2013 California State Rail Plan

California Transportation Plan 2040
Integrating California's Transportation Future

RAIL PLAN
California State Rail Plan

Caltrans

May 2013

CALIFORNIA STATE TRANSPORTATION AGENCY

Edmund G. Brown Jr.
Governor

Brian P. Kelly
Secretary

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October 30, 2013

I commend the California Department of Transportation (Caltrans) and its private sector and public sector partners for their efforts that have resulted in the *2013 California State Rail Plan* (CSRP). The California State Transportation Agency (CalSTA) has formally approved this CSRP, and related planning documents: Pacific Surfliner North Corridor, Pacific Surfliner South Corridor, San Joaquin Corridor and Coast Corridor Service Development Plans; and Coachella Valley Intercity Rail Corridor Planning Study.

The State's transportation priorities are mobility, safety, and sustainability. The CSRP outlines how our rail system can deliver on these priorities through investments to increase passenger ridership, support goods-movement, and deliver positive train control, which improves safety.

The CSRP is being released as California embarks on construction of the nation's first high-speed rail system – the most ambitious rail project since the transcontinental railroad began construction in 1863. Under the leadership of Governor Edmund G. Brown Jr., the High-Speed Rail Authority developed a blended approach for rail modernization, which will integrate high-speed rail with interregional and commuter rail operators. The CSRP embraces this blended approach for high-speed rail, and begins the process to more fully coordinate rail operations across the state.

The Administration is committed to working with all its rail partners to implement rail modernization in California. Electrified high-speed rail, connected to expanded regional and local rail and transit, will be an important tool used to achieve the state's greenhouse gas reduction targets, while also improving mobility and safety for the traveling public.

Sincerely,

Brian P. Kelly
Secretary

Attachment:
2013 California State Rail Plan

2013 CALIFORNIA STATE RAIL PLAN

May 2013

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List of Acronyms

AAR – Association of American Railroads

AB – Assembly Bill

ABS – Automatic Block Signaling

ACE – Altamont Corridor Express

ACR – Assembly Concurrent Resolution

ACTA – Alameda Corridor Transportation Authority

AMATS – Anchorage Metropolitan Area Transportation Solutions

ARB – California Air Resources Board

ARRA – American Recovery and Reinvestment Act of 2009

ARZC – Arizona and California Railroad

ATLC – Active Transportation and Livable Communities

ATSF – Atchison Topeka and Santa Fe Railway

Authority – California High-Speed Rail Authority

BAAQMD – Bay Area Air Quality Management District

BART – Bay Area Rapid Transit

BNSF – BNSF Railway

BTH – Business, Transportation, and Housing Agency

CALCOG – California Association of Councils of Government

Cal EMA – California Emergency Management Agency

Caltrans – California Department of Transportation

CASP – California Aviation System Plan

CCJPA – Capitol Corridor Joint Powers Authority

CCSEP – Capitol Corridor Service Expansion Plan

CCT – Central California Traction Company

CEC – California Energy Commission

CEQA – California Environmental Quality Act

CFMP – California Freight Mobility Plan

CFNR – California Northern Railroad

CIB – California Interregional Blueprint

CIRIS – California Interregional Intermodal Shuttle

CM@R – Construction Manager @ Risk

CMAQ – Congestion Management and Air Quality

CMIA – Corridor Mobility Improvement Account

CO – Carbon monoxide

CO_2 – Carbon dioxide

COFC – Containers-on-flat car

CORP – Central Oregon and Pacific Railroad

CPUC – California Public Utilities Commission

CRCC – Coast Rail Coordinating Council

CREATE – Chicago Regional Environmental and Transportation Efficiency Project

CRIS – Caltrans Reporting Information System

CSLRA – California Shortline Railroad Association

CSRP – California State Rail Plan

CTC – California Transportation Commission

CTP – California Transportation Plan

DB – Design-Build

DBB – Design-Bid-Build

DBF – Design-Build-Finance

DBFO – Design-Build-Finance-Operate

DBFOM – Design-Build-Finance-Operate-Maintain

DBOM – Design-Build-Operate-Maintain

DHS – U.S. Department of Homeland Security

DMU – Diesel multiple unit

DOR – Division of Rail, California Department of Transportation

DOT – Department of Transportation

DOTP – Division of Transportation Planning, California Department of Transportation

EIR – Environmental Impact Report

EIS – Environmental Impact Statement

EMFAC – Emissions Factors model

EPA – Environmental Protection Agency

FAC – Freight Advisory Committee

FAF – Freight Analysis Framework

FAF3 – Freight Analysis Framework Version 3

FAQ – Frequently Asked Questions

FHWA – Federal Highway Administration

FMSIB – Freight Mobility Strategic Investment Board

FRA – Federal Railroad Administration

FRIIP – Freight Rail Infrastructure Improvement Program

FRPP – Freight Rail Preservation Program

FRSGP – Freight Rail Security Grant Program

FTA – Federal Transit Administration

FTIP – Federal Transportation Improvement Program

FFY – Federal Fiscal Year

FY – Fiscal Year

GDP – Gross Domestic Product

GHG – Greenhouse Gas

GIS – Geographic Information System

GM – General Motors

GMAP – Goods Movement Action Plan

GPS – Global Positioning System

GTM – Gross Ton-Miles

HRCSA – Highway-Railroad Crossing Safety Account

HSIPR – High-Speed Intercity Passenger Rail

HSR – High-Speed Rail

HTF – Highway Trust Fund

ICTF – Intermodal Container Transfer Facility

IOS – Initial Operating Section

IRC – Implementing Recommendations of the 9/11 Commission Act

IRCP – Intercity Rail Capital Projects

IRFA – Iowa Rail Finance Authority

IRRS – Interregional road system

IRSF – Industrial Rail Service Fund

ITA – Interagency Transfer Agreement

ITIP – Interregional Transportation Improvement Program

ITS – Intelligent Transportation Systems

ITSP – Interregional Transportation Strategic Plan

JPA – Joint Powers Authority

LA – Los Angeles

LACMTA – Los Angeles County Metropolitan Transportation Authority

LAJ – Los Angeles Junction Railway Company

LATC – Los Angeles Transportation Center

LAUS – Los Angeles Union Station

LCR – Lake County Railway

LAUS – Los Angeles Union Station

LOSSAN – Los-Angeles-San Diego-San Luis Obispo Rail Corridor Agency

LRFA – Local Rail Freight Assistance

LVRE – Las Vegas Railway Express, Inc

MAN – Manual Block (train control signal)

MAP-21 – Moving Ahead for Progress in the 21st Century

MAROps – Mid-Atlantic Rail Operations Study

MET – Modesto and Empire Traction Company

MFAC – Minnesota Freight Advisory Committee

mph – Miles per hour

MPO – Metropolitan Planning Organization

MTC – Metropolitan Transportation Commission

MWRRI – Midwest Regional Rail Initiative

NAAC – Native American Advisory Council

NAFTA – North American Free Trade Agreement

NCHRP – National Cooperative Highway Research Program

NCRA – North Coast Railroad Authority

NCRPWG – Northern California Rail Partners Working Group

NCTD – North County Transit District

NSDCTDB – North San Diego County Transit District Board

NCURS – Northern California Unified Rail Service

NEPA – National Environmental Policy Act

NNEPRA – Northern New England Passenger Rail Authority

NO_x – Oxides of nitrogen

NTSB – National Transportation Safety Board

NVRR – Napa Valley Railroad

NWP – Northwestern Pacific Railroad

O&M – Operations and maintenance

OCTA – Orange County Transportation Authority

OHIT – Outer Harbor Intermodal Terminal

OIG – Oakland International Gateway

ORDC – Ohio Rail Development Commission

ORNL – Oak Ridge National Laboratory

OTP – On-Time Performance

OTR – Oakland Terminal Railway

PCJPB – Peninsula Corridor Joint Powers Board

PHL – Pacific Harbor Lines, Inc.

PHMSA – Pipeline and Hazardous Material Safety Administration

PIH – Poisonous-by-Inhalation

PISOP – Public Information and Stakeholder Outreach Plan

PLAN – Planning Local Assistance Network

PM – Particulate Matter

POLA – Port of Los Angeles

POLB – Port of Long Beach

PPP – Public Private Partnership

PRB – Powder River Basin

PRCIP – Passenger Rail Corridor Investment Plan

PRIIA – Passenger Rail Investment and Improvement Act of 2008

PSRR – Pacific Sun Railroad

PTA – Public Transportation Account

PTC – Positive Train Control

PTCIP – Positive Train Control Implementation Plan

PUC – Public Utilities Commission

QRR – Quincy Railroad

R&R – Ridership and revenue

RCES – Rail Crossings Engineering Section

RCTC – Riverside County Transportation Commission

RCTF – Rural Counties Task Force

ROG – Reactive organic gas

ROI – Return on investment

ROW – Right-of-way

RPRC – Richmond Pacific Railroad Corporation

RRIF – Railroad Rehabilitation and Improvement Financing

RSIA – Rail Safety Improvement Act of 2008

RT – Sacramento Regional Transit District

RTC – Revenue and Taxation Code

RTIP – Regional Transportation Improvement Program

RTP – Regional Transportation Plan

RTPA – Regional Transportation Planning Agency

SACOG – Sacramento Area Council of Governments

SAFETEA-LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (2005)

SamTrans – San Mateo County Transit District

SANDAG – San Diego Association of Governments

SAV – Sacramento Valley Railroad

SB – Senate Bill

SCAC – Standard Carrier Alpha Code

SCAG – Southern California Association of Governments

SCAQMD – South Coast Air Quality Management District

SCRPWG – Southern California Rail Partners Working Group

SCBG – Santa Cruz Big Trees and Pacific Railway Company

SCIG – Southern California International Gateway

SCLA – Southern California Logistics Airport

SCRRA – Southern California Regional Railroad Authority

SCS – Sustainable Communities Strategy

SCVTA – Santa Clara Valley Transportation Authority

SDIY – San Diego and Imperial Valley Railroad

SDMTS – San Diego Metropolitan Transit System

SDP – Service Development Plan

SERA – Sierra Northern Railway

SFMTA – San Francisco Municipal Transportation Agency

SFY – State Fiscal Year

SGC – Strategic Growth Council

SGR – State of Good Repair

SHA – State Highway Account

SIB – State Infrastructure Bank

SJRRC – San Joaquin Regional Rail Commission

SJVR – San Joaquin Valley Railroad

SJVRC – San Joaquin Valley Rail Committee

SLOCOG – San Luis Obispo Council of Governments

SMART – Sonoma–Marin Area Rail Transit

SMV – Santa Maria Valley Railroad

SOV – Single-Occupancy Vehicle

SP – Southern Pacific Transportation Company

SR – State Route

SRSIF – State Rail Service Improvement Fund

STB – Surface Transportation Board

STE – Stockton Terminal and Eastern Railroad

STIP – State Transportation Improvement Program

STP – Surface Transportation Program

STSP – Statewide Transit Strategic Plan

SWPC – Southwest Portland Cement Railroad

TAMC – Transportation Agency for Monterey County

TCIF – Trade Corridor Improvement Fund

TCRP – Traffic Congestion Relief Program

TEU – Twenty-foot equivalent unit

TIF – Transportation Investment Fund

TIFIA – Transportation Infrastructure Finance and Innovation Act

TIGER – Transportation Investment Generating Economic Recovery

TIH – Toxic inhalation hazard

TJPA – Transbay Joint Powers Authority

TRANSCON – Transcontinental Corridor

TOD – Transit-oriented development

TOFC – Trailer-on-flat car

TRC – Trona Railway Company

TREDIS – Transportation Economic Development Impact System

TSA – Transportation Security Administration

TWC – Track Warrant Control

U.S. DOT – U.S. Department of Transportation

UPRR – Union Pacific Railroad

USC – United States Code

V/C – Volume/Capacity

VCRR – Ventura County Railroad

VCTC – Ventura County Transportation Commission

VHT – Vehicle hours traveled

VMT – Vehicle miles traveled

WFS – Western Farm Service (West Isle Line, Inc.)

YOE – Year-of-Expenditure

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Executive Summary

In 2008, the United States Congress enacted the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which aimed to strengthen the national rail network by developing a long-term vision of the rail system. PRIIA underscores the benefits of integrating rail planning into the statewide transportation planning process. The federal law requires that states develop state rail plans no less frequently than every five years to be eligible for federal funding for high-speed rail (HSR) and intercity passenger rail programs. The law also encourages states to develop strategies and policies for enhanced passenger and freight rail services that benefit the public. The 2013 *California State Rail Plan* (CSRP) makes the State compliant with 49 United States Code Section 22102 concerning state rail plans and state rail administration.

The CSRP establishes a statewide vision and objectives, sets priorities, and develops implementation strategies to enhance passenger and freight rail service in the public interest. The CSRP uses 2020 as the five-year horizon, 2025 as the 10-year horizon, and 2040 as the 20-year horizon. This 2040 horizon coincides with the analysis horizon of the California Transportation Plan (CTP) and many of California's Regional Transportation Plans. The CSRP provides a comprehensive listing of long-range investment needs for California's passenger and freight infrastructure. It supports the State's goal of developing an integrated, multimodal transportation network. Finally, the CSRP will guide federal and state rail investments that will improve the movement of people and goods while enhancing economic growth and quality of life.

The CSRP has 10 chapters, as follows:

1. Introduction.
2. California Rail Transportation Context and Challenges.
3. Rail Vision Statement.
4. Public Outreach.
5. Existing Passenger Rail System.
6. Existing Freight Rail System.
7. Passenger and Freight Rail Integration.
8. Passenger Rail Improvements.
9. Freight Rail Improvements.
10. Rail Benefits and Next Steps.

Introduction

California's rail system performance over the past decade underscores the system's importance to the State. Intercity and commuter passenger rail ridership has been robust and increased during that period. At the same time, the freight rail network has become increasingly important for international, domestic, and intrastate trade.

Passenger and freight rail are positioned to help address environmental, economic development, and population growth challenges, such as increased travel demand, traffic congestion, and greenhouse gas (GHG) emissions. The advent of a statewide HSR system that will be integrated into the existing passenger rail network provides opportunities to address these challenges.

Meeting these challenges will be complex. Additional funding is needed for capital investments, ongoing operations, and maintenance. Plans for HSR development and integration with intercity and commuter rail systems—which leverage state and federal HSR investments—will require well-coordinated and integrated planning, programming, and execution by multiple agencies. Rail networks face increasing freight and passenger demand, often on freight-owned rail infrastructure. Additionally, multiple passenger rail operators (HSR, intercity, and commuter) must respond to traveler expectations of coordinated rail service operations, safety, ticketing, and traveler information.

Institutional structures for planning and delivering passenger rail services are evolving as a result of recent state recent legislation. Effective July 1, 2013, a new transportation agency will be created in California state government. This agency will have jurisdiction over the California High-Speed Rail Authority (Authority), the California Department of Transportation (Caltrans), and other transportation-related state departments. The California State Legislature also authorized creation of joint powers authorities (JPA) for the *Pacific Surfliner* and *San Joaquin* routes that can assume certain intercity passenger rail planning and operations responsibilities for the two routes.

These changes bring the possibility of more collaborative passenger rail planning between state and local agencies and between HSR, intercity and commuter rail agencies. Such collaboration is already evident in several related planning efforts and studies that currently underway. These studies include railroad operations modeling, ridership and benefit studies, and focussed analysis such as the Stockton Hub study. These ongoing and future efforts are key steps in developing a more integrated passenger rail system.

The 2013 CSRP provides a planning framework for improving and integrating California's rail system. It notes improvements made over the past decade, addresses future needs, and details plans for expansion and integration of rail services.

CSRP Highlights

The major findings and results of the CSRP are as follows:

- The 2013 CSRP is more comprehensive and wide-reaching than previous state rail plans, partly because of new federal rail law.
- The CSRP establishes the following rail vision statement for the future:

  California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life.
- The CSRP plans for the integration of HSR, intercity and commuter rail systems consistent with the Authority's California High-Speed Rail Program Revised 2012 Business Plan (2012 Business Plan). The plans for this network anticipate the travel needs of future population and employment growth.
- California has invested in expanding high-capacity and high-performance intercity and commuter passenger rail services for many years. These services attract high passenger volumes; the three state-supported services are the second, third, and fifth busiest routes in the country.
- Intercity passenger rail institutional roles are changing as the result of 2012 legislation that authorized creation of two JPAs to administer the *Pacific Surfliner* and *San Joaquin* routes.
- In 2013, Caltrans and the Authority will become part of a new State Transportation Agency. This agency's actions may have a major impact on rail planning and service delivery.
- The CSRP summarizes plans for expanding the *San Joaquin* route to support service on the first construction section of the Initial Operating Section (IOS) of the HSR system planned for 2018.

As many as 7 to 11 daily *San Joaquin* roundtrips may operate on the first construction section of the IOS, and as many as three to six daily *San Joaquin* roundtrips may operate on the BNSF Railway line until the entire IOS is constructed (planned for 2022).

- The CSRP describes the planned passenger rail system in 2025, including initial HSR operations (which are anticipated to be in effect by 2022). At that time, 34 round trips on the initial HSR segment from Merced to the San Fernando Valley are planned. Additional expansions to intercity and commuter routes are planned to provide network integration with the HSR system and meet demand from population growth. These intercity and commuter expansions are subject to additional service planning and operations modeling.
- The CSRP describes plans for expansion of existing intercity rail services and new intercity services. The proposed expansion of services listed below and the anticipated associated passenger rail improvements described in the CSRP are the subject of ongoing Class I railroad operations analysis and related studies. Project scope and costs will be refined as the result of this analysis.
    - *Pacific Surfliner*. By 2030, 6 more daily round trips from San Diego to Los Angeles for a total of 18; 2 more daily round trips from Los Angeles to Goleta for a total of 7 with 2 of those trips continuing from Goleta to San Luis Obispo for a total of 4. Some of these frequencies could operate before 2030 if the necessary capital improvements are completed. Two of these trains would extend north to San Francisco as the new Coast Daylight service.
    - *Capitol Corridor.* By 2020, 1 additional weekday round trip from Sacramento to Oakland for a total of 16, and four additional weekday round trips from San Jose to Oakland for a total of 11.
    - *San Joaquin*. Services could be revised to take advantage of opportunities provided by completion of the first construction section of the IOS. Specific expansion plans beyond 2018 will be determined through ongoing planning activities.
- The CSRP provides next steps for the implementation of Coachella Valley intercity rail service, including completion of a Service Development Plan and a Programmatic Environmental Document.
- The CSRP describes commuter rail agency plans for expansion of existing commuter rail services and new commuter services. Execution of these plans is contingent upon funding and agreement of the railroad that owns the right-of-way.
- California is a major origin and destination for freight rail traffic, given its market size and position in international trade flows. The expansion of the Panama Canal and other Pacific Coast port expansions are unlikely to change Pacific Rim trade that moves on California freight railroads. Regional planning studies have identified a series of projects that can resolve freight chokepoints and bottlenecks.
- The CSRP emphasizes the critical role Class I and short line freight railroads play in international trade which benefits California shippers and the national rail network. In many cases short line railroads provide the only connection for California customers, shippers, and manufactures to the national rail network. The CSRP explains how the freight rail system is connected to ports and intermodal terminals through multimodal transportation networks.
- The CSRP stresses the importance of large annual expenditures by Class I and short line freight railroads in maintenance, capacity expansion, locomotives, and rolling stock. The plan also identifies currently planned trade corridor and grade-separation projects totaling almost

$16 billion. These public investments will leverage private rail spending, helping to expand the economic benefits of the State's freight rail network.

- Many of the intercity and commuter rail services run on private Class I freight railroad right-of-way, which provides challenges and opportunities for the passenger and freight rail systems.
- Major conflicts in rail corridors will require careful coordination between multiple passenger and freight users. Examples of such corridors include Oakland to Sacramento, Los Angeles to Colton, Los Angeles to Riverside, and Los Angeles to Burbank.
- The CSRP describes the following public benefits of the HSR and intercity passenger rail improvements:
    - Statewide carbon dioxide emission reduction of 37,000 tons per year in 2020, 573,000 tons per year in 2025, and almost 1.9 million tons per year by 2040 from the expanded HSR and intercity passenger rail system.
    - Annual user and non-user economic benefits increasing from $150 million in 2020 to $2.7 billion in 2025 and to nearly $7.2 billion in 2040.
- The CSRP describes potential local community effects from rail system investments, and also explains how freight and passenger rail systems are generally more environmentally efficient than other modes in terms of emissions per ton-mile or per passenger mile.
- Stakeholder outreach was conducted using a variety of methods and channels to encourage input and feedback. These channels included 5 CSRP Open House meetings and a webinar for both stakeholders and the general public. Outreach was also conducted with Native American tribes. During the review period, 216 comments were received, with 929 separate comments recorded. These comments are reflected in this CSRP.
- Dynamic changes have created rapid evolution in funding and planning for California's passenger and freight rail system. Class I railroads are conducting operations analysis, Caltrans and the Authority will be updating planning documents, and environmental work at the program and project level is proceeding. This work will be reflected in future documents, including the next CSRP and the 2014 High-Speed Rail Program Business Plan.

CSRP Chapter Summaries

Chapter 1: Introduction. Chapter 1 explains what the 2013 CSRP will accomplish and why the plan is more comprehensive and wide reaching than previous state rail plans. It details how the CSRP meets federal requirements for state rail plans. The chapter also explains how the 2013 CSRP responds to changes in federal rail policy and funding.

Chapter 2: California Rail Transportation Context and Challenges. Chapter 2 describes the policy, planning, and legislative context for the CSRP. The chapter includes background regarding California's socioeconomic and environmental context, tribal perspectives for passenger and freight rail, and emerging rail transportation system challenges. The first section in Chapter 2 describes the evolving responsibilities for California's passenger rail system and key network integration needs. The section continues by describing the Authority's 2012 Business Plan and the CSRP's consistency with that plan. The section concludes by highlighting the relationship between the CSRP, other Caltrans modal planning efforts, and the CTP. Remaining sections in Chapter 2 address the environmental review processes for rail projects, rail transportation's environmental benefits, tribal consultation and transportation needs, demand factors for growth in passenger and freight traffic, needs for seamless passenger transportation connections, necessity of integrated passenger rail planning, and requirements for continued investment in Positive Train Control (PTC) and "state of good repair". Appendix A provides the county-level population and employment forecasts used in the CSRP ridership and benefits analysis.

Chapter 3: State Rail Plan Vision Statement. Chapter 3 presents California's unified rail vision: *California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life*. The passenger rail system creates an integrated network with state-of-the-art, customer-focused services that enhance quality of life. The freight rail system connects industries and shippers to national and international markets, co-exists with growing passenger rail services, and improves quality of life. Chapter 3 also describes how the CSRP vision is consistent with the CTP vision, goals, and objectives, and it describes Caltrans' role.

Chapter 4: Public Outreach. This chapter details the public outreach goals, objectives, and support tasks such as stakeholder databases, website development, branding, and creation of collateral materials. The public outreach plan included a series of meetings and coordination with the CSRP Advisory Committee, other state agencies, and public meetings associated with the February 2013 Draft CSRP release. The chapter outlines this activity, summarizes how comments received were incorporated into the CSRP, and details how interested stakeholders provided their CSRP input and feedback. Appendix B provides more detailed information on outreach.

Chapter 5: Existing Passenger Rail System. Chapter 5 includes a detailed description of California's state-supported intercity routes: *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor*, including the connecting Amtrak Thruway bus service. It also describes the Amtrak long-distance trains that operate in California. The chapter describes the State's commuter rail services, urban rail systems, and their connectivity to intercity and commuter rail. Exhibit ES.1 shows the state-supported and Amtrak long-distance intercity passenger rail routes in California. The chapter discusses passenger rail connectivity, rail station configurations, and operational aspects, and includes performance data for the state-supported and long-distance routes. Additionally, Chapter 5 explains current and emerging institutional roles and relationships among owners/operators of passenger rail and other regulatory agencies, and it details safety and security agencies, programs, and issues.

Chapter 6: Existing Freight Rail System. This chapter describes and inventories California's freight railroad system, which is shown in Exhibit ES.2. For Class I and short lines, this information includes system characteristics, capabilities, and functions. The chapter offers details on types of commodities moved along the current and future freight rail network. The chapter describes freight rail trends, emphasizing the unique function of California's freight rail network, international trade flows, logistics change, and upcoming PTC requirements. The chapter also discusses freight rail system bottlenecks and capacity issues, institutional structure of freight rail programs, statutes affecting freight rail, public initiatives for rail freight, and freight rail safety and security. Appendices C to F provide additional information on the freight rail system.

Chapter 7: Passenger and Freight Rail Integration. This chapter discusses current and future issues in California regarding passenger and freight trains sharing the same tracks. The chapter identifies corridors with high train volumes, challenges for ongoing shared conditions, and strategies and mitigation measures for corridors experiencing increased demand by multiple users. Major conflicts in several rail corridors will require careful coordination among multiple passenger and freight users. The chapter also discusses passenger and freight rail connectivity. Appendix G provides supplemental information on demand and capacity.

Exhibit ES.1: California Existing Intercity Passenger Rail Routes

Sources: Esri, 2012; Caltrans, 2013.

Exhibit ES.2: California Class I Rail System, 2012

Sources: Esri, 2012; Caltrans, 2013.

Note: Map indicates rail lines over which Class I railroads operate and the underlying track owner, which includes public agencies.

Chapter 8: Passenger Rail Improvements. This chapter discusses HSR phased implementation, including the strategy of early investments to create a statewide rail network; details the proposed frequency increases for the three existing state-supported intercity rail routes based on existing planning studies, and provides a list of prioritized improvements by time frame (subject to additional studies currently underway) to provide these frequency increases and other service improvements; proposed extensions to intercity rail routes and proposed new routes; a program of improvements for existing commuter rail services and proposed new commuter rail services; and the proposed X Train and HSR XpressWest services. Exhibit ES.3 depicts the planned California HSR system, while Exhibit ES.4 shows the integrated statewide passenger rail system map including conventional intercity, long-distance Amtrak routes, the proposed HSR system, and related proposed services. Finally, the chapter addresses station planning to enhance connectivity to other transportation systems.

Chapter 9: Freight Rail Improvements. Chapter 9 outlines four kinds of freight rail issues and improvements: trade corridors, local rail, community impact mitigation, and economic development. The chapter describes new projects and programs for freight investments, policy issues, and best practices for consideration, and lists freight rail-related highway-rail grade separations. It also stresses the importance of large annual expenditures by Class I and short line freight railroads in maintenance, capacity expansion, locomotives, and rolling stock. Chapter 9 identifies currently planned trade corridor and grade-separation projects totaling almost $16 billion. Appendix H provides further information on grade-separation projects.

Chapter 10: Rail Benefits and Next Steps. Chapter 10 summarizes the illustrative rail service planning assumptions for 2020, 2025, and 2040 for phased implementation of the HSR system and blended operations with intercity and commuter rail routes to deliver integrated statewide passenger rail service. Ridership and revenue projections for these illustrative planning assumptions are then presented. Impacts projected to result from implementation of the planning scenarios are quantified for vehicle miles and hours traveled, GHG and air quality emission, and economic effects for rail system users and the general public. Other environmental and land use and community benefits of planned rail are discussed. The chapter describes current and potential federal and state rail funding programs. Finally, the chapter suggests important next steps presented in the following categories: institutional changes, planning activities, and project execution. The next steps are:

- **Institutional Changes**. Relationships among organizations engaged in passenger rail planning and service delivery could change in the near future. To deliver the HSR Blended System, new institutional structures may evolve.
    - Effective July 1, 2013, a new State Transportation Agency will be created in California state government that will have jurisdiction over the Authority, Caltrans, and other transportation related state departments. The proposed State Fiscal Year (SFY) 2013-14 Governor's Budget states: "The Transportation Agency develops and coordinates the policies and programs of the State's transportation entities to achieve the State's mobility, safety, and air quality objectives from its transportation system." This agency's actions may have a major impact on rail planning and delivery.
    - In 2012, the California State Legislature authorized the creation of two new JPAs to administer the *Pacific Surfliner* and *San Joaquin* routes (described in more detail in Section 5.3.1 in Chapter 5). JPAs have been created and can enter into interagency transfer agreements with Caltrans between June 30, 2014 and June 30, 2015. The legislation specifies several requirements that must be reached before the interagency transfer agreements can be executed. Under the terms of the legislation, Caltrans would continue to administer the two routes through SFY 2013-14. The process of establishing JPAs which would administer the routes has started. This process provides a forum for reexamination of the appropriate institutional structures to administer intercity rail in California.

Exhibit ES.3: California High-Speed Rail Initial Operating Section and Phased Implementation

Source: Authority, 2013.

Notes: Map for illustrative purposes only. Phase II alignment segments are still in the planning stages and will require extensive environmental work, outreach, and review. “Northern California Unified Service” is discussed in greater detail in Section 8.1.4.

Exhibit ES.4: Proposed New Passenger Rail Routes and Current Route Extensions

Sources: Esri, 2012; Caltrans, 2013.

  - With the release of the 2012 Business Plan, the Authority, Caltrans, Capitol Corridor JPA, commuter rail agencies, and other regional transportation and urban transit agencies realized new cooperative structures would need to be formed to plan and deliver the HSR Blended System. As discussed in Section 2.1.3 of Chapter 2, the Northern and Southern California Rail Partners Working Groups were formed to assist in planning and delivering the HSR Blended System. These planning and delivery structures are still evolving, as are decisions on the necessary planning documents and projects to deliver the Blended system.
  - The Authority expects to enter into partnerships with private firms and/or consortia for funding, construction, and/or operations of HSR services.
  - Congressional deliberations on reauthorization of PRIIA and of the Moving Ahead for Progress in the 21st Century Act (MAP-21) may expand or alter federal programs for passenger and freight rail programs. Any program changes could alter federal and state agency responsibilities.

- **Planning Activities**. Entities engaged in rail planning and delivery will continue to plan a wide range of passenger and freight rail projects and services in California. These activities include developing plans for the HSR Blended System, planning for existing system expansion, and planning and delivering new rail systems. As noted above, the institutional structure to plan and operate the HSR Blended System is evolving, and it has not been fully determined which entities will be involved in the following planning activities:
  - Plans for integrating HSR and conventional passenger rail into the Blended System will need to be developed. Necessary actions include:
    - Prioritize capital projects for the 2018 and 2022 Blended System.
    - Administer and fund operations and maintenance, including revenue and cost sharing.
    - Deliver, utilize, and maintain fleet.
    - Develop schedule and fare integration policies and systems.
    - Plan transit and other transportation connectivity.
    - Develop integrated marketing and branding.
  - Detailed capital and service planning is necessary for some specific locations where the existing rail systems will need to be expanded to meet the needs of the statewide Blended System. Examples of these locations include Stockton, the HSR IOS Merced terminus, the HSR IOS San Fernando Valley terminus, and Los Angeles Union Station.
  - Railroads will be conducting ongoing and new rail operations simulation modeling to determine the effects of planned HSR, intercity, and commuter passenger rail operations in freight and publicly-owned rail corridors, and the necessary capital projects to allow delivery of the planned service.
  - Environmental clearance for HSR projects and for necessary intercity and commuter rail projects on existing routes and the planned HSR Blended System will continue through the completion of program and project environmental documents.
  - Service development plans, which are the rail corridor-level companion documents to environmental documents, will be completed and possibly updated, particularly in relation to planning the HSR Blended System.

  - Station area planning activities for stations on the HSR and conventional rail network will be conducted to improve connectivity.
  - Detailed plans, including engineering and environmental, will be prepared for passenger and freight rail projects listed in Chapters 8 and 9.
  - The CSRP and the Authority's 2012 Business Plan will be updated in accordance with state law. These updates will include the latest information on future passenger rail operations and ongoing planning activities.
  - New passenger rail services or extensions of services described in Chapter 8 will require operational modeling and operational agreements with the applicable freight railroads.
  - Planning for freight rail projects in the upcoming *California Freight Mobility Plan* will proceed.
- **Project Execution**. Even as public agencies complete detailed passenger and freight rail plans, many funded freight and passenger rail projects will move into procurement, construction, and/or manufacturing. These steps include the following:
  - Passenger rail locomotives and coaches for intercity service meeting new national equipment specifications will be manufactured domestically and will be tested and put into operating service.
  - New mainline track, sidings, switches and turnouts, and train signal and control systems will be constructed on rail lines throughout the State for freight rail operations and for passenger rail services.
  - New maintenance and layover facilities will be constructed to accommodate blended HSR service.

Conclusions

The CSRP provides a thorough description of how California's planned rail investments will continue to support the nation's largest population and economy by moving people and goods across a sustainable system. The CSRP provides an analysis for long-range passenger and freight rail investment to meet projected passenger travel and domestic and international freight demand. These investments are also informed by the following vision for the future: *California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life.*

This CSRP has been developed through an extensive stakeholder and public outreach process. It meets federal rail plan requirements to ensure California's eligibility for future federal high-speed and intercity passenger rail funding. The CSRP integrates into a broader set of plans that will lead to the 2040 CTP, which will meet the state statutory requirements for identifying an integrated, statewide multimodal transportation system that supports the State's GHG emission reduction goals.

The CSRP integrates the plans of many institutions, agencies, and companies from across California, reflecting the State's unique culture of shared transportation planning and operations and its ongoing commitment to expanding freight and passenger rail services. The CSRP incorporates the Authority's HSR implementation plans, including network integration and infrastructure improvements for intercity and commuter passenger rail corridors and systems. Since these plans are evolving due to the dynamic nature of HSR network integration planning, the CSRP captures the plans existing at the time of CSRP release.

The CSRP includes a comprehensive listing of proposed and planned rail improvements within the context of the current freight and passenger rail system inventory and planning environment. Future CSRP iterations will build upon this plan to capture and reflect the updates and plans for the California integrated passenger and freight rail environment.

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1.0 Introduction

The purpose of the *California State Rail Plan* (CSRP) is to:

- Establish the overall vision for the state rail system and support the State's goals and policies to improve passenger and freight rail transportation and serve the public interest.
- Describe how system components managed by the California Department of Transportation (Caltrans) and those managed by other entities will work together to deliver a comprehensive set of rail services that are well integrated in the State's multimodal transportation system.
- Provide a current inventory of the system and identify opportunities, needs, and deficiencies.
- Analyze rail corridors and programs, propose future improvements and investments, and assess funding options.
- Support and reflect other state, regional, and local planning activities throughout California.

