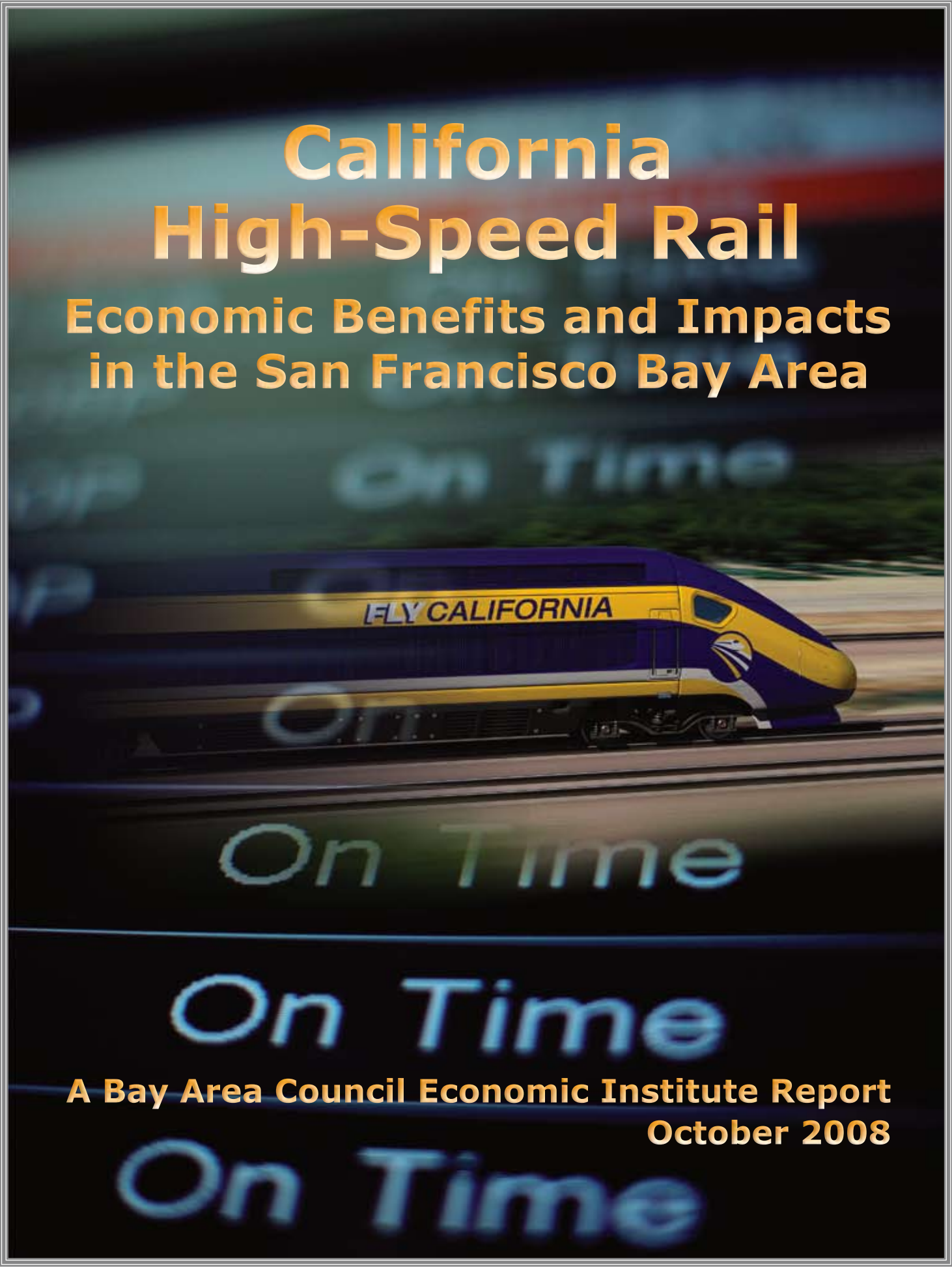
California High-Speed Rail

Economic Benefits and Impacts in the San Francisco Bay Area



A Bay Area Council Economic Institute Report

October 2008

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BAY AREA COUNCIL
ECONOMIC INSTITUTE
A Partnership of Business, Labor, Government and Higher Education

Authors and Acknowledgements

This report was prepared by Dr. Sean Randolph, President & CEO of the Bay Area Council Economic Institute. Dr. Jon Haveman, Founding Principal at Beacon Economics, and Ted Egan, Chief Economist for the City and County of San Francisco, made valuable contributions to the analysis by quantifying airport traffic and construction spending impacts. Patrick Mullen, a graduate intern from San Francisco State University, provided valuable support through documentary research and assistance with assembly of the final document. Pam Winter, of WinterPM, copyedited the document and produced the page layout. The Economic Institute is also indebted to the many regional leaders who were willing to be interviewed in connection with this project.

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The Bay Area Council Economic Institute is a public-private partnership of business, labor, government and higher education, that works to support the economic vitality and competitiveness of California and the Bay Area. Its work builds on the twenty-year record of fact-based economic analysis and policy leadership of the Bay Area Economic Forum, which merged with the Bay Area Council in January 2008. The Bay Area Council and the Association of Bay Area Governments (ABAG) are its leading institutional partners.
The Economic Institute also supports and manages the Bay Area Science and Innovation Consortium (BASIC), a partnership of Northern California's leading scientific research institutions and laboratories. Through its economic and policy research and partnerships, the Economic Institute addresses major issues impacting the competitiveness, economic development and quality of life of the region and the state, including infrastructure, globalization, science and innovation, and governance. Its Board of Trustees, which oversees its products and initiatives, is composed of leaders representing business, labor, government, higher education, science and technology, philanthropy and the community.

Executive Summary

Mobility, as evidenced by crowded airports and growing highway congestion, presents a growing challenge for California and its economic future, impacting residents and businesses alike. Polls taken in the Bay Area since 1995 consistently show transportation to be either the number one or number two source of regional concern. Projected population growth in the state and the region suggest that between now and 2050, this challenge will continue to intensify. The proposed California high-speed rail project has been designed to provide fast, efficient transportation between California's major urban centers, linking Los Angeles and San Francisco through the rapidly-growing Central Valley. At least 88 million Californians are expected to ride the proposed high-speed train annually by 2030.

The potential benefits of high-speed rail to the Bay Area fall into four categories: business and job creation; mobility (the mitigation of highway and airport congestion); urban development; and climate change. Collectively, these factors also yield quality-of-life benefits for residents.

Business, Employment and Commercial Impacts

By 2030, high-speed rail will produce a sustained 1.1 percent increase in employment, or 48,000 new jobs in the Bay Area. Half of those jobs will be in service industries such as government, finance, real estate and insurance. Wholesale and retail trade, transportation, communication and utilities will account for approximately one-quarter of this anticipated growth. The project will stimulate between $6.9 and $8 billion in construction spending within the region, mainly for tracks, stations and related infrastructure. This will directly and indirectly generate between 100,000 and 128,000 Bay Area jobs during the period of construction. Jobs created in the construction, rail and transit sectors will pay high wages, and will have a high rate of unionization compared to statewide averages.

From a business standpoint, reducing the time lost by commuters in Bay Area traffic will increase business productivity. Bay Area commuters lose approximately 150,000 hours each day to congestion, at an annual economic cost of approximately $2.6 billion. High-speed rail will help Bay Area businesses expand their market reach within the state and, by bringing workers in the Central Valley into closer reach, will enable businesses to access a larger labor pool. By providing more efficient access to Central Valley sites with lower costs, high-speed rail may also help Bay Area businesses keep cost-sensitive activity such as manufacturing in California—activity that might otherwise go to other states or overseas due to the high cost of land and labor in the Bay Area's urban core.

The statewide system will stimulate tourism and support growth in the restaurant and hotel sectors by generating an increased visitor flow, especially from foreign visitors who can more conveniently access both Northern and Southern California in a single trip. San Francisco, with its wealth of tourist destinations and large stock of hotel rooms, particularly stands to benefit.

Commercially, the proposed high-speed rail system may be used to move light commercial freight and parcels, avoiding delivery delays on crowded intercity and urban roadways.

There is also a global aspect to high-speed rail: high-speed train service is becoming a significant feature of advanced, globally competitive economies, with systems currently in place or planned in France, the United Kingdom, Spain, Italy, Belgium, the Netherlands, Taiwan, Japan and China. California is the world's eighth largest economy, and the efficiencies and improved mobility produced by a high-speed rail system would support the Bay Area's and the state's global competitveness.

Congestion Relief

While the high-speed rail system is designed primarily for intercity travel between Northern and Southern California, it will also provide significant commuter benefits to the Bay Area. This is particularly the case for employees commuting to Silicon Valley from the Central Valley, where a growing segment of the region's workforce lives. Employers and employees of Silicon Valley companies would also benefit from the improved access provided by high-speed rail to workers who live in San Francisco and commute to Silicon Valley.

While the main trunkline to Southern California would not directly serve the East Bay, $950 million of funds in the rail bond will be available statewide to fund the connection of high-speed rail with other intercity, commuter and light-rail systems, such as the Altamont Commuter Express (ACE) and BART. Reflecting the interest of cities and organizations in the East Bay in better access to high-speed rail and to communities in the Central Valley, the California High-Speed Rail Authority is pursuing discussions with East Bay agencies and transit providers on an independent project to develop shared high-speed rail and commuter train infrastructure in the Altamont Corridor, with possible terminal points in Oakland and/or San Jose, or Livermore. An East Bay connection to high-speed rail, whether through efficient connections from other rail systems or through an extension of the high-speed rail system itself, would benefit East Bay commuters by relieving congestion on the crowded I-580 corridor.

High-speed rail on the Peninsula will relieve congestion on Highway 101 and support improved Caltrain service by funding the accelerated development of shared infrastructure (railbeds, grade crossings and electrification). The system will cut travel time between San Francisco and San Jose to thirty minutes. Business travelers, commuters and tourists arriving in San Francisco and San Jose on high-speed trains will benefit from efficient access to bus and other train systems at major intermodal facilities such as the Transbay Terminal and Diridon Station.

The alternative that high-speed rail offers will provide significant relief to congestion in the Los Angeles–San Francisco air corridor, the most heavily trafficked in the country. In 2005, there were 8.6 million air trips, which accounted for 43 percent of all intercity trips between the two regions. With limited runway space and few options for expansion, all three Bay Area airports—San Francisco, Oakland and San Jose—face long-term capacity constraints. If built, high-speed rail to Southern California will relieve long-term air traffic congestion in the

region by shifting a portion of short-haul, in-state air traffic to trains that deliver competitive travel times. This will allow airports to allocate more of their existing capacity to long-distance and international flights, and will reduce congestion and improve the travel experience for travelers using the airports. SFO will see the greatest impact.

