



# Regional Rail Plan for the San Francisco Bay Area

Final Report



## 1.0 INTRODUCTION

It has been a half-century since the last comprehensive look at the San Francisco Bay Area's rail system. The 1957 Rail Plan for the Bay Area was one of the most ambitious efforts of its time, envisioning an integrated rail network covering all nine Bay Area counties. The plan's central conclusion still rings true today:

*“If the Bay Area is to be preserved as a fine place to live and work, a regional rapid transit system is essential... A satisfactory solution to the Bay Area's traffic problem cannot be reached by building freeways alone. The solution can be reached only through a system of mass rapid transit developed on the premise of moving people-not automobiles.”*

On March 2, 2004, Bay Area voters approved Regional Measure 2, which increased bridge tolls on the region's seven state-owned bridges by a \$1, raising an estimated \$125 million each year. RM2 funds will implement the Regional Traffic Relief Plan — a comprehensive strategy for addressing congestion in the transbay bridge corridors and enhancing the convenience and reliability of the Bay Area's public transit system. RM2 specified and provided funding for the preparation of a comprehensive master plan for Bay Area rail.

This Bay Area Regional Rail Plan seeks to complete the unfinished work of the 1957 plan, and to address new opportunities not anticipated in that plan.

Among the many changes that has occurred over the past 50 years is the emergence of Northern California as a “megaregion” — an extended network of metropolitan areas including the Bay Area and its neighboring Sacramento and Central Valley regions that are linked by their transportation, economic and environmental systems. Improving the mobility of travelers, goods and services between the cities within our growing megaregion has become increasingly important to ensure the health and productivity of each metropolitan area and the megaregion as a whole. This plan keeps this challenge in mind as it defines new regional rail investments.

The charge for this Regional Rail Plan is to examine ways for the Bay Area to incorporate passenger trains into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit and railroad-based rail network, increase rail capacity, and coordinate rail investment around transit-friendly communities and businesses.

This plan also includes an analysis of potential high-speed rail routes between the Bay Area and Central Valley. It offers recommendations on the most promising high-speed rail alignments for Pacheco and Altamont passes. These recommendations are formulated independently of the California High-Speed Rail Authority (CHSRA). The intent of this plan is to provide input to the CHSRA as it prepares its final environmental document for the Bay Area to Central Valley High-Speed Train Program. The CHSRA will ultimately decide on the preferred route for high-speed rail between the Bay Area and Central Valley.



## 2.0 REGIONAL RAIL PURPOSE & NEED

### 2.1 Plan Purpose

The purpose of creating the Regional Rail Plan is threefold:

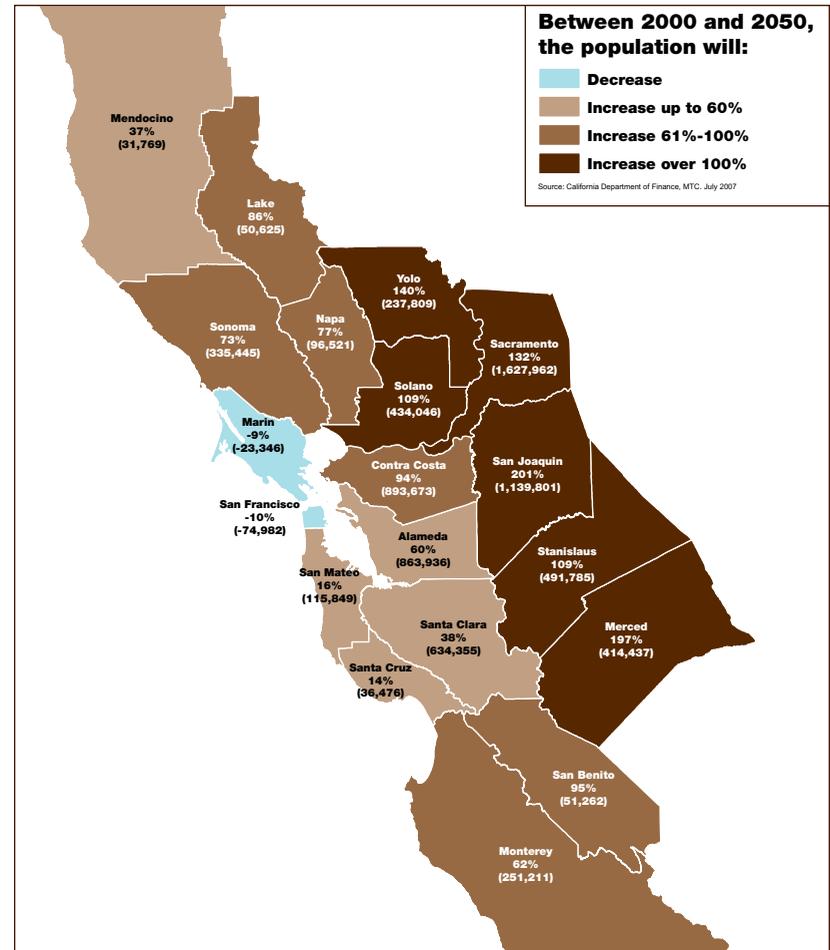
- To comprehensively identify a vision for a robust, interconnected system of Bay Area passenger rail improvements and expansions to guide investment decisions;
- To create a safe, fast, reliable, and integrated passenger and freight rail network that addresses the tremendous growth anticipated in transportation demand; and
- To sustain and enhance the economic vitality of Northern California, while minimizing the impact on the environment, by providing excellent transit service that strengthens existing downtowns and economic centers.