The CSRP fulfills all the requirements of the Federal Railroad Administration's (FRA) State Rail Plan guidance and complies with the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). A number of major differences in the current rail policy environment make this CSRP different from the previous state rail plan entitled *California State Rail Plan 2007-2008 to 2017-2018*. These include:

- Changes in federal rail policy through the enactment of the PRIIA, $10 billion of subsequent appropriations for high-speed rail improvements in 2009 and 2010, and statutory requirements that authorized federal high-speed and intercity passenger rail funds can only be granted to projects identified in PRIIA-compliant state rail plans.
- Federal requirements for state rail plans in PRIIA which provide common expectations for state rail plan content and organization, and FRA guidance in the form of plan outlines and templates.
- New California legislation[1] that integrates transportation planning requirements at regional and state levels with greenhouse gas emissions reductions requirements in Assembly Bill (AB) 32 (Núñez 2006).
- Voter-approved implementation of high-speed rail (HSR) in California; and subsequent development of environmental, engineering, and business plans led by the California High-Speed Rail Authority (Authority), as well as the start of construction in the Central Valley in 2013.

Additionally, the CSRP has been prepared in parallel with other modal plans and the California Interregional Blueprint (CIB) for incorporation into the California Transportation Plan (CTP) 2040. Accordingly, the CSRP uses 2020 as the five-year horizon, 2025 as the 10-year horizon, and 2040 as the 20-year horizon. This 2040 horizon coincides with the analysis horizon for the CTP and many of California's Regional Transportation Plans. Chapter 2 further explains how the CSRP relates to other modal plans.

[1] Senate Bill (SB) 375 (Steinberg 2008) and SB 391 (Liu 2009).

The following federal and state rail planning requirements dictate the plan's content and scope.

Federal state rail plan requirements. PRIIA requires that states prepare comprehensive rail plans to be eligible for new federal rail grants, including funding for conventional and high-speed rail capital improvements. The CSRP will address PRIIA requirements by providing:

- An inventory of the existing state rail transportation system, rail services, and facilities.
- An explanation of state passenger rail service objectives.
- An analysis of the transportation, environmental, and economic impacts in the State.
- An analysis of long-range state investment needs for current and future freight and passenger infrastructure.
- A plan for long-range state infrastructure investment needs and associated legislative, policy, institutional, and program changes

The FRA provided a grant that partially funded CSRP development. The FRA also provided a Preliminary State Rail Plan Outline incorporating PRIIA requirements. The FRA also provided funding to Caltrans to prepare service development plans for three passenger rail corridors. Planning information from these service development plans, along with other non-FRA funded documents, is incorporated into this CSRP.

California statutory requirements. Current California Government Code Section 14036 requires Caltrans to prepare a 10-year State Rail Plan with both passenger and freight rail elements enumerated in the statute, and update the plan biennially. However, legislation was introduced in February 2013[2] that would modify Section 14036 to conform to PRIIA. The CSRP will provide the basis for a future state rail plan that complies with state law, as amended.

Caltrans contractual requirements. This CSRP has been prepared with the assistance of consultants procured by Caltrans.[3] The scope of work for that contract specified that this CSRP would comply with PRIIA, the FRA's Preliminary State Rail Plan Outline, and would incorporate other study elements. Caltrans approved the outline for this CSRP to address all of these required planning elements.

High-Speed Rail. This CSRP integrates HSR into the full scope of the plan. The Authority adopted the *California High-Speed Rail Program Revised 2012 Business Plan*[4] (2012 Business Plan) that includes early investments in local rail systems that will be ultimately integrated with HSR. A key element of the implementation strategy is the blended approach in which existing metropolitan rail infrastructure is used as much as possible, and upgraded as needed to provide HSR connections into urban areas. Chapters 8 and 10 of the CSRP explain how the statewide HSR system will be implemented and integrated with other passenger rail systems; how that phased integration will affect corridor investments; and how state, federal, and private funds are expected to be leveraged in the delivery of the blended HSR service.

CSRP Approval Process. Caltrans will submit this CSRP to FRA for approval under the terms of the FRA grant that produced this CSRP. FRA staff have been reviewing and approving CSRP work products and milestones throughout the CSRP development process, offering comments and instructions, which have been incorporated into this CSRP. Furthermore, the CSRP, along with other state rail plans, service development plans, and multistate regional plans, will be input into future iterations of the *National Rail Plan*.

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2 AB 528 (Lowenthal).

3 Bid 75A0321, California State Rail Plan and Service Development Plans, January 31, 2011.

4 The 2012 Business Plan can be found at http://www.cahighspeedrail.ca.gov/Business_Plan_reports.aspx.

State legislation was introduced in February 2013 to modify existing state law (California Government Code 14036) regarding the contents and state approval process regarding state rail plans. This CSRP will provide the basis for a future state rail plan that will comply with state law, as amended.

CSRP Overview. State rail planning involves a different set of stakeholders, interests, organizations, agencies, operators, and customers than other modal plans that will contribute to CTP 2040. The CSRP describes how public and private funding brings about improvements to the rail system; how those improvements benefit the public and the private sectors; and how those improvements are important components of the State's multimodal transportation system.

Table 1.1 lists the chapters in the CSRP and describes the major topics and elements included in each chapter.

Table 1.1: State Rail Plan Chapters

Chapter/Title	Chapter Topics
1. Introduction	Purpose and requirements for the CSRP
2. California Rail Transportation Context and Challenges	Policy and legislative context, socioeconomic and environmental background, rail transportation system challenges
3. Rail Vision Statement	Vision statement for the CSRP; objectives for passenger and freight rail systems; how the CSRP vision fits within CTP 2025 vision, goals, and policies; CIB, and other modal plans
4. Public Outreach and Approval Process	Explains efforts to engage stakeholders and the public in CSRP preparation
5. Passenger Rail System	Inventory of current passenger rail services, performance measures, institutional issues and trends, safety, and security information
6. Freight Rail System	Inventory of freight rail companies, lines, and connections; freight demand statistics, trends, and issues; freight system bottlenecks, institutional issues, safety, and security
7. Passenger/Freight Rail Integration	How passenger rail projects on freight rail facilities will interact, considering passenger and freight demand projections
8. Passenger Rail Improvements	Corridor-level information on near-, mid-, and long-term programs of improvements to HSR; intercity and commuter rail services and connectivity
9. Freight Rail Improvements	Projects and programs for freight rail projects, including capacity expansion, congestion relief, and connectivity improvements
10. Rail Benefits and Next Steps	Ridership and revenue forecasts for passenger rail services; public and private benefits for rail projects, including transportation, economic and environmental benefits, rail abandonment and preservation programs, rail funding, and financing programs; and next steps for implementation plans

Source: Cambridge Systematics, Inc., 2013.

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2.0 California Rail Transportation Context and Challenges

Chapter 2 describes key policies that affect rail planning within California and provides an overview of demographic, socioeconomic, and economic trends that will affect passenger and freight rail demand. The chapter concludes with a discussion of challenges facing the state rail system.

2.1 Policy Context

This section describes the transportation planning requirements and documents that influence plans for passenger and freight rail improvements in this *California State Rail Plan* (CSRP).

2.1.1 California's Evolving Passenger Rail Planning and Delivery

Since changes in state law in the late 1990s, regional agencies have played an active role in planning and delivering highway projects. Similar institutional and organizational changes are now taking place with passenger rail planning and delivery. These changes bring the possibility of more collaborative passenger rail planning between state and local agencies and between high-speed rail (HSR), intercity and commuter rail agencies. As a result, the changes may facilitate developing a more integrated passenger rail system.

At the same time, agency roles and responsibilities are still evolving because the structures for planning and delivering passenger rail services are not yet fully determined. These institutional changes may affect how rail planning agencies will fulfill their duties in multimodal transportation plans. Section 5.3 describes these relationships and roles in more detail.

Recent legislation has affected the authority of and relationships among California's rail planning agencies. Effective July 1, 2013, a new transportation agency will be created in California state government. This agency will have jurisdiction over the California High-Speed Rail Authority (Authority), the California Department of Transportation (Caltrans), and other transportation-related state departments. The new agency will provide additional focus on transportation issues and unify transportation and rail policy under one state agency.

The California State Legislature authorized creation of joint powers authorities (JPA) for the *Pacific Surfliner* and *San Joaquin* routes. The legislation empowers local governments to collaborate and form JPAs. If a JPA is created, state law authorizes the Secretary of Transportation to enter into an interagency transfer agreement with the JPA between June 30, 2014 and June 30, 2015, that would transfer certain intercity passenger rail planning and operations responsibilities to the JPA. JPAs have been formed for both routes. Under the terms of the legislation, Caltrans would continue to administer the two routes at least through State Fiscal Year (SFY) 2013-14. This process provides a forum for the reexamination of the appropriate institutional structures to administer intercity rail in California.

As a result of these changing structures, new opportunities are arising for integrated planning and cross-leveraging state, regional, and federal funds for capital project and service delivery. However, these organizational changes will require additional coordination between HSR, intercity, and commuter rail agencies at the regional level to maintain a cohesive and efficient rail service.

This CSRP captures as many of the outputs of rail planning work as possible as plans for passenger rail (HSR, intercity, and commuter) are developed by a changing roster of rail planning organizations. Future CSRP updates will reflect how the ongoing state and regional planning work will produce new service plans, projects, public benefits, and funding programs.

2.1.2 Integrating Statewide Passenger Rail

California has invested in expanding high-capacity and high-performance intercity and commuter passenger rail services for many years. These passenger rail routes and connecting transit services attract high passenger volumes. For example, the three state-supported intercity passenger rail routes attracted nearly 5.6 million riders in the SFY 2011-12 compared to 3.6 million a decade earlier[5]. These routes, the *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor*, are the second, third, and fifth busiest routes in the country, respectively. Commuter rail ridership totaled 28.5 million trips in SFY 2011-12 compared to 20.5 million trips a decade earlier. These passenger rail routes connect to urban transit systems throughout California; these transit providers served 1.27 billion trips in calendar year 2012.[6]

These ridership trends have occurred in conjunction with increased passenger rail route coverage and service frequencies. California's passenger rail and urban transit operators have also collaborated to begin providing a more integrated rail and transit experience within metropolitan areas and across the State. For example, many southern California agencies have worked to further integrate passenger rail services in the Los Angeles-San Diego-San Luis Obispo corridor.

Progress has also been made with simplifying fare payments for travelers who transfer between passenger rail and urban transit route. The "Rail to Rail" program, which allows joint ticket honoring between the *Pacific Surfliner* and commuter rail in southern California traveling on the LOSSAN corridor, began with Metrolink in September 2002 and COASTER in April 2004. The *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor* also offer free transfers to and from many urban transit routes.

In spite of these advances, several notable operating and service gaps currently hinder the vision of integrated statewide passenger rail service. Schedule coordination between passenger rail operators is inconsistent across the State, requiring long wait times for many travelers who transfer between routes. In spite of the transfer programs noted above, multiple tickets – purchased from multiple vendors – are still often required to complete a door-to-door trip via passenger rail. While real-time arrival information is available from many passenger rail and urban transit providers, the information is specific to individual routes or operators; accordingly, a traveler is unaware of the effect that a single route delay can have on an entire journey across multiple operators. Section 2.4.2 identifies the key service integration elements that are critical to providing a seamless travel experience; these elements are further detailed in Section 5.1.3.

The most notable statewide gap is the lack of a frequent single-seat passenger rail service between northern and southern California. While extensive passenger rail options exist within northern California (between Sacramento, the Bay Area, and the San Joaquin Valley) and within southern California (between the Central Coast, Los Angeles, the Inland Empire, Orange County, and San Diego), only one passenger train – Amtrak's long-distance *Coast Starlight* – offers a single-seat connection between northern and southern California. The *San Joaquin* provides rail service between northern and southern California, but the trip requires an Amtrak Thruway bus connection between Los Angeles and Bakersfield. Thruway bus connections can also be made to other points in southern California.

The Amtrak Thruway bus connections are essential to success of all three state-supported routes in terms of meeting its customers' travel needs and improving financial performance. Nonetheless, a combined rail-bus trip is not an optimal long-term solution for integrated statewide passenger rail service. Addressing this service gap has been mentioned in prior CSRPs and regional and corridor studies. Near-term gap resolution was also mentioned by many individuals and organizations during the 2013 CSRP public outreach process.

5 Intercity and commuter passenger rail ridership data can be found in Section 5.1.

6 Source: Public Transportation Ridership Report, Fourth Quarter 2012; American Public Transit Association; March 2013.

Gap closure along the coast and across the Tehachapi Mountains south of Bakersfield is a major investment focus in this CSRP. Each of the three planning horizon years includes plans for service expansion, infrastructure projects, and equipment purchase to incrementally improve direct passenger rail service between northern and southern California. For example:

- By 2020, a *Coast Daylight* route will reestablish direct passenger rail service between San Francisco and Los Angeles. This service will supplement the existing *Coast Starlight* route with stops at several additional intermediate communities. Integrated passenger rail services will be expanded between intercity and passenger rail providers in northern and southern California. An expanded Thruway bus network between Bakersfield and southern California is envisioned to augment increased passenger rail service in the San Joaquin Valley.
- By 2025, the service gap across the Tehachapi Mountains will be closed upon completion and operation of the HSR Initial Operating Section (IOS), which is planned for 2022. This IOS will provide a single-seat ride between Merced and the San Fernando Valley, with connecting passenger rail service to Sacramento, the Bay Area, Los Angeles, and elsewhere in southern California.
- By 2040, single-seat service between the Bay Area and southern California will be greatly expanded through completion of the HSR Phase 1 Blended System to Los Angeles Union Station, Anaheim, San Jose, and San Francisco. A second daily *Coast Daylight* round trip will expand direct passenger rail service between San Francisco and Los Angeles via the Central Coast.

Coordinated planning and implementation have been underway for decades to begin developing the type of integrated passenger rail system expected by today's travelers. Progress may appear slow at times since development is incremental as funding becomes available. Planning for the Blended System has increased this coordination in the past few years. As facility and service gaps are closed, California gets closer to a statewide reality of door-to-door multimodal travel options across regional borders. Fully implementing this CSRP is a key step in realizing the vision.

2.1.3 High-Speed Rail 2012 Business Plan

The Authority is building California's future with an HSR system running from San Francisco to Los Angeles/Anaheim via the Central Valley, and later to Sacramento and San Diego. The *California High-Speed Rail Program Revised 2012 Business Plan* (2012 Business Plan) provides an implementation strategy of early investments in intercity, regional, and commuter rail systems and phased HSR system delivery. The blended approach to HSR implementation is a key element of the system. It integrates HSR service with existing systems allowing for coordinated scheduling, ticketing, and transfers.

The 2012 Business Plan identifies a strategy to fund IOS construction from a variety of potential sources. The 300-mile IOS will extend from Merced through Bakersfield and Palmdale to the San Fernando Valley, closing the passenger rail service gap across the Tehachapi Mountains. Upon IOS completion and service initiation, the Authority anticipates positive ridership and revenue flow and private sector investment consistent with international experience. The Authority will partner with the private sector for the delivery, operation, and maintenance of system infrastructure and the operation of rail service. The 2012 Business Plan details a statewide HSR program that will produce economic benefits, support statewide environmental and energy goals, create near- and long-term employment, and improve mobility throughout the State. This planning effort is discussed further in Chapter 8.

A major focus of the Authority's 2012 Business Plan is to implement a statewide integrated rail network through coordinated infrastructure investments and blended operations in both northern California (2018) and southern California (2022). An integrated system whereby HSR and conventional passenger rail services feed into one another will improve ridership potential for all participating services. Developing a cohesive, blended service requires coordinated planning between the Authority, intercity rail, and commuter rail agencies.

The Authority has engaged ad-hoc regional working groups to facilitate the planning process. The Northern California Rail Partners Working Group (NCRPWG) and Southern California Rail Partners Working Group (SCRPWG) comprise a statewide working group that is exploring service plans and early infrastructure projects for the Blended System. These working groups will also identify ways to integrate passenger rail services, including scheduling, ticketing, and station improvements. Future CSRP updates will incorporate the results of these blended service planning activities.

NCRPWG members include the Authority, Caltrans, and northern California passenger rail operators (Altamont Corridor Express (ACE), Capitol Corridor Joint Powers Authority (CCJPA), the Peninsula Corridor Joint Powers Board (PCJPB), and Sacramento Regional Transit). The NCRPWG is participating in a planning process to develop a Northern California Unified Rail Service (NCURS) plan. Prior to completion of the IOS, the Authority plans to complete construction of a 130-mile section between Madera and just north of Bakersfield. Some *San Joaquin* trains are planned to use this first construction section of the IOS. The NCURS plan will examine ways to enhance current passenger operations to provide a more integrated service as some *San Joaquin* service will temporarily shift to HSR tracks between 2018 and 2022, and some will remain on the existing *San Joaquin* route. Operations modeling analysis and other studies are underway to provide input to this planning process.

SCRPWG members include the Authority, Caltrans, the San Diego Association of Governments, the Southern California Association of Governments, and the five county agencies that comprise the Southern California Regional Rail Authority (SCRRA).[7] The SCRPWG is planning the southern California elements of the Blended System that will integrate commuter, conventional intercity, and high-speed passenger rail operations. The Blended System will provide HSR service to the Los Angeles Basin and surrounding areas upon IOS completion in 2022. The SCRPWG is also using ongoing operations modeling analysis and other studies to guide this planning process.

Several Memorandums of Understanding (MOU) have been approved to guide these two planning processes. In southern California, SCRPWG members approved an MOU in April 2012 that identified a program of Bookend investments in southern California to advance the Blended System integration. The members also agreed to work collaboratively to advance the HSR project. The Metropolitan Transportation Commission and its member agencies also approved an MOU in April 2012 that outlines investments that would enable HSR service to share Caltrain tracks upon corridor electrification. An MOU with the NCRPWG is pending.

The Authority, Union Pacific Railroad (UPRR), and northern California rail operators approved an MOU in 2012 that specified the timing, location, and frequencies that the UPRR will consider for capacity modeling and potential future passenger rail use of UPRR right-of-way. This MOU provides guidance on portions of the HSR system that could impact UPRR, including utilization of UPRR tracks for conventional passenger rail to provide blended service. The BNSF Railway (BNSF) has conducted capacity modeling to determine the program of capital projects necessary to increase service on the *San Joaquin* route. Both railroads are conducting additional capacity modeling to evaluate infrastructure needed to support blended service. These efforts will inform subsequent planning documents.

[7] These agencies are the Los Angeles County Metropolitan Transportation Authority, Orange County Transportation Authority, Riverside County Transportation Commission, San Bernardino Association of Governments, and Ventura County Transportation Commission.

2.1.4 Multimodal Planning and Integration

Caltrans is in a new phase of multimodal planning and integration with the long-standing California Transportation Plan (CTP) supported by the new California Interregional Blueprint (CIB). This section describes the CTP and CIB individually and the linkages between the two documents. The section also discusses the integration of the CSRP with statewide and regional planning.

California Transportation Plan

The CTP is the California's long-range transportation policy plan and it serves as a guide for coordinating multimodal transportation planning throughout the State. It lays out a long-range transportation vision across all modes, provides a detailed overview of the existing transportation network, and assesses future transportation trends and challenges. It offers strategies for improving mobility and accessibility across all modes, and emphasizes transportation investments that will improve the economy, the environment, and social equity.

The CTP includes the State's transportation policies and performance objectives. It describes broad system concepts and strategies synthesized from Regional Transportation Plans (RTP), and presents recommendations for transportation system planning. Caltrans is required to update the CTP every five years. As mentioned earlier, Caltrans has begun the next CTP update, the CTP 2040.

California Interregional Blueprint

In 2009, Caltrans expanded the State's transportation planning process with an initiative to include the development of a state-level transportation blueprint focused on interregional travel needs, while addressing the specific requirements of Senate Bill (SB) 391 (Liu 2009). Similar to requirements for RTPs under SB 375 (Steinberg 2008), SB 391 adds new CTP requirements to meet California's climate change goals under Assembly Bill (AB) 32 (Núñez 2006) and Executive Order S-3-05. SB 391 requires the CTP to identify the statewide integrated multimodal transportation system that supports California's greenhouse gas (GHG) emission reduction goals.[8]

CIB and CTP Linkage

The CIB integrates proposed interregional highway, transit, rail, goods movement, aviation, and other transportation system and strategic plans into one cohesive analysis. Drawing on information from regional and mode-specific plans, the CIB process links statewide transportation goals with regional transportation and land use plans to produce a unified multimodal transportation strategy. Exhibit 2.1 shows the CIB framework and its relationship with CTP 2040.

As required by SB 391, Caltrans prepared an interim report describing how the Sustainable Communities Strategy (SCS) and Alternative Planning Strategy implementation under SB 375 will advance development of an integrated, statewide multimodal transportation system. The *CIB Interim Report* also summarizes regional efforts with respect to transportation-related GHG emission reduction, and their potential effects on the statewide transportation system. CTP 2040 will build on and incorporate these regional strategies to influence interregional travel and GHG emissions.

Information on planning efforts associated with the CIB and the CTP can be found at Caltrans' CIB/CTP web portal.[9]

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[8] These goals include reducing total GHG emissions to 1990 levels by 2020, and 80 percent below the 1990 levels by 2050.

[9] *California Transportation Plan & California Interregional Blueprint*, Caltrans, http://www.dot.ca.gov/hq/tpp/californiainterregionalblueprint/.

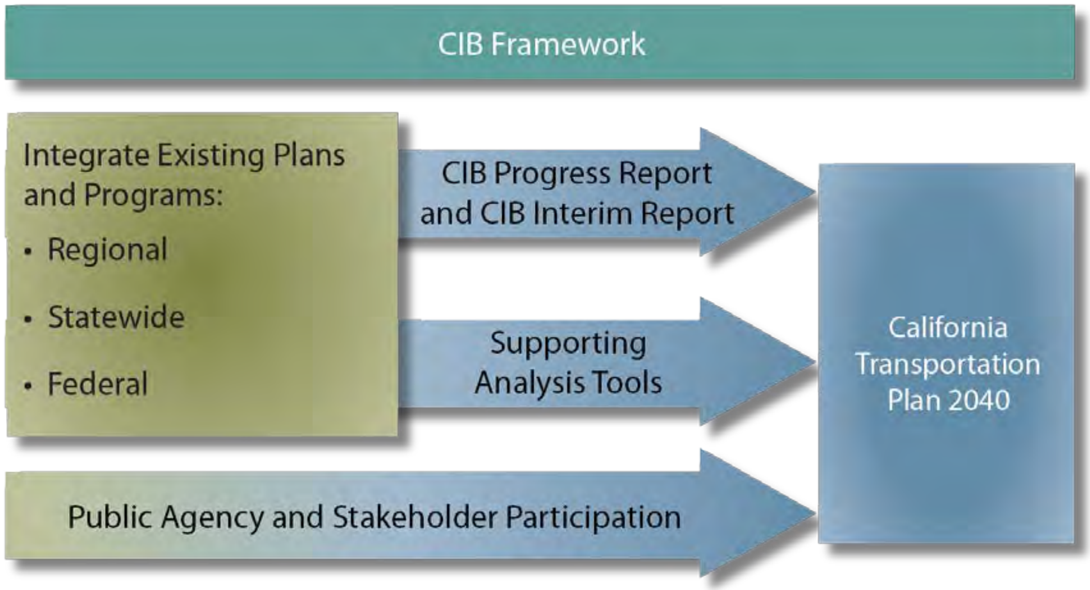

Exhibit 2.1: California Interregional Blueprint Framework

Source: Caltrans, 2013.

The CIB process coordinates data, policies, and recommendations between the modal plans and with regional transportation and land use planning efforts. This CSRP is part of the CIB effort with the focus on integrating commuter rail, conventional intercity passenger rail, and HSR systems.

State Rail Plan Integration into Statewide and Regional Planning

A seamless interregional travel experience will require coordinated transportation planning and interagency cooperation at the state and regional levels. The Federal Railroad Administration (FRA) requires coordinated passenger rail planning under its new state rail planning guidelines. The FRA has indicated that coordinated system- and project-level planning presented in state rail plans and service development plans will be linked to future federal funding for high-speed or conventional intercity passenger rail projects.

RTPs are the long-term blueprints of regions' transportation systems. Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Agencies develop the RTPs as guided by federal and state statutes. RTPs are the basis for statewide transportation plans, including the CSRP and CTP and all regional transportation investments, including regional and local rail.

The CSRP is a cohesive statewide plan that facilitates integration of regional rail investments with blended HSR service. The CTP then serves as a guide for coordinating multimodal transportation planning throughout California. The CTP offers policies and strategies for improved multimodal mobility and accessibility with a focus on meeting statewide goals. The vision, priorities, and implementation for high-speed, intercity passenger, and freight rail investments contained in the CSRP inform the CTP and will play a critical role in achieving the State's goals.

Investments in California's conventional and HSR systems that are consistent with the CTP 2040 vision will continue to drive changes in statewide travel patterns and mode choice. Additionally, coordinating transportation improvement projects will further enhance the statewide transportation system benefits generated by investments, including reduced vehicle miles traveled (VMT), vehicle hours traveled (VHT), and shifting trips from automobile and air to rail.

2.1.5 Other Modal Plans

CTP 2040 will rely, in part, on policy and project recommendations documented in this CSRP and four other modal plans: 1) the *Interregional Transportation Strategic Plan* (ITSP), 2) the *California Freight Mobility Plan* (CFMP), 3) the *Statewide Transit Strategic Plan* (STSP), and 4) the *California Aviation System Plan* (CASP).

Interregional Transportation Strategic Plan

The ITSP prioritizes interregional state highway projects and summarizes information about other interregional transportation modes. The purpose of the ITSP is to plan high-standard facilities that meet interregional travel demand within California and connect the State's urban areas and major regions. The 1998 ITSP included a section outlining performance standards for the three state-supported intercity passenger rail routes (*Pacific Surfliner*, *San Joaquin*, *and Capitol Corridor*, described further in Chapter 5), but passenger rail issues are covered by this CSRP and in the current CIB process, not in the current ITSP update. The ITSP also addresses interregional highway systems and recommends improvements to bring facilities up to a reasonable standard.

The ITSP defines a hierarchy of facilities that comprises the State's Interregional Road System (IRRS) and classifies them as High Emphasis Routes and Focus Routes. Passenger rail aside, the ITSP emphasizes system completion on key routes and optimizing usage of existing facilities and corridors. The ITSP covers all modes and includes discussion of freight movement, seaports, and airports.

The 2013 ITSP update is anticipated to be completed in June 2013. The next ITSP update will reflect new modeling tools that will be used to assess if the IRRS and Focus Route system are adequately defined. The update will be consistent with RTPs completed by that time, and address modal linkages to HSR and conventional intercity passenger rail stations that arise from the CSRP.

Freight Mobility Plan

The CFMP is an update and expansion of the *Goods Movement Action Plan* (GMAP) that was jointly developed by Caltrans; the California Air Resource Board (ARB); the California Environmental Protection Agency (EPA); and the Business, Transportation, and Housing Agency. The GMAP guided Proposition 1B's project funding allocation under the Trade Corridors Improvement Fund Program (TCIF).

When complete, the CFMP will address goods movement in California across all modes and focus on current conditions, future trends, and major issues. Many changes have occurred since the 2005 and 2007 GMAPs were developed, resulting in new considerations. These include adoption of the SCS, adoption of GHG emission reduction targets, and new trends in interstate and global goods movement. Additionally, there is interest in increasing the focus on the freight mobility plans of partner agencies, incorporating more about trucking, and increasing focus on regional issues. The anticipated completion dates for the CFMP are December 2013 (draft) and December 2014 (final), depending on the Moving Ahead for Progress in the 21st Century Act (MAP-21) and state legislation.

MAP-21 was signed by President Obama on July 6, 2012. MAP-21 directs the U.S. Department of Transportation (DOT) to develop a multimodal National Freight Strategic Plan in consultation with states and other stakeholders, and it encourages states to develop a comprehensive freight plan. The CSRP provides important information and priorities that feed into the CFMP.

Statewide Transit Strategic Plan

The STSP emphasizes the importance and benefits of transit service and transit-oriented development (TOD) throughout California. The STSP defines a common mission and achievable goals for transit service providers. It recognizes that transit is a critical part of California's transportation system and lays out a plan to improve the system in accordance with state goals. It provides a framework for a cost-effective transit system to improve mobility, meet targets associated with key legislation such as AB 32 and SB 375, provide improved access to jobs, and make environmental improvements.

This multiphase plan includes baseline conditions for regional and interregional transit services, stakeholder engagement, assessment of cost-effective transit improvements, and development of a final report. The STSP was completed in mid-2012 and is available on Caltrans' website.[10]

California Aviation System Plan

The October 2011 update of the CASP focused on strategies to improve the role airports play as valuable hubs of economic activity. Consistent with state and regional policies, the CASP supports an integrated transportation system that quickly and easily moves goods and people to aviation-compatible mixed development near airports.

The CASP, unlike other modal plans, does not recommend specific projects, but rather provides vision and guidance for aviation in California with the policy element serving as the key section. The CASP's main elements include the promotion of a safe aviation environment for pilots, passengers, and persons on the ground and the benefits of aviation for mobility and economic development. The plan also provides guidance for Caltrans district planners and local planners on how airport and aviation should relate to surface transportation systems.

2.1.6 State Climate Change Initiatives

In recent years, California has enacted several laws and executive orders to reduce climate change-inducing GHG emissions through efficient land use and transportation planning, increased energy efficiency, and other actions.

Executive Order S–3–05, signed in 2005, established state GHG emission reduction targets to reduce California's contribution to global climate change. The Global Warming Solutions Act, AB 32, signed into law in 2006, expanded on these goals. It requires that California's GHG emissions be reduced to 1990 levels by the year 2020 (Chapter 488). AB 32 is a multisector, interdisciplinary approach to reducing GHG emissions within the State. In accordance with its responsibilities under AB 32, the ARB adopted a "Scoping Plan" in December 2008 (readopted in August 2011) that quantified the statewide GHG emission reduction target and identified reductions that would result from specific programs. This included the HSR project, which is expected to reduce GHG emissions by one million metric tons annually in carbon dioxide (CO_2) equivalent. Other related legislative bills outline individual regulations for specific sectors.

SB 375 – the Sustainable Communities and Climate Protection Act of 2008 – promotes integrated transportation and land use planning to reduce GHG emissions from passenger vehicle travel and help California meet AB 32 goals. SB 375 requires the ARB to develop regional GHG emissions reduction targets for passenger vehicle travel, setting benchmarks in 2020 and 2035 for each of the State's 18 MPOs. SB 375 requires that California's MPOs each draft an SCS as part of their RTP, which describes the transportation and land use strategies the region will use to meet the regional GHG emissions reduction targets established by the ARB.

While SB 375 has a regional focus, SB 391 highlights the critical roles that Caltrans and other state agencies play in addressing interregional travel issues, including the reduction of GHG emissions associated with interregional travel. CIB defines strategies to address interregional travel needs, while ensuring that CTP 2040 identifies statewide policies and investment priorities needed to support the State's GHG emission reduction goals. These goals include reducing GHG emissions to 80 percent below 1990 levels by 2050, as called for in Executive Order S–3–05.

[10] http://www.dot.ca.gov/hq/MassTrans/statewide-transit.html.

2.1.7 Corridor-Level Planning

Passenger Rail Corridor Investment Plans

A Passenger Rail Corridor Investment Plan (PRCIP) is an FRA requirement to plan for passenger rail corridor improvements. The PRCIP consists of two primary elements: a Service Development Plan (SDP), which is focused on passenger rail service planning and alternatives analysis and a programmatic, corridor-level environmental analysis of rail services being proposed. The PRCIP includes an alternatives analysis and presents the preferred alternative that best addresses the underlying transportation issues. Completing a PRCIP is a precondition of further high-speed and intercity passenger rail federal investment. Information from the PRCIPs also provides valuable input and information for the CSRP.

Chapter 8 provides more information regarding SDPs.

Corridor System Management Plans

Caltrans also provides for the development of *Corridor System Management Plans* (CSMP). CSMPs are developed to facilitate the efficient and effective movement of people and goods along California's most congested transportation corridors. CSMPs help Caltrans and its regional planning partners prioritize, implement, and manage multimodal investments. CSMPs are developed by Caltrans in consultation with local stakeholders, and provide critical insights into rail capacity and intermodal accessibility issues and solutions at key chokepoints throughout California.

Each CSMP presents an analysis of existing and future travel conditions, and proposes traffic management strategies and transportation improvements to maintain and enhance mobility. Analyses encompass state highways, local roadways, transit, and other transportation modes. CSMPs result in a phasing plan of recommended operational improvements, intelligent transportation system strategies, and capacity expansion projects to maintain or improve corridor performance. CSMPs are required for all projects receiving funding from the Corridor Mobility Improvement Account (CMIA) under Proposition 1B (2006).

2.2 Tribal Government Context

Tribal input is valuable in guiding CSRP direction. Federally recognized tribes, nonrecognized tribes, and tribal organizations can help determine policies and practices that will ensure that tribal transportation needs and cultural resources are considered and addressed throughout the CSRP.

Federal and state laws require engaging tribal governments in government-to-government consultation. In addition, Presidential Executive Order 13175 of November 6, 2000 lays out the federal principles and policies for consultation and coordination with Indian Tribal Governments. Within California, the Governor's Executive Order B-10-11 of November 19, 2011 requires state agencies to coordinate and consult with California Indian Tribes. As a result, Caltrans makes efforts to consult with tribal governments prior to making decisions, taking actions, or implementing programs that may impact Native American communities.

Caltrans representatives met with the Caltrans Director's Native American Advisory Committee on December 5, 2012 to provide a presentation on the CSRP process including public meeting plans. A more detailed CSRP informational meeting took place with tribal representatives on March 1, 2013. During these and subsequent meetings, tribal representatives expressed concerns that more formal tribal consultation had not occurred during CSRP development. The representatives requested that early, collaborative communication take place with individual tribal groups.

Caltrans has agreed to conduct tribal coordination and consultation in a timely and improved manner for the next CSRP update. Caltrans will involve tribes in developing a tribal consultation process that encourages early input and facilitates direct communication with individual tribal groups.