Urban Development, Land Use and Quality of Life

High-speed rail stations will be catalysts for growth and urban infill patterns that support and advance land use policies that are being widely adopted by Bay Area elected, civic and planning leaders. Stations will promote more compact, transit-oriented development in the immediately surrounding areas. This will increase property values, generate new opportunities for development, and facilitate the development of more livable, walkable urban districts and communities. Businesses seeking better commuting conditions for their employees and businesses whose employees frequently travel to Southern California can be expected to concentrate in those areas, producing stronger business districts that support increased retail, service and entertainment activity.

Environmental Considerations

CO2 emission reduction is becoming a significant goal for many Bay Area businesses and communities. High-speed rail will help the state meet the CO2 emissions targets outlined in the Global Warming Solutions Act (AB32) by reducing CO2 emissions in California by 12 billion pounds annually by 2030. Traveling by high-speed train will use one-third the energy of a similar trip by air, and one fifth the energy if the trip were made by car. A high-speed rail trip from San Francisco to Los Angeles will save 324 pounds of CO2 over the same trip by car. The same trip from San Jose to Los Angeles will generate 288 pounds less CO2.

Introduction

The California High-Speed Rail Authority was formed in 1996 to develop a high-speed rail system connecting Northern and Southern California, including all major metropolitan areas of California, at speeds of over 200 miles per hour. The proposed California high-speed train (HST) would link Bay Area cities to the Central Valley, Sacramento and Southern California, incorporating linkages to airports, regional mass transit, and highway networks.

Of the $9.95 billion in proposed bond funding on the November ballot, $9 billion would be used to develop and construct the core segment of the system, connecting San Francisco with Los Angeles. The bond proceeds would be used to acquire right-of-way, trains and related equipment, and to construct the required power systems, tracks, structures and stations. Bond

proceeds may be used to provide no more than half of the total cost. The Authority must therefore develop private and other public (e.g., federal) funding sources to cover the balance.

An alotment of $950 million of the bond funds would be available to other passenger rail systems for capital improvements that expand their capacity to connect to the high-speed rail system. Of the $950 million, $190 million is earmarked for intercity rail services, while the remaining $760 million would be available to other urban and commuter passenger rail services.

The Authority has overseen a number of environmental and economic impact studies over the course of the last decade, and has evaluated potential ridership for a range of rail routes and stations. Options were considered in the context of several objectives:

- Supplement strained capacity at major airports and on interstate highways;
- Supplement current transportation systems to increase intercity mobility;
- Provide intermodal linkages with local transit, airports and highways;
- Reduce travel time between California's major urban centers;
- Reduce vehicle miles traveled for intercity trips and greenhouse gas emissions;
- Assure the most environmentally-sensitive route possible;
- Implement the project in phases by 2020; and
- Generate revenues above operation and maintenance costs.

One of the most important decisions before the Authority was the choice for the route connecting the Bay Area to the Central Valley. Two primary options were considered—the Altamont Pass (east of Livermore) and the Pacheco Pass (south of San Jose)—with the Pacheco Pass route eventually being chosen. In those considerations, the Authority determined that the Pacheco Pass route offered a more direct route from Southern California, higher potential ridership and various land use benefits.

This report looks at the economic and quality of life benefits and impacts of implementing high-speed rail in the Bay Area. It does not attempt to engage in cost-benefit comparisons or analysis of the benefits of alternative routes, and it does not assess the impact of high-speed rail in other regions of the state, which is the focus of other independent studies. It does, however, include an extensive discussion of linkages between the Bay Area and those parts of the Central Valley that could be considered part of the emerging San Francisco Bay/Northern California megaregion.

The Environmental Impact Report (EIR) developed for the Authority in 2004 (and updated in 2007) by Cambridge Systematics provides a foundation for this report, which draws on relevant parts of its analysis. Data from the EIR has been supplemented by a review of other relevant studies that relate to high-speed rail, further quantitative analysis, and interviews with regional government, business, labor, civic, transportation, and economic development organizations and leaders.

Assessing the Impact of High Speed Rail in the Bay Area

In the greater Bay Area, high-speed rail, using the Pacheco Pass route chosen by the High-Speed Rail Authority, would pass through or make stops at: Modesto (Amtrak Briggsmore), Merced (SP Downtown), Gilroy, Morgan Hill, San Jose (Diridon Station), Redwood City, Millbrae-SFO, and San Francisco's Transbay Terminal. To understand the implications of high-speed rail for the Bay Area, one must first consider the context of high-speed rail in California.

The California Context

As of 2005, California had an estimated population of 36.1 million, supporting 20.9 million jobs. By 2030, the state's population is expected to grow to 48 million people, and jobs to nearly 29 million. As the world's eighth largest economy, California needs to invest in the infrastructure to support that growth and sustain its economic competitiveness and the quality of life of its residents. The need to improve California's transportation networks can be specifically traced to several pressure points:

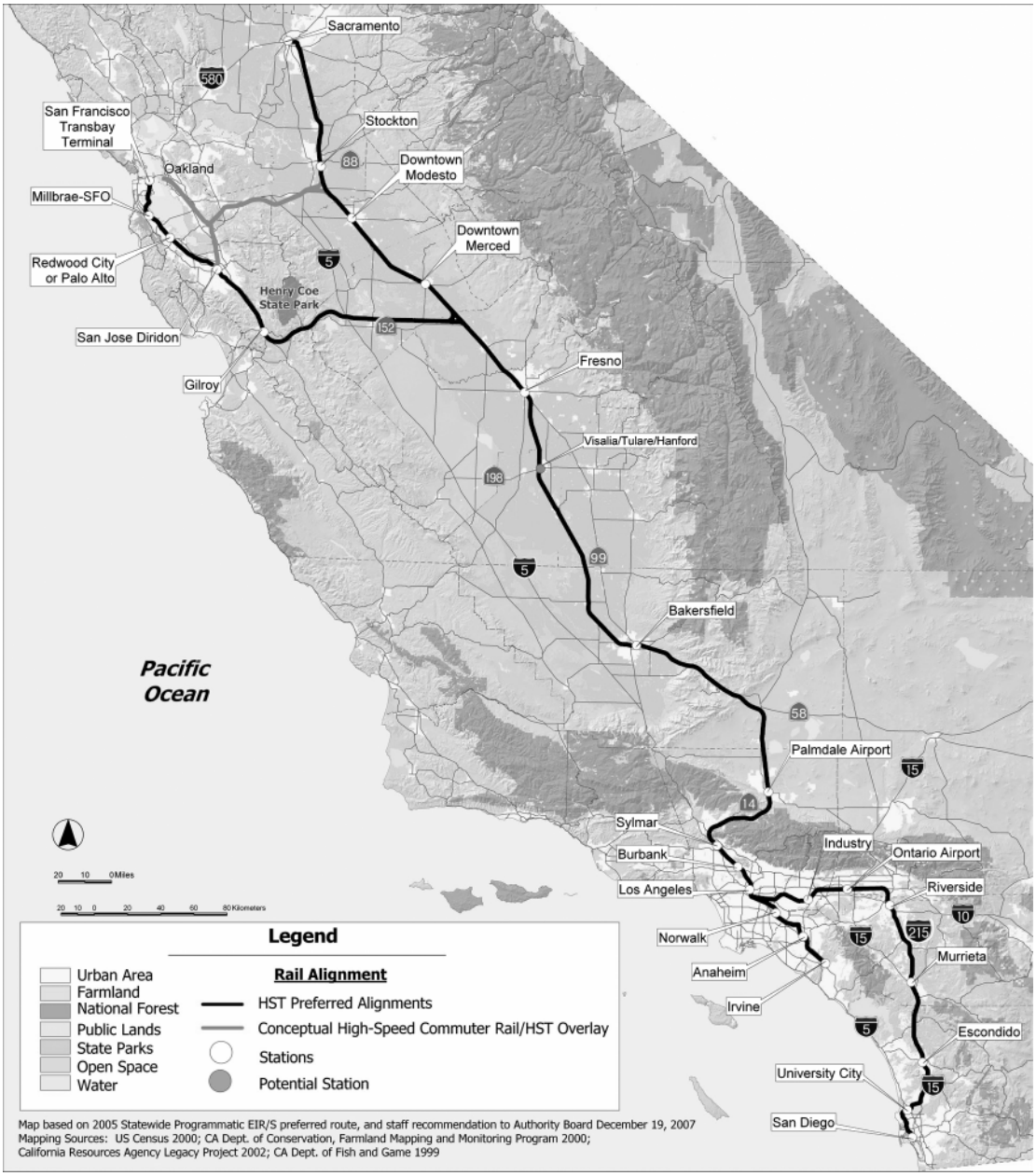
- Future growth in intercity commuters;
- Capacity constraints at existing highways and airports;
- Congestion and delays adversely affecting business and personal travel; and
- Growing concern with climate change and greenhouse gas emissions.

Communities up and down the state each have their own concerns with the quality of California's transportation infrastructure. San Francisco, for example, is not directly served by any major statewide rail system: the current Amtrak route to Los Angeles now requires two bus transfers and a total travel time of over ten hours.

While a range of major transportation projects, such as highway and airport expansions, are being considered for development between now and 2030, studies suggest that these improvements will not be adequate to accommodate the state's growth. By mid-century, California would require at least two new major airports—in the north and in the south—and more than 3,000 miles of freeway, at a cost of $100 billion. However, due to environmental, financial and political constraints, it is unclear whether highways and airports can actually be built or expanded to the extent necessary to meet California's growing requirements. Environmental sustainability is an additional concern. Given the challenges that a major expansion of the state's existing transportation infrastructure will face, the development of a scalable statewide rail system that can be expanded relatively simply, by the acquisition of additional rolling stock, offers an option with the potential to meet a significant part of the state's needs through the 21st century.

The debate on high-speed rail and its contribution to the economy and the quality of life of Californians should be seen in this context. Based on the conservative assumption that costs for air and automobile transportation remain constant, at least 88 million passengers are projected to ride the high-speed train annually by 2030. High-speed rail offers an alternative approach to mobility in an environment characterized by growing challenges and increasingly constrained options.

Proposed High-Speed Rail Route



Map based on 2005 Statewide Programmatic EIR/S preferred route, and staff recommendation to Authority Board December 19, 2007. Source: California High-Speed Rail Authority, www.cahighspeedrail.ca.gov

Study Area

The Bay Area is composed of nine counties with a population of nearly 7 million people and an economy supporting nearly 3 million jobs. By 2030 the region's population is projected to grow by 1.7 million, adding 1.4 million jobs. By 2050, the Bay Area's population is projected to reach nearly 10 million.