### 2.2 Why Rail Is Important to the Bay Area

#### ■ A Growing Region

Today, the nine-county Bay Area is home to nearly 7 million people and supplies more than 3 million jobs. By 2050, the region's population is anticipated to grow by over 40 percent for a total of 10 million people, as shown in Figure 1. This population growth will place tremendous pressure on the existing transportation network. The total number of daily trips made by Bay Area residents is projected to grow by 35 percent to a total of 28.5 million by 2030, wherein we will be logging over 200 million vehicle miles of daily travel. Further, by 2030, work trips by transit will see a net increase of 433,000 transit riders on an average

Fig. 1 Change in Population Growth: Bay Area and Surrounding Counties (2000–2050)



weekday or about 108 million additional transit riders each year. Added capacity and expansions will be required in order to accommodate increased demand on the existing transit system.

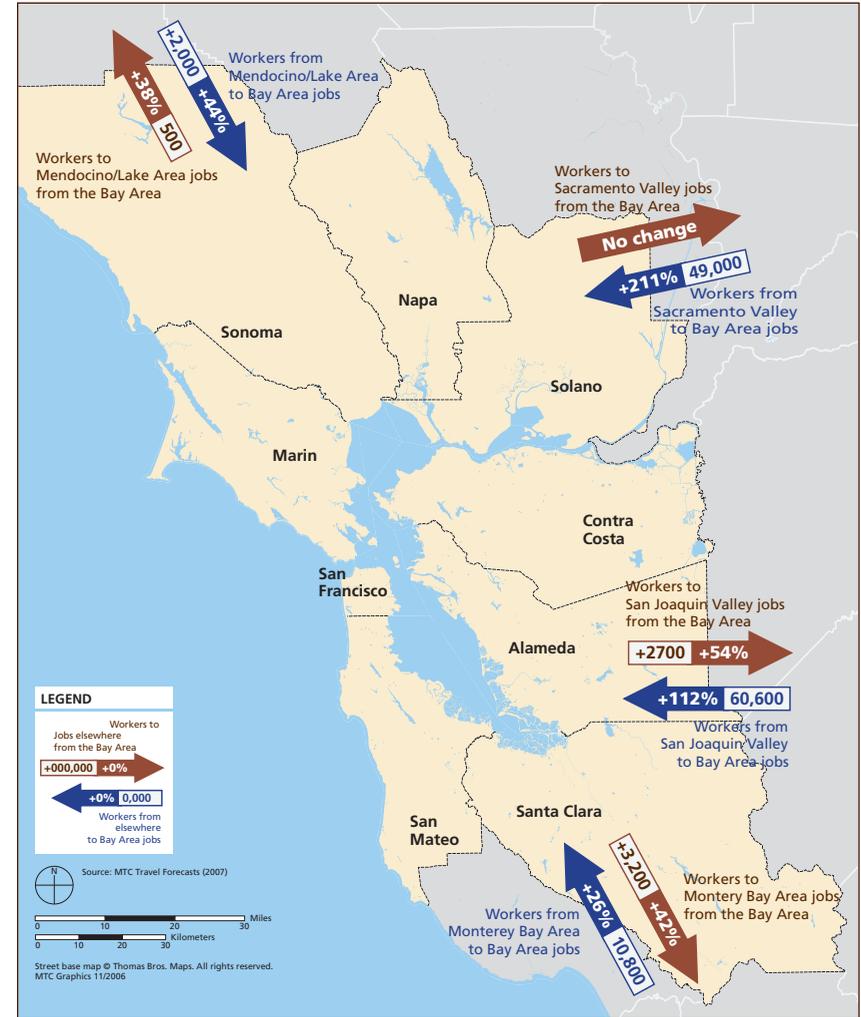
## ■ In-Commuting from Neighboring Sacramento and San Joaquin Valleys