As a result of the tribal communication that has occurred to date, Caltrans understands that tribes are particularly concerned about the following CSRP aspects:

- Early Coordination and Consultation. Early coordination and consultation will ensure that issues of particular concern to tribes are adequately and appropriately addressed in the CSRP. Meaningful tribal input will help develop the next CSRP.
- Protection of Culturally Sensitive Sites. California is home to many culturally sensitive sites that are of great significance to individual tribes. Many of these sites are not on existing Native American reservations. Planned rail projects, whether along existing alignments or in new locations, could impact ancestral sites. Early engagement between project planners and tribal representatives will provide the opportunity to identify suitable transportation solutions with the least negative impact to ancestral sites. Also, tribes may have additional information, unavailable through other sources, regarding these culturally sensitive sites.
- Access to Passenger Rail Services. Passenger rail systems usually only serves metropolitan areas and medium-sized cities directly, because passenger rail is a fixed guideway system. Rail planners and providers work to make the service convenient and reliable from beginning to end. But rail planners and providers should also work with Native American tribes to develop plans to connect tribal lands and communities to rail systems. Many Native American tribes have Transportation Plans that can be coordinated with passenger rail plans to improve access for Native Americans in rural or underserved regions to intercity and commuter passenger rail services.
- Environmental Process. Early engagement with tribes during the environmental process will ensure that planners understand unique tribal issues related to rail projects. This information can then be reflected in subsequent environmental analysis and documents to facilitate more informed decision-making.

2.3 Socioeconomic and Environmental Context

This section summarizes economic and demographic growth trends that will contribute to future changes in passenger and freight rail demand in California. This section provides a brief overview of the historical and future demographic and socioeconomic trends for passenger rail ridership and goods movement in California, and it describes the environmental context for both passenger and freight rail.

2.3.1 Demographic and Employment Information

Table 2.1 summarizes historical trends in California's population and nonfarm employment between 1980 and 2011 and projections in five-year increments through 2040.

The following key demographic and employment trends are most likely to affect passenger and freight rail patterns and demand:

- California was home to about 37.8 million residents in 2011, roughly 12 percent of the U.S. population. The State's population grew at an average annual rate of 1.5 percent since 1980, including a considerable slow down between 2005 and 2010. Going forward, population growth is projected to slow slightly to an average annual growth rate of 1.1 percent between 2011 and 2040.

Table 2.1: Statewide Demographic Profile

	1980	1990	2000	2011	2015	2020	2025	2030	2035	2040
Total Population	23,797,000	29,960,000	33,995,000	37,784,000	39,429,000	41,709,000	44,066,000	46,399,000	48,901,000	51,532,000
Total Households	8,677,000	10,451,000	11,546,000	12,842,000	13,575,000	14,322,000	14,944,000	15,492,000	16,015,000	16,593,000
Population Density (persons per square mile)	153	192	218	242	253	267	283	298	314	330
Total Employment[a]	9,814,000	12,395,000	14,192,000	13,743,000	14,984,000	15,536,000	16,079,000	16,683,000	17,412,000	18,202,000
Construction	410,000	621,000	719,000	541,000	625,000	662,000	707,000	759,000	824,000	904,000
Manufacturing	2,000,000	1,973,000	1,834,000	1,244,000	1,311,000	1,266,000	1,222,000	1,180,000	1,140,000	1,097,000
Wholesale	441,000	559,000	612,000	597,000	621,000	624,000	622,000	628,000	651,000	681,000
Retail	1,207,000	1,390,000	1,533,000	1,497,000	1,552,000	1,524,000	1,507,000	1,523,000	1,594,000	1,690,000
Transportation and Warehousing	282,000	356,000	448,000	413,000	426,000	433,000	425,000	411,000	386,000	374,000
Professional Services[b]	1,106,000	1,693,000	1,966,000	1,911,000	2,119,000	2,221,000	2,319,000	2,427,000	2,537,000	2,619,000
Other Services[c]	2,258,000	3,243,000	4,131,000	4,650,000	5,274,000	5,676,000	6,103,000	6,535,000	6,987,000	7,461,000
Government[d]	1,672,000	2,064,000	2,317,000	2,380,000	2,513,000	2,577,000	2,615,000	2,646,000	2,682,000	2,718,000
Other	434,000	493,000	630,000	517,000	550,000	560,000	566,000	581,000	619,000	665,000

Source: Moody's Analytics, www.economy.com, 2011.

Notes:

[a] This refers to total nonfarm employment; totals may not add due to rounding.

[b] Professional Services include Fire and Insurance; Real Estate and Rental and Leasing; Professional, Scientific, and Technical Services; and Management of Companies and Enterprises.

[c] Other Services include Administrative and Support and Waste Management and Remediation; Educational Services; Health Care and Social Assistance; Arts, Entertainment, and Recreation; Accommodation and Food Services; and Other Services.

[d] Government includes State Government, Local Government, and Federal Government.

- The total number of households in California grew at an average annual rate of 1.3 percent between 1980 and 2011. Similar to trends in population growth, household growth is projected to slow to an average annual rate of 0.9 percent between 2011 and 2040. In both cases, household growth lags population growth.
- Employment growth in California is expected to remain relatively steady. Between 1980 and 2011, total employment in the State increased at an average annual growth rate of 1.1 percent. It is projected to decrease only slightly to 1.0 percent out to 2040.
- The composition of California's economy will continue to shift with employment in Construction, Professional Services, and Other Services projected to outpace growth in other industries and grow as a share of total employment between 2011 and 2040. During the same period, employment growth in the Wholesale and Government sectors is expected to slow; and the Manufacturing sector is expected to continue to shrink, albeit at a slower rate.

Population and employment growth patterns in California will have a direct effect on passenger and freight rail patterns and demand. As growth continues, California will experience increased demand for cost-effective alternatives to driving, such as passenger rail and an increased demand for goods and services for freight rail.

Effects of an Aging Population

In California, the population of older adults has been growing, reflecting the aging baby boomers, longer life spans, and the out-migration to other states. Exhibit 2.2 shows the population pyramid distributed by age range in 2000 versus 2010. Roughly 11.4 percent of California residents were age 65 or older in 2010 versus 10.7 percent in 2000. The California Department of Finance projects this trend to continue, with 21.9 percent of the population age 65 or older by 2040[11]. This older adult population is forecast to total nearly 10 million California residents by 2040, compared to about 4.3 million in 2010. This age cohort accounts for nearly 55 percent of California's projected population growth to year 2040. An aging population may increase demand for cost-effective public transportation options, including intercity passenger rail services.

Population Growth and Goods Movement

The amount and distribution of population growth will influence future goods movement patterns and demand on the freight rail system. The demand for goods will come about not just by population growth within California, but also by national and international population growth and consumer demand.

Exhibit 2.3 displays population totals by county for 1980, 2011, and 2040; detailed figures and growth rates for each county are provided in Appendix A. Over the next 29 years, California's population is projected to increase to 51.5 million, corresponding to an annual growth rate of about 1.1 percent. Between 1980 and 2011, California experienced an average annual growth rate of 1.5 percent. Broadly speaking, the San Joaquin Valley, Sacramento region, and Riverside and San Diego counties are projected to experience the largest population growth between 2011 and 2040. In absolute terms, population growth is projected to be highest in southern California, the south and east portions of the San Francisco Bay Area, and Sacramento County.

[11] Report P-1 (Age), State and County Population Projections by Major Age Groups; California Department of Finance, Demographic Research Unit; January 31, 2013.

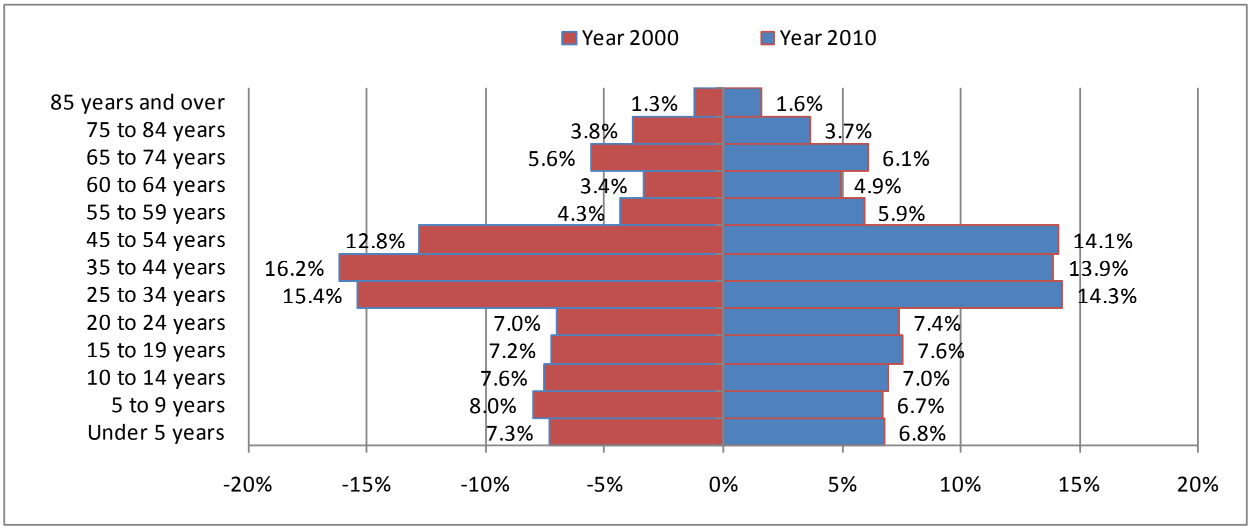

Exhibit 2.2: Population Pyramid Comparing 2000 and 2010

Source: U.S. Census Summary File for 2000 and 2010.

Transportation demand to move products for construction-related services is expected to grow, as new housing is built (or as the existing stock is renovated) to accommodate the growing population. Demand for consumer products is also expected to rise with the growing population, as is the accompanying need for transportation, warehousing, and distribution centers. Increased demand for imported products and materials may create more inbound traffic and intraregional traffic associated with warehousing and distribution to markets within the State.

2.3.2 Socioeconomic Information

California's economic and employment trends will have a direct effect on demand for passenger and freight rail. Table 2.1 presents historic and projected growth in nonfarm employment growth through 2040.

Employment Growth and Growth in Interregional Passenger Travel

As shown in Appendix A, population and employment growth rates differ across counties. This mismatch will potentially increase the demand for interregional passenger travel, with individuals seeking employment outside of their home regions and commuting longer distances. Professional services and personal services sectors are expected to experience significant growth in the future due in part to the large influx of residents anticipated over the next 30 years. This is especially true of the major metropolitan areas. Exhibit 2.4 displays employment by county for 1980, 2011, and 2040. Detailed figures and growth rates for each county are provided in Appendix A. Over the next 30 years, California's total nonfarm employment is projected to increase to 18.2 million, corresponding to an annual growth rate of about 1.0 percent. Broadly speaking, employment growth in Imperial, Madera, Placer, Ventura, and Yuba counties is projected to experience the largest population growth rates between 2011 and 2040. In absolute terms, employment growth is projected to be highest in Los Angeles, Orange, Riverside, San Diego, and Santa Clara counties.

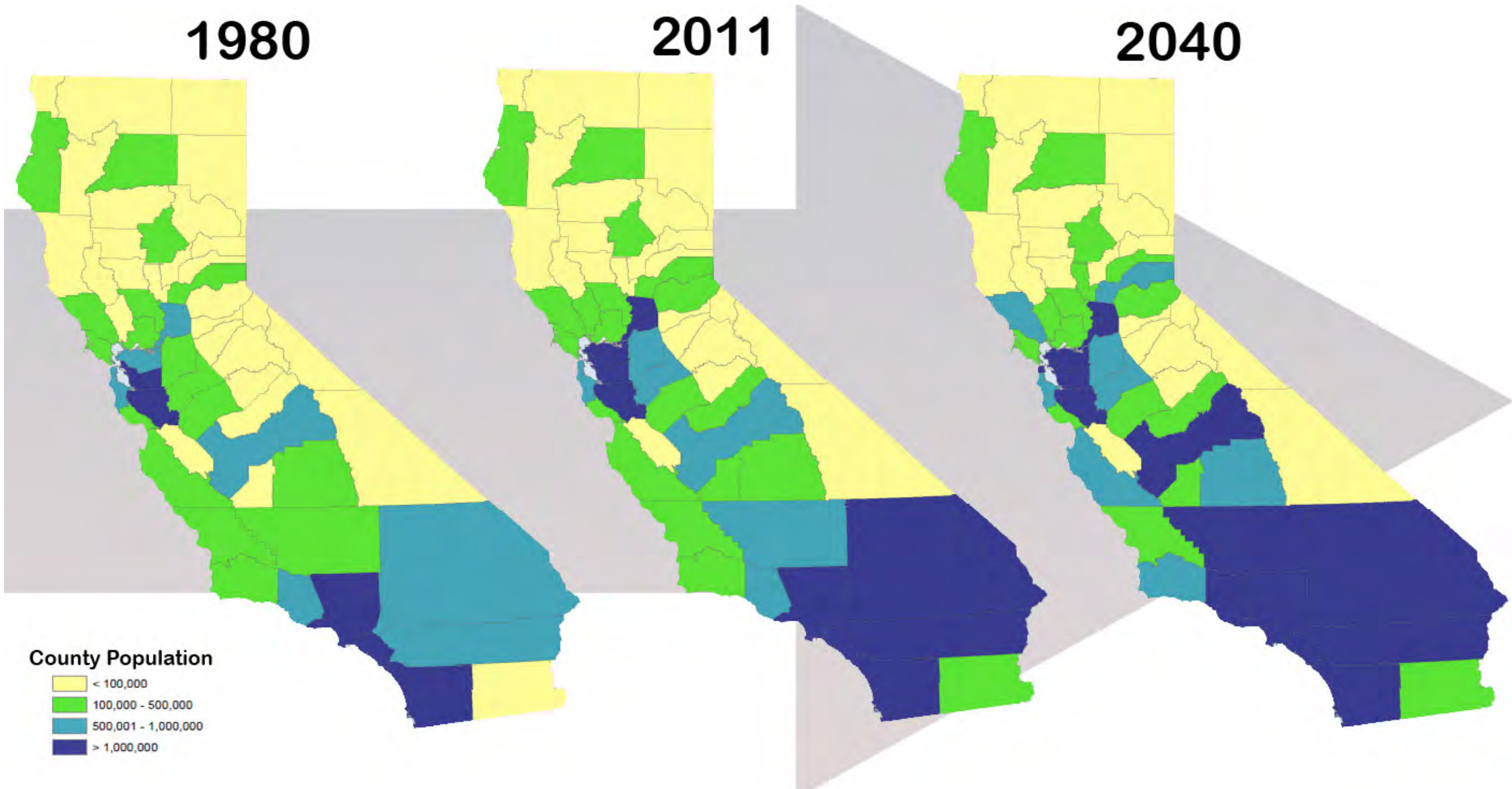

Exhibit 2.3: State Population Trends, 1980 to 2040

Source: Moody's Analytics, www.economy.com, 2011.

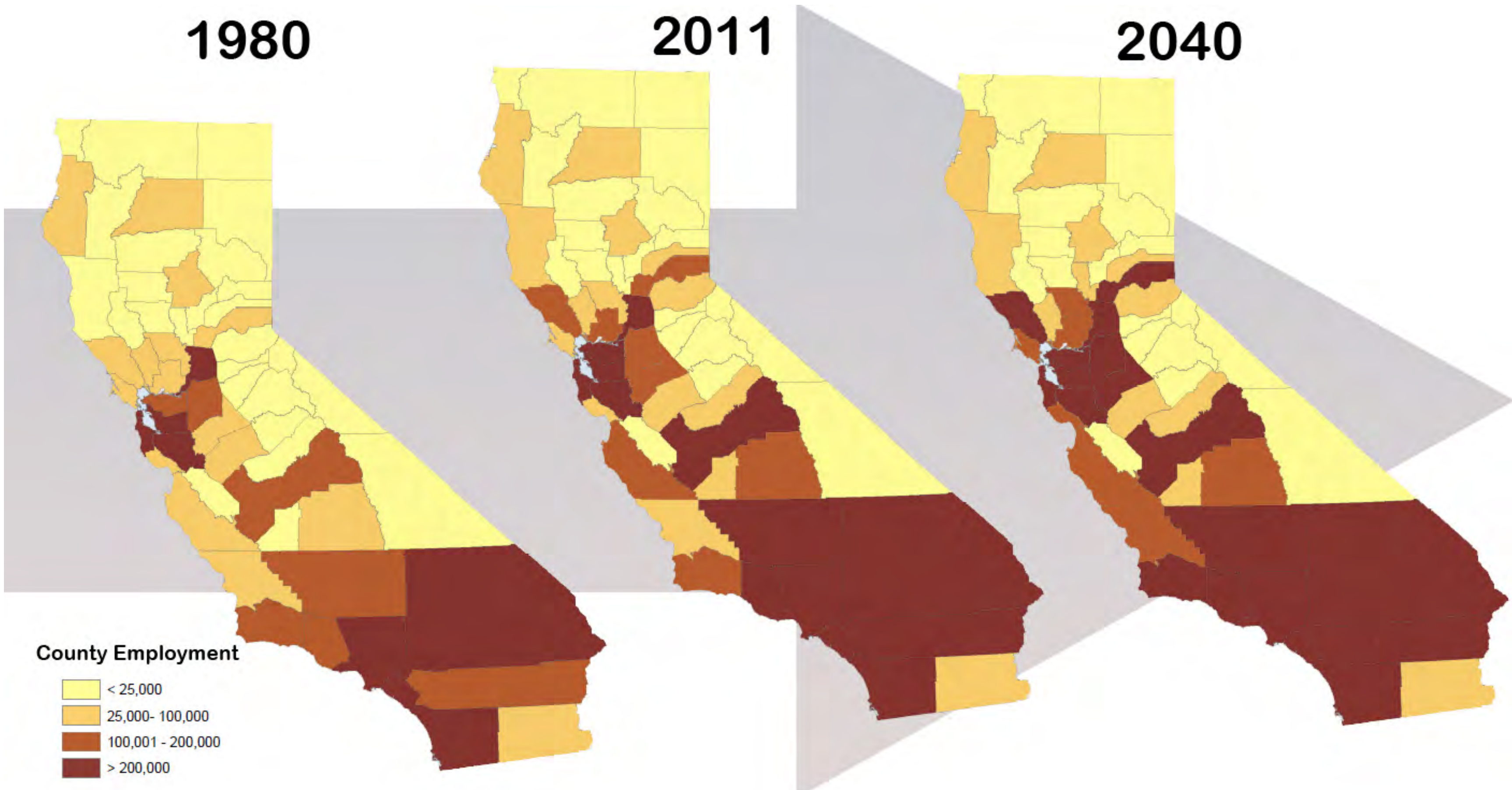

Exhibit 2.4: State Nonfarm Employment Trends, 1980 to 2040

Source: Moody's Analytics, www.economy.com, 2011.

Personal travel is expected to grow statewide by 2030, as illustrated with the illustrative sample of interregional travel markets in Exhibit 2.5. While the largest markets will likely continue to involve travel between the State's major metropolitan areas and adjacent regions, the fastest growing markets are projected to be longer distance (such as between the San Francisco Bay Area and San Diego) or involve travel to or through the San Joaquin Valley. Rapid growth in interregional personal travel along these corridors is illustrated by the darker color bands in Exhibit 2.5.

Professional Services Increases the Demand for Same-Day Rail Travel

Professional services growth is a primary driver of travel demand for long-distance interregional trips as many business trips within the State require travel between northern and southern California. As shown in Table 2.1, professional services employment has grown as a share of total employment since 1980, while wholesale and retail employments have declined. This gradual trend is expected to continue through 2040, with professional services industries accounting for 14.4 percent of total employment in California; up from 11.3 percent in 1980 and 13.9 percent in 2011. Exhibit 2.6 shows growth in professional services compared to other sectors of California's economy.

Increased Industrial Output Requires Strong Goods Movement Links

Industrial sectors highly dependent on freight rail and goods movement accounted for about $1.52 trillion in output in 2008, driven by industries including manufacturing ($770 billion output), construction ($179 billion output), and retail trade ($175 billion output). Table 2.2 shows the production levels for industrial sectors highly reliant on freight rail and goods movement by region. Industrial output is projected to grow at a rate of about 2.5 percent annually, reaching an output of almost $3.4 trillion in 2040. As shown in Table 2.2, the majority of this output is associated with the Los Angeles Basin ($675 billion of output in 2008) and San Francisco Bay Area ($471 billion of output in 2008). Agriculture-related output ($48 billion in 2008) is generated primarily from the San Joaquin Valley and, to a lesser extent, from the remainder of California.

As shown in Table 2.2, between 2008 and 2040, the average annual growth of key industries is projected to be 3.9 percent in the wholesale trade sector, 2.6 percent in the manufacturing sector, and 3.1 percent in retail trade. By 2040, manufacturing output will reach $1.7 trillion, followed by wholesale trade ($517 billion) and retail trade ($461 billion).

The industrial output driving goods movement in California is expected to grow at a significantly greater rate (2.5 percent) than population (1.1 percent) and employment (1.0 percent) over the next three decades. This is due to the key role that California's ports of Long Beach/Los Angeles and Oakland/San Francisco play moving goods shipped from Asia and the cluster of transportation and warehousing services located in southern California. In fact, statewide industrial output is tied more closely to national and international growth rates than to localized employment and population, due in part to the role California's ports play in connecting domestic and international markets. The bulk of the industrial output driving these movements is expected to occur in the greater Los Angeles and San Francisco Bay Area regions, while the San Joaquin Valley will continue to generate the vast majority of the State's agricultural output. Overall, this means that increased freight traffic growth will outpace that of population and employment, thus, generating demand for a robust goods movement infrastructure.

Exhibit 2.5: Growth in Interregional Personal Travel, 2000 to 2030

Source: California High-Speed Rail Ridership and Revenue Model, 2012.

Note: This exhibits shows data for the largest and/or highest growth interregional travel markets. Some travel markets are not shown on the map to retain legibility.

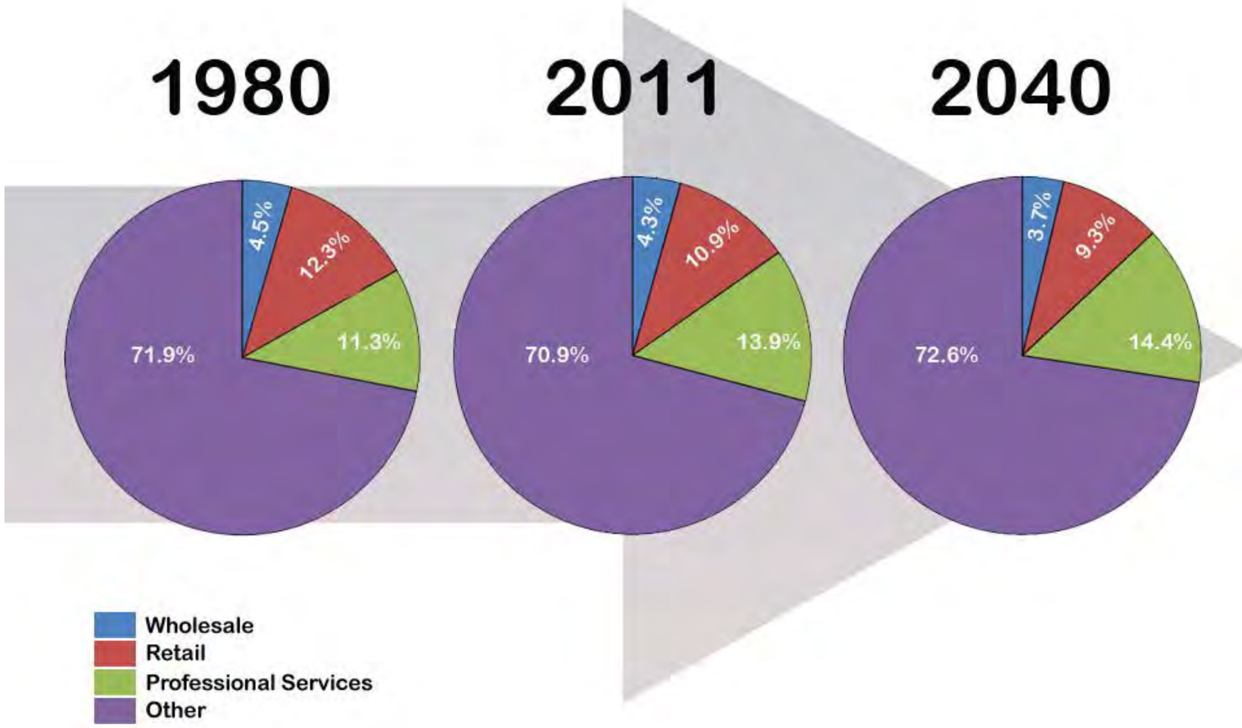

Exhibit 2.6: Total Statewide Nonfarm Employment by Economic Sector

Source: Moody's Analytics, www.economy.com, 2011.

2.3.3 Environmental Context

This section provides background regarding environmental effects associated with passenger and freight rail, an explanation of rail's contribution to GHG emission reduction, and a description of the State's environmental review process for rail plans and projects.

Environmental Opportunities and Challenges

With careful planning and implementation, the State can capture the benefits of increased rail service for passenger and goods movement industries. Passenger rail service growth can benefit the environment as travelers shift from automobiles to intercity rail. Reduced auto usage contributes to decreased congestion, reduced GHG emissions, and improved air quality. Relocating freight rail lines or operations can ease rail bottlenecks, reduce air pollution emissions in existing neighborhood, reduce vehicle traffic delays at grade crossings, improve safety, and spur economic development opportunities. For certain goods, shifting freight from truck to rail can contribute to GHG emission reduction.

Passenger rail investments can also support California's broader climate change initiatives. Jurisdictions throughout California are planning and developing intercity, commuter, and urban rapid transit rail stations as locations that will support of mix of activities beyond rail service access. Providing a greater mix of uses and increased development density around rail stations (such as TOD) can spur a broader shift from auto to rail usage. TOD also increases the potential for auto trips to shift to transit, bicycle or pedestrian trips as greater numbers of these trips become attractive within a compact station area with a mix of uses.

Table 2.2: Production Levels for Industrial Sectors that Depend on Goods Movement (Millions of 2008 Dollars)

Geography	Description[a]	Agriculture, Forestry, Fishing/ Hunting	Mining, Quarrying/ Oil and Gas Extraction	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation & Warehousing	Total
Los Angeles-Long Beach	2008 Production	5,211	8,144	78,615	333,409	86,387	80,834	46,078	**675,090**
	2040 Production	5,580	13,957	83,949	715,921	282,764	203,824	95,144	**1,458,587**
	Annual Growth Rate	0.2%	1.7%	0.2%	2.4%	3.8%	2.9%	2.3%	**2.4%**
San Francisco-Bay Area	2008 Production	3,431	3,072	44,207	290,135	38,219	46,006	20,689	**471,231**
	2040 Production	3,654	27,054	51,718	654,750	121,236	119,412	37,643	**1,055,568**
	Annual Growth Rate	0.2%	7.0%	0.5%	2.6%	3.7%	3.0%	1.9%	**2.6%**
San Joaquin Valley	2008 Production	20,718	5,669	13,281	52,842	7,054	12,057	7,213	**126,482**
	2040 Production	30,311	12,171	23,059	139,839	30,480	40,273	14,835	**307,036**
	Annual Growth Rate	1.2%	2.4%	1.7%	3.1%	4.7%	3.8%	2.3%	**2.8%**
San Diego	2008 Production	1,376	283	17,053	44,904	11,018	14,255	4,025	**100,848**
	2040 Production	1,435	411	18,198	106,238	41,583	38,798	7,383	**249,469**
	Annual Growth Rate	0.1%	1.2%	0.2%	2.7%	4.2%	3.2%	1.9%	**2.9%**
Sacramento	2008 Production	2,346	769	14,101	21,124	5,750	10,536	4,860	**61,746**
	2040 Production	2,356	2,346	24,137	44,462	18,542	25,691	14,361	**135,076**
	Annual Growth Rate	0.0%	3.5%	1.7%	2.4%	3.7%	2.8%	3.4%	**2.5%**
Remainder of California	2008 Production	14,584	1,168	11,351	27,500	6,028	11,735	5,840	**84,440**
	2040 Production	18,739	3,419	14,871	63,807	22,888	33,779	13,406	**181,641**
	Annual Growth Rate	0.8%	3.4%	0.8%	2.7%	4.3%	3.4%	2.6%	**2.4%**
California Statewide	2008 Production	47,667	19,105	178,608	769,914	154,456	175,422	88,703	**1,519,836**
	2040 Production	62,075	59,359	215,932	1,725,016	517,492	461,777	182,772	**3,387,378**
	CAGR	0.8%	3.6%	0.6%	2.6%	3.9%	3.1%	2.3%	**2.5%**

Source: U.S. Bureau of Labor Statistics: CES, QCEW; Moody's Analytics, www.economy.com, 2011.

[a] All production is in millions of 2008 fixed dollars.

As one example, the Authority adopted general principles for station area planning that promote TOD principles, support infill development, and minimize urban sprawl. Station areas as envisioned advance the objectives of SB 375 and SB 391. The planning process enables the Authority, station cities, and stakeholders to work together to ensure that the station, surrounding area, and transportation systems are planned to work together to maximize the economic, mobility, environmental, and other benefits of the HSR stations.

While these potential benefits are encouraging, capacity expansion projects for new passenger and freight rail alignments are also expected to impact the natural and social environment. For example, as expansion plans for existing rail lines that run through environmentally sensitive areas should take into account potential impacts to wetlands, floodplains, coastal bluffs, environmental justice issues that may affect local communities, and habitats of threatened and endangered species. New or increased rail service could result in land use, noise and vibration, or other impacts.

State Rail Planning and Climate Change

Earlier this chapter describes the recent California laws that require changes to the transportation planning process, so that the State can achieve specific goals in reducing GHG emissions. As of 2010, transportation GHG emissions accounted for 27 percent of total U.S. GHG emissions.[12] In California in 2009, transportation GHG emissions accounted for nearly 38 percent of total statewide GHG emissions.[13] Passenger rail and freight transportation are a small percentage of statewide transportation GHG emissions, as shown in Exhibit 2.7. Rail transportation supports transportation and land use linkages within the State and transportation GHG emission reductions through reduced single-occupancy vehicle travel, improved rail vehicle technology, and increased fuel efficiency.

Passenger and freight rail are particularly important modes for reducing GHG emissions because of their efficiency. Passenger rail travel generates fewer GHG emissions per passenger mile than travel by car and air, as shown in Exhibit 2.8. As demonstrated in Exhibit 2.9, freight rail has the least GHG emissions (per-freight ton-mile) of all freight modes. Thus, it is particularly important that the CSRP outline an efficient rail system in support of the State's GHG emissions reduction goals.

Environmental Review for Rail Investments

In California, most projects must comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Most proposals for physical development in California are subject to the provisions of CEQA. This includes many governmental decisions that do not immediately result in physical development (such as adoption of a general or community plan). Every project that requires a discretionary governmental approval will require at least some environmental review pursuant to CEQA or NEPA based on funding, unless the project is considered categorically exempt; safety improvements and work within existing rail rights-of-way are two such examples.

Environmental review can occur in several ways. However, at some point, a proposed project's potential effect on the natural and human environment, and the relative effects of potential alternatives, must be disclosed.

[12] Base Data is from U.S. EPA, 2012, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2010.

[13] *California's Greenhouse Gas Inventory for 2000 to 2009*. California Environmental Protection Agency, Air Resources Board. Last Updated October 26, 2011.

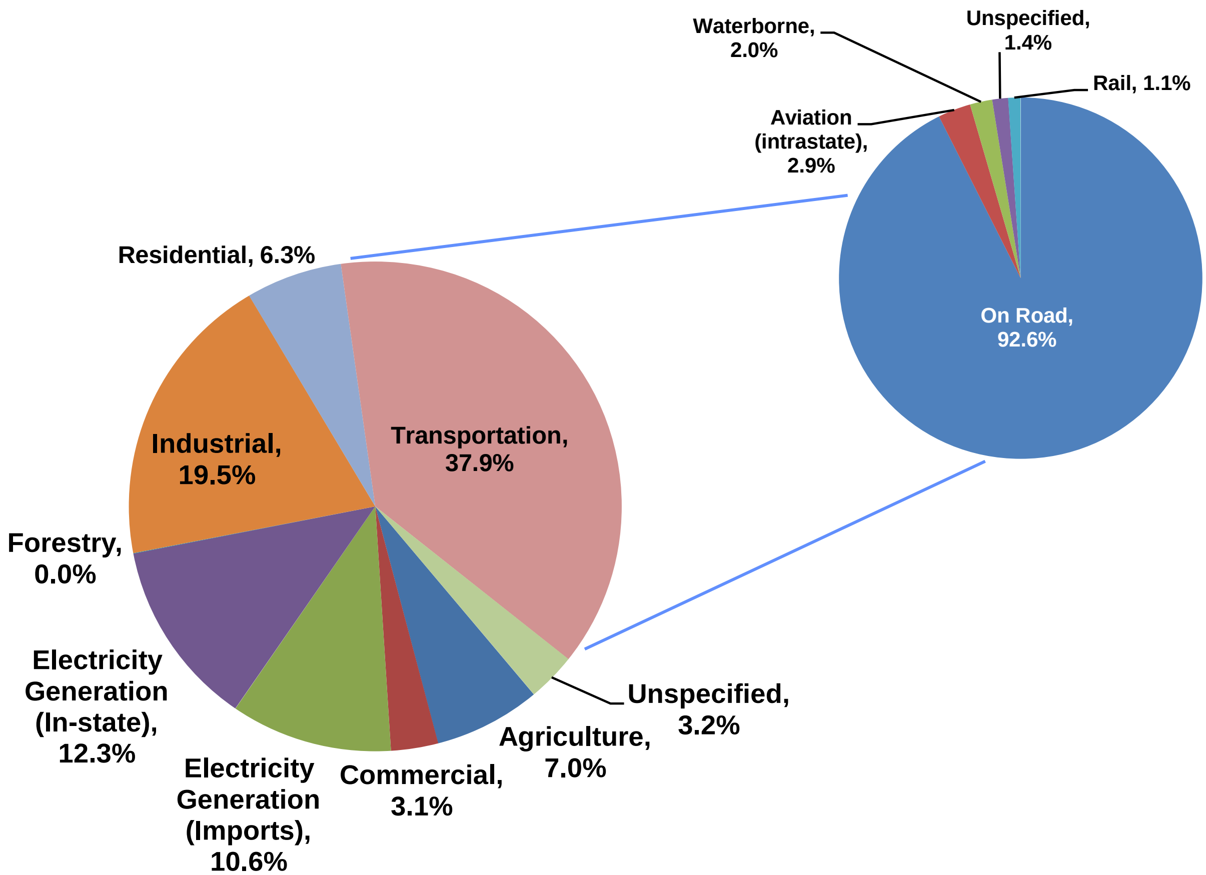

Exhibit 2.7: 2009 GHG Emissions by Transportation Modes within California (Percentage of Total Gross Emissions)

Source: *California's Greenhouse Gas Inventory for 2000 to 2009*. California Environmental Protection Agency, Air Resources Board. Last updated October 26, 2011.