This growth is expected to be relatively compact, with 60 percent taking place in the cities and suburbs that ring the Bay. This also means that the remaining 40 percent of growth will occur in the region's outer fringe of distant suburbs and farmlands. Much of this growth is expected to occur in adjacent counties in the Central Valley. By 2030, the Central Valley will see its population grow by 2.4 million and will add 900,000 jobs. A significant part of that growth will result from the continued outflow to Central Valley cities of Bay Area workers in search of affordable housing. The connection to the Central Valley is, therefore, a key consideration when evaluating high-speed rail's impacts on the region.

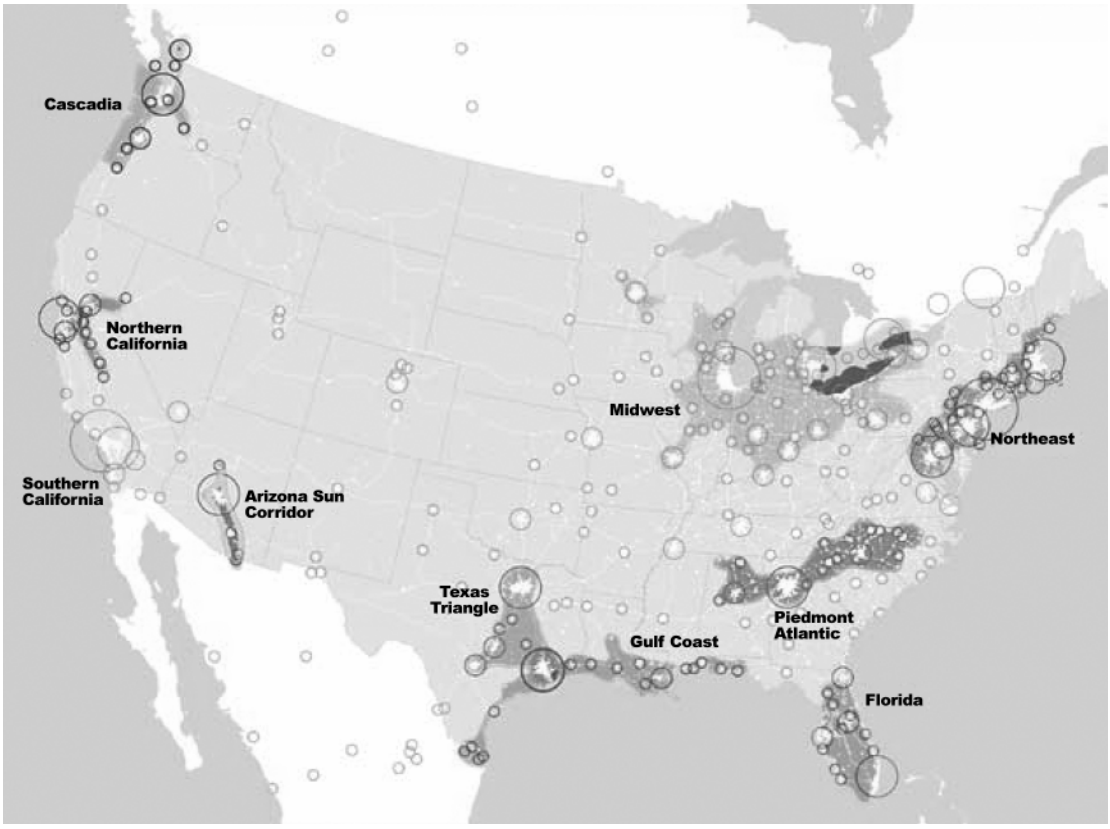
For its purposes, the High-Speed Rail Authority defines the San Francisco Bay Area as composed of the five counties that would be directly served either by high-speed rail or by interconnecting rail service:

- Alameda County;
- Contra Costa County;
- San Francisco County;
- San Mateo County; and
- Santa Clara County.

Since the high-speed train (HST) would not pass through the North Bay counties of Marin, Solano, Sonoma, or Napa, they were not included in the Authority's EIR/EIS Study. However, these counties would indirectly benefit from the HST, in much the same way that North Bay counties benefit from regional facilities such as San Francisco and Oakland International Airports. This study therefore addresses those impacts for the North Bay.

The likely impacts of high-speed rail—whether from the standpoint of jobs, business, mobility, or land use—should be considered not just from the standpoint of the nine core Bay Area counties, but also from the standpoint of what is quickly emerging as a Northern California megaregion. This expanded region covers as many as 21 California counties, including Santa Cruz, San Benito and Monterey to the south; San Joaquin, Stanislaus and Merced Counties in the Central Valley; and the seven Sacramento area counties (Sacramento, El Dorado, Placer, Sutter, Yolo, Yuba and Colusa). It is linked by a common labor pool; an extended commute shed; interconnected business clusters; and shared port, airport and highway infrastructure. By 2030, the megaregion will have a total population of over 15 million, with 8.7 million in the nine core Bay Area counties and 6.6 million in the twelve outlying counties.

Ten Emerging "Megaregions" in the United States



Source: *The Northern California megaregion*, SPUR, 2007, www.spur.org

Perhaps the biggest challenge presented by this emerging reality is infrastructure. Mega-regions are not concentrated entities, but are instead composed of interconnected cities linked through overlapping commute sheds and key highway or rail corridors. This puts a premium on reliable, efficient transportation infrastructure, as population expands and reliance on existing highway networks grows. The San Francisco Planning and Urban Research Association (SPUR) estimates that every county in the Sacramento and San Joaquin Valleys more than doubled its population per square mile between 1972 and 2004. Between 1980 and 2000, the number of commuters from the 12 surrounding counties into the Bay Area quadrupled, from 30,000 to 117,000, placing enormous and unanticipated stress on the region's roads and highways. As the Central Valley's growth continues, improved and more diverse transportation options will be critical if exurban sprawl is to be contained and the destruction of open space and farmland reduced. Quality of life—increasingly impaired by lengthening commutes—is an aspect of the regional fabric that will be directly impacted by future transportation decisions.

I

Business, Employment and Commercial Impacts

A state-wide high-speed train system has the potential to benefit Bay Area and other California businesses in several respects.

Job Creation

Job growth estimates produced for the Environmental Impact Report (EIR) compare employment levels in 2005 with projected employment growth between 2005 and 2030 if high-speed rail is or is not built. Looking ahead to 2030—15 years after the anticipated 2016 completion of the high-speed train's main line from San Francisco to Los Angeles—allows time for the system's market impacts to kick in and enables a deeper understanding of the secondary benefits the HST will bring to the Bay Area.

Year 2030 Employment & Population
Percent Change from Year 2005 Conditions

	Employment		Population	
County	**No Project**	**High-Speed Rail**	**No Project**	**High-Speed Rail**
Alameda	30.80%	32.00%	40.50%	41.40%
Contra Costa	50.00%	51.20%	51.60%	52.30%
San Francisco	25.20%	26.20%	7.40%	9.30%
San Mateo	37.20%	38.40%	16.10%	17.10%
Santa Clara	33.70%	34.80%	26.30%	28.10%
Bay Area Total	**33.90%**	**35.00%**	**30.80%**	**32.00%**

Source: *Economic Growth Effects Analysis/Environmental Impact Report and Tier 1 Environmental Impact Statement*, Cambridge Systematics Inc., July 2007 (4–3)

Statewide studies suggest that high-speed rail will generate a moderate increase in overall jobs in California, above the level of job creation that could normally be expected if the project were not built. In the Bay Area, there would be a modest 1.1 percent increase in employment, with 48,000 new jobs created. Alameda County would see the highest level of job growth (1.4 percent) in the region, while San Francisco would see the highest growth in population (13,472).

The construction of a high-speed train would create new jobs in a number of industries. Service industries that occupy commercial office space and tend to support relatively high-paying white-collar jobs would be most likely to aggregate in the higher-density development that is expected in the immediate vicinity of high-speed rail stations. Sectors such as finance, insurance, real estate, and similar services would account for half of this anticipated growth, while wholesale and retail trade, transportation, communication and utilities would account for approximately one-quarter.

Year 2030 Employment & Population: County & Bay Area Totals

	Employment			Population		
		2030			2030	
County	**2005 Conditions**	**No Project**	**High-Speed Train**	**2005 Conditions**	**No Project**	**High-Speed Train**
Alameda	953,937	1,247,413	1,259,563	1,451,065	2,038,482	2,051,196
Contra Costa	508,854	763,445	769,521	1,017,644	1,543,053	1,549,526
San Francisco	779,357	975,823	983,634	741,025	796,208	809,680
San Mateo	522,830	717,526	723,835	701,175	814,065	821,063
Santa Clara	1,323,920	1,769,498	1,785,181	1,705,158	2,152,963	2,183,649
Bay Area Total	**4,088,898**	**5,473,705**	**5,521,734**	**5,616,067**	**7,344,771**	**7,415,114**

Source: *Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report / EIR/EIS*, California High-Speed Rail Authority & U.S. DOT Federal Railroad Administration, May 2008 (5–14)

The project can be expected to generate significant numbers of construction jobs, tied to the construction of tracks, stations and related infrastructure. Total direct construction spending in the Bay Area is estimated to range between $8.90 billion (based on relative levels of urbanization in regions served by the system) and $6.94 billion (based on the distribution of track within the statewide system). Both of these methods of measurement point to significant economic benefits in spending and employment. The former measure indicates total regional spending of $15.3 billion and employment gains of 128,383 during the construction period. The latter measure indicates total regional spending of $11.99 billion, and 100,122 new jobs

created. These estimates embrace jobs and spending that are related to construction activity, and include jobs and spending that are induced or indirectly generated by construction activity, as well as direct jobs in the construction sector.

There are uncertainties about the exact distribution of construction costs by region, but the following table illustrates what the allocation amounts would be if they are scaled according to regional population or to the track mileage within a region.