While the Bay Area continues to grow at a steady rate, our Sacramento and Central Valley neighbors are experiencing their own tremendous population growth. San Joaquin County, just east of the Altamont Pass, will see more than a 200 percent increase in population by 2050. Similarly, Sacramento County will experience a 132 percent growth increase. The greatest increase in travel growth into the Bay Area over the next few decades is anticipated to come from these neighbors to the east. By 2030, in-commute into the Bay Area by commuters from the Sacramento Valley will rise by over 200 percent (+49,000 commuters) and San Joaquin Valley will grow by 112 percent (+60,600 commuters), as shown on Figure 2. Without stronger transit systems leading to the main Central Valley cities and connecting them to each other, there will be fewer opportunities for the cities to plan for the kind of compact development that the Bay Area is moving towards.

## ■ International Trade and Regional Freight Movement

The region's economy depends on the movement of goods within, into and out of the Bay Area. Freight traffic demands is expected to grow in excess of 350 percent over the next 50 years. The growth is already happening; bulk cargo grew 23 percent growth in one year between 2003 and 2004. Many of these lines are shared by passenger rail, such as the Capitol Corridor, and all of them are approaching their capacity. Expanded and improved rail infrastructure will be needed to support the demands of freight and passenger growth to mitigate the explosive growth of truck traffic on our roads.

Fig. 2 Change in Total Commuters at Key Bay Area Gateways (2000–2030)