In some cases, a detailed project-level assessment is preceded by a programmatic" or "Tier 1" environmental process that addresses broader questions and likely environmental effects for a group of projects that are related in time or geography. For passenger rail corridors, a programmatic environmental review often includes an examination of the cities and stations served, route alternatives, service levels, ridership projections, and major infrastructure components. The *Los Angeles to San Diego Proposed Rail Corridor Improvement Final Program EIR/EIS* and the Authority's *Final Program Environmental Impact Report/Environmental Impact Statement for the Proposed California High-Speed Train System* are two examples of programmatic documents that have been followed by project-level environmental analysis.

Methods for project-level environmental analysis are defined at the start of the analysis process. If program-level analysis has been completed previously, the project-level analysis methods will build on this programmatic work to further identify and describe impacts as necessary for permits and approvals. The environmental analyses prepared using these methods will inform lead agency decisions on specific alignment and station locations, mitigation commitments, and future regulatory and other approvals. Guidance on federal environmental compliance under NEPA for rail projects is provided by both the Surface Transportation Board (STB) and the FRA.

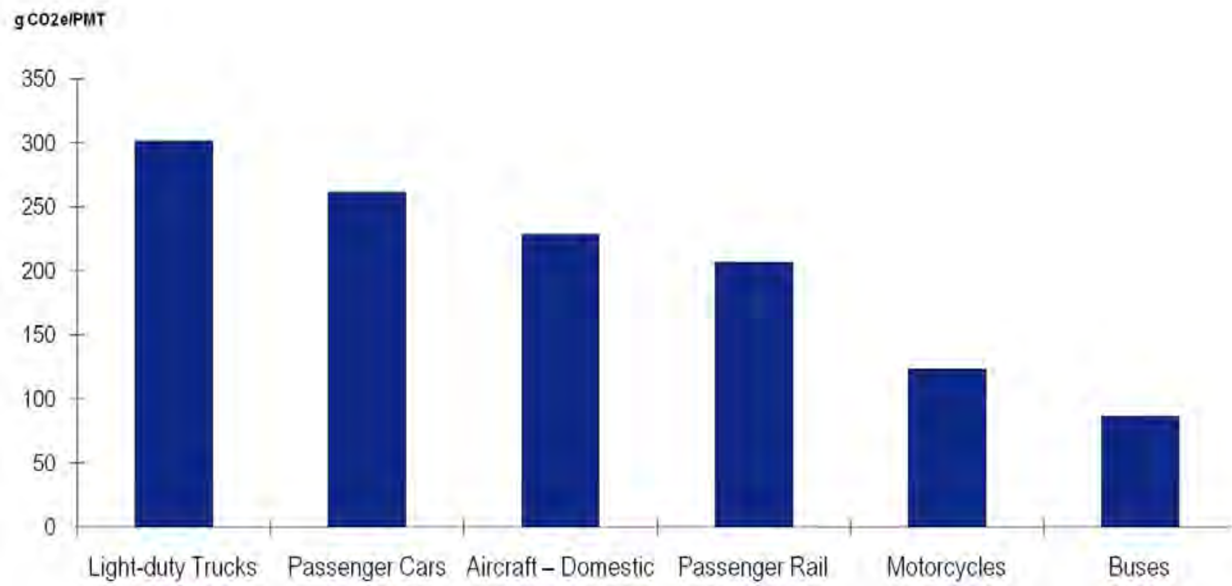

Exhibit 2.8: GHG Emissions per Passenger-Mile by Passenger Transportation Mode, 2006

Source: U.S. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 to 2006*, Bureau of Transportation Statistics, Bureau of Transportation Statistics, National Transportation Statistics, and U.S. Department of Energy, *Transportation Energy Data Book*.

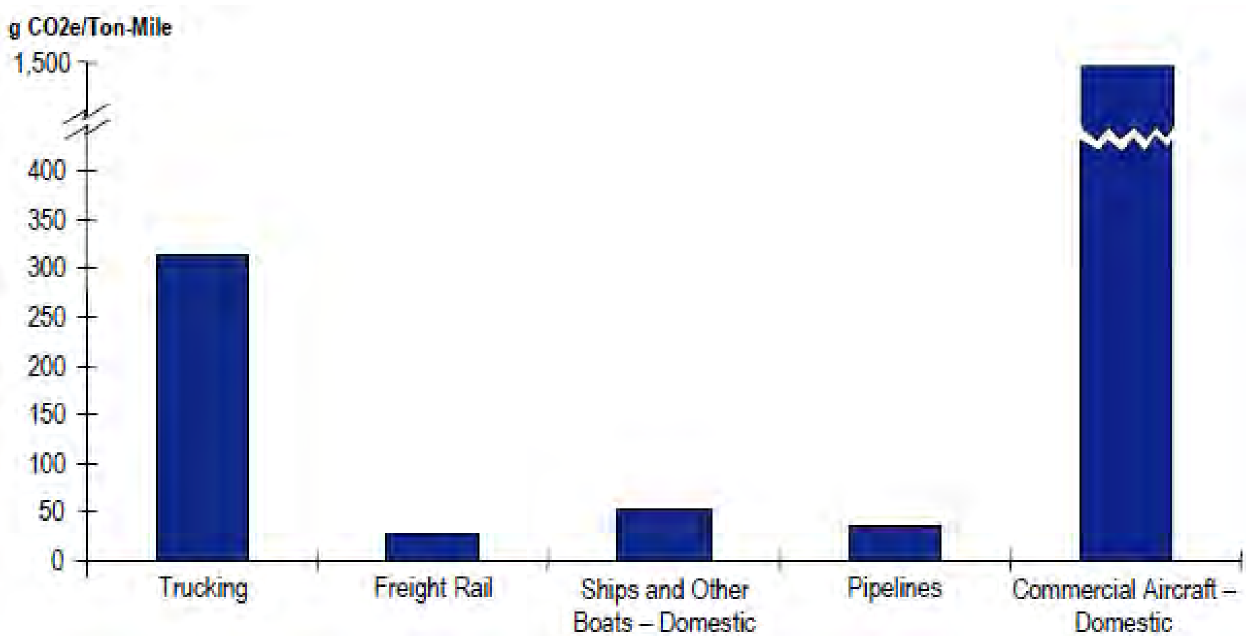

Exhibit 2.9: GHG Emissions per Freight Ton-Mile by Freight Transportation Mode, 2006

Source: U.S. EPA, 2008, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 to 2006*; and Bureau of Transportation Statistics, National Transportation Statistics.

Commuter rail and urban transit projects that use some Federal Transit Administration (FTA) funding sources go through a customized environmental review process per FTA guidelines.

2.4 Rail Transportation System Challenges

This section highlights several customer and institutional factors that are likely to influence future rail service, project delivery, and operation:

- Demand factors leading to growth in passenger and freight rail.
- Customer expectations for a seamless travel experience.
- Coordinated statewide planning and development for HSR, intercity passenger rail, and commuter rail systems.
- Completing Positive Train Control (PTC) implementation.
- Maintaining passenger rail equipment and infrastructure in a state of good repair.

California's challenging topography and physical constraints add to these customer and institutional factors. Connecting northern and southern California requires one or two mountain crossings for an alignment through the San Joaquin Valley, or a routing through the Coastal Range. Closer connections along existing rail corridors, such as between the Bay Area and Sacramento or Los Angeles and San Diego, also present challenges due to winding coastal alignments and dense urban development.

2.4.1 Demand Factors

Passenger Rail

State and regional rail plans reflect anticipated changes in population and employment growth. Market analyses conducted for the CSRP and related SDPs reveal that future economic growth will increasingly be concentrated in three general regions:

1. The San Joaquin Valley.
2. Northern California counties in the San Francisco Bay Area and Sacramento region.
3. Southern California coastal and inland areas.

Future population and employment will grow at lower rates than those experienced in recent decades, but the increases will lead to further concentration in these three regions, both in terms of absolute numbers and geographic density. Population and economic growth are primary drivers of passenger mobility trends.

This regional economic concentration also will be reflected in California's five busiest interregional travel corridors in 2030, which are projected to account for more than one-half of the 662.5 million interregional person trips by that year:

1. Los Angeles Basin[14] to/from San Diego (145.9 million annual person trips).
2. Sacramento[15] to/from San Francisco Bay Area[16] (78.7 million).

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[14] Includes Ventura, Los Angeles, San Bernardino, Orange, Riverside, and Imperial counties.

[15] Includes Placer, El Dorado, Yuba, Sutter, Sacramento, and Yolo counties.

3. San Francisco Bay Area to/from Central Coast[17] (53.9 million).
4. San Francisco Bay Area to/from the northern San Joaquin Valley[18] (50.9 million).
5. Los Angeles Basin to/from Central Coast (43.9 million).

With the exception of the corridor connecting the San Francisco Bay Area and the Central Coast, which is only served by the Amtrak *Coast Starlight* route, all of the corridors listed above currently have intercity and/or commuter passenger rail systems with growing ridership. Continued growth in the rail market share for these and other robust California travel markets will be achieved by providing passenger rail service with the right combination of schedule, cost, reliability, and convenience features that allow rail to compete with automobile, air, and intercity bus alternatives. A one-size-fits-all combination of these four features cannot be applied to all of California's travel markets. The balance should be based on the traveler needs and modal competition specific to each corridor.

Freight Rail

The expected growth in industrial output in the State by 2040 will drive freight rail demand. Industrial output is expected to more than double between 2008 and 2040, compared to a modest increase in projected population and employment growth. According to the CSRP market analysis, this industrial output growth is related to changes in freight logistics and national and international economic activity more than industrial or agricultural output and employment in California. This higher growth in freight demand will change some of the major characteristics of freight rail between 2007 and 2040, as shown in Exhibits 2.10, 2.11, and 2.12, which are also explained in Chapter 6, Freight Rail System. These changes include:

- Directional rail traffic is forecast to reverse from a majority of inbound over outbound rail movements to a majority of outbound traffic. "Inbound" rail shipments begin outside California and are transported to a destination or other carrier (truck or ship) in the State; "outbound" rail shipments begin in California and are transported to a different state.
- Traffic mix is forecast to change from a majority of carload over intermodal (containers) to majority of intermodal. In this context, "carload" rail shipments are transported in railroad-specific vehicles, such as covered or open hopper cars, box cars (refrigerated or not), pressurized or unpressurized tank cars, flat cars, or rail cars built specially to transport lumber, rolled steel, or automobiles. "Intermodal" rail shipments generally refer to shipping containers, which can be single- or double-stacked on rail trailers, or stacked in a container ship or placed on a truck trailer.
- Origins and destinations of freight rail traffic are forecast to shift from a 2:1 ratio of domestic origins/destinations to port-related traffic (Los Angeles, Long Beach, Oakland) to an even split of domestic and port-related traffic. In this context, "domestic" shipments begin or end within the rail system (rail cars moved from a plant or warehouse) or transloaded to or from trucks; typically within the U.S. "Port-related" rail traffic are rail cars with goods directly loaded or unloaded dockside at a port, or transported to or from the port by a short-haul drayage truck movement from a rail yard.

[16] Includes Sonoma, Napa, Solano, Marin, Contra Costa, San Francisco, Alameda, San Mateo, and Santa Clara counties.

[17] Includes Santa Cruz, San Benito, Monterey, San Luis Obispo, and Santa Barbara counties.

[18] Includes San Joaquin, Amador, Calaveras, Stanislaus, Tuolumne, Merced, Mariposa, and Madera counties.

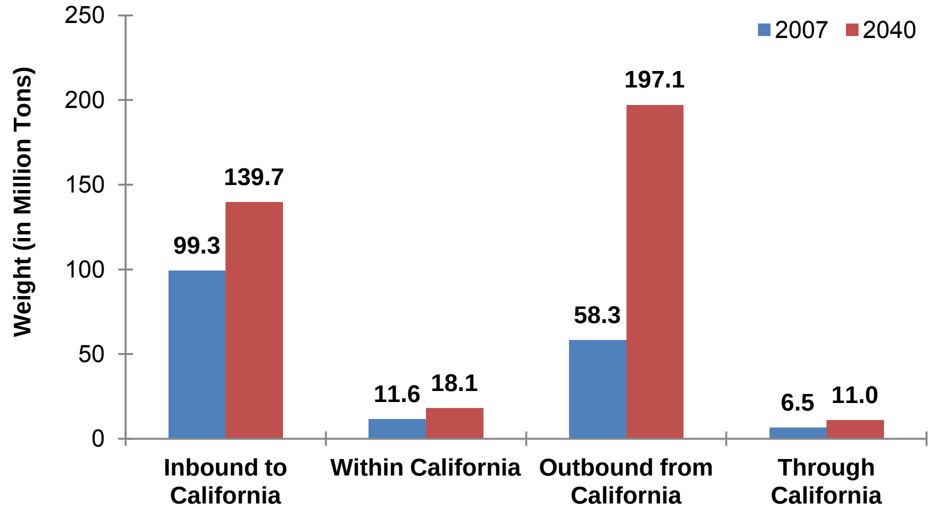

Exhibit 2.10: California Rail Tonnage Distribution by Direction of Movement, 2007 and 2040

Sources: Federal Highway Administration, Freight Analysis Framework Version 3 (FAF3) database, http://ops.fhwa.dot.gov/freight/freight_analysis/faf/faf3/netwkdbflow/index.htm; and STB Carload Waybill Sample, http://www.stb.dot.gov/stb/industry/econ_waybill.html.

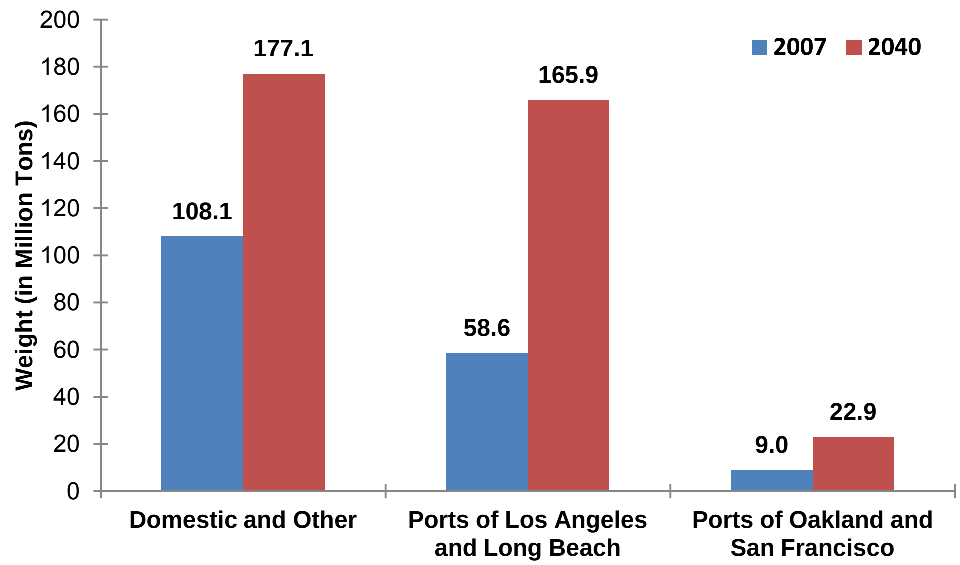

Exhibit 2.11: California Rail Tonnage Distribution by Rail Market Type, 2007 and 2040

Sources: Federal Highway Administration, FAF3 database, http://ops.fhwa.dot.gov/freight/freight_analysis/faf/faf3/netwkdbflow/index.htm; and STB Carload Waybill Sample, http://www.stb.dot.gov/stb/industry/econ_waybill.html.

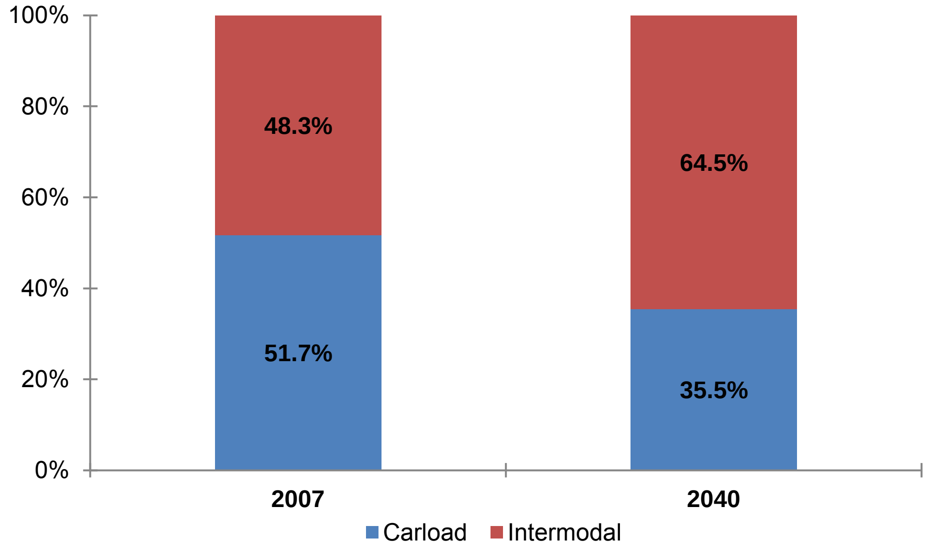

Exhibit 2.12: California Rail Tonnage Splits by Rail Service Type

Sources:Federal Highway Administration, FAF3 database, http://ops.fhwa.dot.gov/freight/freight_analysis/faf/faf3/netwkdbflow/index.htm; and STB Carload Waybill Sample, http://www.stb.dot.gov/stb/industry/econ_waybill.html.

These factors are related to expected growth in intermodal traffic linked to international shipments to and from California's ports. These freight traffic trends may influence several projected changes in the freight railroad industry in the coming years:

- Freight railroad companies are trending toward longer trains, consolidated loading or transloading at major terminals, and limited mainline switching.
- Supply chain and manufacturing sourcing could change as growth in fuel costs may lead to increased sourcing in North America, which may lead to changes in traffic in major rail corridors.
- New company-related security planning and routing may drive freight rate increases for certain hazardous materials, and further concentrate freight traffic on major corridors that can be monitored more carefully.

Growing freight rail demand may attract private investments in physical and technological improvements to handle more traffic on California freight rail lines profitably. Modest public funding might leverage railroad capital for resolving bottlenecks (further identified in Chapter 6) and increasing average train speeds, which could reduce blocked crossings, reduce emissions, and otherwise aid communities with these high-traffic freight lines.

Shared Passenger and Freight Rail Corridors

Many of California's busiest rail corridors have shared use between freight, commuter, and intercity passenger trains. In these shared use corridors the demographic and economic growth factors underlying passenger and freight demand may combine to create operational effects that are multiplicative rather than additive in scale. Chapter 7 details integration issues within shared use corridors. The chapter describes operational complications from growing freight and passenger rail volumes and the kinds of improvements necessary to address those complications. Exhibits 7.3 and 7.4 in Chapter 7 illustrate the projected future train volumes within shared use corridors.

Passenger rail service expansions described in Chapter 8 will require extensive negotiations between private freight rail owners and public passenger rail operators regarding timing of specific capacity improvements within shared use corridors. As with prior negotiations, these discussions will need to acknowledge that freight rail owners desire to retain capacity to serve future rail demand, while public agencies desire to focus investments in infrastructure (track, signals) and operations (train control and maintenance) that are directly linked to new passenger services. Determining needs and benefits for all parties will inform negotiations on capital and operating cost sharing. Caltrans and the Authority, regional rail corridor agencies and commuter rail operators, and MPOs are collaborating to address future mobility needs in these shared use corridors.

2.4.2 Customer Expectations for a Seamless Travel Experience

The nation's freight industry has improved intermodal connectivity in the decades following deregulation of railroads and motor carriers. The increased productivity, cost effectiveness, and technological sophistication of motor carriers and freight railroads have equipped freight shippers to use the U.S. freight transportation network as an extension of their overall supply chains.

Freight shippers are demanding that ocean carriers, port operators, truck companies, and freight railroads increase their effectiveness in transferring shipments from one carrier to another and from one mode to another. Most movements and transfers are conducted through private contracts that include profit incentives for both shippers and carriers. Some shippers may have less leverage than others if they are geographically isolated, ship small volumes, or have commodities with limited modal alternatives and limited carrier competition. However, the trend in goods movement has been to increase the seamlessness of freight transfers between supply chain links.

Passenger mobility is more complicated because it is characterized by the movement of individuals with limited opportunity for sharing trips or gaining leverage with transportation providers. Many elements of the passenger transportation system are under individual ownership (autos) or trip-based contracts with private companies (motor coaches or commercial airlines). However, a large majority of passenger travel occurs on publicly owned and operated infrastructure, such as highways, airports, rail stations, or transit lines for at least a portion of the trip. Since the public infrastructure is planned, built, funded, and operated by hundreds of different local, regional, and state agencies, it is not always easy for the traveling public to connect between system elements that are owned and/or operated by different agencies. The vision of a statewide integrated multimodal transportation system aims to improve passenger rail travel by enhancing coordinated planning and operations between agencies.

California's progress in reducing single-occupant vehicle and associated GHG emissions may depend on travel options that are more carefully coordinated (in terms of station proximity and operating schedules); are more seamless between services (interoperable fare media, more global 511-style traveler information); and address the entire door-to-door trip (allowing bicycles on trains, sufficient bicycle storage capacity, bicycle sharing programs at train stations, etc.). A coordinated and seamless passenger rail system will address, at a minimum, the following elements:

- Schedule Coordination. Rail travelers want to minimize waiting time when they switch from one passenger rail system to another. Coordinated schedules among different routes and operators are vital for providing competitive door-to-door travel time, particularly when connections are made between infrequent services, during off-peak hours, or on the last trip offered during the service day.
- Fare Integration. Intercity passenger rail travelers, much like air or urban transit users, often use two or more vehicles or operators to complete their door-to-door trip. These travelers often

experience a cost disadvantage from buying a second or third full fare along with the inconvenience of buying multiple tickets for a trip. An integrated fare structure allowing travelers to purchase one ticket for an entire trip across multiple operators must be a focus of future passenger rail planning.

- Station Configuration. A rail station's physical layout is a major contributor to successfully coordinating operations – and schedules – between passenger rail and urban transit operators. While configurations that allow cross-platform or direct vertical connections help minimize transfer times, such configurations cannot always be provided due to cost, space, operational and other considerations. Logical layouts with clearly marked and safe connections are important for the majority of stations where direct connections will not be feasible.
- Station Access and Wayfinding. Signage and wayfinding systems are critical features for transferring travelers in an integrated passenger rail system. While some rail stations may integrate multiple rail or urban transit models within a single building or property, most stations will rely on the local street and sidewalks for some or all connections. Travelers will expect that high standards of sidewalk, roadway, streetscape, and wayfinding conditions will be maintained irrespective of whichever agency owns a particular infrastructure item.
- Station Area Development. A station's location and relationship to surrounding development will influence multimodal connections and passenger rail ridership. TOD can increase land use mixes and development density and can be achieved at scales appropriate to each community that hosts a passenger rail station. A supportive station area development pattern can reinforce operational goals such as good multimodal connections and an active, safe station area environment, and may increase overall passenger rail ridership.

Chapter 8 details the blended approach, as introduced in the Authority's 2012 Business Plan. This approach relies on integration of existing and new rail infrastructure, and coordinated operations and administration between all of California's intercity, commuter, and urban passenger rail providers. The implementation of these blended systems and operations could be a pilot experience (as in northern California among Caltrain, ACE, *San Joaquin*, and *Capitol Corridor* services) for enhanced passenger-level connectivity and interoperability. This northern California pilot would augment ongoing integration activities between *Pacific Surfliner* and Metrolink services in the LOSSAN corridor.

2.4.3 Coordinated Passenger Rail Planning

A seamless travel experience will require coordinated transportation planning and interagency cooperation at levels rarely seen in recent decades. This type of coordinated passenger rail planning is an FRA requirement under its new state rail planning guidelines. The FRA has indicated that future federal funding for high-speed or conventional intercity passenger rail projects will be linked to coordinated system- and project-level planning presented in state rail plans and service development plans.

Coordinated planning and operation of California's intercity passenger rail system have historically been a challenge since a large portion of the funds for expanding and operating multimodal systems is either provided through local sales taxes or allocated at the discretion of regional agencies. However, near-term rail funding made available through the federal American Recovery and Reinvestment Act of 2009 (ARRA) grants and California Propositions 1A and 1B could be used to incentivize increased planning coordination – on an interregional basis – involving local, regional, and state agencies.

Coordinated planning is necessary to fully consider the combined effects of passenger rail operations – current and proposed – on privately owned freight rail lines. California's current passenger rail services are subject to complex operating agreements that exist between public agencies (North County Transit

District, SCRRA, PCJPB, CCJPA, Caltrans, and San Joaquin Regional Rail Commission); service operators (Amtrak and Herzog Transit Services); and the freight railroads. Expanded passenger rail service will require negotiating additional access rights among these parties. Such planning and negotiations address passenger rail needs and capacity needs to serve current and forecasted freight train volumes. The potential interaction between expanded passenger rail services and freight rail operations is discussed in Chapter 7.

2.4.4 Positive Train Control Implementation

PTC refers to technology that is capable of preventing train-to-train collisions, over speed derailments, and casualties or injuries to roadway workers (e.g., maintenance-of-way workers, bridge workers, and signal maintainers). The technology combines the following elements:

- Precise real-time location of all trains and other vehicles occupying track.
- Catalog of infrastructure, including turnouts, crossing junctions, grades, and associated permissible speeds.
- Algorithms that calculate the effective safe braking characteristics for each train en-route in PTC territory.
- Wireless communications between all operating units, including engineers, dispatchers, and work crews.

The Railroad Safety Improvement Act of 2008 mandated widespread PTC systems installation by December 2015 on the following three rail line categories:

1. All lines handling regularly scheduled passenger trains.
2. All lines handling toxic-by-inhalation hazardous (TIH) materials.
3. All lines with freight volumes that are greater than five million gross ton miles annually.

These categories apply to most of California's Class I rail network. UPRR's and BNSF's mainlines, the publicly-owned passenger service corridors in northern and southern California, and a few short line segments that host regularly scheduled passenger service will require PTC installation.

PTC implementation is expensive and technically difficult. Costs are likely to far exceed the $10 billion nationwide implementation cost projection. Additionally, the technical challenges that have been encountered are so complex that it is increasingly doubtful that the 2015 implementation deadline will be met at an industry-wide level. A recent FRA report confirms these challenges, and many freight railroads and passenger train operators have increased pressure on public decision-makers to extend the implementation deadline. However, thus far, the deadline has remained firm.[19]

California's railroads and agencies have been leaders in implementing PTC, with some initial operations anticipated to occur by 2014. SCRRA, which has budgeted $211 million for PTC implementation on its routes, expects to begin testing in 2013 with full implementation by the 2015 deadline.[20] Using different technology, Caltrain is moving forward with a $231 million effort called CBOSS over its route between San Francisco and San Jose.[21] PTC installation along California's three major intercity corridors is also

[19] Bowen, Douglas John, FRA says PTC deadline won't be met, *Railway Age,* August 15, 2012.

[20] http://www.metrolinktrains.com/pdfs/Agency/PTC_Fact_Sheet_1.pdf.

[21] http://www.caltrain.com/projectsplans/Projects/Caltrain_Modernization_Program/Caltrain_CBOSS_PTC_Project.htm.

being installed on an expedited basis through cooperative arrangements between Caltrans, regional agencies, and BNSF and UPRR.

2.4.5 State of Good Repair

Freight and passenger railroads are among the most capital intensive industries. Recent investment levels for freight rail capitalized maintenance and expansion have ranged between 15 percent and 17 percent of gross operating revenue, with a nationwide total for Class I railroads of about $20.3 billion in 2011 and a 2013 forecast of $24.5 billion[22]. These investments are essential to maintain the physical plant at its design level and to accommodate changing rail traffic. Accommodating changing traffic includes actions such as new or expanded passenger rail service, or increased tunnel and bridge clearance for double-stack container service.

Capital investments improve the track, control systems, civil structures, and rolling stock. The condition of these physical assets directly affects capacity, performance, safety and efficiency for both passengers and freight operations. For freight railroads, these investments are matters of economic necessity since they allow railroads to compete against truck, water, and air transport. The investments are no less important for passenger rail operators since they help maintain fast and reliable travel times.

The effects of insufficient capital investment became increasingly apparent from the 1950s through the 1970s. During this time period, deteriorating economic conditions in the railroad industry led to diminished physical plant investment and resulting service performance declines. The turnaround began in the 1980s when economic deregulation and other changes brought about renewed investment throughout the North American rail network.

In California, substantial private capital invested by the railroads has been augmented by public funding in certain key corridors since the late 1980s. These investments have produced a primary rail network that is maintained to high standards, with little or no deferred maintenance. Some public funding, such as the Alameda Corridor and more recent TCIF program, directly supports freight rail infrastructure. The majority of public funding has been invested in passenger rail corridors through direct project support and ongoing access fees.

Conditions on California's secondary rail lines are far more variable. While a rail line can function for a time with maintenance at levels below state of good repair (SGR), its performance will diminish over time. Diminished performance will result in declining operating speeds, physical restrictions such as weight limits, diminished reliability, and rising operating costs. Eventually, conditions will drop to a level where service may no longer be economically or operationally feasible, and substantial investment will be required simply to maintain a rail line's continued utility. Such conditions are not uncommon on light density lines that are owned by short line railroads where a combination of modest traffic, unclear market outlook, and weak finances provide insufficient resources to achieve a SGR.

The requirements to maintain an SGR on a rail line are sensitive to the rail traffic level and type of use on the line. A secondary line that handles one daily freight train may have modest SGR investment needs when compared to a primary line that handles 60 passenger trains and intermodal freight traffic on a daily basis. Nevertheless, the long-term viability of any line requires continued investment to maintain SGR. In states such as California with extensive intercity passenger rail service, these investments will continue to be a shared private-public responsibility.

[22] Hatch, Tony; Railroad Capital Expenditures (CapEx) remain crucial to the "Rail Renaissance"; National Railroad Construction & Maintenance Association; 2013.

3.0 Rail Vision Statement

Chapter 3 presents California's unified rail vision statement, which was adopted by the California Department of Transportation (Caltrans) in cooperation with the California State Rail Plan Advisory Committee (discussed in Chapter 4). The chapter describes the rail system objectives for passenger and freight rail, and explains how the *California State Rail Plan* (CSRP) rail vision statement and objectives relate to the vision and goals stated in the California Transportation Plan (CTP) 2025. Chapter 3 also contrasts Caltrans' roles and responsibilities in the rail system with its roles in the highway system.

California State Rail Vision Statement
California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life.

3.1 Rail Vision Statement

According to the *State Rail Planning Best Practices* guidebook,[23] an effective rail vision statement has the following attributes:

- Describes the role of rail in the future.
- Reflects the desires of rail stakeholders and constituents.
- Depicts what the rail system will be like in the future.
- Recognizes challenges and opportunities.
- Provides high-level strategic guidance to goals and objectives.

To develop this vision statement, Caltrans reviewed vision statements found in other recent state rail plans[24] and those for passenger rail and freight rail in the *California State Rail Plan 2007-2008 to 2017-18*. This review revealed a range of approaches to vision statements, including:

- Simple, unified vision statements that encompass both passenger and freight systems.
- Separate vision statements for the passenger rail system and freight rail system, and hybrid approaches that include a unified vision statement and distinct vision statements for the passenger and freight rail systems.

[23] American Association of State Highway Transportation Officials (AASHTO), *State Rail Planning Best Practices*, November 2009.

[24] State rail plans reviewed included plans from Departments of Transportation in Texas (2010), Wisconsin (2010), Minnesota (2010), Kansas (2011), and Michigan (2011).

- A diverse array of elements addressed, including future challenges, connectivity, freight and passenger rail issues, mobility, multimodal/intermodal, reliability, and safety.

After reviewing this information and consulting with the CSRP Advisory Committee, Caltrans determined that a single, succinct, unified vision statement is most appropriate for the State. A simple vision statement should be easy to remember and disseminate effectively so that it can successfully influence CSRP implementation.[25] This vision statement describes what the State's rail system will be like at the conclusion of the CSRP planning horizon.[26]

The major concepts in the vision statement include:

- Premier. The word itself is defined as first, leading, or chief. In the vision statement, this word means that California's rail system will be a national leader by 2040 in its functionality, innovation, and effectiveness. Caltrans will regularly benchmark the passenger rail and freight rail services in the State against that of other states and international leaders.
- Customer-Focused. For private freight rail companies, serving rail shippers is the primary means of generating revenues and profits for employees and shareholders. As such, freight railroads have a built-in motive to be customer-focused. Passenger rail operators have traditionally focused on serving customers on their respective systems, but one of the motivations of the new high-speed rail (HSR) blended service approach is to enable more seamless connections between passenger rail systems and transit services. A focus on passenger rail customers will lead to common or interoperable systems for ticketing, trip planning, and service status information across operators. In addition, station location and improvements will continue to be customer-focused; meaning they will be pedestrian- and bicycle-friendly, located near existing employment centers, accessible by public transit, and will accentuate existing central cities.
- Successfully Moves. The rail system will offer high performance to customers. This is consistent with the emphasis on performance management in the 2012 Moving Ahead for Progress in the 21st Century (MAP-21) federal surface transportation legislation described in Chapter 2. Another measure of success in the rail system will be the movement of people and products safely and without incident.
- People and Products. California's rail system will effectively balance the needs of freight rail and passenger rail customers. Infrastructure requirements for additional passenger rail services will be thoroughly negotiated between public agencies and private railroad companies. Public funding will correspond to the public benefits generated by the rail improvements.
- Economic Growth. The passenger and freight rail systems offer mobility to facilitate the growth of California's existing businesses and communities, and support the development of new businesses within the State. Rail systems will improve the State's economic competitiveness and attract businesses and populations to relocate to California.
- Quality of Life. The current CTP defines quality of life as "The Three E's:" prosperous Economy, social Equity, and quality Environment (emphasis and capitals added). The CSRP will guide improvements to the State's rail system that will enhance the quality of life for Californians.

[25] Bryson, John M., *Strategic Planning for Public and Non-Profit Organizations*, Third Edition, John Wiley and Sons, 2004, page 237.

[26] As explained in Chapter 2, the CSRP is being conducted as a parallel modal transportation plan as part of the California Interregional Blueprint (CIB), which will lead to the next CTP, with a horizon year of 2040.