Distribution of High-Speed Rail Construction Costs

Region	2006 Population[1]	Percentage of Population	Method 1 Cost (Millions)	Planned Miles of Track[2]	Percent-age of Track	Method 2 Cost (Millions)
Central Valley	4,897,472	14.86%	$5,946	363	47.92%	$19,168
Bay Area	7,334,107	22.26%	$8,904	132	17.36%	$6,944
Los Angeles	10,747,801	32.62%	$13,048	84	11.09%	$4,436
Inland Empire	4,026,135	12.22%	$4,888	79	10.43%	$4,172
Orange County	3,002,048	9.11%	$3,644	38	5.02%	$2,007
San Diego	2,941,454	8.93%	$3,571	62	8.18%	$3,274
Total	**32,949,017**	**100.00%**	**$40,000**	**758**	**100.00%**	**$40,000**

Source: *Allocating Construction Costs of California High-Speed Rail*, Forward Observer, August 2008

[1]*State & County QuickFacts*, U.S. Census Bureau, July 2008, http://quickfacts.census.gov/qfd/states/06000.html
[2]*Interactive Rail Map*, California High-Speed Rail Authority, http://www.cahighspeedrail.ca.gov/map.htm

Leaders in the labor community see employment benefits not only in the number of jobs created, but also in the kinds of jobs. From this perspective, high-speed rail promises to create diverse jobs at different rungs of the employment ladder including planning, engineering, construction, maintenance, service and operations, leading to a range of potential career paths. Many of the jobs directly created by high-speed rail will be well compensated, unionized positions, with good benefits. Where the average wage for non-professional workers in California is $13.93, the average wage in the rail sector is $17.70 and is $16.34 in public transit. The average wage in the construction sector, which would also benefit directly, is $17.07. Unionization rates in the state average 11 percent across all industries. For the public transit sector, the rate is 44 percent; for rail and other transportation, 25 percent; and for construction, 19 percent.

The total level of economic benefits that high-speed rail brings will depend on local economic characteristics. Companies will benefit from access to larger labor pools, brought by high-speed rail into commutable distance, or from expanded market reach. Areas with low-cost land and labor may attract labor and land-intensive industries; areas with highly skilled and educated workforces may attract higher-end firms (see discussion of land use impacts below).

Studies of high-speed rail systems in Europe and Japan support the conclusion that, in general, the areas surrounding high-speed train stations offer an attractive location for commercial and office development. High-wage service industries, such as government, finance, insurance and real estate, are particularly attracted to development in close proximity to such stations, which provide convenient access for both business travelers and long-distance commuters. Supporting retail and other services tend to follow.

Research in Europe and Japan also shows that high-speed train stations encourage more business development in adjacent areas than conventional rail transit stations or highway interchanges. French and Japanese high-speed train stations in particular have been shown to stimulate industry clustering, in which related and complementary businesses locate close to each other and collectively access common support services and a shared labor force.

Productivity

Time lost to highway congestion has a negative impact on business productivity (see discussion of congestion relief in Section II). Hours spent in traffic not only reduce time on the job, but produce tiredness and tension in employees that can impact workplace effectiveness. To the extent that commuters and other business travelers use the high-speed train as a faster, more comfortable, and ultimately more reliable alternative to driving, business productivity will benefit. Shorter travel times for executives and employees—avoiding long-distance drives and the almost inevitable highway backups—also translate to business cost savings.

Estimated Peak Condition Total Travel Times (Door-to-Door) between City Pairs by Auto, Air, and Conventional Rail

City Pair	Auto 2000	Auto 2030	Air 2000	Air 2030	Conventional Rail
Los Angeles downtown to San Francisco downtown	6:28	6:50	3:30	3:38	10:05
Fresno downtown to Los Angeles downtown	3:32	3:41	3:17	3:24	5:46
Los Angeles downtown to San Diego downtown	2:37	2:41	2:51	3:01	3:26
Burbank airport to San Jose downtown	5:31	5:54	2:46	2:43	9:46
Sacramento downtown to San Jose downtown	2:29	2:32	3:33	3:33	4:06

Source: *Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report / EIR/ EIS*, California High-Speed Rail Authority & U.S. DOT Federal Railroad Administration, May 2008 (1–9)

Market Reach

Service businesses in particular may expand their market reach through improved access to new markets in the state, deepening their market base and increasing their sales and employment. More efficient access to customers, partners, clients and suppliers throughout the state will help regional firms achieve new economies of scale.

Workforce Access

Access to human capital is rapidly becoming a critical factor in determining economic competitiveness. Faced with the nation's highest housing costs, Bay Area companies are challenged to attract and retain workers, who in many cases can't afford to live close to their places of employment and endure long commutes from the Central Valley and elsewhere where homes are more affordable. A fast rail link has the potential to bring now relatively remote regions of the state within commuting distance of major business centers such as San Francisco and Silicon Valley. Businesses will have the opportunity to capitalize on the improved transportation option provided by high-speed rail to tap into workforce pools in once-remote areas, expanding the Bay Area's labor market. Firms can be expected to capitalize on the opportunities presented by better access to workforce pools and to expansion sites where housing and land are less expensive. As many Silicon Valley workers reside in San Francisco (often due to the attractions of its lifestyle and cultural amenities), employers and employees of Silicon Valley companies would also benefit from the improved access between San Francisco and the South Bay that high-speed rail would provide.

Business Location and Expansion

The wider market access, access to quality services, and more efficient access to key transportation facilities such as international airports (San Jose/Mineta and SFO) provided by high-speed rail will make less-costly areas in the Central Valley more attractive for the siting of new firms. Similar considerations would apply to new firms headquartered in the Bay Area but faced with the need to expand. Companies with production or manufacturing facilities that are too costly to sustain in the Bay Area's high-priced core could particularly benefit. From this perspective, high-speed rail presents an opportunity to retain manufacturing in California that is currently at risk of leaving the state for lower-cost locations in the U.S. or overseas.

Tourism

San Francisco can expect to benefit from additional tourism generated by more efficient access to Southern California markets. This will directly support activity in the hospitality, restaurant, retail and entertainment sectors, as well as museums and other cultural institutions. A high-speed rail terminus at San Francisco's Transbay Terminal will deliver passengers within walking distance of 30,000 hotel rooms, convention facilities and other tourist destinations. To the extent that they offer attractive cultural amenities, other cities such as San Jose can also expect to benefit from an increased visitor flow from outside the region.

The convenience of high-speed rail will put Northern California travel destinations within comfortable reach of both Central Valley and Southern California population centers for day trips as well as longer stays. High-speed rail can also be expected to generate additional visits by foreign travelers, many of whom are accustomed to traveling by train and would find including both Northern and Southern California destinations in a single California trip more attractive. The greater feasibility of a single California vacation encompassing both north and south may also induce tourists to lengthen their visits, with added benefits for the hotel and restaurant sectors.

Commercial Goods Movement

A high-speed rail network may also be used to transport small packages and light parcels in dedicated cars or trains. Dedicated trains would most likely operate at night in order to avoid disrupting passenger service, and would require separate loading and unloading facilities. This mode of transport could be particularly effective for the shipment of small, high-value, time-sensitive goods that are currently shipped by highway, since parcel delivery services have been required to push back promised delivery times in the Bay Area to account for roadway congestion.

Global Competitiveness

World-class infrastructure is required to support world-class economies. Innovative, world-class companies and their employees are increasingly likely to locate and cluster in nations, states, regions and cities with a diverse and educated workforce, high quality of life, and world-class infrastructure. Experience in places such as Western Europe, Japan and now China suggests that fast rail service is becoming a key component of the infrastructure of competitive 21st century economies. High-speed trains are currently operating in France, the United Kingdom, Spain, Italy, Belgium, the Netherlands, Taiwan and Japan, and are being planned for China. Though difficult to quantify, as the world's eighth largest economy, California's global competitiveness will be enhanced by the more efficient integration of California's markets, business networks and workforce that high-speed rail will offer.

From each of the above perspectives, but particularly from the perspectives of workforce access and business location, the improved efficiency and lower costs afforded by high-speed rail can be expected to increase the competitiveness of Bay Area and other California companies relative to businesses outside California. By linking Bay Area companies more effectively with potential manufacturing sites in the Central Valley, high-speed rail also offers the possibility that California and the Bay Area can retain well-paid jobs and manufacturing activity that otherwise may leave the state.

II

Congestion Relief

California's highway system, airports, and conventional passenger rail systems have not kept pace with the state's expanding economy and population, and are increasingly under stress. The future demand brought on by further population and economic growth will increase those strains. Currently, the Bay Area's traffic congestion is the second worst in the country, after only Los Angeles. Regional polls taken by the Bay Area Council since 1995 consistently rate transportation (traffic congestion, road conditions and public transit) as either the number one or number two concern of Bay Area residents. Transportation has ranked as the number one concern in every year except 2003 and 2008, when the region faced unusually difficult economic conditions.

Q.1 What do you think is the most important problem facing the Bay Area today?

Issue	1995	1996	1998	1999	2000	2001	2002	2003	2004	2006	2007	2008
Transportation (in general, and/or including traffic congestion, road conditions, and public transit)	16%	33%	40%	38%	43%	32%	32%	25%	26%	35%	33%	18%
Economy (in general, and/or including unemployment and cost of living)	12%	10%	6%	3%	4%	27%	20%	33%	23%	17%	7%	22%
Housing	1%	2%	8%	1%2	24%	14%	12%	8%	17%	19%	11%	15%
Overpopulation / Crowding	5%	7%	9%	9%	7%	6%	5%	3%	5%	6%	4%	2%
Crime	32%	24%	12%	7%	1%	3%	6%	4%	6%	12%	10%	9%
Homelessness	7%	4%	5%	7%	2%	6%	5%	7%	3%	6%	3%	1%
Schools and Education	6%	6%	14%	6%	4%	6%	5%	7%	6%	14%	4%	5%
Environment / Pollution	8%	7%	6%	4%	2%	3%	5%	2%	4%	4%	5%	4%
Healthcare	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2%	2%	3%	1%
Poor local government leadership	N/A	N/A	1%	*	1%	2%	2%	3%	3%	5%	3%	1%

Source: *Bay Area Council Poll*, 1995–2008, Bay Area Council

Absent concerted action at the state and regional levels, transportation congestion will continue to generate longer travel times, lower business productivity, and degraded service reliability for affected transportation modes (e.g., air travel and parcel delivery service).

The strain on the region's transportation network will be felt primarily in major corridors. One clear impact is that peak travel times within the region will be extended over more hours of the day. The Metropolitan Transportation Commission's 2000 San Francisco Bay Crossing Study, for example, projects that peak Bay Bridge crossing periods will more than double, from 1.5 hours in 2000 to 3.5 hours by 2020.

The Bay Area Regional Transportation Plan projects an increase of 249 percent between 1990 and 2020 in the average daily number of vehicle hours attributed to traffic delay in the Bay Area. Congestion is both an economic and quality of life issue. According to the Metropolitan Transportation Commission, in 2003, the 150,000 daily hours of Bay Area commute congestion had an estimated economic cost of $2.6 billion.

Highway Congestion and Traffic Mitigation

The Bay Area experiences some of the worst traffic congestion in the country. Among cities where most commuters drive to work, Bay Area residents are more likely to find themselves stuck in traffic. The Economic Institute's 2008 Bay Area Economic Profile report found that the amount of time lost to traffic delays by Bay Area commuters rose from 62 hours in 1993 to just under 72 hours in 2003, compared to 67 hours in Atlanta, 51 in Boston and 49 in New York.