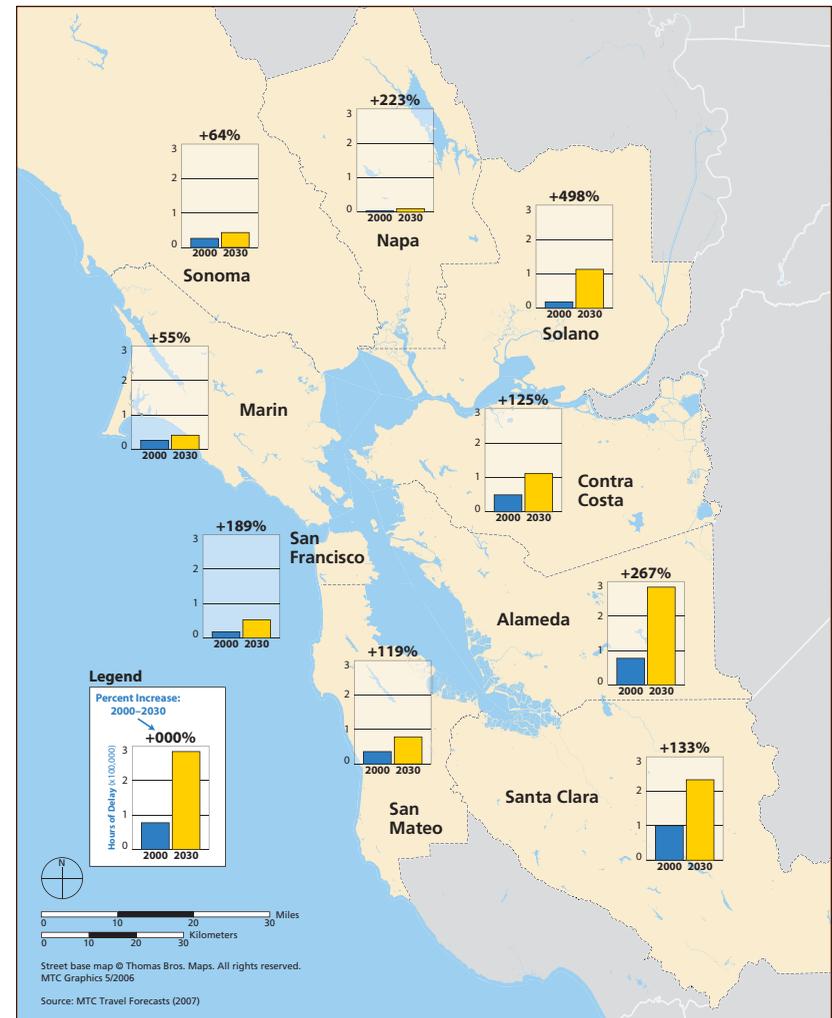




### ■ High Levels of Traffic Congestion

Bay Area polls often find persistent traffic congestion as the primary concern for our residents. Congestion often seems to come “out of nowhere” but there is clear cause — as the volume of traffic exceeds a road’s capacity, the speed of traffic decreases exponentially rather than gradually. Solano County provides an acute example of how conditions can degrade quickly once roads are saturated. Dispersed growth patterns, tremendous truck traffic in the I-80 corridor, and significant increase in interregional commuting between the Bay Area and Sacramento have led to higher transportation demand in Solano County. As a result, Solano County is projected to experience about 500 percent growth in daily vehicle hours of delay in 2030 as shown in Figure 3. Other travel corridors throughout the Bay Area are experiencing similar congestion and delay.

Fig. 3 Average Weekday Daily Vehicle Hours of Delay by County (2000–2030)





## 2.3 Consequences of Not Addressing Bay Area Rail Needs

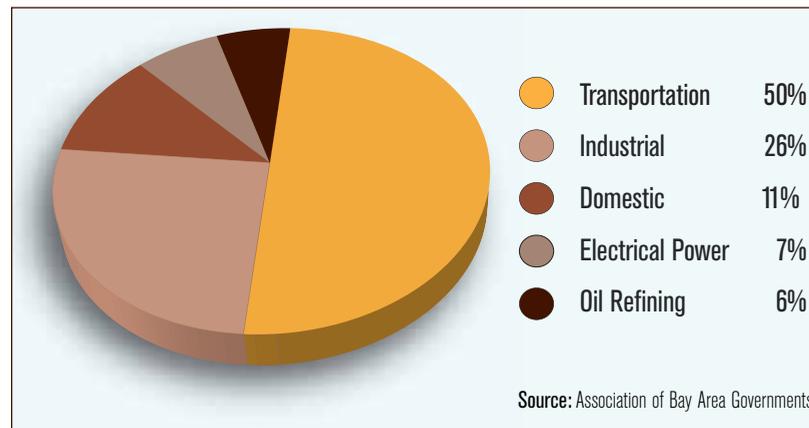
### ■ High Cost to Our Economy

The adverse economic impacts of congestion and inadequate transit access are already becoming apparent. The 150,000 daily hours of Bay Area commute congestion had an estimated cost of \$2.6 billion in 2003 alone. And, congestion would have been about 50 percent worse if not for the region's public transit system, according to the Texas Transportation Institute's 2005 Mobility Study Performance Measure Summary. The region's economy is becoming increasingly reliant on shipping from our ports — whether vegetables from the Central Valley or electronics from Silicon Valley. Longer shipping times because of congestion can add significant cost to these goods.

### ■ High Cost to Our Environment

Without an expanded rail system, the natural environment may also suffer. Over 400,000 acres of land in the Bay Area are at risk from development. Promoting development in walkable communities near transit is our best hope for taking development pressure off open space and farms. According to the Reconnecting America and the Center for Transit-Oriented Development, there is an anticipated demand for an additional 550,000 homes near transit in the Bay Area by 2030. Compact, transit-oriented development only functions well when transit service is frequent and reliable enough that residents will ride, foregoing owning an additional car and reducing the number of car trips they take.