3.2 Rail Plan Objectives

To complement this unified vision statement, this CSRP includes two descriptive objectives for the passenger and freight rail systems that also will affect information, programs, and recommendations in the CSRP.

3.2.1 Passenger Rail Objective

California is committed to developing a world-class, sustainable passenger rail system that accomplishes the following objectives:

- Integrates high-speed, intercity, and commuter rail services into a coordinated statewide network.
- Is state-of-the-art and customer-focused.
- Provides an accessible mobility option that connects to other modes.
- Reduces highway congestion, improves air quality, reduces greenhouse gas (GHG) emissions, promotes local and regional economic development, fosters livable and vibrant communities, and supports social equity.

This passenger rail objective is consistent with the state rail vision statement (described earlier in this chapter), which emphasizes the transportation system's role in supporting economic development and social equity in California. The following descriptions explain the passenger rail objective:

- Coordinated Statewide Network. A coordinated statewide passenger rail network incorporates future HSR and enhancements in intercity passenger rail and commuter rail that will not merely connect with each other, but be part of a functionally integrated network. Further, the State's HSR system will be implemented in phases. HSR, intercity, and commuter rail operations will be coordinated, and infrastructure will be shared as the HSR project moves to maturity. The distinctions between intercity and commuter rail are described further in Chapter 5, but the primary differences are in length of service segments (commuter rail tends to be shorter than intercity) and in scheduled operations (commuter rail generally has more frequent services during workday peak-travel periods, while intercity rail provides service throughout the day and weekends).
- State of the Art and Customer-Focused. California is a national leader in passenger rail development. The State's highly utilized intercity passenger rail services and its planning for Core Express[27] HSR service are two examples of this national leadership. The State's objective is to continue to offer the best possible technology, service integration, and traveler options to rail system passengers. The phrase "customer-focused" has the same meaning here as it does in the CSRP Vision Statement described in Section 3.1.
- Accessible Mobility Option that Connects. As the passenger rail network becomes more integrated, Californians will gain additional access to the network through extensive connections to other transportation modes. A rail system that is effectively connected to urban and rural transit systems will provide an attractive travel alternative to mid-range and long-range automobile trips.
- Reduces Highway Congestion. An accessible, connected, integrated, state-of-the-art passenger rail system offers travelers a wealth of mobility choices, which should reduce reliance on the

[27] "Core Express" is the term used by the Federal Railroad Administration (FRA) to describe HSR operating more than 150 mph.

automobile. Reducing the number of auto trips will reduce pressure on the State's highway network.

- Improves Air Quality. As the State's passenger rail system grows, the resulting reduction in auto trips and highway congestion will bring about air quality benefits. As described in Chapter 2, emissions from transportation account for 38 percent of California's total GHG emissions; the vast majority of which comes from on-road sources. Limiting the growth of auto travel will reduce auto-related emissions.
- Economic Development. An integrated and coordinated passenger rail system connects workers to their jobs and travelers to recreation, and fosters sustainable development around rail stations. This robust passenger rail system supports the continued development of California's economy.
- Livable Communities. An integrated and coordinated passenger rail system will foster livable communities. Passenger rail is a safe, clean, and efficient mode of transportation with stations that complement and enhance the surrounding streetscape. Regional Transportation Plans now include Sustainable Communities Strategies, which link land use planning and transportation investments. Regional agencies should coordinate passenger rail projects included in this CSRP with other transportation and community projects.
- Cost Effectiveness. Passenger rail, which attracts substantial ridership by providing connections within the rail system and to highway and transit networks, is a cost-effective means of moving high passenger volumes along corridors.

3.2.2 Freight Rail Objective

California is committed to developing a world-class, sustainable freight rail system that accomplishes the following objectives:

- Links seaports, manufacturing and warehousing centers, agricultural regions, and intermodal freight transfer facilities with an integrated statewide freight network that connects to national and international freight networks.
- Provides for the efficient movement of freight while reducing energy consumption and highway congestion by reducing truck traffic.
- Operates in coordination and cooperation with an extensive passenger rail system.
- Supports California's global economic competitiveness.
- Improves air quality; reduces GHG emissions; promotes local and regional economic development by connecting California customers, shippers, and manufacturers to the national rail network; fosters livable and vibrant communities; and supports social equity.

The freight rail objective mirrors many of the ideas in the state rail vision statement and the passenger rail objective. The following explains the freight rail objective:

- Integrated Freight Network. The freight generators and destinations are among the major origins/destinations of freight rail shipments in California, as explained in Chapter 6. The State's freight rail network will connect California's businesses with domestic and international markets, enhancing economic activity and job growth.
- Goods Movement with Energy, Congestion, and Air Quality Benefits. Rail is a relatively energy efficient way to move freight. According to federal statistics, an average freight rail car moves

10.6 miles per gallon of fuel consumed, while an average combination truck moves 5.9 miles per gallon.[28] A 2009 FRA study reported that a double-stack container-trailer-freight rail car moves freight three to five times more fuel efficiently than a truck.[29] Each freight train carries much more total weight than a single combination truck, so each train movement reduces truck traffic on highways and reduces GHG emissions.

- Passenger Rail System Coordination. Similar to the "people and products" phrase in the CSRP vision statement (described in Section 3.1), this objective emphasizes that the expansion of the State's rail system will expand capacity and services for shippers and passengers alike.
- Global Economic Competitiveness. The freight rail system provides California's businesses, producers, and manufacturers with cost-effective transportation connections to national and international markets, making the State an effective place to conduct business.
- Livable and Vibrant Communities. Caltrans will pursue policies and improvements for freight rail services in a way that connects economic activity centers with rail services, and also enhances the relationship between railroads and their neighboring communities.

This CSRP addresses state policies and practices to enhance freight rail services. This objective and the associated recommendations do not necessarily represent the policies or actions of the private freight rail companies listed in Chapter 6. Those companies, subject to certain federal and state laws and regulations, are responsible for daily operational decisions and capital investments on the freight rail network. In this respect, they are not bound by the operational and investment decisions of the State of California or local agencies.

3.3 CTP Vision, Goals, and Policies

The CSRP was not developed independently of other Caltrans plans; and the CSRP vision statement should be seen in the context of the overall vision, goals, and policies of the state transportation system. The CSRP vision statement builds upon the CTP 2025 vision, goals, and objectives. As the CTP is updated in the future, the CSRP vision statement can be adjusted to remain in synch with the State's goals for the multimodal transportation system as a whole. The following describes the CTP 2025 vision statement, goals, and policies:

- CTP 2025 vision statement: "California has a safe, sustainable, world-class transportation system that provides for the mobility and accessibility of people, goods, services, and information through an integrated, multimodal network that is developed through collaboration and achieves a Prosperous Economy, a Quality Environment, and Social Equity."[30]
- CTP 2025 goals:
  - Improve mobility and accessibility.
  - Preserve the transportation system.
  - Support the economy.
  - Enhance public safety and security.

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[28] Bureau of Transportation Statistics, *National Transportation Statistics*, Tables 4-14 (2012) and 4-17 (2011).

[29] Federal Railroad Administration, Comparative Evaluation of Rail and Truck Fuel Efficiency on Competitive Corridors, 2009, page 5.

[30] California Department of Transportation, *California Transportation Plan 2025*, April 2006.

  - Reflect community values.
  - Enhance the environment.
- CTP 2025 policies:
  - Increase system efficiency.
  - Preserve and maintain the system.
  - Enhance goods movement.
  - Support research to advance mobility and accessibility.
  - Provide viable transportation choices.
  - Manage and operate an efficient intermodal system.
  - Provide additional and flexible funding.
  - Improve system and system user safety.
  - Provide for system security.
  - Expand collaboration in planning and decision-making.
  - Manage growth.
  - Conserve natural resources.
  - Commit to a clean and energy efficient system.

3.4 Caltrans Roles and Responsibilities

Caltrans' operational mission statement is "Caltrans Improves Mobility Across California." This statement anchors Caltrans' varied activities and policies to a common purpose – to improve mobility for people and goods throughout the State. This mission describes how Caltrans will direct its activities; but it does not mean that Caltrans has the power or authority to improve mobility equally across all modes. The transportation system is comprised of private and public equipment, infrastructure, and facilities, all owned and operated by a variety of agencies and companies.

Chapter 3 links the CSRP vision statement with the vision and goals stated in Caltrans' CTP 2025 that guide the state transportation system. But, the roles and responsibilities of state agencies differ among modes. This distinction is best illustrated by comparing the State's highway system, passenger rail system, and freight railroad system. Table 3.1 lists some of the distinctions between these three systems.

Chapters 5 and 6 explain in more detail the roles and responsibilities of the various parties involved in passenger and freight rail. For the state highway system (explained in the *Interregional Transportation Strategic Plan* being developed concurrently with the CSRP), Caltrans shares responsibilities with federal and regional agencies. Similarly, for passenger rail projects, Caltrans shares planning and operational responsibilities with federal and regional agencies that have different roles for funding, operating, and project delivery. Caltrans' statutory rail planning responsibilities under federal and state law, explained in the previous chapters, do not necessarily give Caltrans broad power to control CSRP implementation. The private owners of the freight rail system, the new State Transportation Agency, and California's MPOs, county transportation agencies, and regional passenger rail agencies share CSRP implementation responsibility. However, those same laws governing state rail planning require Caltrans to establish a guiding vision and objectives for the freight and passenger rail systems, and this chapter accomplishes those requirements.

Table 3.1: Highway and Rail System Distinctions

Element	State Highway System	Freight Rail System	Passenger Rail System
Infrastructure Ownership	Public	Private	Private freight rail (with limited exceptions)
Infrastructure Maintenance	Public	Private	Private (with limited exceptions)
System Planning	Public, collaborative	Private (limited public regulation)	Public and private, collaborative
Project Prioritization	Public (federal, state, regional processes)	Private (based on rates of return)	Public (federal, state, regional processes)
Vehicle Ownership	Private and Public	Private (railroads, lessees)	Public
Vehicle Access to Infrastructure	Nearly unlimited (subject to vehicle and operator registration and traffic laws)	Strictly controlled by private railroad operator (subject to limited public regulation)	Strictly controlled by private railroad operator (with limited exceptions)
Property Taxes	Exempt	Paid	Exempt if right-of-way is publicly owned Paid if right of way owned by private rail companies
Costs of Capital and Maintenance Expenses	Public (federal, state, and local)	Private (with limited exceptions)	Public and Private

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4.0 Public Outreach

This chapter summarizes the Public Outreach Plan for the *California State Rail Plan* (CSRP). It provides an overview of the methods and specific steps used to engage the general public and interested and key stakeholders. The chapter also discusses coordination with the public outreach activities for the California Interregional Blueprint (CIB) and the California Transportation Plan (CTP) – the statewide multimodal plan.[31]

4.1 California State Rail Plan Public Outreach and Coordination

The CSRP team outlined the outreach goals for the CSRP in a public outreach plan. The public outreach plan ensures that strategic and effective communication supports the technical work program and is fully integrated with the California Department of Transportation's (Caltrans) existing and ongoing outreach efforts.

The overall long-term goals for the CSRP public outreach program include:

- Ensure that the statewide rail community and interest groups are aware of and understand that the CSRP reflects the State's collective vision for rail and Caltrans' role in state rail planning.
- Conduct a transparent and inclusive outreach campaign that facilitates the development of a comprehensive CSRP.
- Implement a complementary and coordinated outreach program with the ongoing CIB program efforts.
- Pursue an outreach program complementary and coordinated with the California High-Speed Rail Authority's (Authority) ongoing communication efforts.

The short-term objectives for the outreach program include:

- Increase CSRP awareness within Caltrans districts and improve public awareness through collaborative efforts that capitalize on existing communication programs.
- Provide easily understood, concise, and multilingual project information that fosters project education and garners public input.
- Establish recognizable project branding and media venues that will serve as long-term public portals for obtaining statewide rail information.
- Ensure underrepresented groups are part of the public outreach process.
- Create opportunities for key stakeholders to provide valuable input that improves decision-making, leading to better project delivery.
- Improve statewide stakeholder communication and collaboration between rail corridor areas.
- Convey the CSRP vision and objectives.

[31] Appendix B includes more detailed information on the activities undertaken, the feedback received, and how that feedback has been incorporated into the CSRP.

- Communicate how California is responding to Senate Bill 391 (Liu 2009) and greenhouse gas emissions reduction targets.
- Develop and implement a communication framework, which moves the CSRP toward consensus.

4.2 Public Outreach Plan Support Activities

The public outreach plan outlines a number of activities used to support public involvement and stakeholder outreach efforts, including:

- Stakeholder Database Development. Working with CIB outreach consultants, state and regional agencies that prepared freight and rail plans covered in this CSRP, Amtrak, Caltrans district offices, the Authority, the California Transit Association, the California Department of Public Health, and the Caltrans Native American Liaison Branch, the CSRP team created a database of stakeholder contacts for use in outreach activities during the CSRP development process.
- Branding, Messaging, and Collateral Material Production. The CSRP team developed branding for the CSRP consistent with CIB themes. The team crafted key messages as the CSRP drafts were completed, to be used in collateral materials, interviews, and presentations. The collateral materials included CSRP brochures, frequently asked questions documents, fact sheets, meeting logistics and support materials, display boards, and meeting facilitation technologies.
- Website Development and Management. The CSRP website served as an information portal to disseminate information on CSRP content and meeting information and to receive information from the public through survey instruments and comment forms. The website www.californiastaterailplan.com also links to social media sites to distribute and receive public information. Exhibit 4.1 is an image from the CSRP website, which is an example of the outreach conducted for the plan. The website address, which during the outreach process was "www.californiastaterailplan.com", is changing to "www.californiastaterailplan.dot.ca.gov" effective May 31, 2013.
- Graphics and Media. Print and electronic materials explained the CSRP goals and content to the general public and stakeholders. Interaction with traditional and print media organizations and with social media platforms enhanced outreach efforts.

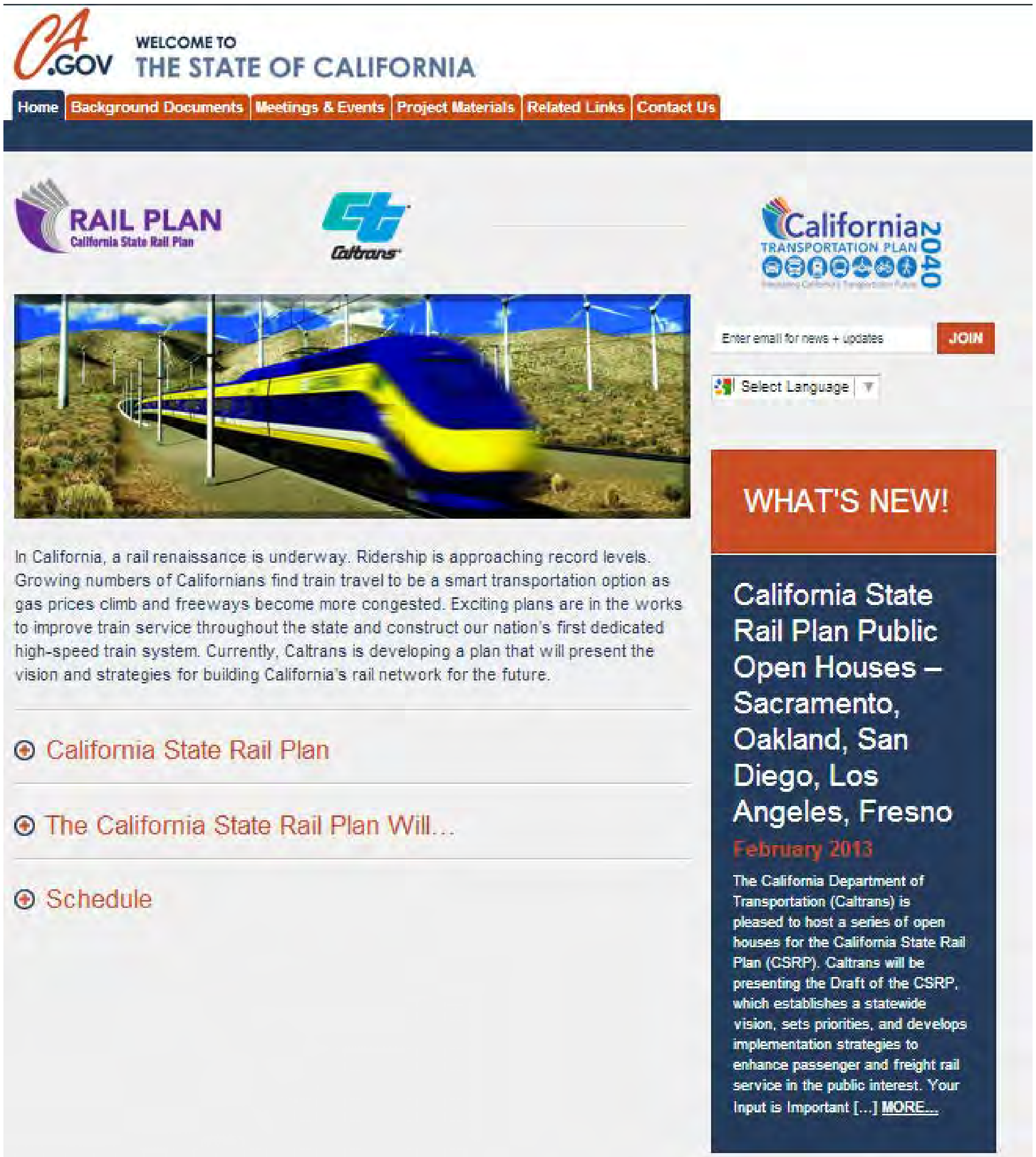

Exhibit 4.1: Notice for California State Rail Plan Public Open House on the CSRP Website

Source: Caltrans, 2013.

4.3 Meetings and Coordination

The California Business, Transportation and Housing Agency (BTH), Caltrans divisions and districts, state and regional agencies, rail corridor committees, railroads, and other stakeholders participated in briefings on the CSRP goals, process, and schedules. This was to ensure that key decision-makers and executive staff were well informed and regularly updated on the status of the CSRP process and findings prior to the 2013 submittal of the Draft CSRP for public distribution. Appendix B includes detailed information on the briefings and meetings held as part of the execution of the public outreach plan.

The public outreach plan specified different levels of coordination and briefings that took place during development of the CSRP for these different types of stakeholder organizations:

- Caltrans Internal Coordination. The CSRP project team conducted 25 internal coordination meetings, which involved briefings on the CSRP process and content to Division of Rail leadership, Caltrans Executive Board members, Caltrans District Directors, and other Caltrans divisions (e.g., Freight Planning Branch, Division of Transportation Planning); CIB coordinators; CTC staff; and the BTH.
- Caltrans Organizational Briefings. Five briefings ensured that information was shared with public information officers at all districts for review and dissemination. Meetings with district planning directors in the Planning Local Assistance Network (PLAN) occurred regularly.
- CSRP Advisory Committee. The purpose of the Advisory Committee was to provide critical input from agency peers and major rail stakeholders into the CSRP process, and to cross-pollinate regional activities, findings, and recommendations. The CSRP team worked with Caltrans to constitute a statewide CSRP Advisory Committee that was representative of the rail corridor areas. The CSRP Advisory Committee convened on six occasions to discuss content from the CSRP.

  The Advisory Committee comprised representatives of key rail stakeholders as follows:

  - Amtrak.
  - BTH.
  - BNSF Railway (BNSF).
  - California Short Line Railroad Association (CSLRA).
  - The Authority.
  - California Transportation Commission (CTC).
  - Capitol Corridor Joint Powers Authority (CCJPA).
  - Coast Rail Coordinating Council (CRCC).
  - Federal Railroad Administration (FRA).
  - Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency (LOSSAN).
  - San Joaquin Valley Rail Committee (SJVRC).
  - Union Pacific Railroad (UPRR).
- State and Regional Agencies. The following state and regional agencies were among those included in a series of 17 briefings:
  - California Air Resources Board.
  - Active Transportation and Livable Communities.
  - California Association of Councils of Governments, which is made up of Metropolitan Planning Organizations and Regional Transportation Planning Agencies (RTPA).
  - Southern California Association of Governments (SCAG).
  - Rural Counties Task Force, which is made up of rural RTPAs.
- Rail Corridor Organizations. The CSRP project team conducted 21 briefings for these organizations of regional and local stakeholders that advise (and in some cases, administer) intercity passenger rail operations. The organizations include local planning and transportation

agencies along each rail corridor. Advisory Committee members helped facilitate communication on the CSRP to their respective organizations. These organizations were represented on the CSRP Advisory Committee:

  - CCJPA.
  - CRCC.
  - LOSSAN.
  - SJVRC.

- Freight Railroads. While freight railroads were part of the CSRP Advisory Committee, the CSRP team held five total briefings with the following railroads to obtain a more detailed review of freight-related chapters in the CSRP:
  - BNSF.
  - CSLRA.
  - UPRR.
- Passenger Rail Owners, Administrators, or Operators. These organizations own rail right-of-way, administer and/or operate intercity and commuter passenger rail services throughout California. They participated in the CSRP process and provided valuable input and feedback:
  - Amtrak.
  - Los Angeles County Metropolitan Transportation Authority.
  - North County Transit District, the operator of COASTER.
  - Orange County Transportation Authority.
  - Peninsula Corridor Joint Powers Board, the operator of Caltrain.
  - Riverside County Transportation Commission.
  - San Diego Metropolitan Transit System.
  - San Joaquin Regional Rail Commission, the operator of Altamont Corridor Express.
  - Southern California Regional Rail Authority, the oversight body for Metrolink.
  - Ventura County Transportation Commission.
- Other States. Federal regulations require that states coordinate with neighboring states on developing state rail plans. Caltrans pursued opportunities to gain input from and coordinate plans with neighboring states (Nevada, Arizona, and Oregon). These states have completed or are preparing their state rail plans.
- Tribal Governments. Caltrans held three meetings with tribal groups: a briefing to the Caltrans Director's Native American Advisory Committee, an informational meeting for tribal representatives on the CSRP, and a meeting with one tribe to discuss their concerns related to the CSRP. Chapter 2 contains additional information on Tribal Consultation.
- Public Meetings and Webinar. Five public meetings and a webinar occurred after the Draft CSRP's release in February 2013. These meetings allowed review of draft findings and stakeholder input. The public meetings supported and integrated with the Authority, CIB, and other modal plans. Some meetings included non-English participation options. Meetings occurred in the following locations:

- Sacramento (February 12, 2013).
- Oakland (February 14, 2013).
- San Diego (February 19, 2013).
- Los Angeles (February 20, 2013).
- Fresno (February 21, 2013).
- On-Line Webinar (February 26, 2013).

Appendix B provides further detail on these meetings, including information about engagement of persons who have limited English proficiency adherent to Title VI Guidelines. The five public meetings and webinar had 505 registered participants. The CSRP project team received 216 comments or sets of comments during the public comment period on the Draft CSRP, and 859 separate comments were recorded.

4.4 Comment Documentation, Analysis, and Synthesis

The CSRP team established a protocol for documenting, analyzing, and synthesizing public comments received as part of this program.

In the course of the outreach process, the public provided comments in many formats, including written letters, e-mail, comment cards, website submissions, and via social media.

The following protocol guided the management of comments received in all formats:

- The team created a comments matrix to log comments.
- Within the comments matrix, the team established a set of categories to help organize comments into major themes.
- The team maintained the comments matrix on an ongoing basis. Caltrans and the CSRP team reviewed the matrix on a regular basis.
- The CSRP team organized and managed all comments using a common database.

As appropriate, the public/stakeholders received responses to comments submitted. Appendix B describes the public involvement and stakeholder outreach process in more detail, including a record of briefings and meetings conducted, a summary of major themes and comments received, and a description of how these comments were included in the final version of the CSRP.

5.0 Existing Passenger Rail System

5.1 Passenger Rail Inventory

5.1.1 Rail Services Operating Today

California's passenger rail system has three primary components:

1. Intercity rail service connecting urban areas (overseen by state and regional organizations).
2. Commuter rail service within metropolitan regions or between adjacent regions (provided by local and regional agencies).
3. Urban rail transit service within a metropolitan area (provided by local and regional agencies).

This section summarizes these passenger rail systems operating in California today.

Intercity Passenger Rail Services

Intercity passenger rail services provide transportation between metropolitan areas, to rural areas of California, and to points beyond California's borders. Amtrak operates all intercity rail services in the State. California's intercity rail services can be divided into two groups: 1) state-supported routes, which are funded by the State and serve California travel markets; and 2) Amtrak long-distance routes, which are funded by Amtrak and serve California and interstate markets.

State-Supported Routes – Overview

- *Pacific Surfliner* Route (San Luis Obispo – Los Angeles – San Diego). The *Pacific Surfliner* route is the second busiest Amtrak route in the nation, serving approximately 2.6 million passengers in Federal Fiscal Year (FFY) 2012.[32]
- *San Joaquin* Route (Bay Area/Sacramento – Stockton – Bakersfield). The *San Joaquin* route provides service from the San Francisco Bay Area and Sacramento through the San Joaquin Valley to Bakersfield. Over 1.1 million passengers traveled on the *San Joaquin* route in FFY 2012.
- *Capitol Corridor* (San Jose – Oakland – Sacramento – Roseville/Auburn). The *Capitol Corridor* provides intercity service between San Jose, the San Francisco Bay Area, and the Sacramento region. A total of 1.7 million passengers traveled this route in FFY 2012.

Exhibit 5.1 indicates the location of California's state-supported intercity rail routes.

Amtrak Long-Distance Routes

- *California Zephyr* (Emeryville – Sacramento – Reno – Denver – Chicago). The *California Zephyr* provides daily round trip regional service in the Emeryville-Sacramento-Reno corridor. Extra coaches are often operated on this portion of the route to handle heavy loads to and from Reno. Connecting buses link Emeryville with San Francisco. A stop in Truckee serves Lake Tahoe and nearby Sierra Nevada ski areas. En route to Chicago, the *California Zephyr* route also serves Salt Lake City, Denver and Omaha.

[32] October 1, 2011 to September 30, 2012.

- *Coast Starlight* (Los Angeles – Oakland – Sacramento – Portland – Seattle). The *Coast Starlight's* daily round trip is the second most popular long-distance train in the Amtrak system. For many years, demand has often outstripped capacity during summer and holiday travel periods. A substantial portion of the route's ridership is generated by intrastate California travel. The route provides the only rail service north from Sacramento to Redding and Oregon, and the only through rail service from the Bay Area to Los Angeles. Connections with the *Pacific Surfliner* route at Los Angeles provide access to San Diego and connections with the *San Joaquin* route at Sacramento and Martinez provide access to the Central Valley. Portland and Seattle are key stops to the north.
- *Sunset Limited* (Los Angeles-San Antonio-New Orleans). The *Sunset Limited* operates three days a week in each direction and is the only rail service serving Palm Springs. It continues east, connecting California to Tucson, El Paso, San Antonio, Houston, and New Orleans. The *Texas Eagle*, which links Chicago with San Antonio, carries through-cars to and from the *Sunset Limited*.
- *Southwest Chief* (Los Angeles – Albuquerque – Kansas City – Chicago). The daily round trip *Southwest Chief* provides the only rail service in California between Los Angeles and Victorville, Barstow and Needles to the east. Beyond California, major stops include Flagstaff (Grand Canyon), Albuquerque, Kansas City, and Chicago.

Amtrak California Connecting Bus Network

An extensive network of Amtrak dedicated Thruway buses support intercity passenger rail by providing dedicated connecting service to markets without direct passenger rail service. In Bakersfield, Thruway buses provides convenient connections between the *Pacific Surfliner* and *San Joaquin* rail routes to facilitate smooth service between northern and southern California where no passenger rail service is available. Similarly, on the coast, the *Pacific Surfliner* Thruway bus also links northern and southern California by providing service between Goleta and Oakland through San Luis Obispo and San Jose and connecting with the *Capitol Corridor*.

Thruway bus connections at Stockton allow passengers traveling north on the *San Joaqui*n intercity rail route to access both of the route's northern termini (Oakland and Sacramento) from every train on the route that originates in Bakersfield. A bus meets all trains in Stockton and provides service to the terminus not served by the train. Similarly, on the *Pacific Surfliner* route, a bus meets all trains terminating in Goleta and provides service to San Luis Obispo.

In addition to Amtrak's major Thruway bus trunk lines, additional buses routes serve destinations, including McKinleyville and Redding in the north, Coachella Valley and San Diego in the south, and Reno and Las Vegas in the east. Amtrak Thruway buses provide connections to many popular destinations in California, including Yosemite National Park, Palm Springs, Lake Tahoe, and Monterey Bay. Amtrak Thruway bus service is extended only to passengers who transfer directly to/from either state-supported or Amtrak long-distance rail routes.

Exhibits 5.2 and 5.3 display existing Amtrak Thruway bus routes alongside the state-supported intercity rail routes and the stations that serve the intercity routes. Exhibit 5.2 shows services in northern California, and Exhibit 5.3 shows areas in southern California. The following subsections provide additional information on the three state-supported intercity passenger rail routes. These subsections also detail the current Amtrak Thruway bus routes that serve each state-supported rail routes.

Exhibit 5.1: California Intercity Routes

Sources: California Department of Transportation (Caltrans), 2012 and Esri, 2012.

Exhibit 5.2: Amtrak Thruway Bus Service (Northern California)

Sources: Amtrak, 2011; Caltrans, 2012; Esri, 2012.

Exhibit 5.3: Amtrak Thruway Bus Service (Southern California)

Sources: Caltrans, 2012 and Esri, 2012.

State-Supported Routes – Detail

Pacific Surfliner Route

Route Description

The *Pacific Surfliner* route extends 351 rail miles between San Luis Obispo and San Diego through Los Angeles. The stations serving the *Pacific Surfliner* route are shown in Exhibit 5.3 and listed in Table 8.21 in Chapter 8. The route serves 29 stations, of which 17 are between San Luis Obispo and Los Angeles and 12 are south of Los Angeles. The Camarillo, Moorpark, San Clemente Pier and San Diego Old Town stations have limited service (every train does not stop at these stations). At San Diego Old Town trains only stop to board passengers in the northbound direction and to discharge passengers in the southbound direction.

Effective October 1, 2012, the *Pacific Surfliner* route has 11 daily round trips between San Diego and Los Angeles. Of which five trips extend north to Santa Barbara and Goleta with two of these trips extending further north to San Luis Obispo.[33] Dedicated Amtrak Thruway bus connections provide service to and from San Luis Obispo for rail passengers making connections in Goleta.

The average speed between Los Angeles and San Diego, including station dwell time, averages 46 miles per hour (mph) in both directions. This segment includes more than 70 miles between Santa Ana and Sorrento where the maximum track speed is 90 mph, the only location on the state-supported routes where trains operate above 79 mph. Between Los Angeles and Santa Barbara, the average speed is 40 mph in the northbound direction and 36 mph in the southbound direction. The average speed between Santa Barbara and San Luis Obispo is 44 mph in the northbound direction and 51 mph in the southbound direction.

Regional and local agencies in Ventura, Los Angeles, Orange, and San Diego counties purchased most segments of the rail line between Moorpark and San Diego to facilitate the implementation of commuter rail service. The Union Pacific Railroad (UPRR) owns 175 miles of line between San Luis Obispo and Moorpark. The BNSF Railway (BNSF) owns 22 miles between Redondo Junction in Los Angeles and Fullerton. Exhibit 5.4 details the current ownership, segment, mileage, and track and signal characteristics of the *Pacific Surfliner* route.

Travel Times

Current San Diego to Los Angeles travel times average 2 hours and 47 minutes. Los Angeles to Santa Barbara averages 2 hours and 37 minutes in the northbound direction and 2 hours and 55 minutes in the southbound direction. Los Angeles to San Luis Obispo, via Santa Barbara, averages 5 hours and 26 minutes in the northbound direction and 5 hours and 27 minutes in the southbound direction.

[33] One of the northbound trips that serves San Luis Obispo begins in Los Angeles instead of San Diego.

PACIFIC SURFLINER ROUTE
OWNERSHIP AND TRACK CHARACTERISTICS

Between	Mile Post	And	Mile Post	Miles	Owner of Track	*No. of Tracks	*Max. Speed	Signal System
San Luis Obispo	248.7	South San Luis Obispo	251.4	2.8	UPRR	2	60	CTC
South San Luis Obispo	251.4	Ellwood	355.8	104.3	UPRR	1	70	TWC/ABS
Ellwood	355.8	North Santa Barbara	365.0	9.2	UPRR	1	79	CTC
North Santa Barbara	365.0	South Santa Barbara	368.6	3.6	UPRR	2	45	CTC
South Santa Barbara	368.6	Los Posas (west of Moorpark)	423.1	54.5	UPRR	1	70	CTC
Los Posas (west of Moorpark)	426.4	Ventura/Los Angeles county line	442.0	15.6	(a)UPRR/VCTC	1	70	CTC
Ventura/Los Angeles county line	442.0	Raymer (west of Van Nuys)	453.1	11.1	(a)UPRR/LACMTA	1	70	CTC
Raymer (west of Van Nuys)	453.1	Burbank Jct. (milepost equation)	462.6	9.5	(a)UPRR/LACMTA	2	70	CTC
Burbank Jct. (milepost equation)	11.3	Glendale (CP Fletcher Drive)	4.8	6.5	(a)UPRR/LACMTA	2	79	CTC
Glendale (CP Fletcher Drive)	4.8	CP Dayton	2.2	2.6	LACMTA	2	79	CTC
CP Dayton (b)	2.2	Mission Tower	0.7	1.5	LACMTA	2	50	CTC
Mission Tower	0.7	L.A. Union Station	0.0	1.4	LACMTA	5	25	CTC
Mission Tower	0.7	CP San Diego Jct. (mp equation)	0.9	0.2	LACMTA	2	25	CTC
CP San Diego Jct. (mp equation)	140.2	Soto (east of Redondo Jct.)	144.4	4.2	LACMTA	2	79	CTC
Soto (east of Redondo Jct.)	144.4	Bandini (west of Pico Rivera)	149.8	5.4	BNSF	3	79	CTC
Bandini (west of Pico Rivera)	149.8	Buena Park	160.3	10.5	BNSF	2	79	CTC
Buena Park	160.3	Fullerton Jct.	165.5	5.2	BNSF	3	79	CTC
Fullerton Jct.	165.5	Santa Ana	175.2	9.7	OCTA	2	79	CTC
Santa Ana	175.2	Laguna Niguel	193.7	18.5	OCTA	2	90	CTC/ATS
Laguna Niguel	193.7	San Juan Capistrano	197.2	3.5	OCTA	1	90	CTC/ATS
San Juan Capistrano	197.2	Orange/San Diego County line	207.4	10.2	OCTA	1	40	CTC/ATS
Orange/San Diego County line	207.4	Del Mar/San Diego City Limits	245.6	38.2	NCTD	2	90	CTC/ATS
Del Mar/San Diego City Limits	245.6	CP Cumbres (Miramar Road)	252.9	7.3	SDMTS	2	90	CTC/ATS
CP Cumbres (Miramar Road)	252.9	CP Elvira	257.9	5.0	SDMTS	2	50	CTC
CP Elvira	257.9	Old Town	264.2	6.3	SDMTS	2	75	CTC
Old Town	264.2	San Diego	267.6	3.4	SDMTS	1	60	CTC
Total (**includes round trip between Union Station and Mission Tower)				351.6				

* Number of Tracks = General number of mainline tracks; does not include sidings or very short sections of 2nd main track.
*Maximum Speed = Primary maximum passenger speed (not necessarily continuous) within indicated section of main line.