The proposed high-speed train system is intended to serve primarily as an intercity network linking the major population and job centers of Northern and Southern California. For Bay Area residents, the system also offers significant commuter benefits. This is particularly the case for employees commuting to Silicon Valley from the Central Valley, where a growing segment of the region's workforce lives. The Association of Bay Area Governments (ABAG) estimates that 130,000 people commute from the Central Valley and San Benito County into the Bay Area on a daily basis.

While the Bay Area's population is growing, the Central Valley's is growing faster. The population of San Joaquin County, just over the Altamont Pass, is projected to grow more than 200 percent by 2050, and Sacramento County will see a 132 percent increase. The greatest increase in intra-regional travel will come from this direction. The Metropolitan Transportation Commission estimates that by 2030 the number of commuters from the Sacramento Valley will rise by over 200 percent (+49,000), and from the San Joaquin Valley by 112 percent (+60,600). Regional mobility and the quality of life of Bay Area residents will therefore be significantly impacted by the urban patterns and transit options that are developed between now and then.

Proposed high-speed train stations in Modesto, Merced, Gilroy and Morgan Hill will provide a fast alternative to driving, reduce highway congestion, and generally improve driving conditions in Silicon Valley. High-speed rail through the Gilroy station will provide added access and connectivity between the Bay Area and the Monterey Bay area. Rail improvements being considered to link the East Bay to the high-speed train in the Central Valley through the Altamont Corridor would have similar benefits.

As indicated in the table on page 9, within the core Bay Area counties, high-speed rail is expected to stimulate an additional 1.2 percent population increase (above projections for 2030 without high-speed rail). This growth, however, is likely to take place near high-speed train stations. In other words, new residents attracted to the Bay Area and the Central Valley by high-speed rail are most likely to locate in the areas immediately adjacent to high-speed train stations, and would rely on the high-speed train as a primary mode of transit. Congestion, however, can be expected to increase in the immediate vicinity of high-speed train stations.

While the main high-speed train trunkline would not serve all cities and counties in the region, other communities would benefit from funding provided in the rail bond measure that allocates $950 million to support linkage of other rail systems to the high-speed train network. Of the $950 million, $190 million would be allocated for intercity rail, and $760 million for urban and commuter rail.

East Bay

In the East Bay, where concern with transportation to the Central Valley focuses heavily on the I-580 Altamont Corridor, rail bond funds would be available to support improvements to BART in the South Bay and the ACE train to Stockton. Although the Pacheco Pass route was selected by the California High-Speed Rail Authority as the primary route into the Bay Area, the Authority is actively pursuing discussions with East Bay agencies and transit providers on an independent project to develop shared high-speed rail and commuter infrastructure in the Altamont Corridor, with possible terminal points in Oakland and/or San Jose, or Livermore (connecting to an extended BART). That infrastructure would be configured for joint use by high-speed trains and commuter rail, with a core objective of connectivity to Oakland and Oakland International Airport.

Although not yet proposed or funded, other rail connections that may be considered for funding include a fast commuter train (100 miles per hour plus) connecting the East Bay to the proposed high-speed train station in Stockton. A fast train to the Central Valley, if built, would link Bay Area employment centers to the largest concentration of commuters in the Central Valley, helping to relieve congestion on I-580.

Funding Allocation for California State Passenger Rail Services
20% of $950 Million Available for Intercity Rail
and 80% Available to Other Operators, pursuant to Senate Bill 1856*

Operator	Mode	Potential Revenue	Percentage of Total
SF Muni	Cable Car	$11,894,494	1.60%
SCRRA	Commuter Rail	$121,805,629	16.00%
Coaster	Commuter Rail	$17,925,689	2.40%
Caltrain	Commuter Rail	$45,688,457	6.00%
ACE	Commuter Rail	$17,572,615	2.30%

[Table Continued on Next Page]

Funding Allocation for California State Passenger Rail Services
20% of $950 Million Available for Intercity Rail
and 80% Available to Other Operators, pursuant to Senate Bill 1856*
[Continued]

Operator	Mode	Potential Revenue	Percentage of Total
LACMTA	Heavy Rail	$41,368,155	5.40%
BART	Heavy Rail	$284,987,199	37.50%
LACMTA	Light Rail	$56,104,682	7.40%
Sacramento RT	Light Rail	$21,044,357	2.80%
San Diego Trolley	Light Rail	$63,260,137	8.30%
SF Muni	Light Rail	$57,153,864	7.50%
San-Jose-Santa Clara VTA	Light Rail	$21,194,724	2.80%
Total for All Except Intercity		**$760,000,000**	
Intercity Rail		**$190,000,000**	
Total Available		**$950,000,000**	

Source: *SB1856, Intercity Rail Funding*, Forward Observer, August 2008

*Senate Bill 1856, *Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century*, Approved and Filed September 19, 2002

A proposed intermodal transit facility at Union City could serve as a major connector to the high-speed train for East Bay residents. The facility is eligible to receive $320 million in capital funds and additional operating funds from Regional Measure 2 (the voter-passed measure that allocated one dollar of Bay Area bridge tolls to fund transit improvements), but additional funding is needed from federal or other sources, such as high-speed rail, to complete the project. The facility would connect to the proposed east-west rail line linking the East Bay with the Peninsula and Silicon Valley via the Dumbarton Bridge. The Dumbarton rail project has committed funding from San Mateo County, Santa Clara County and Alameda County. Union City is developing a master plan calling for compact, high-density transit-oriented development in the vicinity of its station, similar to plans for the Transbay Terminal and Diridon Station. City leaders envision East Bay riders connecting to the high-speed train using an ACE train connector to Stockton via San Jose, or by BART to San Jose.

San Jose

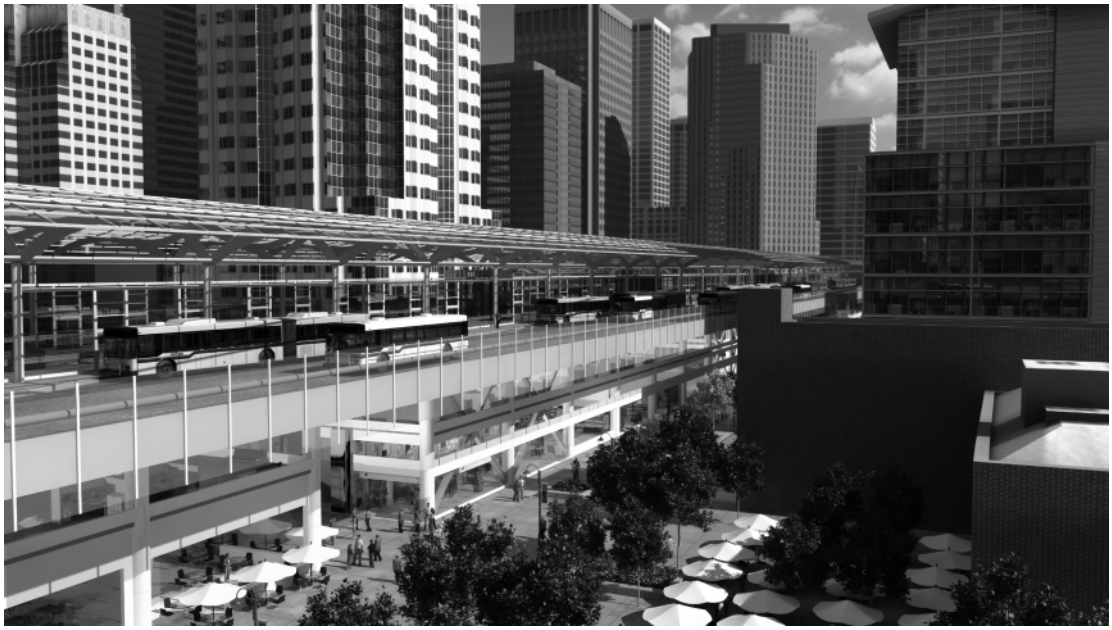
The high-speed train would serve San Jose through Diridon Station, just west of downtown. Current projections are that ten million riders per year will eventually transit Diridon using multiple rail services (ACE, Caltrain, BART, VTA and high-speed rail). While the primary ridership to San Jose will be business travelers from Southern California, another segment of riders will come from business and other commuters who currently drive from Fresno or Merced. For those travelers, high-speed rail will offer a fast, reliable, and safer alternative to driving.

Peninsula

On the Peninsula, bond funds will support improvements to the infrastructure the high-speed train would share with Caltrain, including electrification, railbed widening, grade separation, and safety enhancements. The corridor would include four tracks: two for high-speed rail and two for Caltrain. Though high-speed rail funding would not fund Caltrain directly, the above improvements to Caltrain's infrastructure would directly benefit the Caltrain system and its riders, as well as drivers on Highway 101 and I-280, who would benefit from the decreased congestion resulting from both high-speed rail service (which would include a limited number of Peninsula stops) and from improved Caltrain service.

San Francisco

For San Francisco, high-speed rail would provide a major new transportation link, not just with Los Angeles but also with San Jose. High-speed train service will cut travel time between San Jose and San Francisco to thirty minutes, providing commuters a major new option and, by taking cars off the road, reducing congestion in the heavily-trafficked Highway 101 corridor.



Transbay Terminal Exterior: Conceptual exterior view of San Francisco's Transbay Terminal
Source: Newlands & Company, Inc., www.nc3d.com

The new Transbay Terminal proposed for downtown San Francisco will be an intermodal facility designed to accommodate multiple transit modes including seven regional bus systems, BART (through a pedestrian extension), and high-speed rail. Proposition H, passed by San Francisco voters in 1998, directs that the TransbayTerminal accommodate future high-speed rail, as does Regional Measure 1, which authorizes the allocation of $1 of Bay Area bridge tolls to support improved regional transit.

The project financing and completion of the Transbay Terminal, conceived as the "Grand Central Station of the West," does not depend on high-speed rail being built, but the Joint Powers Authority responsible for development of the project anticipates that at least $600 million of high-speed rail funds will be available to support the construction of the shared high-speed rail–Caltrain extension from Caltrain's current terminus at Fourth and Townsend Streets to the Transbay Terminal. The mobility effect of this extension would be to bring rail access directly to the heart of San Francisco, eliminating the need to take a bus or taxi from Fourth and Townsend, and providing more efficient access to both San Jose and Los Angeles. Utilization of the Transbay Terminal's facilities by high-speed rail passengers can also be expected to benefit the local transit systems to which high-speed train riders will connect, terminal concessions, and transit users in general through the improved safety that comes with high-volume, round-the-clock activity.

Transbay Terminal Interior: This interior view of Transbay Terminal shows how high-speed rail would operate in a large transit oriented station.