Fig. 4 Bay Area Greenhouse Gases



### ■ High Energy Consumption and Greenhouse Gas Emissions

A fast growing environmental concern is global climate change, and the transportation sector is responsible for 40 percent of California's greenhouse gas emissions, and up to 50 percent in the Bay Area (see Figure 4). These emissions are directly proportional to the amount of gasoline burned, so offering real transportation choices that can reduce driving will be critical for cutting greenhouse gas emissions.



### 3.0 REGIONAL RAIL VISION

Key elements of the Regional Rail vision include:

#### ■ Ring the Bay with Rail

A long-term vision of many in the region is to ring the Bay, connecting the three major Bay Area cities (San Francisco, Oakland, and San Jose), with a fast, frequent and integrated passenger rail network. BART and Caltrain would provide seamless, peak and off-peak rapid transit service to the region's largest employment and population centers, with intermodal connections at key nodes. In addition, the rail network would also provide direct or indirect transit access to the region's major international airports and numerous local transit hubs.

#### ■ The Right Technology Should Be Used With the Right Corridor

A broad range of rail technologies, including BART and conventional passenger trains like Amtrak are considered in this plan. Emerging technologies such as non-Federal Railroad Administration compliant Electric Multiple Unit (EMU) trains are also explored. These trains run on standard gauge rail tracks but must be separated from freight trains. They have significant cost and speed advantages over conventional trains and are included in the plan on selected segments.

#### ■ The BART and Caltrain Systems Are the Backbone

The BART and Caltrain systems serve as the backbone of the regional rail network and it is clear there will be capacity constraints and renovation needs for the existing systems. This

reinvestment should be a top regional priority over the next few decades.

#### ■ The BART System's Outward Expansion Is Nearly Complete

While BART will always remain at the core of the region's rail system; its outward expansion potential is limited. Once the extension to San Jose is completed, and the existing lines are brought to logical terminals in Livermore, Santa Clara and East Contra Costa County, no additional outward extensions of the BART technology are contemplated. This is important, not only because portions of the existing BART system will be reaching capacity limits, but also because higher-speed express trains would better serve outlying suburban markets. Instead, BART will evolve toward a higher-frequency, highly productive metro system. New BART lines are considered only to alleviate capacity concerns in the Transbay Corridor and to serve dense urban markets in the inner East Bay and San Francisco, and to provide additional connectivity to the regional/inter-city rail system.

#### ■ The Bay Area Needs a Regional Rail Network

As the BART system becomes more of a high-frequency, close stop spacing urban subway system, similar to the Paris Metro or Berlin "U-Bahn" network, it would need to be complemented with a larger regional express network serving longer-distance trips. The European counterpart to the regional express network is the "S-Bahn" in Berlin or the Regional Electric Rail (RER) in Paris. These European rail systems provide a truly integrated inter and intraregional rail system that minimizes transfer barriers for its customers. The next step is to incrementally separate



passenger rail rights-of-way from freight rights-of-way and over time develop a higher speed, express regional rail network. These trains would run largely on existing tracks, some shared with freight and others in their own rights-of-way with specialized signaling and dispatch systems. Over the next 40 years, much of the new investment in intercity and suburb-to-city regional rail in Northern California will utilize modern, standard-gauge equipment, following the model of most European and Asian capitols.

### ■ Rail Infrastructure Must Be Expanded to Accommodate Growth In Passenger and Freight Traffic

To allow the region's economy to continue growing while meeting increased passenger needs, the freight and passenger rail systems must be increasingly accommodated. This plan acknowledges that certain freight corridors require additional mainline tracks to support high-frequency freight and passenger services.

### ■ High-Speed Rail Provides Opportunities to Enhance and Accelerate Regional Rail Improvements

High-Speed Rail complements and supports the development of regional rail — a statewide high-speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present in the same corridor.