(a) On these segments VCTC and LACMTA purchased a 40 foot wide portion of UPRR's right-of-way.
Between Raymer and Burbank Junction, LACMTA constructed and owns the second main line track.

(b) Via West Side of Los Angeles River (Downey Avenue Bridge)

Owners:
- BNSF - The BNSF Railway Company
- LACMTA - Los Angeles County Metropolitan Transportation Authority
- NCTD - North County Transit District
- OCTA - OCTA
- SDMTS – San Diego Metropolitan Transit System
- UPRR - Union Pacific Railroad Company
- VCTC - Ventura County Transportation Commission

Signal Systems:
- ABS - Automatic Block Signals - Wayside signals protect possession of block by indicating whether the track ahead is clear. The signals do not grant authority for train movements.
- ATS - Automatic Train Stop - An overlay system that allows speeds of 90 miles per hour. System automatically applies train brakes if a restrictive signal indication is not observed or warning alarm is not acknowledged.
- CTC - Centralized Traffic Control - Wayside signals protect possession of blocks and grant authority for train movements. Signals and powered switches are remotely controlled from the dispatching center.
- TWC - Track Warrant Control - Dispatching center gives authority for train movement by radio to train crew directly. (On some railroads this is identified as Direct Traffic Control, or DTC.)

Exhibit 5.4: *Pacific Surfliner* Route Characteristics

Source: Caltrans, 2013.

Amtrak Thruway Bus Routes

Amtrak Thruway buses provide an important extension for the *Pacific Surfliner*. Caltrans contracts with Amtrak to provide connecting feeder bus services. Amtrak in turn contracts with private bus operators. The bus routes function as a direct part of the Amtrak system with coordinated connections, guaranteed seating, integrated fares, and ticketing procedures. They are also included in Amtrak's central information and reservation systems. The current *Pacific Surfliner* bus routes and their origins/destinations are as follows:

- Route 1. Los Angeles Basin, Los Angeles-Bakersfield.[34]
- Route 4. South Coast, Los Angeles-Santa Barbara.
- Route 17. Central Coast, Santa Barbara-San Luis Obispo-San Francisco/Oakland.
- Route 21. Central Coast, Santa Barbara-San Jose.[35]
- Route 39. Fullerton-Indio.

On the northern segment of the *Pacific Surfliner*, buses from Los Angeles to Santa Barbara and then to San Luis Obispo have served as precursors to rail service, and play an important role in testing and developing rail ridership. Currently buses from Santa Barbara and San Luis Obispo to San Jose, San Francisco and Oakland provide an important extension for the service and testing this market. Caltrans plans to expand and improve Amtrak Thruway bus service on the route, including additional connections to the San Francisco Bay Area.

Route Administration

The State and Amtrak share operating responsibilities for *Surfliner*. Amtrak considers 30 percent of the service to be part of national long-distance service ("basic service") and provides operating support on this portion of the route. The remaining 70 percent of the service is state-supported. Amtrak operates all trains, and Caltrans is responsible for the oversight of the *Pacific Surfliner* service through its operating contract with Amtrak. Caltrans coordinates functions such as marketing, scheduling, and on-board services with Amtrak. The *Pacific Surfliner* route uses a combination of state and Amtrak-owned equipment on the route. Amtrak owns all of the locomotives and 40 cars, and the State owns 10 cars. Amtrak maintains all of the equipment.

LOSSAN

Caltrans works closely with the Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency (LOSSAN), formed in 1989, that acts as a planning and an advisory group for intercity rail in southern California. The members are San Diego Metropolitan Transit System (SDMTS), San Diego Association of Governments (SANDAG), North County Transit District (NCTD), Orange County Transportation Authority (OCTA), Los Angeles County Metropolitan Transportation Authority (LACMTA), Ventura County Transportation Commission (VCTC), Santa Barbara County Association of Governments (SBCAG), San Luis Obispo Council of Governments (SLOCOG), and Caltrans. Amtrak, Riverside County Transportation Commission (RCTC), the California High-Speed Rail Authority (Authority), and the Southern California Association of Governments (SCAG) are ex-officio members. In addition to these agencies, BNSF, the California Public Utilities Commission (CPUC), Southern California Regional Railroad Authority (SCRRA), and UPRR comprise the LOSSAN Technical Advisory Committee (TAC).

[34] Route 1 serves the *Pacific Surfliner* and *San Joaquin* routes.

[35] Route 21 serves the *Pacific Surfliner* and *Capitol Corridor* routes.

Route History

Amtrak was created in 1971 to revitalize passenger rail service. The Los Angeles-San Diego service, initially called the *San Diegan,* operated on tracks owned by the Atchison Topeka and Santa Fe Railway (ATSF)[36] between Los Angeles and San Diego. These trains functioned primarily as connections to long-haul trains, as opposed to a local transportation network for passengers traveling within the corridor. Amtrak maintained the three round trips operated by ATSF (but reduced one to tri-weekly for the first year), and service remained at this level until state involvement began in 1976.

The segment north of Los Angeles to Santa Barbara and San Luis Obispo, on Southern Pacific Transportation Company (SP) tracks, was served by Amtrak's *Coast Starlight*, a daily round trip between Los Angeles and Seattle. It operated three times per week north of Oakland until June 1973.

The State began supporting the route in 1976. This corridor has been unique among state-supported routes in California because some individual trains were entirely supported by Amtrak, because they were part of Amtrak's basic system. However, the State paid most of the costs of the other trains, which were considered part of the state-supported service. In October 1995, the cost allocation system changed and the State began supporting 64 percent of all service, instead of supporting individual trains. This support level increased to 70 percent in November 2004 and has remained at that level to the present.

In 1988, the *San Diegan* route was extended to Santa Barbara with a further extension to San Luis Obispo in 1995. In 2000, the service was rebranded the *Pacific Surfliner* in recognition of its expanded service area. A second round trip between Los Angeles and San Luis Obispo was added on November 17, 2004.

Service on the *Pacific Surfliner* between Los Angeles and San Diego increased from the original 3 round trips to the current level of 11 round trips daily as follows:

- 9/1/76. Los Angeles-San Diego: fourth round trip added, state-supported train.
- 4/24/77. Los Angeles-San Diego: fifth round trip added, state-supported train.
- 2/14/78. Los Angeles-San Diego: sixth round trip added, state-supported train.
- 10/26/80. Los Angeles-San Diego: seventh round trip added, Amtrak basic system.
- 10/25/81. State-supported Spirit of California Los Angeles-Sacramento round trip overnight train provided Los Angeles to Santa Barbara service. Service discontinued October 1, 1983.
- 10/25/87. Los Angeles-San Diego: eighth round trip added, state-supported train.
- 6/26/88. First train extended to Santa Barbara, state-supported train.
- 10/28/90. Second train extended to Santa Barbara, state-supported train.
- 10/25/92. Los Angeles-San Diego: ninth round trip added, Amtrak basic system.
- 2/1/94. Third train extended to Santa Barbara, state-supported train.
- 5/15/95. Los Angeles-San Diego: ninth round trip discontinued.
- 10/29/95. Los Angeles-San Luis Obispo: first round trip (fourth round trip, Los Angeles-Santa Barbara).
- 10/26/97. Los Angeles-San Diego: ninth round trip restored and tenth round trip added.
- 10/25/98. Los Angeles-San Diego: eleventh round trip added.

[36] ATSF is a predecessor of the BNSF.

- 5/21/01. Los Angeles-San Diego: twelfth Friday through Sunday round trip added.
- 11/17/04. Los Angeles-San Luis Obispo: second round trip added (fifth round trip, Los Angeles-Santa Barbara).
- 10/01/12. Los Angeles-San Diego twelfth Friday through Sunday round-trip discontinued.

Historical Performance

Exhibit 5.5 shows ridership and financial performance data on an annual basis from the start of state-supported service in State Fiscal Year[37] (SFY) 1976-77 through SFY 2011-12. Ridership and farebox return climbed steadily through the early 1990s with the years 1987-88 through 1992-93 experiencing particularly strong ridership growth and financial performance. The farebox ratio was near or over 100 percent for these six consecutive years, and ridership peaked at 1.8 million in SFY 1992-93.

A number of events occurred in the early- and mid-1990s that negatively impacted fare box return on the *Pacific Surfliner* route. Metrolink commuter rail service in the Los Angeles Basin was introduced in October 1992 and COASTER commuter rail service in the San Diego area was introduced in 1995. Ridership on the route dropped in SFY 1993-94 and did not reach the 1992-93 level again until 2002-03. Around the same time that commuter rail service was introduced, additional state-supported service was added (a third round trip between Los Angeles and Santa Barbara, and the first round trip between Los Angeles and San Luis Obispo). Then additional service was added towards the end of the 1990s (the ninth, tenth and eleventh round trips between San Diego and Los Angeles). The additional service did not stimulate ridership, but costs increased, resulting in a reduction of farebox return. Finally, in SFY 1995-96 and again in 1996-97, Amtrak increased the amount and types of costs charged to the State. This also negatively impacted farebox return. Farebox return reached a low of 33.9 percent in SFY 1997-1998.

Since the early 2000s, ridership on the corridor has increased significantly, offsetting the initial financial impacts of the new commuter services. Ridership reached two million in 2002-03, and farebox return has exceeded 50 percent since 2000-01. Additionally, the introduction of the "Rail 2 Rail" Program, which allows joint ticket honoring between Amtrak and commuter rail services, on Amtrak and Metrolink service in September 2002 and in April 2004 on the COASTER was associated with another large increase in ridership. Ridership peaked at nearly 2.9 million in 2007-08, a 68 percent increase over 2001-02 ridership (the year before Rail 2 Rail was introduced) with farebox recovery nearing 60 percent. The *Pacific Surfliner* has the second highest intercity rail ridership in the country.

The *Pacific Surfliner* lost ridership each year between SFY 2007-08 and 2009-10. In SFY 2011-12, the *Pacific Surfliner* route had not fully recovered to the 2007-08 ridership level.

San Joaquin Route

Route Description

The *San Joaquin* route extends 316 route miles between Oakland and Bakersfield with 13 intermediate stops. In addition, the Stockton-Sacramento segment of the route extends 49 miles with one intermediate stop. The stations serving the *San Joaquin* route are shown in Exhibits 5.2 and 5.3 and listed in Table 8.21 in Chapter 8. Amtrak operates the *San Joaquin* under provisions of its contracts with the BNSF and UPRR. BNSF predominantly owns the right-of-way along this route (Port Chicago-Bakersfield); however, UPRR owns 39 miles at the north end of the route between Oakland and Port Chicago and 49 miles in the segment between Stockton and Sacramento. Exhibit 5.6 details the current ownership, segment mileage, and track and signal characteristics of the *San Joaquin* route.

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[37] The SFY begins July 1 and ends June 30.

PACIFIC SURFLINER Route

Annual Operating Performance - State Fiscal Years

State Fiscal Year	Notes	Ridership Data: All Trains Ridership	All Trains PM/TM (F1)	State Supported* Ridership	Financial Data for Operations - State Supported Train and Bus Service Only*: Revenue	Expense (F2)	Loss	State Calculated Service Costs (F3)	Amtrak Calculated Service Costs (F4)	Train Loss per PM (F5)	Farebox Ratio (F6)
1973-74	(S1)	381,844									
1974-75		356,630									
1975-76		376,900									
1976-77	(S2)	607,976	146	101,572	$ 598,140	$ 1,662,714	$ 1,064,574	$ 548,534			36.0%
1977-78	(S3)	753,246	128	258,800	$ 1,446,036	$ 3,768,065	$ 2,322,029	$ 1,325,087			38.4%
1978-79		967,316	163	415,865	$ 2,203,403	$ 4,333,602	$ 2,130,199	$ 1,178,667			50.8%
1979-80		1,218,196	177	557,113	$ 3,341,561	$ 5,536,840	$ 2,195,279	$ 1,064,713			60.4%
1980-81	(S4)	1,238,135	152	555,418	$ 4,032,480	$ 6,572,539	$ 2,540,059	$ 1,233,490			61.4%
1981-82		1,167,718	144	533,093	$ 4,097,254	$ 6,607,395	$ 2,510,141	$ 1,217,418		6.3¢	62.0%
1982-83		1,131,146	138	488,606	$ 4,094,750	$ 6,928,334	$ 2,833,584	$ 1,374,097		8.3¢	59.1%
1983-84		1,221,256	143	524,857	$ 4,842,400	$ 6,337,083	$ 1,494,683	$ 1,452,450		4.1¢	76.4%
1984-85		1,240,003	152	568,902	$ 5,410,502	$ 6,411,308	$ 1,000,806	$ 1,212,261		2.5¢	84.4%
1985-86		1,394,320	167	597,025	$ 5,658,915	$ 6,424,634	$ 765,719	$ 1,097,966		1.8¢	88.1%
1986-87		1,461,003	173	624,618	$ 6,072,523	$ 6,510,113	$ 437,590	$ 955,509		1.0¢	93.3%
1987-88	(S5)	1,661,512	174	749,996	$ 8,223,462	$ 7,859,783	$ (363,679)	$ 1,145,330		(0.7¢)	104.6%
1988-89		1,717,539	164	865,003	$ 11,458,084	$ 10,563,459	$ (894,625)	$ 794,159		(1.2¢)	108.5%
1989-90		1,746,673	174	882,167	$ 12,189,942	$ 11,808,251	$ (381,691)	$ 988,847		(1.4¢)	103.2%
1990-91	(S6)	1,791,781	159	946,988	$ 13,306,307	$ 13,364,150	$ 57,843	$ 1,170,448		(0.7¢)	99.6%
1991-92		1,673,107	161	884,224	$ 13,152,063	$ 13,245,924	$ 93,861	$ 1,012,564		(0.5¢)	99.3%
1992-93	(S7)	1,810,572	155	951,987	$ 13,692,612	$ 13,254,709	$ (437,903)	$ 958,857		(0.8¢)	103.3%
1993-94	(S8)	1,699,882	133	876,766	$ 12,725,094	$ 14,017,591	$ 1,292,497	$ 1,525,074	$ 727,987	0.9¢	90.8%
1994-95	(S9)	1,464,577	119	790,781	$ 11,805,859	$ 16,061,849	$ 4,255,990	$ 3,642,588	$ 1,700,424	5.0¢	73.5%
1995-96	(S10)	1,480,674	125	912,905	$ 13,553,553	$ 23,983,026	$ 10,429,473	$ 11,107,071	$ 863,230	11.4¢	56.5%
1996-97		1,617,641	134.7	1,035,290	$ 14,804,355	$ 39,563,546	$ 24,759,191	$ 16,189,103	$ 10,020,544	24.5¢	37.4%
1997-98	(S11)	1,624,693	120.4	1,069,547	$ 15,194,498	$ 44,769,723	$ 29,575,225	$ 20,369,417	$ 10,600,767	29.1¢	33.9%
1998-99	(S12)	1,563,275	101.9	1,047,394	$ 16,401,625	$ 40,391,845	$ 23,990,220	$ 22,078,192	$ 4,014,071	25.3¢	40.6%
1999-00		1,567,318	99.3	1,050,103	$ 17,883,725	$ 37,497,489	$ 19,613,764	$ 20,806,672	$ 1,381,986	19.8¢	47.7%
2000-01	(S13)	1,661,704	106.2	1,113,342	$ 20,430,153	$ 38,215,732	$ 17,785,579	$ 21,911,398	$ 335,197	16.6¢	53.5%
2001-02	(S14)	1,742,768	108.3	1,167,655	$ 20,922,453	$ 39,374,190	$ 18,451,737	$ 21,976,183	$ 502,080	16.6¢	53.1%
2002-03		2,030,491	114.1	1,360,429	$ 22,247,564	$ 42,331,531	$ 20,083,967	$ 23,901,407	$ 472,848	16.7¢	52.6%
2003-04		2,307,010	126.9	1,545,697	$ 24,559,183	$ 45,300,782	$ 20,741,599	$ 21,719,288	$ 94,883	16.0¢	54.2%
2004-05	(S15)	2,454,396	129.8	1,644,445	$ 26,660,048	$ 48,105,899	$ 21,445,851	$ 21,445,851		15.7¢	55.4%
2005-06		2,655,490	133.3	1,858,843	$ 31,604,715	$ 55,570,797	$ 23,966,082	$ 23,966,082		15.6¢	56.9%
2006-07		2,685,194	136.1	1,879,639	$ 34,753,372	$ 58,389,864	$ 23,636,492	$ 23,636,492		15.3¢	59.5%
2007-08		2,835,132	145.5	1,984,592	$ 37,266,009	$ 60,444,082	$ 23,178,073	$ 23,178,073		17.2¢	61.7%
2008-09		2,696,951	137.3	1,887,866	$ 34,857,678	$ 61,635,574	$ 26,777,896	$ 26,777,896		14.0¢	56.6%
2009-10		2,614,777	134.8	1,830,344	$ 35,822,186	$ 67,012,735	$ 31,190,549	$ 31,190,549		15.0¢	53.5%
2010-11		2,746,320	141.4	1,922,424	$ 38,739,760	$ 69,156,690	$ 30,416,930	$ 30,416,930		13.4¢	56.0%
2011-12		2,664,935	135.4	1,865,455	$ 42,884,431	$ 74,494,543	$ 31,610,112	$ 31,610,112		15.6¢	57.6%
TOTAL		**64,030,101**		**37,349,751**	**$ 586,936,695**	**$ 1,007,506,391**	**$ 420,569,696**	**$ 416,178,775**			

** Through September 1995, the State supported specific trains; Amtrak operated the remaining trains as basic system trains not receiving State funding. Between October 1995 and October 1997, the State supported 64 percent of the operation of all trainson the Pacific Surfliner Route; Amtrak supports 36 percent as basic system trains. Effective November 1997, State support increased to 67%. Effective December 2004, State support increased to 70%. State supports 100 percent of net cost of connecting buses; all data shown includes bus operations.*

Exhibit 5.5: *Pacific Surfliner* Historic Operating Performance

Source: Caltrans, 2013.

(S1) Three round trips between Los Angeles and San Diego (LA-SD) (not State-supported) through 8/30/76.
(S2) Fourth LA-SD round trip (first State-supported train) added 9/1/76; fifth LA-SD round trip (second State-supported train) added 4/24/77.
(S3) Sixth LA-SD round trip (third State-supported train) added 2/14/78.
(S4) Seventh LA-SD round trip (not State-supported) added 10/26/80.
(S5) Eighth LA-SD round trip (fourth State-supported train) added 10/25/87; first State-supported round trip between Los Angeles and Santa Barbara (LA-SB) added 6/26/88.
(S6) Second State-supported LA-SB round trip added 10/28/90.
(S7) Ninth LA-SD round trip (not State-supported) added 10/25/92.
(S8) Third State-supported LA-SB round trip added 2/1/94.
(S9) Ninth LA-SD round trip (State-supported in one direction only) discontinued 5/15/95.
(S10) Los Angeles-San Luis Obispo round trip added 10/29/95, also represents fourth LA-SB round trip.
(S11) Ninth LA-SD round trip restored and tenth LA-SD round trip added 10/26/97.
(S12) Eleventh LA-SD roundtrip added 10/25/98.
(S13) Twelfth LA-SD round trip on weekends only added on 5/21/01.
(S14) Fifth LA-SB round trip on weekends only added on 5/25/02.
(S15) Second LA-SLO round trip added on 11/17/04.

(F1) Passenger-miles per train mile (PM/TM), a measure of the average load on a train over its entire route. Actual passenger-mile data was not provided by Amtrak prior to August 1981. PM/TM figures shown for All Trains are calculated by Amtrak and cover the Amtrak Fiscal Year (October through September).

(F2) Prior to October 1983, all trains billed on solely related cost basis. From October 1983 through September 1995, all Los Angeles- San Diego trains and the first Los Angeles-Santa Barbara train billed on short-term avoidable cost basis. The second and third Los Angeles- Santa Barbara trains billed on long-term avoidable cost basis. Between October 1995 and September 1996, all trains billed on long-term avoidable cost basis. Effective October 1996, all trains billed on Full Cost (Train, Route and System) Basis. Depreciation and interest (equipment capital cost) included in operating cost under solely-related basis but excluded and charged separately under short-term, long-term avoidable and full cost bases.

(F3) *Calculated service costs shown here may not reflect actual State contract costs.*
From October 1976 through September 1983, State cost was 48.5 percent of operating loss (including equipment costs). For the third Los Angeles-Santa Barbara train, State cost was 100 percent of operating loss from February 1994 through September 1994, and 70 percent through September 1995. For all other trains, effective October 1983, through September 1995, State cost was 65 percent of operating loss plus 50 percent of depreciation and interest (equipment capital cost). Between October 1995 and September 1996, State cost was 100 percent of operating loss and 60 percent of equipment capital cost for the State supported 64 percent of train service on the route. Between October 1996 and September 1997, State cost was 55 percent of operating loss and 100 percent of equipment capital cost for the 64 percent State share. Effective October 1997, State is billed contractually specified percentages of most individual cost elements, plus a fixed amount for certain other cost elements.
The State share increased to 67 percent in November 1997 and to 70 percent in December 2004 of train service on the route to reflect additional State supported service. Also includes State payment of special payments to Amtrak for additional service and State payment for entire net cost of all connecting bus routes.

(F4) Between State Fiscal Years 1993-94 and 2003-04, Amtrak cost is based on billings submitted and reflects cost bases and Amtrak shares as stated in notes (F2) and (F3) above. However, Amtrak does not include the unbilled Amtrak share of fixed cost elements.
Prior to FY 1993-94, data to calculate Amtrak cost is not available; beginning in FY 2004-05, no Amtrak share is billed.

(F5) Train loss (deficit) per train passenger mile. Separate passenger-mile data for State-supported trains was not provided by Amtrak prior to August 1981. Connecting buses not included in loss per passenger mile data.

(F6) Farebox Ratio, the ratio of Revenue to Expense.

Exhibit 5.5: *Pacific Surfliner* Historic Operating Performance (continued)

Source: Caltrans, 2013.

SAN JOAQUIN ROUTE
OWNERSHIP AND TRACK CHARACTERISTICS

Between	Mile Post	And	Mile Post	Route Miles	Owner of Track	*No. of Tracks	Max Speed	Signal System
Oakland Jack London Square	7.0	Oakland 10th Street	4.2	2.8	UP	2	50	CTC
Oakland 10th Street	2.2	Martinez	31.7	29.5	UP	2	79	CTC
Martinez	34.7	Port Chicago	41.3	6.6	UP	1	79	CTC
Port Chicago	1163.5	Stockton	1120.7	42.8	BNSF	1-2	79	CTC
Sacramento	89.0	Elvas	91.8	2.8	UP	2	35	CTC
Elvas	38.8	Stockton	84.7	45.9	UP	1	60	CTC
Stockton	1120.7	Bakersfield	886.9	233.8	BNSF	1	79	CTC
			Total	364.2				

* General Number of Mainline Tracks

Owners:
BNSF - BNSF Railway Company
UP - Union Pacific Railroad Company

Signal Systems:
CTC - Centralized Traffic Control - Wayside signals protect possession of blocks. Signals and powered switches are also remotely controlled from the dispatching center to direct the movement of trains.

Exhibit 5.6: *San Joaquin* Route Characteristics

Source: Caltrans, 2013.

There are currently six daily round trip trains on the *San Joaquin* route, of which, four run between Oakland and Bakersfield and two run between Sacramento and Bakersfield. All trains between Stockton and Bakersfield operate on the same tracks. In order to provide the six-frequency service between all points on the route, connecting Thruway buses run between Stockton and Sacramento for trains serving Oakland. For trains serving Sacramento, connecting buses operate between Stockton, Oakland and San Francisco.

Overall average speed between Bakersfield and Oakland, including station dwell time, is 51.4 mph. Between Sacramento and Bakersfield the overall average speed is 53.9 mph. The maximum track speed on the *San Joaquin* route is 79 mph.

Travel Times

The average travel time between Bakersfield and Oakland is 6 hours and 9 minutes, and between Bakersfield and Sacramento the average travel time is 5 hours and 16 minutes.

Amtrak Thruway Bus Routes

The extensive network of Amtrak Thruway buses connecting with the *San Joaquin* route is essential to success of the route both of in terms of meeting its customers' travel needs and improving financial performance. Forty-six percent of all *San Joaquin* riders use one or more buses for a portion of their trip. Additionally, ridership analysis shows that feeder bus riders make longer than average trips, and therefore produce higher revenue per trip.

Caltrans contracts with Amtrak for dedicated feeder bus services, and Amtrak then contracts with bus operators. The bus routes function as direct parts of the Amtrak system, with coordinated connections, guaranteed seating, integrated fares and ticketing procedures, and inclusion in Amtrak's central information and reservation system in the same manner as the trains. The current *San Joaquin* bus routes and their origins/destinations[38] are as follows:

- Route 1 Network–Los Angeles Basin.[39]
  - 1a–*Bakersfield*-Los Angeles-San Diego.
  - 1b–*Bakersfield*-Los Angeles-Long Beach/San Pedro.
  - 1c–*Bakersfield*-Van Nuys-Torrance.
- Route 3–Sacramento Valley, *Stockton-Sacramento*-Marysville-Chico-Redding.
- Route 6–South Bay, *Stockton*-San Jose.
- Route 7–North Bay/Redwood Empire, *Martinez*-Vallejo-Napa-Santa Rosa-Eureka-McKinleyville.
- Route 9–High Desert-Las Vegas, Bakersfield-Las Vegas.
- Route 10–Valley-South Coast, *Bakersfield*-Oxnard-Santa Barbara.
- Route 12–Antelope Valley, *Bakersfield*-Victorville.
- Route 15–Yosemite, *Merced*-Yosemite National Park.
- Route 18–Valley-Central Coast.
  - 18a–*Hanford*-San Luis Obispo-Santa Maria.
  - 18b–*Hanford*-Visalia.
- Route 19–Inland Empire-Coachella Valley.
  - 19a–*Bakersfield*-Riverside-San Bernardino-Hemet.
  - 19b–*Bakersfield*-Riverside-San Bernardino-Palm Springs-Indio.
- Route 34–Bay Area – Stockton, *Stockton*-Oakland-San Francisco.
- Route 20a–Sierra Foothills/High Sierra, *Sacramento*-Auburn/Reno/Sparks.
- Route 20c–Lake Tahoe, *Sacramento*-South Lake Tahoe/Stateline.
- Route 99–Trans Bay, *Emeryville*-San Francisco.
- Route 395-Eastern Sierra (summer only), *Merced*-Yosemite-Mammoth Lakes.

Route Administration

The State and Amtrak share operating responsibility for the *San Joaquin* route. The State funds the route's operation, Amtrak operates the trains, and Caltrans is responsible for the oversight of the *San Joaquin* service through its operating contract with Amtrak. Caltrans coordinates functions such as marketing, scheduling, and on board services with Amtrak. The State owns all *San Joaquin* equipment, while Amtrak maintains it.

[38] Connecting stations for *San Joaquin* trains are shown in *italics*. Cities designated with asterisks (*) are not served by all schedules on the route.

[39] Route 1 serves the *Pacific Surfliner* and *San Joaquin* routes.

San Joaquin Valley Rail Committee

The San Joaquin Valley Rail Committee (SJVRC) consists of representatives from each county served by the *San Joaquin* trains and other key counties served by feeder buses. Agency associate members represent Amtrak, CPUC, UPRR, BNSF, the Metropolitan Transportation Commission (MTC), SCAG, and Caltrans. The committee is informed of all significant matters affecting the *San Joaquin* route. It provides valuable input to Caltrans on all aspects of the service. Section 14074.8 of the Government Code provides that the committee may confer with the Secretary of the Business, Transportation and Housing Agency (BTH) to coordinate intercity passenger rail service for the *San Joaquin* route.

Route History

Two daily trains served the San Joaquin Valley prior to May 1971 when Amtrak was formed. The two trains used different routes through the Central Valley; they were operated by different railroads, and had different destinations. The SP operated the *San Joaquin Daylight* between Oakland and Los Angeles and a connecting train, the *Sacramento Daylight*, from Sacramento that provided a connection with the *San Joaquin Daylight* at Tracy. The ATSF operated the *San Francisco Chief* between the Bay Area and Chicago via Stockton, Fresno and Bakersfield, and the *Golden Gate* between Bakersfield and the Bay Area.

Amtrak's initial route structure in May 1971 used the SP's Coast Line for service between northern and southern California, leaving the San Joaquin Valley without rail passenger service. Public pressure for restoration of rail service began almost immediately after the formation of Amtrak. As a result, Amtrak's appropriation for FFY 1974 included funding for service in the San Joaquin Valley. Amtrak selected a joint SP-ATSF route using a connection between the two railroads at Port Chicago (near Martinez). In March 1974, the new *San Joaquin* entered service between Oakland and Bakersfield, entirely funded by Amtrak.

In 1979, a major reduction in Amtrak's nationwide route structure was proposed, including the termination of the *San Joaquin* route. However, the State reached an agreement with Amtrak to continue the train with state support under the provisions of Section 403(b) of the Amtrak Act. Thus, state support of the route started in October 1979, and a second Oakland-Bakersfield round trip was added in February 1980.

Service on the *San Joaquin* route has increased from the original single round trip to the current six daily round trips as follows:

- 2/3/80. Second round trip added between Oakland and Bakersfield.
- 12/17/89. Third round trip added between Oakland and Bakersfield.
- 10/25/92. Fourth round trip added between Oakland and Bakersfield.
- 2/21/99. Fifth round trip added, running between Bakersfield and Sacramento (instead of Oakland); this is the first train service between Sacramento and the San Joaquin Valley since 1971.
- 3/18/02. Sixth round trip added, also between Sacramento and Bakersfield, making two Sacramento round trips.

Historical Performance

Exhibit 5.7 shows ridership and financial performance data on an annual (SFY) basis from the start of state-supported service in 1979-80 through 2011-12. Ridership and revenue have increased at a fairly steady rate over that period, as have expense, loss, and state cost. *San Joaquin* ridership for 2011-12 was over 1.1 million passengers – the fifth highest intercity rail ridership in the country. The *San Joaquin* ridership and farebox return has increased since 2006-07. Since 2006-07 ridership has increased 44 percent. Ridership surpassed one million passengers in SFY 2010-11 and 2011-12.

SAN JOAQUIN Route

Annual Operating Performance - State Fiscal Years

State Fiscal Year	Notes	Ridership Data: Ridership	Ridership Data: PM/TM (F1)	Financial Data for Operations: Revenue	Expense (F2)	Loss	Calculated Service Costs: State (F3)	Calculated Service Costs: Amtrak (F4)	Train Loss per PM (F5)	Farebox Ratio (F6)
1973-74	(S1)	38,770	83.6							
1974-75		66,990	44.2							
1975-76		66,530	43.8							
1976-77		87,642	56.0							
1977-78		80,611	52.7							
1978-79		87,645	60.2							
1979-80	(S2)	123,275	63.6	$ 1,174,065	$ 3,975,185	$ 2,801,120	$ 518,206		18.4¢	29.5%
1980-81		159,498	55.3	$ 2,224,137	$ 6,940,934	$ 4,716,797	$ 1,360,391		18.4¢	32.0%
1981-82		189,479	65.3	$ 3,115,710	$ 7,774,029	$ 4,658,319	$ 2,228,585		14.0¢	40.1%
1982-83		186,121	62.9	$ 3,342,137	$ 7,991,697	$ 4,649,560	$ 2,490,275		14.6¢	41.8%
1983-84		248,275	85.3	$ 4,730,431	$ 8,094,789	$ 3,364,358	$ 2,518,066		7.3¢	58.4%
1984-85		269,837	94.6	$ 5,210,951	$ 8,641,293	$ 3,430,342	$ 2,802,955		7.7¢	60.3%
1985-86		280,798	101.1	$ 5,425,329	$ 8,610,554	$ 3,185,225	$ 2,658,895		6.8¢	63.0%
1986-87		304,668	106.1	$ 6,084,677	$ 9,179,133	$ 3,094,456	$ 2,929,148		5.1¢	66.3%
1987-88		340,573	121.1	$ 7,457,686	$ 9,633,659	$ 2,175,973	$ 2,605,572		2.2¢	77.4%
1988-89		370,190	133.7	$ 9,527,268	$ 10,968,216	$ 1,440,948	$ 1,887,450		1.3¢	86.9%
1989-90	(S3)	418,768	116.9	$ 11,845,743	$ 15,286,520	$ 3,440,777	$ 3,544,332		3.2¢	77.5%
1990-91		463,906	104.1	$ 12,691,986	$ 18,456,785	$ 5,764,799	$ 5,803,565		4.9¢	68.8%
1991-92		483,593	104.3	$ 12,369,805	$ 18,633,777	$ 6,263,972	$ 6,472,598		4.3¢	66.4%
1992-93	(S4)	516,113	109.6	$ 12,628,496	$ 22,227,149	$ 9,598,653	$ 10,789,651		6.5¢	56.8%
1993-94		558,569	94.6	$ 13,894,624	$ 26,678,861	$ 12,784,237	$ 12,335,021	$ 3,937,150	8.3¢	52.1%
1994-95		524,680	88.8	$ 12,244,668	$ 25,077,153	$ 12,832,485	$ 12,668,018	$ 3,705,069	9.7¢	48.8%
1995-96		526,088	86.6	$ 12,477,497	$ 25,386,099	$ 12,908,602	$ 14,483,048	$ 1,360,327	11.8¢	49.2%
1996-97		652,544	106.1	$ 13,817,681	$ 34,528,165	$ 20,710,484	$ 16,265,387	$ 5,672,236	18.6¢	40.0%
1997-98		702,178	118.0	$ 15,230,966	$ 36,517,290	$ 21,286,324	$ 17,190,515	$ 4,493,597	17.7¢	41.7%
1998-99	(S5)	680,687	102.8	$ 16,496,457	$ 37,269,835	$ 20,773,378	$ 19,938,254	$ 1,712,168	17.6¢	44.3%
1999-00		671,295	92.7	$ 18,061,512	$ 41,791,782	$ 23,730,270	$ 24,232,326	$ 652,236	19.0¢	43.2%
2000-01		710,833	97.9	$ 19,667,681	$ 43,404,325	$ 23,736,644	$ 24,350,127	$ 540,809	18.2¢	45.3%
2001-02	(S6)	733,152	96.9	$ 20,114,693	$ 46,503,548	$ 26,388,855	$ 26,281,035	$ 396,392	20.0¢	43.3%
2002-03		769,708	89.9	$ 20,318,564	$ 50,552,529	$ 30,233,965	$ 29,729,650	$ 504,315	21.7¢	40.2%
2003-04		752,227	87.2	$ 22,100,796	$ 50,061,460	$ 27,960,664	$ 27,960,664	$ 89,345	20.5¢	44.1%
2004-05		743,245	85.1	$ 22,590,880	$ 49,883,689	$ 27,292,809	$ 27,292,808		19.6¢	45.3%
2005-06		801,242	91.1	$ 25,869,979	$ 55,226,742	$ 29,356,763	$ 29,356,763		19.0¢	46.8%
2006-07		789,641	88.8	$ 26,862,994	$ 61,188,078	$ 34,325,084	$ 34,325,084		28.8¢	43.9%
2007-08		894,346	88.2	$ 28,945,651	$ 65,474,253	$ 36,528,602	$ 36,528,602		21.4¢	44.2%
2008-09		958,946	90.0	$ 30,671,510	$ 68,232,766	$ 37,561,256	$ 37,561,256		21.2¢	45.0%
2009-10		967,437	103.7	$ 32,117,615	$ 62,689,957	$ 30,572,342	$ 30,572,342		22.2¢	51.2%
2010-11		1,032,579	112.9	$ 36,571,173	$ 69,578,077	$ 33,006,904	$ 33,006,904		21.9¢	52.6%
2011-12		1,133,654	124.0	$ 40,865,063	$ 74,323,829	$ 33,458,766	$ 33,458,766		20.2¢	55.0%
TOTAL		**19,386,333**		**$ 526,748,425**	**$ 1,080,782,158**	**$ 554,033,733**	**$ 536,146,259**			

(S1) Service started 3/6/74 with one round-trip between Oakland and Bakersfield. Data is for four months only.