Source: Newlands & Company, Inc., www.nc3d.com

North Bay

Although high-speed rail will not serve the North Bay counties of Marin, Sonoma, Napa and Solano directly, residents will enjoy substantial benefits through the improved intercity access to Los Angeles and Silicon Valley that the system would provide. Since both SFO and Oakland International Airports are regional airports serving the entire Bay Area, North Bay travelers can expect benefits similar to other air travelers: a significant alternative to air travel and reduced terminal and airfield congestion for those travelers choosing to fly. North Bay residents will be able to access the Transbay Terminal through an extension of existing airport bus services, or by ferry service to San Francisco's ferry terminal from multiple

North Bay locations (Sausalito, San Rafael, Vallejo, and others that may in the future be constructed by the Bay Area Water Emergency Transportation Authority).

Overall, 900,000 Bay Area workers live in a different county from where they work. Approximately ten percent of those use public transit to commute, suggesting that 820,000 commute to work by highway. If, as has been suggested, 6 percent of Bay Area commuters shift from cars to high-speed rail, Beacon Economics calculates that this would have the effect if taking more than 40,000 cars off Bay Area roads.

Airport Congestion and Traffic Mitigation

The Los Angeles (LAX) to San Francisco (SFO) air route remains the most heavily traveled in the United States, with 8.6 million in-state air trips in 2005. These trips account for about 43 percent of intercity trips between the two cities by all modes of travel. Put differently, more than 40 percent of travelers between the Los Angeles and San Francisco Bay regions travel by air. The Los Angeles Basin accounts for 15 percent of all flights from SFO and 36 percent of flights from both Oakland and San Jose.

Growing demand for in-state travel will soon confront capacity constraints, however, as all three major Bay Area airports (San Francisco, Oakland and San Jose) are projected by the FAA to reach or exceed capacity within the next 20 years. A May 2007 Federal Aviation Agency report, *Capacity Needs in the National Airspace System*, finds that four major metropolitan areas in the U.S.—Los Angeles, New York, Philadelphia and San Francisco—do not have sufficient airport capacity to meet expected demand by 2015. In the Bay Area, for physical, environmental, and political reasons, none of the three major airports currently plans to expand runway capacity. To varying degrees, therefore, high-speed rail will benefit Bay Area airports and the travelers who use them by reducing pressure on limited airfield infrastructure and releiving airport congestion.

San Francisco International Airport (SFO)

While SFO has yet to regain the 41 million annual passengers recorded just prior to 9/11 and the collapse of the dot-com bubble, air traffic has slowly recovered, reaching 35,792,707 passengers in 2007. As population, tourism and the economy grow, SFO's overall passenger traffic is projected to increase to 61 million passengers annually by 2030.

As SFO anticipates that growth, moves are underway to encourage fewer flights on heavily-trafficked short-haul routes—such as SFO–LAX—in favor of increased long-haul (transcontinental and international) service. This increased orientation toward long-haul traffic is particularly attractive to airport managers, as long-distance flights require larger aircraft with more passengers per plane, but fewer flights. This—along with demand management (pricing of landing fees to reflect hours of high and low use) and deployment of new technology to allow more frequent landings in poor weather—would allow SFO to make more efficient use of its limited runway capacity.

Intercity Air Travel Between Southern California and the San Francisco Bay Area (Annual Enplanements)

	Historical		Projected Continued Trend		Percentage Change
Airport	**1992**	**2000**	**2005**	**2020**	**2005–2020**
Bay Area to Southern California Airports					
San Francisco	1,667,290	1,531,306	2,949,590	5,563,183	89%
Oakland	1,317,960	2,072,328	2,644,380	4,474,188	68%
San Jose	687,680	2,127,815	3,927,300	6,897,516	76%
Bay Area	3,674,922	5,733,449	9,541,270	16,934,887	77%
Southern California to Bay Area Airports					
Los Angeles	1,688,870	2,286,330	4,212,440	6,819,689	62%
John Wayne	588,670	1,766,314	2,281,030	3,422,818	50%
Ontario	559,980	607,930	1,213,240	1,881,429	55%
Burbank	705,110	1,066,844	1,834,560	2,582,595	41%
Long Beach	130,300	x	x	x	x
So. California	3,672,930	5,727,418	9,541,270	14,706,531	54%
All Travel	**7,345,860**	**10,856,550**	**19,082,540**	**31,641,418**	**62%**

Source: FAA Terminal Area Forecasts and U.S. Department of Transportation O&D Database.
Note: These data represent all air trips, including both in-state and out-of-state (i.e., connecting) travelers and differ from the HST ridership forecasting model, which includes only in-state travelers.

Source: *Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report / EIR/EIS*, California High-Speed Rail Authority & U.S. DOT Federal Railroad Administration, May 2008 (1–7)

It should be noted at the same time that short-haul connectors are important feeders to long-haul international and East Coast flights. This is particularly the case for major carriers such as United that use the Bay Area as regional and international hubs. SFO is therefore unlikely to completely relinquish its intra-state business, although it may in the future choose to focus more on retaining those flights that serve a connector function. It should also be borne in mind when considering future airfield utilization that the decision where to fly or not fly is made by airlines, not airports. SFO can be expected to accommodate future airline requests to use the airport for short-haul flights, but due to airfield constraints and demand management policies, those flights may be either more expensive or scheduled at less convenient hours.

Airfield capacity is a particular problem at SFO, as runways built following World War II approach their maximum levels of utilization. Recent proposals by the airport to build new runways were blocked—for the medium term and possibly permanently—by opposition in the environmental community. That opposition, with support from San Francisco's Board of Supervisors, was provoked by the additional Bay fill that new runways would require: originally built on Bay fill, future runway expansion can only happen if additional land can

be created in the Bay, or by utilizing floating runways (an option considered but rejected by the airport.) It is highly unlikely in the foreseeable future that the political dynamics surrounding runway expansion at SFO will change.

Even with the adoption of new technologies and a bias toward larger aircraft, SFO therefore faces a limit to its capacity to handle additional aircraft, particularly in bad weather when fewer aircraft are permitted to land. These capacity constraints suggest that over the period covered by this analysis (looking forward to 2030) congestion at SFO will worsen and short-haul in-state traffic will face growing constraints.

While travel by air is faster than travel by train, short-haul travel passengers spend more time on the ground than in the air (factoring in travel to and from the airport, arriving 60–90 minutes before flights, ticketing and security, but not including weather or other operating delays). On a total-time-expended basis, therefore, travel to Southern California by high-speed rail will be competitive with travel by air.

High-speed rail connecting San Francisco to Southern California can be expected to mitigate congestion by providing a competitive alternative to short-haul air travel. A mode shift of passengers from plane to train will reduce demand for in-state flights from SFO, freeing up limited airfield capacity for more efficient and lucrative long distance travel and giving the airport added breathing room. Compared to the scenario in which no high-speed rail is available, passengers who continue to use air travel for both short-haul and long distance flights should benefit from reduced crowding and delays.

Oakland International Airport (OAK)

Compared to SFO, Oakland International Airport is more focused on short-haul domestic travel, particularly in California. In contrast to SFO, OAK's traffic has grown since 9/11 and the collapse of the dot-com bubble, from 9,879,556 in 2000 to 14,613,489 in 2007, mostly through added service from short-haul and discount carriers. In principle, Oakland and the carriers serving it therefore are more vulnerable to the diversion of in-state passengers to high-speed rail. However, because high-speed rail would approach San Francisco on a route up the Peninsula, including a stop at Millbrae/SFO, high-speed rail will likely be less competitive for air passengers using Oakland International Airport than for passengers currently using SFO. This is due to two factors: the added time needed to access the high-speed train from the East Bay (adding to total trip time) and the fact that in transportation environments, each shift of transit mode results in decreased levels of ridership (in this case, travel by car to Stockton, or a shift from BART or AC Transit at either San Francisco's Transbay Terminal or San Jose's Diridon Station).

While high-speed rail is unlikely to divert significant traffic from Oakland International Airport in the short-to-medium term, in the longer term, Oakland also faces runway capacity constraints. For reasons similar to those faced by SFO, the construction of new runways in the Bay does not appear to be a politically viable option. The airport's master plan anticipates that runway capacity will be reached by 2025. While economic conditions can move that date

either forward or backward (recent economic conditions have reduced passenger traffic at OAK by 25%), the airport's physical capacity will eventually be reached, most likely within the next 25 to 30 years.

To address that constraint, options being considered by Oakland (like SFO) include demand management and strategies that would shift short-distance flights to smaller regional airports. Over the long-term, therefore, high-speed rail will provide a competitive alternative to air travel through Oakland International Airport, reducing airfield congestion and improving the travel experience for passengers who continue to use those facilities.

San Jose International Airport (SJC)

Mineta International Airport in San Jose would see impacts and benefits similar to SFO and Oakland. Half of all flights at San Jose are to or from Southern California. Expansion plans now underway will eventually permit the airport to serve 17.6 million passengers. As the airport is currently serving 8–10 million passengers and current economic conditions have reduced air service, San Jose's airport will have sufficient capacity for some time. Like San Francisco's and Oakland's airports, however, Mineta is physically and geographically constrained, and capacity is expected to be filled by 2017. By reducing the volume of short-haul traffic over the long term, high-speed rail can be expected both to reduce airport congestion and to make it easier for the airport to grow its long distance domestic and international traffic.

While the diversion of intrastate air travelers to the high-speed rail system will yield significant benefits for travelers and eventually for airports, airlines themselves could be negatively impacted by a reduction in total flights to and from the region. This, in turn, could impact airline employment. As reported elsewhere, the rail system has the potential to divert nearly one-third of the passengers on planes between Northern and Southern California. In 2007, the Bay Area's three airports together averaged 479 flights per day connecting Northern with Southern California destinations. Demand for these flights should increase with population. Indeed, Beacon Economics estimates that if load factors (how full the planes are) and plane sizes remained the same as they are today, this number would have to increase to 568 to accommodate the likely growth in demand by 2020. Using different assumptions of load factors, high-speed rail could reduce the overall number of flights to and from the region between 119 and 173, a significant fraction of regional air traffic. In 2007, flights per day totaled 1,539. If, over time, total flights at the region's airports were to increase by 20 percent, the reductions discussed above would amount to between 6 and 9 percent of all takeoffs and landings. Given the capacity constraints at these three airports, high-speed rail could provide significant congestion relief.