- **Rail Transit and Focused Transit-Oriented Developments Must Go Hand in Hand:** If the region is to make a substantial investment in rail infrastructure, land development surrounding the stations/stops and along the rail corridor must be fully integrated with rail services and they must be supportive of one another. Regional and local policies and programs that support focused land-uses must be in place to make this happen.
- **Institute a New Governance Structure for Delivery of Rail Services:** Delivering high-quality, efficient rail services will require institutional changes from the multiple transit operators and multiple providers of regional rail that are in place today. The “new” entity(ies) would be responsible for planning, design, funding, construction, and/or maintenance and operations of passenger rail. The region must set a course of action to initiate and implement the necessary institutional changes.
- **Successor to Resolution 3434 Needed to Advocate for Rail Funding:** Securing public/private funding for rail expansions and operations and maintenance is a tall order, but can be done if the region forges consensus behind a program of projects from which to advocate for funding in Sacramento and Washington D.C. MTC's Resolution 3434 set a powerful precedent that having a consensus agreement in place will help the region to not only articulate a shared vision about rail expansions but also lay out a strong advocacy platform to aggressively compete for scarce public/private, regional, state and federal funds. Furthermore, defining the rail improvements that go beyond Resolution 3434 would help to inform subsequent Regional Transportation Plan updates.



## 4.0 REGIONAL RAIL STUDY STRUCTURE & PROCESS

### 4.1 WE'VE BEEN WORKING ON THE RAIL PLAN — A TEAM EFFORT

The Metropolitan Transportation Commission, the Peninsula Corridor Joint Powers Board (Caltrain), the Bay Area Rapid Transit District (BART), and the California High-Speed Rail Authority (CHSRA) joined efforts over the past two years to develop a long-range vision for improving the passenger rail system we have in place and expanding its reaches to serve future Bay Area travel demand.

We received plenty of help along the way —

- Technical review and direction was provided by a regional rail steering committee, comprised of local passenger and freight rail operators, including Caltrain, BART, Capitol Corridor, Altamont Commuter Express (ACE), Sonoma-Marín Area Transit District (SMART), Caltrans Division of Rail, and Union Pacific Railroad and BNSF Railway, along with the county congestion management agencies and the Transbay Transit Center Joint Powers Authority and Port of Oakland. In addition to Steering Committee meetings, the passenger and freight rail operators were consulted at key milestones throughout the study effort.
- An advisory group of academics, environmentalists, and business people also offered their technical expertise.
- Our neighboring regional agencies and county government associations such as Sacramento Area Council of Governments (SACOG), San Joaquin Council of Governments (SJCOG), Transportation Agency for Monterey County (TAMC), and Santa Cruz County Regional Transportation Commission (SCCRTC) helped us to broaden our scope and consider interregional rail travel and connectivity beyond our nine-county borders.
- Stakeholders and the general public became involved early in the study effort through a series of rail visioning workshops conducted in late 2005 wherein they helped us to brainstorm about possible extensions of existing service and new rail routes. Stakeholders also provided their input through the regional rail steering committee meetings that were open to the public and will continue to do so through the community outreach workshops occurring in summer 2007.



## 4.2 STUDY GOALS AND OBJECTIVES

The Regional Rail Plan represents a vision of an integrated and interconnected system of passenger rail improvements and expansions for the Bay Area. The four elements of regional rail are rapid rail transit (BART), railroad-based services, high-speed rail services, and freight rail.

The plan's network and services are intended to:

- Address the combined challenge of moving people and goods;
- Provide people with a link to commercial, employment, and residential centers;
- Expand capacity for goods movement to support the regional economy;
- Serve as the backbone of an integrated regional transit network with seamless connections at key transit hubs to local transit services;
- Accommodate development of statewide high-speed rail, enable the operation of regional services along high-speed rail lines, and vice versa;
- Identify policies and incentives to encourage local governments to create well-designed, walkable communities with a mix of services near transit; and,
- Explore a governance structure that can develop regional system improvements and deliver coordinated, customer-oriented services.

## 4.3 STUDY SCOPE

The Regional Rail Plan effort was organized into three distinct study phases, as described below:

**Phase 1 — Visioning:** Kick-start study effort by brainstorming possible extensions of existing service and new rail routes through stakeholder and public outreach workshops. Define vision statements to help identify candidate rail options for consideration in study alternatives.

**Phase 2 — Vision-Based Alternatives Development & Analysis:** Using vision statements, identify distinct conceptual alternatives for three regional rail outcomes (regional rail only, regional rail with high-speed rail entry from east, and regional rail with high-speed rail entry from the south). Refine study alternatives in response to technical input and feedback from passenger and freight rail stakeholders on initial conceptual alternatives. Refine study alternatives with high-speed rail upon evaluation of regional rail only alternative and ridership analysis of high-speed rail options. Conduct analysis that takes into account engineering feasibility, cost, ridership, and operational, environmental and implementation issues.