(S2) State support started 10/1/79. Data is for nine months, during which time ridership totaled 93,206.
Second round trip added 2/3/80 between Oakland and Bakersfield.

(S3) Third round trip added 12/17/89 between Oakland and Bakersfield.

(S4) Fourth round trip added 10/25/92 between Oakland and Bakersfield.

(S5) Fifth round-trip added 2/21/99 between Sacramento and Bakersfield.

(S6) Sixth round-trip added 3/18/02 between Sacramento and Bakersfield.

Exhibit 5.7: *San Joaquin* Historic Operating Performance

Source: Caltrans, 2013.

(F1)	Passenger-miles per train mile (PM/TM), a measure of the average load on a train over its entire route.
(F2)	Prior to October 1983, all trains billed on solely related cost basis. From October 1983 through September 1995, all trains billed on short term avoidable cost basis, except fourth round trip billed at long term avoidable cost basis. Effective October 1995, all trains billed on long term avoidable cost basis. Effective October 1996, all trains billed on Full Cost (Train, Route and System) Basis. Includes cost of connecting buses. Depreciation and interest (equipment capital cost) included in operating cost under solely-related cost basis but excluded and charged separately under short-term, long-term avoidable and full cost bases.
(F3)	*Calculated service costs shown here may not reflect actual State contract costs.* From October 1979 through September 1983, State cost increased in stages from 18.5 to 48.5 percent of operating loss (including equipment costs). Between October 1983 and September 1995, State cost was 65 percent of train operating loss for first three round trips, plus 50 percent of depreciation and interest (equipment capital cost). For the fourth round trip, State cost was 70 percent of train operating loss plus equipment capital cost. Between October 1995 and September 1996, State cost was 100 percent of train operating loss and 60 percent of equipment capital cost. Between October 1996 and September 1997, State cost was 65 percent of train operating loss. Effective October 1997, State is billed contractually specified percentages of most individual cost elements, plus a fixed amount for certain other cost elements. Also includes State payment of costs of special agreements with Amtrak for use of equipment, and State payment of entire net cost of all connecting bus routes.
(F4)	Between State Fiscal Years 1993-94 and 2003-04, Amtrak cost is based on billings submitted and reflects cost bases and Amtrak shares as stated in notes (F2) and (F3) above. However, Amtrak does not include the unbilled Amtrak share of fixed cost elements. Prior to FY 1993-94, data to calculate Amtrak cost is not available; beginning in FY 2004-05, no Amtrak share is billed.
(F5)	Train loss (deficit) per train passenger-mile. Connecting buses not included in loss per passenger mile data.
(F6)	Farebox Ratio, the ratio of Revenue to Expense.

Exhibit 5.7: *San Joaquin* Historic Operating Performance (continued)

Source: Caltrans, 2013.

Capitol Corridor Route

Route Description

The *Capitol Corridor* extends 169 rail miles from Auburn to San Jose. The route is owned by UPRR, except for three miles between Santa Clara and San Jose which is owned by the Peninsula Corridor Joint Powers Board (PCJPB). The Capitol Corridor Joint Powers Authority (CCJPA) contracts with Amtrak to operate the *Capitol Corridor* service. Pursuant to the Rail Passenger Service Act of 1970 that formed Amtrak, Amtrak has a perpetual right to operate on all rail tracks in the U.S. Exhibit 5.8 summarizes the current ownership, segment mileage, and track and signal characteristics of the *Capitol Corridor*.

The stations serving the *Capitol Corridor* route are shown in Exhibit 5.2 and listed in Table 8.21 in Chapter 8. The *Capitol Corridor* has 7 daily round trips between Oakland and San Jose, 15 weekday round trips between Sacramento and Oakland (11 on weekends), with 1 daily round trip extending from Sacramento to Auburn. The speed between Sacramento and Oakland averages 45 mph in the eastbound direction and 47 mph in the westbound direction. The speed between Oakland and San Jose averages 40 mph in the eastbound direction and 34 mph in the westbound direction. The speed between Auburn and Sacramento averages 33 mph in both directions.

Travel Times

Current Sacramento-Oakland travel times average 2 hours in the eastbound direction and 1 hour and 54 minutes in the westbound direction. Oakland-San Jose travel times average 1 hour and 4 minutes in the eastbound direction and 1 hour and 17 minutes in the westbound direction. Auburn-Sacramento averages 1 hour and 3 minutes in both directions.

CAPITOL CORRIDOR **OWNERSHIP AND TRACK CHARACTERISTICS**								
Between	Mile Post	And	Mile Post	Route Miles	Owner of Track	*No. of Tracks	Max Speed	Signal System
Auburn	124.3	Rocklin	110.5	13.8	UP	1	50	ABS/CTC
Rocklin	110.5	Roseville	106.4	4.1	UP	2	40	CTC
Roseville	106.4	Elvas	91.8	14.6	UP	2	79	CTC
Elvas	91.8	Sacramento	88.9	2.9	UP	2	35	CTC
Sacramento	88.9	Sacramento River	88.5	0.4	UP	2	20	CTC
Sacramento River	88.5	Davis	75.4	13.1	UP	2	79	CTC
Davis	75.4	Martinez	31.7	43.7	UP	2	79	CTC
Martinez	31.7	Oakland 10th Street	2.2	29.5	UP	2	79	CTC
Oakland 10th Street	4.2	Oakland Jack London Square	7.0	2.8	UP	2	50	CTC
Oakland Jack London Square	7.0	North Elmhurst	13.5	6.5	UP	2	79	CTC
North Elmhurst	13.5	Niles Junction	29.7	16.2	UP	1	79	CTC
Niles Junction	29.7	Newark	34.9	5.2	UP	2	79	CTC
Newark	31.0	Santa Clara	44.7	13.7	UP	1	70	CTC
Santa Clara	44.7	San Jose	47.5	2.8	PCJPB	3	40	CTC
			Total	169.3				

* General Number of Mainline Tracks

Owners:
UP - Union Pacific Railroad Company
PCJPB - Peninsula Corridor Joint Point Board

Signal Systems:
ABS - Automatic Block Signals - Possession of a segment of track (block) is protected by a wayside signal. Switches must be thrown manually by train crews entering sidings.
CTC - Centralized Traffic Control - Wayside signals protect possession of blocks. Signals and powered switches are also remotely controlled from the dispatching center to direct the movement of trains.

Exhibit 5.8: *Capitol Corridor* Route Characteristics

Source: Caltrans, 2013.

Connecting Amtrak Buses

The CCJPA contracts with Amtrak for the provision of dedicated feeder bus services, and Amtrak then contracts with bus operators or local transit operators. The bus routes function as direct extensions of the Amtrak system, with coordinated connections, guaranteed seating, integrated fares and ticketing procedures, and inclusion in Amtrak's central information and reservation system. The CCJPA has established partnerships with local transit providers to operate the Highway 17 Express bus between San Jose and Santa Cruz, and Route 55 bus between San Jose and Monterey. Both routes are timed to coordinate with on-time train service.

Below is a listing of the *Capitol Corridor* bus routes and their origins/destinations as well as the *San Joaquin* bus routes that also connect to the *Capitol Corridor*. Cities that are *Capitol Corridor* train connection points are in *italics*. The bus routes are:

- Route 3. Sacramento Valley, Sacramento-Marysville/Chico/Redding.
- Route 6. Stockton, San Jose-Stockton.

- Route 7. North Bay/Redwood Empire, Martinez-Vallejo/Napa/Santa Rosa/Eureka/McKinleyville.
- Highway 17 Express-Santa Cruz (through ticketing with local transit operator), San Jose-Santa Cruz.
- Route 20a. High Sierra/Sierra Foothills, Sacramento-Auburn/Reno/Sparks.
- Route 20c. Lake Tahoe, Sacramento-South Lake Tahoe/Stateline.
- Route 21. Central Coast, San Jose-San Luis Obispo/Santa Barbara.[40]
- Route 55. Express (through ticketing with local transit operator), San Jose-Monterey.
- Route 99. Trans Bay, Emeryville-San Francisco.

Route Administration

The administrative structure of the *Capitol Corridor* differs from the current structure of the *Pacific Surfliner* and *San Joaquin* routes. The CCJPA has responsibility for management of the route, while the State continues to fund the service operation and many capital projects. Amtrak operates the trains, the CCJPA is responsible for the oversight of the *Capitol Corridor* service through its operating contract with Amtrak, and the State funds the service. Contracting for capital work and other projects, such as the extra cost of maintaining track at Class V instead of Class IV standards is done through multi-party agreements between CCJPA, Amtrak, and UPRR. The CCJPA coordinates functions such as marketing, scheduling, and on board services with Amtrak, and also coordinates some functions with Caltrans, such as marketing. The State owns all equipment in the northern California fleet (used by both the *Capitol Corridor* and the *San Joaquin*), while Amtrak maintains it and the CCJPA oversees Amtrak's maintenance work.

Local agencies have always had an active role in planning and promoting the *Capitol Corridor*. Initially the Assembly Concurrent Resolution (ACR) Policy Advisory Committee, formed as part of the ACR 132 study (Hannigan, Statutes of 1988), acted in an advisory capacity to make recommendations about the route. Chapter 263, Statutes of 1996 (Senate Bill (SB) 457 (Kelley 1996)) allowed the State to enter into an interagency transfer agreement (ITA) with a joint powers authority (JPA) to assume responsibility for intercity rail services on the *Capitol Corridor*. Caltrans and the CCJPA executed an ITA on July 1, 1998, transferring the responsibilities of management for the *Capitol Corridor* to the CCJPA. The Bay Area Rapid Transit (BART) General Manager and designated BART staff provide administrative support to the CCJPA.

Pursuant to the ITA, BTH has responsibility for allocating operating funds to the CCJPA. BTH also reviews and approves the CCJPA's business plan that includes future service levels and funding needs. Chapter 263 specified the composition of the CCJPA. The CCJPA Board has 16 members. Six representatives must come from the BART Board of Directors (two residents each from Alameda County, Contra Costa County, and the City and County of San Francisco). Two members each are drawn from the Board of Directors of the Sacramento Regional Transit District (RT), the Board of Directors of Santa Clara Valley Transportation Authority (SCVTA), the Yolo County Transportation District, the Solano Transportation Authority, and the Placer County Transportation Planning Agency.

Route History

Capitol Corridor intercity rail service started in 1991, making this route the newest of the three state-supported routes. ACR 132 directed the MTC, with assistance from the Sacramento Area Council of Governments (SACOG) and Caltrans to conduct a study of the Auburn-Sacramento-Oakland-San Jose

[40] Route 21 serves the *Pacific Surfliner* and *Capitol Corridor* routes.

intercity rail corridor. The final report titled *ACR 132 Intercity Rail Corridor Upgrade Study* was published by MTC in 1990 and provided the basis for the initiation of service on the route.

Service has increased from the original three round trips to the current 15 (weekday) round trips from Oakland to Sacramento as follows:

- 12/12/91. Sacramento-Oakland-San Jose: three round trips with one continuing to Roseville.
- 4/2/95. Oakland-San Jose: one round trip discontinued (except on Saturday northbound and Friday, Saturday, Sunday southbound).
- 4/14/96. Sacramento-Oakland: fourth round trip added.
- 6/17/96. Oakland-San Jose round trip that was discontinued 4/2/95 is restored.
- 1/26/98. Train to Roseville extended to Colfax.
- 10/25/98. Sacramento-Oakland: fifth round trip added.
- 2/21/99. Sacramento-Oakland: sixth round trip added.
- 2/27/00. Sacramento-Oakland: seventh round trip added. Oakland-San Jose: fourth round trip added. Colfax round trip cut back to Auburn
- 4/29/01. Sacramento-Oakland: eighth and ninth round trips added. Oakland-San Jose: fifth and sixth round trips, added on weekends only.
- 10/27/02. Sacramento-Oakland: tenth round trip, added on weekdays only.
- 1/6/03. Sacramento-Oakland: eleventh round trip, added on weekdays only.
- 4/28/03. Sacramento-Oakland: twelfth round trip, added on weekdays only.
- 8/26/06. Sacramento-Oakland: thirteenth through sixteenth weekday round trips added. Oakland-San Jose: fifth through seventh daily round trips added.
- 8/13/12. One Sacramento-Oakland round-trip discontinued

Historical Performance

Exhibit 5.9 shows ridership and financial performance data on an annual basis from the start of state-supported service in SFY 1991-92 through 2011-12. Ridership and revenue have increased over that period, (with the exception of 2009-10) as have expenses, loss, and state cost. The *Capitol Corridor* service has a lower farebox ratio than the other two routes. The *Capitol Corridor* farebox ratio, which has improved significantly over the past few years, reached a peak of 49.6 in 2011-12.

On-time performance (OTP) on the *Capitol Corridor* was fairly low during the initial years of the service. With the completion in early 1999 of major track and signal work over much of the route, OTP improved considerably. In 2005-06, OTP averaged 72.3 percent. New trackage and signal improvement projects between Oakland and San Jose and the Yolo Causeway Second Main Track project have improved the *Capitol Corridor*'s reliability and OTP by facilitating both passenger and freight train movements, and by providing more passing opportunities. In addition, CCJPA funding of a dedicated track maintenance crew and provision of incentive payments to the host railroad have resulted in a significant decrease in slow orders, further improving OTP. OTP on the route since 2008-09 has been over 90 percent, reaching an impressive 95.5 percent in 2010-11.

In SFY 2011-12, the *Capitol Corridor* carried 1.77 million passengers making it the third most used intercity passenger rail service in the country.

CAPITOL CORRIDOR

Annual Operating Performance - State Fiscal Years

State Fiscal Year	Notes	Ridership Data: Ridership	Ridership Data: PM/TM (F1)	Financial Data for Operations: Revenue	Expense (F2)	Loss	State Calculated Service Costs (F3)	Amtrak Calculated Service Costs (F4)	Train Loss per PM (F5)	Farebox Ratio (F6)
1991-92	(S1)	173,672	96.3	$ 1,973,255	$ 4,848,967	$ 2,875,712	$ 1,592,907		15.0¢	40.7%
1992-93		238,785	67.7	$ 2,970,103	$ 8,333,093	$ 5,362,990	$ 6,712,017		20.1¢	35.6%
1993-94		364,070	101.2	$ 3,598,978	$ 9,911,735	$ 6,312,757	$ 6,714,761	$ 1,697,460	15.7¢	36.3%
1994-95	(S2)	349,056	101.7	$ 3,757,146	$ 9,678,401	$ 5,921,255	$ 6,012,315	$ 1,584,692	14.9¢	38.8%
1995-96	(S3)	403,050	111.9	$ 4,805,072	$ 11,077,485	$ 6,272,413	$ 6,434,940	$ 273,025	14.9¢	43.4%
1996-97		496,586	111.3	$ 5,938,072	$ 20,509,999	$ 14,571,927	$ 9,701,519	$ 4,871,345	31.6¢	29.0%
1997-98	(S4)	484,458	109.4	$ 6,212,150	$ 20,597,133	$ 14,384,983	$ 10,830,123	$ 3,555,755	31.8¢	30.2%
1998-99	(S5)	515,768	90.8	$ 6,939,702	$ 22,343,915	$ 15,404,213	$ 14,543,722	$ 969,291	32.6¢	31.1%
1999-00	(S6)	684,334	90.1	$ 8,546,453	$ 25,048,098	$ 16,501,645	$ 17,120,868	$ 194,932	28.2¢	34.1%
2000-01	(S7)	1,030,837	106.0	$ 11,091,742	$ 27,670,759	$ 16,579,017	$ 18,558,681	$ 92,014	21.0¢	40.1%
2001-02		1,090,713	96.9	$ 12,321,755	$ 32,683,794	$ 20,362,039	$ 21,263,811	$ 99,311	25.3¢	37.7%
2002-03	(S8)	1,129,683	92.0	$ 12,550,182	$ 35,390,303	$ 22,840,121	$ 22,413,396	$ 170,254	28.1¢	35.5%
2003-04		1,148,047	86.3	$ 13,012,806	$ 36,231,990	$ 23,219,184	$ 23,168,004	$ 9,584	28.0¢	35.9%
2004-05		1,239,082	93.1	$ 14,788,299	$ 39,160,356	$ 24,372,057	$ 24,372,057		27.3¢	37.8%
2005-06		1,269,964	95.5	$ 15,740,506	$ 38,759,149	$ 23,018,643	$ 23,018,643		24.9¢	40.6%
2006-07	(S9)	1,400,507	82.0	$ 18,406,180	$ 46,584,527	$ 28,178,347	$ 28,178,347		30.2¢	39.5%
2007-08		1,597,390	88.2	$ 22,210,328	$ 51,139,004	$ 28,928,676	$ 28,928,676		26.7¢	43.4%
2008-09		1,670,799	90.0	$ 24,250,324	$ 52,893,345	$ 28,643,021	$ 28,643,021		26.2¢	45.8%
2009-10		1,562,265	85.5	$ 23,883,984	$ 50,753,128	$ 26,869,144	$ 26,869,144		26.8¢	47.1%
2010-11		1,679,889	89.5	$ 26,233,013	$ 56,197,180	$ 29,964,167	$ 29,964,167		27.9¢	46.7%
2011-12		1,770,616	93.7	$ 29,394,891	$ 59,217,558	$ 29,822,667	$ 29,822,667		26.5¢	49.6%
TOTAL		**20,299,571**		**$ 268,624,941**	**$ 659,029,919**	**$ 390,404,978**	**$ 384,863,786**			

(S1) Service started 12/12/91 with three State-supported round trips between Sacramento and San Jose, with one round trip extended to Roseville. Data is for six and one-half months only.

(S2) One round trip discontinued 4/2/95 between Oakland and San Jose (except on Saturday northbound and Friday, Saturday, Sunday southbound.) Feeder bus connection substituted for train.

(S3) Fourth round trip added 4/14/96 between Sacramento and Oakland.
Effective 6/17/96, round trip referred to in *(S2)* above restored to daily service between Oakland and San Jose.

(S4) Effective 1/26/98, the round trip that previously originated and terminated at Roseville was extended to Colfax.

(S5) Fifth round trip added 10/25/98 and sixth round trip added 2/21/99 between Sacramento and Oakland.

(S6) Effective 2/27/00, seventh round trip added between Sacramento and Oakland; fourth round trip added between Oakland and San Jose; the round trip to Colfax was cut back to Auburn.

(S7) Effective 4/29/01, eighth and ninth round trips added between Sacramento and Oakland;
fifth and sixth round trips added between Oakland and San Jose on weekends only.

(S8) Effective 10/27/02, tenth round trip added; effective 1/6/03, eleventh round trip added; effective 4/28/03, twelfth round trip added. These additional trains operate weekdays only between Sacramento and Oakland.

(S9) Effective 8/28/06, thirteenth through sixteenth round trip added between Sacramento and Oakland.
Fifth through seventh round trip added between Oakland and San Jose.

Exhibit 5.9: *Capitol Corridor* Historic Operating Performance

Source: Caltrans, 2013.

(F1)	Passenger-miles per train mile (PM/TM), a measure of the average load on a train over its entire route.
(F2)	Through September 1995, all trains billed on long term avoidable cost basis; includes cost of connecting buses. Effective October 1996, all trains billed on Full Cost (Train, Route and System) Basis.
(F3)	*Calculated service costs shown here may not reflect actual State contract costs.* Though September 1995, State cost was 65 percent of train operating loss. Between October 1995 and September 1996, State cost was 100 percent of train operating loss. Between October 1996 and September 1997, State cost was 55 percent of the train operating loss. Effective October 1997, State is billed contractually specified percentages of most individual cost elements, plus a fixed amount for certain other cost elements. Also includes State payment of costs of special agreements with Amtrak for use of equipment, special payments for service continuation and State payment for entire net cost of all connecting bus routes. Effective October 1999, the Capitol Corridor Joint Powers Authority (CCJPA) and Amtrak entered into a 12 month fixed price operating contract, including all train and bus services. The State Costs shown represent the fixed price contract payment less any performance assessments.
(F4)	Between State Fiscal Years 1993-94 and 2003-04, Amtrak cost is based on billings submitted and reflects cost bases and Amtrak shares as stated in notes (F2) and (F3) above. However, Amtrak does not include the unbilled Amtrak share of fixed cost elements. Prior to FY 1993-94, data to calculate Amtrak cost is not available; beginning in FY 2004-05, no Amtrak share is billed.
(F5)	Train loss (deficit) per train passenger-mile. Connecting buses not included in loss per passenger mile data.
(F6)	Farebox Ratio, the ratio of Revenue to Expense.

Exhibit 5.9: *Capitol Corridor* Historic Operating Performance (continued)

Source: Caltrans, 2013.

Commuter Rail

Commuter rail systems typically provide passenger service within a single region and occasionally between regions. Service is more frequent during peak commuting periods. Commuter rail operates in four key markets:

1. Caltrain offers service from San Francisco through the San Francisco Peninsula to San Jose and Gilroy. Ridership for SFY 2010-11 was approximately 12.7 million.[41]
2. The Altamont Corridor Express (ACE) offers service from Stockton to San Jose via Livermore and Fremont. ACE ridership was approximately 840,000 between April 2011 and April 2012.[42]
3. Metrolink offers a large network of commuter rail services between Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Metrolink served approximately 11.1 million passengers in SFY 2011.[43]
4. COASTER commuter trains offer service along the San Diego County coastline, from Oceanside to San Diego via Carlsbad, Encinitas, and Solana Beach. COASTER served 1.4 million passengers in SFY 2011.

These commuter rail services are essential to supporting and connecting regional economies. This system's interdependence through multimodal connections is highlighted in Section 2.1.4 and serves as an important link between regional to outlying areas.

Commuter rail capital funding comes from state, local, and federal sources, while operating funding is the responsibility of local and regional entities. Table 5.1 shows current commuter rail services in the State by operator and service area. Table 5.2 provides historical annual ridership information for the State's four commuter rail operators. Exhibit 5.10 provides a map of commuter rail service in California.

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41 Caltrain, Personal Communications, August 7, 2012.

42 San Joaquin Regional Rail Commission (SJRRC), June 2012 SJRRC Board Meeting Agenda, 2012.

43 Southern California Regional Rail Authority, Personal Communications, August, 2012.

Table 5.1: Commuter Rail Services Currently Operating in California

Administrative Agency	Service Name	Service Area
PCJPB	Caltrain	San Francisco – San Jose – Gilroy
SJRRC	ACE	Stockton – Livermore – Fremont – San Jose
SCRRA	Metrolink: Ventura County Line	Los Angeles – Oxnard – East Ventura
	Metrolink: Antelope Valley Line	Los Angeles – Palmdale – Lancaster
	Metrolink: San Bernardino Line	Los Angeles – Claremont – San Bernardino
	Metrolink: Riverside Line	Los Angeles – Pomona – Riverside
	Metrolink: Orange County Line	Los Angeles – Santa Ana – Oceanside
	Metrolink: Inland Empire-Orange County Line	San Bernardino – Santa Ana – Oceanside
	Metrolink: 91 Line	Los Angeles – Fullerton – Riverside
NCTD	COASTER	Oceanside – Solana Beach – San Diego

Sources: PCJPB; SJRRC; SCRRA; and NCTD, 2012.

Caltrain

Route Description

Caltrain operates seven days a week on 77 miles of track owned by the PCJPB from San Francisco to Tamien in San Jose and by the UPRR from Tamien to Gilroy. Caltrain serves 29 stations in 18 cities between the cities of San Francisco, San Jose, and Gilroy in the counties of San Francisco, San Mateo, and Santa Clara. The system has a mixture of local, limited, and express trains and serves work centers in San Francisco, the Peninsula, and Silicon Valley including developing residential areas in southern Santa Clara County. Caltrain operates 92 weekday trains between San Francisco and San Jose. Of the 92 trains, 22 are express Baby Bullet (limited-stop express) trains that serve 12 stations. Forty-two trains provide limited service to more stations than the express service, and 28 operate as local service. Frequency varies by time of day and station with more frequent service during the peak periods and at larger stations. All stations from San Francisco through San Jose have at least hourly service, with six trains to and from Gilroy on weekdays.

The system provides extensive weekend service including 36 Saturday trains and 32 Sunday trains. Weekend service consists primarily of local trains operating between San Francisco and San Jose Diridon stations on one-hour headways, supplemented by four Baby Bullet trains. On weekends, buses provide a connection between San Jose Diridon and Tamien stations.

Table 5.2: Historical Annual Ridership Information for California's Commuter Rail Operators

State Fiscal Year	ACE[a]	Caltrain[b]	COASTER[c]	Metrolink[d]
2001-2002	738,969	9,942,082	1,281,124	8,510,558
2002-2003	607,017	8,283,062	1,345,333	8,946,355
2003-2004	640,594	8,094,593	1,428,819	9,481,228
2004-2005	941,693	9,454,467	1,432,468	9,946,566
2005-2006	708,274	10,148,616	1,554,450	10,584,078
2006-2007	805,257	10,980,802	1,560,729	11,026,264
2007-2008	797,253	11,961,717	1,686,015	12,013,206
2008-2009	683,190	12,691,717	1,501,619	12,332,037
2009-2010	676,958	11,967,716	1,271,620	11,325,800
2010-2011	838,750	12,673,420	1,390,142	11,142,645
2011-2012	786,947	14,134,117	1,624,211	11,977,540

[a] Sources: Ridership data for 2004 to 2008 are from the California State Controller's Office, *Transit Operators and Non-Transit Claimants Annual Report.* Other years from ACE, Personal Communications, August 2012 and April 2013.

[b] Source: Caltrain, Personal Communications, August 2012 and April 2013.

[c] Sources: North County Transit District, *Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2011* and *Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2012.*

[d] Source: Metrolink Fare Revenue Reports.

Connecting Services

Caltrain has a direct connection with other major operators on its route at multimodal facilities. These operators include Muni light rail and buses, BART, the San Mateo County Transit District (SamTrans), SCVTA light rail and buses, Alameda-Contra Costa Transit District (AC Transit), the Dumbarton Express bus, and ACE (commuter service from Stockton to San Jose). ACE shares a terminal with Caltrain at San Jose Diridon station.

Caltrain connects directly with the intercity *Capitol Corridor* and Amtrak's long-distance *Coast Starlight* at the San Jose Diridon Station. Amtrak *San Joaquin* and *Capitol Corridor* route feeder bus stops are located at the Caltrain station in San Francisco. Local transit services link many Caltrain stations to local city destinations and employment centers where they can serve patrons more directly than the fixed route rail service. For example, the San Jose Diridon station serves multiple SCVTA bus lines along with Monterey–Salinas Transit buses and Highway 17 Express bus service to Santa Cruz. In addition, over 50 shuttle routes connect Caltrain stations to major employment sites throughout the San Francisco Peninsula, most free and open to the public. In 2007, the Caltrain shuttle service carried approximately 5,000 riders per weekday. Caltrain stations are also served by locally operated paratransit services.

Exhibit 5.10: California Commuter Rail Services

Sources: Caltrans, 2012 and Esri, 2012.

Route Administration

The PCJPB currently includes representatives from San Francisco, San Mateo, and Santa Clara counties. The PCJPB consists of nine members and each county has three members on the board. The San Francisco members represent the mayor's office, the San Francisco County Board of Supervisors, and the San Francisco Municipal Transportation Agency (SFMTA). The San Mateo members represent SamTrans Board of Directors and the Santa Clara members represent the SCVTA, and the cities of San Jose and Santa Clara. Staff from the SamTrans provides administrative support to the PCJPB.

The PCJPB contracts with Transit America Services, Inc. (TASI) to operate service on the corridor between San Francisco and Gilroy. As part of this agreement, TASI is responsible for day-to-day operation and maintenance of the trains. The Caltrain commuter service is awarded on a competitive basis. SamTrans continues to administer the service for the PCJPB.

Background

The Caltrain commuter rail service (previously known as the Peninsula Commute Service) operates on one of the oldest railroad lines in California. SP operated passenger rail service on the peninsula between San Francisco and San Jose from the 1860s until 1980 when SP decided to phase the service out. Caltrans and San Francisco, San Mateo, and Santa Clara counties reached a service agreement to preserve the passenger rail service.

Between 1980 and July 1991, Caltrans District 4 administered a purchase-of-service agreement with SP to continue operating and partially funding the service in cooperation with local agencies. Caltrans' responsibilities included planning, marketing, engineering and design, fare and schedule setting, performance monitoring, and customer service.

In 1987, the commuter rail service was renamed Caltrain and the City and County of San Francisco, SamTrans, and the Santa Clara County Transit District (now called SCVTA) formed the PCJPB and transferred administrative responsibility of the Peninsula Commute Service from the State to the local level.

In July 1992, the PCJPB took over the management of Caltrain from the State and contracted with Amtrak to operate the Caltrain commuter rail service. At the same time, SamTrans officially assumed the operation and administration of the PCJPB.

Service in 1980 consisted of 22 weekday round trip trains from San Francisco to San Jose. Under PCJPB management, service has increased to 96 weekday trips. An extension to Gilroy with two weekday round trips was added in 1992, with service later expanded to four round trips. Baby Bullet limited stop express service, serving 12 stations, was added in 2004.

Altamont Corridor Express

Route Description

ACE operates Monday through Friday over 86 miles of track owned by UPRR and PCJPB, providing four round trips between Stockton and San Jose during morning and evening peak periods. The running time between Stockton and San Jose is approximately 2 hours and 12 minutes.

ACE serves a total of 10 stations (Stockton, Lathrop/Manteca, Tracy, Vasco Road, Livermore, Pleasanton, Fremont, Great America, Santa Clara, and San Jose). Free parking is available at all stations, except at the Santa Clara and San Jose stations where there is a daily fee of $4.00 and $3.00, respectively.

Connecting Services

Bus and rail transit connections and dedicated shuttles are an integral part of the ACE system, providing a seamless commuting link between stations and workplaces. All stations have some form of connecting transit. In addition, four stations have direct connections to rail services. The Stockton station has connections to *San Joaquin* trains. The Great America station connects with SCVTA light rail (approximately 750 feet east of the station) and the *Capitol Corridor*. At Santa Clara, connections can be made with Caltrain and the *Capitol Corridor*, and at San Jose, connections can be made with Caltrain, the *Capitol Corridor*, the Amtrak *Coast Starlight*, and SCVTA light rail.

Route Administration

The SJRRC is a JPA consisting of the County of San Joaquin and the cities of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, and Tracy. The commission is governed by a Board of Directors which consists of six elected officials appointed by the San Joaquin Council of Governments (SJCOG) from nominations by local agencies, and is supplemented by two elected officials appointed by the Alameda County Congestion Management Agency (ACCMA) to address rail service issues affecting Alameda County. Ex-officio members represent Caltrans District 10, San Joaquin Regional Transit District, and SJCOG.

In July 2003, the SJRRC became the designated owner, operator and policy-making body of the ACE service in accordance with the Cooperative Service Agreement between the SJRRC, the ACCMA, and SCVTA, which superseded and rescinded the prior 1997 agreement. As the designated owner of the ACE service, the SJRRC took title to all of the assets and assumed the liabilities that were previously under ownership of the ACE JPA, which was dissolved.

The purpose of the Cooperative Services Agreement is to improve and expand the ACE service and protect the interests of the three counties along the corridor. As part of this agreement, the SJRRC is required to provide a baseline three train service to Santa Clara and Alameda counties in return for a "capped" contribution.

Route History

In 1989, SJCOG, the Stockton Chamber of Commerce and the Building Industry Association of the Delta began the development of a 20-year transportation plan for a future sales tax vote in San Joaquin County. Measure K, the half-cent sales tax for transportation, was strongly supported by voters in 1990, and the number one project identified for funding was Altamont passenger rail service. In 1995, the seven cities and San Joaquin County signed a joint powers agreement that created the SJRRC to implement the rail plan and to explore agreements with the counties of Santa Clara and Alameda. This created a five-member board of directors appointed by SJCOG. San Joaquin County has contributed over $97 million in Measure K funding for Altamont Corridor Express rail service.