III

Urban Development, Land Use and Quality of Life

Apart from job creation, business attraction and mobility benefits, Bay Area residents will see significant impacts from high-speed rail in the form of new urban patterns. Local planning agencies in the Bay Area and elsewhere in California are increasingly moving toward policies designed to encourage a more compact urban form, with greater density of business activity, jobs and residential housing in proximity to public transit. City and county general plans are increasingly seeking to direct new development toward infill projects in urban centers. High-density, mixed-use development at or near transit centers has several objectives: mobility (decreased automobile use), walkable communities, revitalized urban centers, and the slowing or reversal of existing land use patterns in which growth occurs through horizontal sprawl that consumes open space and farmland, adding pressure to highway systems. As already noted, in recent decades, that horizontal movement has spread to the north, east and south of the Bay Area, but it is particularly evident in adjacent Central Valley counties.

The Bay Area's experience with BART suggests the kind of development patterns high-speed rail could be expected to generate: infill development, mixed-use communities incorporating denser housing and retail services, more concentrated office development, higher employment density, and a stronger local tax base. A 2004 BART study estimated that since the 1970s, 113,000 office jobs had been added in San Francisco within one-third mile of downtown BART stations, and another 16,400 jobs had been added within one-third mile of downtown Oakland BART stations. Office space shows a similar pattern: in 1962 about 59 percent of San Francisco office space was within one-third mile of the future downtown BART stations. By 2004, that number had risen to 70 percent. Eighty-two percent of new office construction in San Francisco from 1999 to 2004 was within one-third mile of BART, and those buildings are, on average, twice the size of other office buildings. Residential development also tends to concentrate and increase in value: another 1999 BART study found that home values in Alameda and Contra Costa counties increased by 4–5 percent close to BART (compared to more distant homes) and rent premiums increased by 12–40 percent. Other research found a significant amount of new rental housing development within walking distance (one-third mile) of BART.

Proposed high-speed rail stations in the Bay Area would be compatible with and supportive of this pattern of transit-oriented development. The type of jobs likely to be drawn to high-speed train station areas—services, government, finance, and real estate—are particularly suited to higher-density settings (e.g., high-rise office buildings) of the type envisioned for

high-speed train stations. Access by foot to high-speed trains can also be expected to stimulate higher-density residential development in close proximity to the stations.

As high-speed train stations become magnets for development, some part of the new development they attract will reflect the consolidation of growth that would occur even without high-speed rail but would locate in outlying areas or along highways. Other development is likely to come from new firms attracted to the area by access to high-speed rail. Either way, concentrated development near high-speed train stations can be expected to reduce future sprawl and highway congestion in the region. Property owners and developers can also expect to benefit from the rising land values in the surrounding area due to improved access by companies to their workers, to the quality of life benefits that residents perceive from access to public transit, and to retail activity stimulated by the greater flow of residents and commuters through the station.

Supplementing the economic attractiveness of the station districts themselves, policy tools available to local governments to facilitate these patterns include zoning that encourages mixed use, density bonuses, public-private partnerships, tax increment finance, and tax abatement programs.

In the Central Valley, the easier access to workers and housing afforded by high-speed rail could, under one scenario, serve to accelerate the Bay Area's outward sprawl. A more likely scenario, however, would see high-speed train stations serving as a stimulant for urban revitalization and economic development in core urban centers. Whether new stations are centrally located in central business districts or in outlying greenfield areas will have a critical impact on the urban forms that result. Local governments' general plans and incentives tied to the dissemination of bond funds should be designed to encourage compact development patterns in cities that host high-speed train stations.

In the Bay Area, two key facilities— the Transbay Terminal in San Francisco and Diridon Station in San Jose—can be expected to stimulate the kinds of urban patterns described above.

Transbay Terminal

When completed, San Francisco's Transbay Terminal will be the most connected intermodal facility in the state—and, perhaps, the nation. Located within blocks of the city's Financial District and in the heart of the fast-developing South of Market area, the Transbay Terminal will be designed to deliver high-speed rail to the center of San Francisco's urban core. From there, high-speed train passengers will be able to connect to regional bus systems (Muni, AC Transit, SamTrans and Golden Gate Transit) and to BART by a special pedestrian link. Regional ferries will be a short walk away.

According to the Association of Bay Area Governments, there were 200,000 jobs in downtown San Francisco in 2005. By 2035, that number is expected to grow to 436,000. High-speed rail access can be expected to reinforce downtown San Francisco's position as a major employment center, retaining existing businesses and attracting new businesses whose

employees and executives travel frequently within the state. Similarly, high-speed rail can be expected to attract new downtown residents whose work requires frequent travel to the Central Valley or Southern California and who would benefit from living within walking distance of the Transbay Terminal.

Plans for the district immediately surrounding the new terminal support this compact pattern of development, with 3,400 new housing units planned, and a dramatic increase in height for office buildings above the levels currently allowed. Proximity to high-speed rail would enable such density and contribute to the viability of the investments necessary to support residential and commercial development on this scale, and through those investments, would contribute to the financial viability of the terminal project itself.

Diridon Station

Civic leaders in San Jose envision high-speed rail as the catalyst for the expansion of Diridon Station, the redevelopment of the urban district around it, and the continued revitalization and expansion of downtown San Jose. San Jose's current population of 975,000 is projected to grow to 1.4 million by 2040. The city's goal is to shape how and where that growth is accommodated, by incentivizing growth within the current urban footprint.

San Jose Station: This conceptualization shows a high-speed rail station in San Jose and the potential transit oriented development that it could bring.

Source: Newlands & Company, Inc., www.nc3d.com

With the addition of high-speed rail, Diridon Station is targeted to become the principal intermodal transit hub for Silicon Valley and the South Bay, on a scale comparable to San Francisco's Transbay Terminal. As already noted, passengers arriving by high speed train would be able to access multiple rail systems from a single facility: the Capital Corridor train,

Amtrak, the Altamont Commuter Express (ACE) train, Valley Transportation Authority light rail (via a pedestrian connector) and, eventually, BART. BART would also connect Diridon passengers to Mineta International Airport. Ridership through the station is projected at up to 35,000 passengers daily.

Proposed Land Use – Diridon Station Area, Downtown San Jose

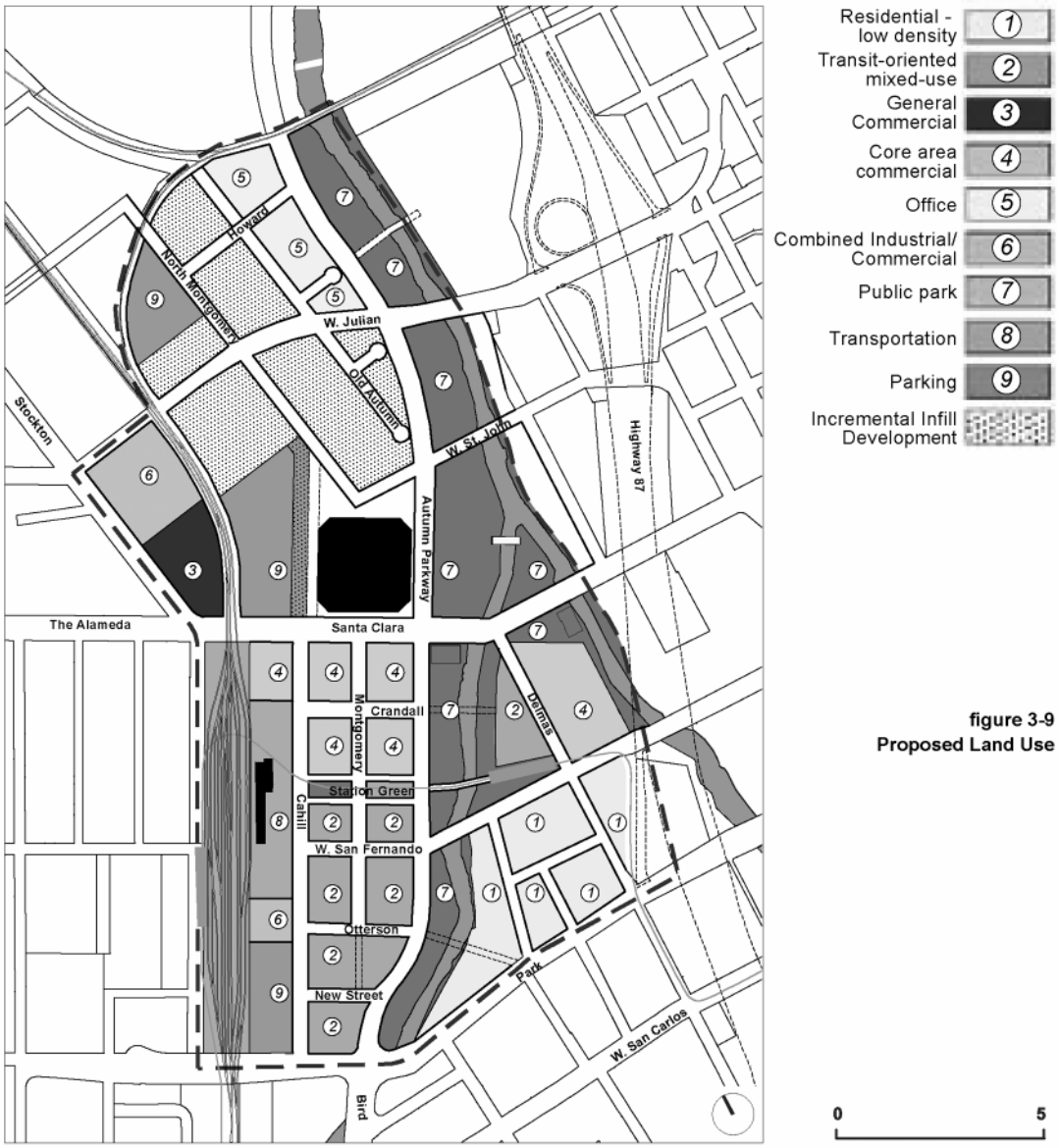


figure 3-9
Proposed Land Use

Source: *Diridon /Arena Strategic Development Plan, San Jose,* California, San Jose Redevelopment Agency, April 2003 (3–9)

In 2005, the San Jose City Council adopted a master plan that expands downtown San Jose to include the Diridon Station area, the largest remaining portion of the downtown area suitable

for high-density development. The station is seen as the centerpiece of a new urban district that will extend downtown to the west. Development plans for downtown San Jose call for 10,000 new housing units and an additional 10 million square feet of office space, most of which would be located in the Diridon district. Plans for the district call for mixed-use, transit-oriented development including housing, retail, office and entertainment development in an environment that encourages pedestrian, bicycle and transit-oriented activity. Within this framework, the higher land values adjacent to the station that high-speed rail can be expected to stimulate would potentially support the creation of a regionally significant entertainment district, converting parking lots adjacent to HP Pavilion to higher value uses. Open space improvements in the adjacent Guadalupe River and Los Gatos Creek areas are expected to enhance the attractiveness and livability of the district.