**Phase 3 — Draft/Final Plan:** Prepare draft and final plans identifying regional and high-speed rail extensions and services for the near-, intermediate- and long-terms.



## 5.0 STAKEHOLDER AND PUBLIC OUTREACH — WHAT WE HEARD

### 5.1 STAKEHOLDER OUTREACH MESSAGES

In October 2005, a week-long planning charrette with passenger and freight rail operators and other stakeholders were conducted to brainstorm some initial planning guidelines.

Ten themes emerged as common planning principles, as follows:

- Develop a visionary rail plan for the next 50 years
- Respect existing rail service improvement plans
- Think like a passenger-ensure convenient, efficient service
- Connect transit and trains
- Offer adequate capacity
- Separate conventional freight and passenger services
- Use proven technology
- Incorporate cost-effective solutions
- Develop a comprehensive funding plan
- Transportation and land use are linked

### 5.2 PUBLIC OUTREACH MESSAGES

#### Fall 2005 - Visioning Workshops

In late November/December 2005, MTC, Caltrain, BART, and the CHSRA conducted an extensive public involvement program to engage the public in thinking about what the Bay Area rail system should look like in 2050, and more specifically, as a first step, what issues, alternatives and screening criteria should be considered as part of the study.

These public visioning workshops/scoping meetings were conducted in Oakland, San Jose, San Francisco, Livermore, Modesto, San Carlos, Suisun City and Santa Rosa. The workshops served double duty as official public scoping meetings for the CHSRA's environmental process for the Bay Area to Central Valley High-Speed Train Program. Large crowds of over 500 participants voiced a wide range of interests and ideas about how to expand the rail network.

Looking across all the comments received during this outreach effort, including written and email correspondence, the following points summarize the key messages from the public. These messages reflect the predominant opinions expressed, however, in most cases, participants voiced opinions reflecting the opposite point of view.

- Connectivity between transportation modes (rail-to-rail and rail-to-bus/ferry/other transit/bicycle/pedestrian), and to other regions is extremely important to ensure reliable, convenient travel across the Bay Area and neighboring regions. Participants expressed the need for buses, shuttles, and other options for going the first or last mile from rail stations.



- There were split opinions on whether the proposed high-speed train system should enter the Bay Area via Pacheco Pass or Altamont Pass.
- New rail routes and stations should be built along major travel corridors and high-density areas, and surrounded by transit-oriented developments, including affordable housing.
- Preserving and acquiring right-of-way for rail are high priority action items to be pursued immediately. Consideration should be given to utilizing existing rights-of-way when possible.
- Freight and passenger service cannot share tracks for much longer. Both need their own set of tracks to avoid conflicts and service delays. The large amount of freight that moves between the Bay Area's ports and the Central Valley significantly impacts our freeways, particularly I-580.
- Accessibility and rail service connections in low-income minority areas should be maximized; however, community disruption and displacement should be minimized when acquiring rights-of-way and constructing new rail lines.
- The concept of "one system, one ticket" via a regional fare system and a universal fare card was suggested to ensure seamlessness in the regional transit system.
- Bay Area transit agencies were encouraged to communicate and coordinate amongst themselves, to refrain from competition, and when warranted, to consider consolidating for cost and efficiency purposes.
- Advanced rail technologies should be applied wherever possible. Although caution was expressed by those who prefer the use of proven technologies.
- A new Bay crossing for rail should be revisited to accommodate new regional rail or high-speed rail service.
- Numerous ideas were suggested on how to improve and expand BART, Caltrain, Capitol Corridor and ACE services, including: BART extensions to San Jose and Livermore (with some opposing such extensions); Caltrain electrification and extension to San Francisco, Gilroy and beyond; ACE track separation from Union Pacific and extension to Modesto; and Capitol Corridor upgrades and extension to Reno.
- Participants rated "maximize rail transit connections and accessibility" as the most important evaluation criterion to be used during the screening and evaluation of rail project ideas. The "maximize ridership/revenue potential" and "maximize service to and promotion of transit-oriented development" evaluation criteria were also rated high.
- Participants overwhelmingly agreed that transit-oriented developments make sense for the Bay Area, their communities and for themselves.

These themes and input from rail stakeholders and public workshops provided the basis to generate rail alternatives and evaluation criteria to test those alternatives.



## Summer 2007 — Response to Draft Plan

In August 2007, a series of regional rail workshops were held to receive public comments on the Draft Report Summary, which was first presented and reviewed by Steering Committee in July 2007. Public workshops were held in five locations in four counties. In four of the locations, both an afternoon and an evening session were held. A total of nine workshops were held in Oakland, San Jose, Livermore, Suisun City and San Carlos. At the public workshops the participants were given an overview of the draft plan and had the opportunity to get questions answered and provide comments on the draft plan to the study partners.

A variety of methods were used to inform the public about the workshops. This included:

- Media advisory issued by MTC on Aug. 8, 2007.
- Direct Mail: Approximately 6,000 postcards announcing the workshops were mailed on August 3, 2007, to MTC's contact database and to names from the California High Speed Rail Authority's database.
- Web Postings: Information about the Regional Rail workshops was posted on MTC's Web site and the Regional Rail Plan public Web site ([www.bayarearailplan.info](http://www.bayarearailplan.info)).
- E-mail blast: An email blast announcing the dates and locations of the public workshops was sent to approximately 5,000 email addresses extracted from MTC's contact database of public agencies, organizations and individuals; and to addresses in the Regional Rail Plan study database.

- Flyers: During the week of August 6, 2007, four rail operators distributed postcards announcing the workshops to their passengers. Altamont Commuter Express (ACE) distributed 2,000 workshop postcards and Caltrain distributed 8,000 workshop postcards to their commuters via a "seat drop." Capitol Corridor also distributed 1,000 workshop postcards to its commuters. Additionally, some 50,000 copies of a special BART Bulletin were distributed at all 34 BART station fare gates starting in early August 2007.

The key messages heard during the August 2007 workshop series included the following:

1. There was general support for regional rail and high-speed rail. Rail was viewed as key to reducing congestion, improving air quality, and providing quality transit service for the region.
2. Most supported either Altamont Pass or Pacheco Pass for high-speed rail entry from the Central Valley into the Bay Area, and some supported the idea of pursuing both alignments over the longer term. Regional overlays on the high-speed rail system received considerable support overall. There were questions about what entity makes the final decision about the high-speed rail alignment (answer: California High-Speed Rail Authority).
3. There was skepticism about a few proposed rail alignments due to geography or other reasons, and alternative rail alignments were suggested. A few participants voiced opposition to any disruption of Niles Canyon in Fremont.
4. Rail improvements are needed sooner rather than later!



5. Rights-of-way must be secured now for future passenger rail service.
6. More and faster service on ACE, Caltrain, Capitol Corridor are needed to serve today's and future travel demand.
7. Many supported rail connections across the Bay as well as across bodies of water into Marin/Sonoma and into Solano County.
8. Building a system that provides improved mobility all day long and not just during commute hours was viewed as important.
9. Potential impacts to local areas/neighborhoods, particularly due to growth in freight rail, must be addressed and mitigations identified soon.
10. Grade separations must be pursued for safety reasons.
11. There must be separate tracks for freight and passenger rail service in order to improve train operations, service levels and reliability of passenger rail service and enable the rail mode to compete successfully with cars. Passenger rail should have its own dedicated tracks, and the freight interface should be eliminated.
12. Connectivity between stations and schedules is crucial. Transfers/connections must be fast, efficient, user-friendly. Rail stations should be served with buses; payoff will be increased ridership on rail systems.
13. Station area planning must occur to make stations more than just a train stop; i.e., look at land use; have housing or job thresholds for stations.
14. How will the proposed rail network be funded? What are the potential funding sources, and what will the process be to take the plan recommendations towards implementation?
15. A policy discussion on whether to invest public funds in privately owned railroad systems is needed.
16. A single body/agency to govern rail interests, including connectivity, fare coordination, wayfinding signage, etc., must be established. How will we get the nine Bay Area counties and the Central Valley to cooperate in order to implement this plan? Partnerships among rail operators, congestion management agencies, transit operators, Caltrans, and local jurisdictions are critical to the fulfillment of the Regional Rail Plan.

Technical comments raised during the workshops have been incorporated into this report where appropriate.