IV

Environmental Considerations

Implementing high-speed rail will contribute to lower levels of CO_2 emissions—an important state goal since the 2006 passage of AB32, the Global Warming Solutions Act, which sets a statewide target to reduce carbon emissions to 1990 levels by 2020, and more deeply after that.

High-Speed Rail Travel Times, CO_2 Savings and Prices to/from Select Destinations

City Pairs	Distance (miles)	Time	CO_2 Saved per Trip (lbs.)	Ticket Price (est.)
San Francisco to Los Angeles	432	2:38	324	$55
San Francisco to San Diego	616	3:56	462	$70
San Francisco to Anaheim	456	2:57	349	$58
San Francisco to Bakersfield	284	1:51	213	$43
San Francisco to Fresno	188	1:20	141	$32
San Francisco to Merced	131	1:14	98	$30
San Francisco to Sacramento	284	1:53	213	$40
San Francisco to San Jose	48	0:30	36	$10
San Francisco to SFO	14	0:13	10	$8
San Jose to Los Angeles	384	2:09	288	$51
San Jose to San Diego	567	3:39	425	$66
San Jose to Burbank	374	2:17	280	$50
San Jose to Bakersfield	236	1:34	177	$38
San Jose to Fresno	140	1:03	105	$28
San Jose to Merced	83	0:45	62	$26

Source: *Interactive Route Map*, California High-Speed Rail Authority, www.cahighspeedrail.ca.gov

The Association of Bay Area Governments reports that 50 percent of the Bay Area's (and 40 percent of the state's) greenhouse gas emissions come from transportation. These figures are directly proportional to levels of fuel consumption, and it is reasonable to expect that as traffic grows, this figure will continue to rise. Travel by car is currently the dominant form of

intercity travel, and automobile trips are projected to account for more than 95 percent of all intercity travel and 86 percent of longer intercity trips by 2030. Also by 2030, nearly 50 percent of all intercity trips within California will have a destination somewhere in the Bay Area or the Central Valley.

The proposed high-speed rail system is projected to have as many as 95 million annual riders—passengers who would otherwise be driving cars or flying. Implementing high-speed rail will therefore reduce total automobile-generated air pollutants in the region and the state. The diversion of travelers to high-speed rail will lead to a 5 percent reduction in vehicle miles traveled (VMT) statewide, and a 7–12 percent reduction in the Bay Area and the Central Valley.

A mode shift from cars to rail will therefore yield significant environmental benefits in terms of both energy use (by reducing the amount of energy used for transportation) and CO_2 reduction. Analysis produced by the European train system Eurostar finds that a trip on a high-speed train between London and Paris generates one-tenth the carbon dioxide produced on an equivalent flight. High speed trains use approximately one-third the energy of travel by plane, and one-fifth the energy of travel by car. As shown in the table on the preceding page, a high-speed rail trip from San Francisco to Los Angeles will save 324 pounds of CO_2 over the same trip by car; the same trip from San Jose will generate 288 pounds less of CO_2. Overall, high-speed rail is projected to reduce CO_2 emissions in California by 12 billion pounds per year by 2030.

Appendix

Annual Ridership Forecast Summary

Source of Ridership	Boardings
Bay Area	22,375,000
Sacramento/Stockton	8,758,000
San Joaquin Valley	7,740,000
Southern California	55,017,000
Total Annual Boardings (inter- and intraregional)	**93,890,000**
Intraregional Boardings	**23,045,000**
% Boardings Intraregional	**25%**

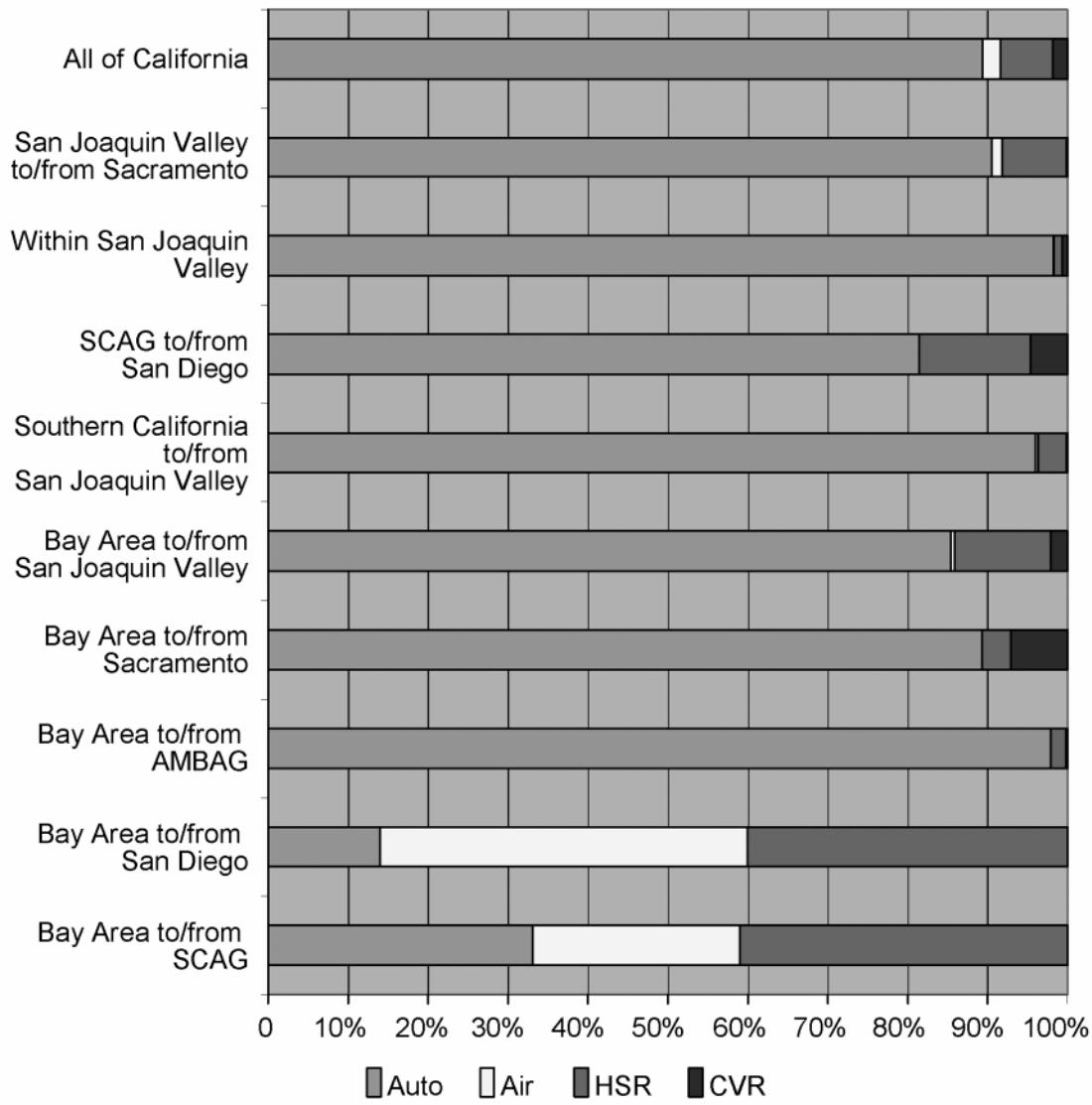
Source: *Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study*, Cambridge Systematics, August 2007 (2–2)

Projected Boardings for Selected Bay Area Stations

Station	Annual Boardings
San Francisco (Transbay Terminal)	11,699,200
Millbrae	1,180,700
Redwood City	2,014,000
San Jose (Diridon Station)	5,338,000
Gilroy	1,767,000

Source: *Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study*, Cambridge Systematics, August 2007 (2–10)

Transportation Mode Shares for Key California Markets



Source: *Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study*, Cambridge Systematics, August 2007 (2–3)

Sources

Reports and Documents

"Air Traffic Statistics – 2000, 2007". San Francisco International Airport [http://www.flysfo.com/web/page/about/news/pressres/]

Association of Bay Area Governments (ABAG) [http://www.abag.ca.gov/]

"BART's Contributions to the Bay Area: An Update". San Francisco Bay Area Rapid Transit District, August 2004.

"Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study". Cambridge Systematics, August 2007.

"Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)". U.S. Department of Transportation Federal Railroad Administration and California High-Speed Rail Authority, May 2008 [http://www.cahighspeedrail.ca.gov/library/Default.aspx?ItemID=8060]

Bay Area Council Poll, Bay Area Council, 1995–2008.

Bay Area Rapid Transit (BART) [http://www.bart.gov/]

Buffa, Andrea, and Carol Zabin, Cheryl Brown, Dave Graham-Squire, "California's Global Warming Solutions Act of 2006: A Background Paper for Labor Unions". Center for Labor Research and Education, University of California Berkeley.

California High-Speed Rail Authority [http://www.cahighspeedrail.ca.gov/]

"California High-Speed Rail Project: SPUR's Call to Action". San Francisco Planning and Urban Research Association, November 1999.

"Capacity Needs in the National Airspace System". Federal Aviation Administration, May 2007.

Cervero, Robert and Michael Duncan, "Transit's Value-Added: Effects of Light and Commuter Rail Services on Commercial Land Values". Department of City and Regional Planning #1850, University of California, Berkeley, November 2001.

Clarke, Emma. "The High-Speed Rail Revolution". CNN News, June 25, 2008 [http://www.cnn.com/2008/TRAVEL/06/25/highspeed.rail/index.html]

"Climate Change Draft Scoping Plan: June 2008 Discussion Draft". California Air Resources Board [http://www.arb.ca.gov/homepage.htm]

"Diridon /Arena Strategic Development Plan, San Jose, California". San Jose Redevelopment Agency, April 2003 [http://www.sjredevelopment.org/PublicationsPlans/DirArena_SDP.pdf]

Sources

"Economic Growth Effects Analysis for the Bay Area to Central Valley Program-Level Environmental Impact Report and Tier 1 Environmental Impact Statement". Cambridge Systematics, July 2007.

Metcalf, Gabriel, "What is Our Region?" San Francisco Planning and Urban Research Association, February 2006.

Metcalf, Gabriel and Egon Terplan, "The Northern California Megaregion". San Francisco Planning and Urban Research Association (SPUR), November 2007 [http://www.spur.org/documents/110107_article_01.shtm#maps]

"Metro Nation: How U.S. Metropolitan Areas Fuel American Prosperity". Brookings Institution Metropolitan Policy Program, 2007.

"Regional Rail Plan for the San Francisco Bay Area". Metropolitan Transportation Commission, September 2007 [http://www.mtc.ca.gov/planning/rail/]

"Year-End Airport Statistics Summary". Oakland International Airport [http://www.oaklandairport.com/airport_stats_yearend_stats.shtml]

Interviews

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