In May 1997, SJRRC, the ACCMA, and SCVTA executed an agreement to create the Altamont Commuter Express JPA. The ACE JPA was dissolved in June 2003 and a cooperative services agreement was executed between SJRRC, ACCMA and SCVTA. The cooperative services agreement identified the SJRRC as the owner/operator of the ACE service, overseeing the day-to-day management, planning, and support services necessary to operate the trains. The SJRRC issued a contract for operations and maintenance of equipment to Herzog Transit Services, Inc., and service began on October 19, 1998. Initially there were two westbound morning trains and two eastbound evening trains. In March 2001, a third train was inaugurated which gave ACE passengers later departure options and eased overcrowding. In October 2012, a fourth round trip was added. In 2012 the name was changed from Altamont Commuter Express to Altamont Corridor Express.

Funding for the operation and management of the ACE service is provided by passenger fares, Transportation Development Act funds, State Transit Assistance, San Joaquin County's half-cent sales tax (Measure K), ACCMA funding through Alameda County's one-half cent sales tax (Measure B), and SCVTA funding. Each agency's annual share is based on the percentage of total ACE daily boardings and alightings that occurred in SFY 2002-03 in each county. Cost sharing for capital projects, excluding stations, is determined on a case-by-case basis and approved by each of the agencies. Station improvements are the responsibility of the agency for the county in which the station is located.

Metrolink

Route Description

Metrolink presently operates 162 daily trains weekdays, serving 55 stations on the following seven lines:

1. Ventura County Line. East Ventura, Oxnard, Camarillo, Moorpark, Simi Valley, Chatsworth, Northridge, Van Nuys, Burbank Bob Hope Airport, Downtown Burbank, Glendale, Los Angeles.
2. Antelope Valley Line. Lancaster, Palmdale, Vincent Grade/Acton, Via Princessa, Santa Clarita, Newhall, Sylmar/San Fernando, Sun Valley, Downtown Burbank, Glendale, Los Angeles.
3. San Bernardino Line. San Bernardino, Rialto, Fontana, Rancho Cucamonga, Upland, Montclair, Claremont, Pomona (North), Covina, Baldwin Park, El Monte, Cal State L.A., Los Angeles.
4. Riverside Line. Riverside Downtown, Pedley, East Ontario, Downtown Pomona, Industry, Montebello/Commerce, Los Angeles.
5. Orange County Line. Oceanside, San Clemente Pier, San Clemente, San Juan Capistrano, Laguna Niguel/Mission Viejo, Irvine, Tustin, Santa Ana, Orange, Anaheim, Fullerton, Buena Park, Norwalk/Santa Fe Springs, Commerce, Los Angeles.
6. Inland Empire-Orange County Line. San Bernardino, Riverside Downtown, Riverside La Sierra, North Main Corona, West Corona, Anaheim Canyon, Orange, Santa Ana, Tustin, Irvine, Laguna Niguel/Mission Viejo, San Juan Capistrano, San Clemente, San Clemente Pier, Oceanside.
7. 91 Line. Riverside Downtown, Riverside La Sierra, North Main Corona, West Corona, Fullerton, Buena Park, Norwalk/Santa Fe Springs, Los Angeles.

Saturday and Sunday service is also operated on the Antelope Valley, San Bernardino, Orange County and Inland Empire-Orange County lines. Most weekday trains operate during peak commuting hours before 8:30 a.m. and after 3:30 p.m. Metrolink has 512 route miles in its regional rail system. All Metrolink stations have ticket vending machines. Stations on the Metrolink routes are owned by the cities or regional transportation commissions, and 22,464 parking spaces are provided, most of which are free.

Connecting Services

Each county has a transit plan to ensure integration of Metrolink service with other transit systems and transportation modes. The Metrolink fare is designed to provide a free transfer either from feeder bus or to local transit at the destination station. Metrolink passengers can connect with Amtrak trains at Anaheim, Burbank Bob Hope Airport, Camarillo, Chatsworth, Fullerton, Glendale, Irvine, Moorpark, Oceanside, Oxnard, San Clemente Pier, San Juan Capistrano, Santa Ana, Simi Valley, and Van Nuys. Metrolink passengers can connect to the Metro Red Line/Purple Line subway and the Metro Gold Line at Los Angeles Union Station (LAUS), to the Metro Green Line at Norwalk (via Norwalk Transit Route 4), to the Metro Blue Line and the Metro Expo Line at the 7th Street/Metro Station, and to the Metro Orange Line at Chatsworth Station, all at no additional charge.

Shuttle service is provided at the Downtown Burbank and Burbank-Bob Hope Airport stations to the Burbank Bob Hope Airport terminal. LAUS connects to the state-supported *San Joaquin* route via Amtrak Thruway bus service. In addition, it also connects to Amtrak long-distance trains such as the *Sunset Limited, Southwest Chief, and Coast Starlight* via Thruway bus service. LAUS also provides connections with various local and city bus and shuttle services, including direct service to Los Angeles International Airport.

Planned light rail additions, including the Metro Exposition Line Extension and the Metro Gold Line Foothill Extension, will also allow Metrolink passengers to reach additional areas by transfers using Metro's rail network.

Organizational Structure

SCRRA is a JPA consisting of five member agencies and three ex-officio member agencies. The SCRRA board consists of 11 members.

Member agencies include LACMTA, OCTA, RCTC, San Bernardino Associated Governments, and VCTC. Ex-officio member agencies include SCAG, SANDAG, and the State of California.

Background

In June 1990, the California State Legislature enacted SB 1402 which required the transportation commission of the counties of Los Angeles, Orange, Riverside, and San Bernardino to develop a plan for regional transit services within the multi-county region.

In August 1991, the SCRRA was created to plan, design, construct, and administer the operation of a regional passenger rail system serving the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura. The SCRRA created the regional commuter rail system Metrolink in 1992. Today, Metrolink serves approximately 43,000 daily trips in 238 communities throughout southern California.

The first three lines, San Bernardino, Santa Clarita (now Antelope Valley), and Ventura County, began service to Los Angeles on October 26, 1992.

The Riverside Line was added in June 1993, and the Orange County Line was added in April 1994. The sixth line, Inland Empire-Orange County, was added in October 1995. In May of 2002, the 91 Line between Los Angeles and Riverside was opened for commuters traveling via Fullerton. The Orange County to Los Angeles Line extends as far south as Oceanside in San Diego County.

The SCRRA contracts with Amtrak to operate the commuter rail service and Bombardier for rail equipment maintenance. It also contracts with the Los Angeles County Sheriff's Department for security, Veolia Transportation Maintenance & Infrastructure, Inc. for track and structure maintenance, and Mass Electric Construction Company for signal and communications maintenance.

COASTER

Route Description

The COASTER serves eight stations between San Diego and Oceanside and operates 22 trains per day Monday through Friday, primarily concentrated during peak periods. Four round trips are operated on Saturdays, Sundays, and holidays. Additional service is provided for home games at Petco Park for the San Diego Padres Major League Baseball franchise.

The eight stations COASTER serves are: Oceanside Transit Center, Carlsbad Village, Carlsbad Poinsettia, Encinitas, Solana Beach, Sorrento Valley, Old Town Transit Center and San Diego Santa Fe Depot. All stations have free parking available except downtown San Diego's Santa Fe Depot, where metered parking is available.

Connecting Services

All COASTER stations have connecting transit services available. COASTER passengers can connect with Amtrak trains at Oceanside, Solana Beach, Old Town Station, and the downtown Santa Fe Depot in San Diego. At Oceanside Transit Center, connections are available to Metrolink commuter service to Los Angeles and to NCTD's SPRINTER light rail service to Escondido via Vista and San Marcos. Other stations have connections to San Diego Transit and San Diego Trolley. Passengers can connect to San Diego State University at the Old Town Transit Center via the San Diego Trolley's Green Line and bus service from Santa Fe Depot to the San Diego International Airport. Transit connections in northern San

Diego County are provided by NCTD BREEZE buses, including several services branded as "COASTER Connection" routes that provide peak hour commute shuttle service to COASTER stations in the Sorrento Valley.

Route Administration

The Board of Directors of NCTD is comprised of one member of each of the city councils of the cities of Carlsbad, Del Mar, Encinitas, Escondido, Oceanside, Solana Beach, San Marcos, and Vista, and one member from the San Diego County Board of Supervisors.

Route History

The North San Diego County Transit District Board (NSDCTDB) was created by state law in 1975 to plan, construct, and operate itself or through a contractor, a public transit system in its area of jurisdiction. In 1976, NCTDB formed NCTD for the purpose of providing integrated public transit services within the North San Diego County region.

In 1987, voters approved the Proposition A TransNet Ordinance, which provided funding for future transit projects and improvements to the existing system. At the same time, planning began on the COASTER commuter rail service between Oceanside and San Diego. In order to expand rail passenger services, in 1992 NCTDB purchased 60 miles of the LOSSAN rail corridor from ATSF.

In 1994, NCTDB created a nonprofit corporation called the San Diego Northern Railway (SDNR) to maintain, enhance, and operate its facilities. The Coast Express Rail Service (COASTER) between Oceanside and San Diego was initiated the following year. Beginning in 2000, the Board contracted directly for COASTER services and ceased using the SDNR nonprofit corporation. In 2002, SB 1703 (Peace 2002) consolidated the planning, programming, and construction functions with SANDAG. On August 30, 2005, the State Legislature changed NSDCTDB's name to the North County Transit District (NCTD).

NCTD owns the portion of the LOSSAN rail corridor from the Orange/San Diego County Line (Mile Post 207.4) south to the Del Mar/San Diego city limits (Mile Post 245.6). SDMTS owns the portion of the LOSSAN rail corridor from that point south to the Santa Fe Depot in San Diego (Mile Post 267.6). Per agreement, NCTD also provides maintenance of the LOSSAN rail corridor in SDMTS area of ownership. NCTD currently contracts with Herzog Transit Services, Inc for COASTER operations.

Urban Rail Systems

Urban rail systems provide passenger service within a metropolitan area. Urban rail service can take several forms, including heavy-rail transit, which offers high-capacity, high-speed service (i.e., subways and elevated trains), cable-cars, trams or streetcars offering lower-speed, lower-capacity localized service, and light rail systems, which offer capacities and speeds between those of heavy rail and streetcars/trams. California features eight urban rail transit systems, including two heavy-rail transit systems, five light rail transit systems, and one cable car system. Table 5.3 highlights urban rail services by operator.

The State's urban rail systems often provide connections to commuter and intercity rail systems, enabling convenient access for long-distance trips. Table 5.4 summarizes the direct connections between urban rail services and other rail systems. It is organized by urban rail operator and includes only those operators that offer connections to other systems. The table lists stations at which rail to rail connections are available, with the exception of the connections between BART and Muni Metro (those connections are too numerous to list in this table, and are detailed in system maps for both systems).

Table 5.3: Existing Urban Rail Systems in California

Type	Operator	Service Name	Service Area
Heavy-Rail Transit	BART	*BART* Green Line	Fremont – Oakland – San Francisco – Daly City
		Orange Line	Richmond – Oakland – Fremont
		Red Line	Richmond – San Francisco – Daly City–Millbrae
		Blue Line	Dublin/Pleasanton – Oakland San Francisco – Daly City
		Yellow Line	Pittsburg/Bay Point – San Francisco – San Francisco Airport – Millbrae
	LACMTA	*Metro Rail: Red Line*	Los Angeles – Wilshire – Hollywood – North Hollywood
		Purple Line	Los Angeles – Westlake – Wilshire/Western
Light Rail Transit	RT	RT Light Rail: Gold Line	Downtown-Sunrise-Folsom
		Blue Line	Watt/I-80-Downtown-Meadowview
		Green Line	Downtown Sacramento–Richards Blvd
	SFMTA	*Muni:* F – Market-Wharves (Streetcar Line)	Fisherman's Wharf-Castro
		J – Church	Ferry Building – Noe Valley – Balboa Park
		K – Ingleside	Ferry Building – Ingleside District – Balboa Park
		L – Taraval	Ferry Building – San Francisco Zoo
		M – Oceanview	Ferry Building – Oceanview District – Balboa Park
		N – Judah	Caltrain Station – Ocean Beach
		T – Third Street	Castro Station – Bayshore
	SCVTA	*SCVTA Light Rail* 900: Almaden to Ohlone/ Chynoweth	Almaden-Ohlone/Chynoweth
		901: Santa Teresa to Alum Rock	Santa Teresa – Ohlone/Chynoweth – San Jose – Tasman-Alum Rock
		902: Mountain View to Winchester	Mountain View – Tasman – San Jose – Winchester
Light Rail Transit	LACMTA	*Metro Rail:* Blue Line	Los Angeles – Compton – Long Beach
		Gold Line	East Los Angeles – Union Station – Highland Park – Pasadena
		Green Line	Redondo Beach – Aviation/LAX – Lynwood-Norwalk
		Expo Line	Los Angeles – Crenshaw – Culver City
	NCTD	SPRINTER	Oceanside – Vista – San Marcos – Escondido
	SDMTS	*San Diego Trolley:* Blue Line	San Diego – San Ysidro
		Orange Line	San Diego – El Cajon
		Green Line	San Diego – Qualcomm Stadium – SDSU – Santee

Table 5.3: Existing Urban Rail Systems in California (continued)

Type	Operator	Service Name	Service Area
Cable Car	SFMTA	*Muni Cable Car* California Street	Embarcadero Station – California Street – Van Ness
		Powell-Mason/Hyde	Powell Street – Mason Street – Taylor/Bay Street, Powell Street – Hyde Street – Victorian Park

Sources: BART; LACMTA; RT; SFMTA; SCVTA; and SDMTS, 2012.

Table 5.4: Direct Urban Rail Connections to Other Rail Systems

Urban Rail Operator	Service Name	Connections and Urban Rail Station
RT	RT Light Rail	Amtrak (Intercity Rail) – Sacramento Valley Station
SCVTA	SCVTA Light Rail	Caltrain (Commuter Rail) – Tamien, San Jose Diridon, Lick Mill, and Mountain View ACE (Commuter Rail) – San Jose Diridon and Lick Mill, Amtrak (Intercity Rail)[a] – San Jose Diridon and Lick Mill
BART	BART	ACE (Commuter Rail) – Dublin/Pleasanton (via shuttle bus) Caltrain (Commuter Rail)-Millbrae Amtrak (Intercity Rail)[a] – Oakland Coliseum and Richmond Muni (Urban Rail) – Balboa Park, Civic Center, Powell, Montgomery, and Embarcadero
SFMTA	Muni Metro	BART (Urban Rail) – Balboa Park, Civic Center, Powell, Montgomery, and Embarcadero Caltrain (Commuter Rail) – Fourth and King
LACMTA	Metro Rail	Amtrak (Intercity Rail) – LAUS and Chatsworth Metrolink (Commuter Rail)-LAUS, Cal State LA, and Chatsworth
NCTD	SPRINTER	Amtrak (Intercity Rail) – Oceanside COASTER (Commuter Rail) – Oceanside Metrolink (Commuter Rail) – Oceanside
SDMTS	San Diego Trolley	Amtrak (Intercity Rail) – Santa Fe Depot and Old Town COASTER (Commuter Rail) – Santa Fe Depot and Old Town

Sources: BART, LACMTA; RT, SFMTA; SCVTA; and SDMTS, 2012.

[a] Includes *Capitol Corridor* trains.

Excursion Passenger Rail Services

Excursion railroads typically serve recreational trips and provide an alternative to automobile travel for tourists visiting scenic destinations throughout the State. Many excursion railroads operate in California. Some of these railroads include the Sierra Railroad, the Fillmore and Western Railway, the Santa Cruz and Monterey Bay Railway, Santa Cruz, Big Trees and Pacific Railway, the Sacramento Southern Railroad, and the Napa Valley Wine Train.

5.1.2 Airport Connections

This section outlines the intercity rail services that provide access to the airports within California and major proposals to enhance the connectivity between the state rail system and airports.

Existing Airport Connections

California's rail system provides important connections to airports throughout the State. Table 5.5 shows the intercity and commuter rail services and the transit connections that provide access to California's major airports.

Major Proposals to Improve Airport Connections

Several state airports have plans or proposals underway to improve airport access. These projects include the Burbank Bob Hope Airport's Regional Intermodal Transportation Center project and the San Diego International Airport.

The Burbank Bob Hope Airport's Regional Intermodal Transportation Center, which will be located directly across from the Burbank Bob Hope Airport Amtrak and Metrolink train stations, will include a three-level consolidated rental car facility, a rental car customer service building, a ground level bus transit station, and an elevated covered moving walkway to the terminal building. The elevated walkway will connect airport passengers with the transportation center where off-airport shuttles will provide service to intercity and commuter rail and transit facilities, including the Burbank Bob Hope Airport Amtrak Station, Burbank Metrolink Station, and the North Hollywood Red Line Station. The transportation center is currently under construction and scheduled to open summer 2014.[44]

The San Diego International Airport's Green Build project is also currently under construction. The project will expand and improve the efficiency airport facilities to accommodate the growing number of airport passengers in an environmentally sustainable manner. The project will include 10 new gates to reduce terminal congestion and expand passenger waiting areas, a dual-level roadway to separate arriving and departing passengers and reduce traffic congestion in pick-up/drop-off areas, taxiway improvements to improve the flow of aircraft, and improved check-in, security, and concession facilities. The Green Build project's scheduled completion is 2013.[45]

[44] Burbank-Glendale-Pasadena Airport Authority. Airport Authority Awards Construction Contracts for Regional Intermodal Transportation Center. May 2012.

[45] San Diego Regional Airport Authority Fact Sheet.

Table 5.5: Rail and Thruway Bus Connections to Airports

Airport	Rail Corridor[a]	Station	Public Transit Connection between Rail Station and Airport
Arcata-Eureka	*San Joaquin* Bus	McKinleyville	No connection. Bus stops at terminal.
Burbank Bob Hope	*Pacific Surfliner*, *Coast Starlight*, Metrolink (Ventura County Line)	Burbank, CA – Airport Station	Within walking distance of main terminal (shuttle also available)
Fresno-Yosemite International	*San Joaquin*	Fresno	Fresno Area Express
John Wayne	*Pacific Surfliner*	Santa Ana	OCTA
	Metrolink (Orange County/ Inland Empire Lines)	Tustin	iShuttle
Long Beach	*San Joaquin* bus	Long Beach	Long Beach Transit
Los Angeles International	*Pacific Surfliner, Coast Starlight*, Metrolink	Los Angeles Union Station	LAX Flyaway bus shuttle
	San Joaquin Bus	Van Nuys Flyaway	LAX Flyaway bus shuttle
San Jose Mineta International	*Capitol Corridor, ACE,* Caltrain	Santa Clara	VTA Airport Flyer
Oakland International	*Capitol Corridor*	Oakland Coliseum	Oakland Airport Connector[b]
	BART	Coliseum/Oakland Airport	Oakland Airport Connector[b]
	San Joaquin	Richmond	BART
Ontario International	*San Joaquin* Bus	Ontario	Omnitrans
	Metrolink	East Ontario, Fontana	Omnitrans
Palm Springs	*San Joaquin* Bus	Palm Springs	No connection. Bus stops at terminal.
Sacramento International	*Capitol Corridor*, *San Joaquin* trains and buses	Sacramento	Yolobus
San Diego International	*Pacific Surfliner*, COASTER	Santa Fe Depot	SDMTS
San Francisco International	BART	San Francisco International Airport	AirTrain
	Caltrain	Millbrae	BART

[a] Thruway bus services listed provide airport connections from Amtrak stations.

[b] The Oakland Airport Connector is under construction. Currently, AirBART shuttle provides service between the airport and the Coliseum/Oakland Airport station.

Source: Cambridge Systematics, Inc., 2013.

5.1.3 Intermodal Passenger Connections

The rail services and feeder bus services introduced in the previous sections depend on convenient connections that allow passengers to transfer from one service to another. The future statewide rail system should focus on developing and improving high-quality corridor rail services that feed each other.

The system should also be integrated with local transit services to create a seamless network. Connections between rail and other modes – auto, bus, air, ferry, as well as pedestrian and bicycle routes and facilities – are also essential for a successful intercity passenger rail system that meets the State's goals.

This section outlines the connectivity issues that must be considered as improvements to intercity passenger rail services are implemented. Intermodal connections are facilitated by two major types of considerations described in this section: physical characteristics and operational characteristics.

Physical Characteristics

The physical characteristics of stations contribute to their function and value as intermodal connections. This includes the station's location within a community as well as the functional layout of station facilities.

Surrounding Land Uses

The location of a station and its relationship to surrounding land uses facilitate intermodal connections. Station locations may range from mixed-use districts to locations dominated by a single type of development, from high-density central business districts to less-dense downtowns of smaller cities, and from the heart of major cities to suburban or exurban locations.

Areas with mixed uses, higher densities, and central locations tend to coincide with nodes in the transportation network and already allow for intermodal connections. As the mix and density of uses increases, as well as the proximity to major institutions and activity centers such as government offices and event facilities, greater transportation access is required. Since railroad stations typically anchored the early of development of many California towns and cities, stations historically have occupied prime locations in downtown districts. Many stations function as the hub of the local transit system, facilitating transfers between both rail-based services as well as among local transit routes.

As some station-area districts and downtowns have declined, such station areas may no longer be located at the center of activity. In such cases, however, redevelopment opportunities are often great and can have a mutually beneficial relationship with new and improved passenger rail service. Adaptive reuse of historic or underused properties, as well as innovative concepts such as air-rights development, are often associated with station area revitalization.

On the other hand, some stations have been located to maximize auto access and parking opportunities, with the surrounding land use context playing a secondary role. Railroads routed away from downtowns and developed areas may also host passenger services, resulting in the necessity of placing stations in peripheral areas. Intermodal connections can still be accommodated in such cases through connection with transit by placing stations near major highways – or even at airports – to facilitate multimodal trips. "Transit-oriented development" (TOD) can also introduce a greater mix of uses and higher density to such locations, overcoming some of the deficiencies of a less-supportive land use context. As a general rule, new station facilities should select station locations that are multimodal transportation hubs with a preference for traditional city centers that provide supportive land uses and TOD opportunities.

Station Access and Wayfinding

Local streets provide connections between a station and the surrounding land uses. Downtown areas, where many stations are located, typically have a grid-based street system that provides excellent connectivity and multiple routes of access. Stations in more suburban areas may offer fewer routes and points of access. In either case, the railroad itself may act as a barrier, resulting in circuitous routes of access that may discourage pedestrian and bicycle access. Pedestrian, bicycle, auto, and transit access may be enhanced with new grade crossings or overcrossings and undercrossings of tracks, to connect communities and provide better station access, as appropriate to the surrounding land use. All stations may benefit from prominently located bike racks. Some stations may benefit from bike lockers, bike rentals, or bike share opportunities to facilitate station access and intermodal connections.

Signage and wayfinding systems can be installed to orient transferring passengers. While stations may integrate multiple modes, facilitating intermodal connections within a single building or property, some connections may depend on the local street system. In such cases, it is important that high standards of sidewalk and streetscape conditions are maintained, and that appropriate wayfinding elements guide passengers to and from the station as they transfer between modes. Caltrans' Complete Streets policy has been adopted to ensure that travelers of all ages and abilities can move safely and efficiently, and to facilitate multimodal travel for transit users and those taking alternative modes such as bicyclists and pedestrians.

Pedestrian and bicycle access should be enhanced with new grade crossings or overcrossings and undercrossings of tracks, as appropriate to the surrounding land use. Stations would also benefit from a combination of bike lockers, bike rentals, and/or bike share opportunities, as appropriate.

Amtrak Thruway bus or local transit access may be provided with a simple stop along the street outside a station, or facilitated with an off-street terminal with multiple bays for different bus, shuttle and van services. Such facilities allow vehicles to layover at the end of their routes, and organize services for better passenger convenience. This is particularly beneficial for Amtrak Thruway coaches, which require space for luggage loading and unloading.

Auto access is facilitated with designated areas for passenger pick-up and drop-off and taxi stands, as well as rental car and car share facilities. Appropriate signage along major routes, such as interstate and state highways, is important to guide motorists to stations and to the various parking, pick-up and drop-off areas. In addition, a review of the road system may be necessary to determine if local streets are adequate for station-related traffic, particularly in association with service expansion.

Parking facilities serving a station may be publicly or privately operated, free of cost or subject to hourly or daily fees, dedicated or shared with adjacent uses, and on surface lots or in structures. While parking availability can have a major influence in ridership, parking provisions may limit the development potential of the station area. Before adding parking, existing spaces in the station area should be accounted for and market prices applied to them so as to return revenue to a station parking benefit district or the existing owners. The cost of improving the transit system should be considered before adding parking spaces, and especially before building a multi-story parking structure.

Station Configurations

Depending on their size and importance in the statewide network, as well as particular site characteristics and constraints, stations may have a broad range of configurations. These may range from a single track and platform, to multiple tracks and platforms, as described below:

- Single passenger track. The simplest station configuration is an at-grade platform alongside a single track. Passengers accessing the platform from the other side of the track cross the tracks at grade. Various design considerations can improve the safety of such crossings.
- Two passenger tracks. With a second passenger track, two side platforms or a central platform may be used. Stations are typically arranged so that passengers cross tracks at grade to reach the outer-side platform or a center platform.
- Multiple passenger tracks. With additional tracks, combinations of center and side platforms may be employed. With more than two platforms and/or greater levels of train traffic, underground or overhead concourses may be implemented to convey passengers to platforms, avoiding at-grade crossings. As space allows, ramps can be used to facilitate movement from ground level to the concourses and avoid the cost of escalators and elevators.

Some stations with a single passenger track are “platform only” stations, while others offer a shelter next to the platform. Many stations, especially with two or more passenger tracks, feature a station building offering an indoor waiting environment and amenities as warranted by the level of station activity.

Stations with enough traffic offer the convenience of ticket machines and may be staffed with ticket windows and baggage check and storage services. Restrooms, vending machines, payphones, and ATMs may also be provided. Space within the station building may be leased or rented to vendors providing food and services catering to the traveling public. The station building itself will typically be located on one side of the tracks with intermodal connections facilitated within or through the building.

In the densest urban environments, trains may operate on tracks in underground tunnels or elevated on aerial structures. At stations with platforms positioned below or above grade, the distribution of passengers may occur at ground level or in an intermediate mezzanine, where intermodal connections are also facilitated. Stations with multiple levels require vertical circulation elements such as elevators and escalators.

Based on the station configuration, a number of intermodal connection types are possible. The configurations are described below, arranged in order of increasing passenger convenience:

- Extended walk or shuttle connection. In this situation, a train platform may be located blocks away from the platform or stop of a connecting service. The transfer may involve crossing streets or taking a short ride on a shuttle bus in order to move from one to the other.
- Concourse connection. In this situation, the transfer takes place within the same building or block. The paths of transferring passengers do not cross streets, though they may include changing levels (a vertical component) and passage through concourses or halls (a horizontal component).
- Direct vertical connection. Unlike the concourse connection, this transfer involves minimal or no horizontal component, only a change in levels. Such connections can be facilitated when a platform or stop is elevated or placed below grade, with a connecting service stopping above or below.
- Cross-platform transfer. For this transfer, passengers get off one vehicle and transfer to another on the opposite side of the same platform, or board a vehicle that arrives later on the same side of the platform or at the same stop.

Operational Characteristics

Just as physical characteristics contribute to a station’s function and value as an intermodal connection, so do operational characteristics. Schedule coordination and fare integration become increasingly important as the statewide rail system becomes more integrated. These issues will be critical in the development of the integrated high-speed rail (HSR) system.

Schedule Coordination

Schedule coordination refers to efforts to minimize delay for passengers transferring between modes. In general, schedule coordination is organized by hierarchy of service. For example, trains serving intercity and regional destinations arrive last at a connectivity station and are the first to leave. Slower services, such as Amtrak Thruway buses, arrive first and wait for passengers to transfer from all of the trains that they are scheduled to meet.

The same principle applies for local transportation networks, whether consisting of light rail, buses, shuttles or vans. Local transit services arrive early enough to transfer their passengers to rail then wait to receive arriving rail passengers before continuing on to their local destination.

Schedule coordination is most important when a connection is made to a less frequent service, during off-peak periods, or to the last trip offered during the service day. On the other hand, schedule coordination becomes less important for major origin and destination stations that have very frequent service.

Three schedule coordination strategies can be implemented, depending on the services involved—pulse schedules, directional schedule coordination, and dependent linked schedules:

1. Pulse Schedules. At a station with a pulse schedule, services converge at regular intervals at a hub and depart after a short interval during which transfers can be made. Pulse schedules are implemented at rail stations that serve as hubs of Amtrak Thruway buses or local transit services. The services either terminate at these stations, or wait several minutes to allow transfers to be completed.
2. Directional Schedule Coordination. In this variation of a pulsed schedule, Thruway or local transit services operating forward in the peak direction of travel “pulse” directly following train arrivals. This type of schedule coordination has the advantage of not requiring the services involved to be held for each other, as in the case of pulse schedules. However, it allows convenient transfers only in one direction of travel. Transferring passengers in the opposite direction of the coordinated schedule face longer waits.
3. Dependent Linked Schedules. Transfer times are reduced to an absolute minimum with dependent linked schedules. When a train arrives, a Thruway bus or vehicle of another feeder service is scheduled to have a layover and immediately receives transferring passengers. This requires high reliability on the part of both services, as delays on one line affect service along the other line in the forward direction of travel.

Fare Integration

Fare integration addresses the cost and inconvenience of paying a second fare when transferring between modes. Amtrak institutes through ticketing across its long-distance, corridor, and Thruway services, allowing a single ticket to cover trips involving more than one of its services.

The cost and inconvenience of paying a second fare are deterrents to passengers transferring to and from other modes. Free transfers are generally only available between the lines of a local transit operator. Discounts are available in many cases, but may not be widely publicized or especially convenient. Typically a ticket or transfer from one service, along with payment of a discounted fare, is accepted on another service. Processes for achieving fare integration and schedule coordination will be included in future Service Development Plans.

5.2 Marketing Program for State-Supported Routes

The annual intercity passenger rail marketing program budget is $6.2 million. This budget includes $5 million in state funds and an Amtrak supplement of an additional $1.2 million for media advertising. Of the $5 million in state funding, $3.8 million is allocated to marketing expenditures for the *San Joaquin* and *Pacific Surfliner* routes. The remaining $1.2 million is allocated to the *Capitol Corridor*. The CCJPA has a separate marketing program that employs these funds.

5.2.1 Marketing for the *Pacific Surfliner* and *San Joaquin* Routes

The marketing program includes advertising, public relations/outreach, websites and social media, group travel and rail safety. Traditional advertising methods are rapidly changing with the emergence of online information sources and social media. Increasing numbers of people will continue to seek information from the internet over the next 10 years. Online platforms to distribute information to customers and market to potential customers will continue to be developed.

Advertising

Caltrans and Amtrak combine resources to create a comprehensive advertising program for Amtrak California intercity passenger rail and Thruway bus services. Caltrans maintains a three-year advertising and marketing contract. Contracted services include strategic planning, campaign development, media planning and purchasing, public relations and outreach, website management, social media management, production and creative services.

In conjunction with Amtrak, Caltrans formulates a detailed plan for media expenditures. The plan includes seasonal fare promotional campaigns that are coordinated with Amtrak's national campaigns and a strategy of targeting constituent groups with a high likelihood of riding the train that has been successful in the past. Passenger profiles guide the selection of media, run times, and appropriate messaging to motivate target audiences. Amtrak and Caltrans target advertising based on customer demographics and type of traveler (e.g., business travelers, solo travelers, and college students).

Public Relations/Outreach

The public relations and outreach program is designed to support advertising efforts. Public relations/outreach includes special promotions, public/media relations, and printed materials. Corridor-specific programs may be constructed from an array of the following items.

- Websites and Social Media.
  - Websites. This includes development, programming, maintenance and monitoring of the Caltrans-managed passenger site http://www.AmtrakCalifornia.com, which is designed to assist existing and potential passengers in planning and booking travel. A mobile-friendly version of AmtrakCalifornia.com was developed and launched in 2012. In addition, the marketing branch is responsible for the Caltrans Division of Rail (DOR) website.
  - Social Media. Caltrans promotes Amtrak California through social media and online sites such as Facebook, Twitter and YouTube. Additionally, under contract, Caltrans maintains a database of those who have opted in for more information about Amtrak California and sends out regular electronic mail (E-Blasts).
- Group Travel.
  - Kids 'n' Trains. The Kids 'n' Trains program was established to provide reduced group fares for students and other youth groups traveling on the *Pacific Surfliner* and *San Joaquin* routes. The original goal of the program was to increase ridership during off-peak periods. Today the program offers an educational opportunity for participants to discover, explore, and learn about popular destinations in California, including museums, zoos, and sites such as the State Capitol. Popularity of the Kids 'n' Trains program has increased steadily over the years.
  - Senior Travel Program. Marketing efforts target seniors who have the flexibility to travel during off-peak periods when ridership is low.
  - College Student Discount Travel Program. A 20-percent student discount is offered to students from participating colleges traveling on the *Pacific Surfliner* and *San Joaquin* routes. Currently, 16 colleges and universities participate in the program.
- Rail Safety. The goal of NCTD's "Be Track Smart" rail safety program is to educate students and the public about safe behavior at railroad crossings and the dangers of trespassing on railroad rights-of-way. NCTD coordinates rail safety activities with the California Operation Lifesaver, a national nonprofit railroad safety organization. California Operation Lifesaver is a coalition of railroads, federal/state and local agencies, private businesses, and individuals concerned with rail safety.

5.2.2 *Capitol Corridor* Marketing Program

Although the *Capitol Corridor* is funded by the State and shares Caltrans-owned *San Joaquin* rail equipment, the route is managed separately by the CCJPA and is considered to be independent of Amtrak California. On occasion, Caltrans partners with the CCJPA on joint promotions; however, the CCJPA receives separate funding and administers its own budget for marketing and public relations activities.

Major elements of the *Capitol Corridor* marketing program for the current and future years include:

- Joint media promotions with well-known organizations and continued coordination with local partners, Amtrak and Caltrans, on the most beneficial promotions, outreach and shared marketing collateral.
- Expansion of social media marketing through networks such as Facebook and Twitter to engage customers, enhance communications, and increase brand visibility.
- Development of a mobile-friendly website.
- Targeted marketing to school groups, senior citizens, and special interest groups.
- Public relations campaign to maximize the awareness of the *Capitol Corridor* brand.

5.3 Passenger Rail Measures

Federal and state laws and regulations require that specific intercity passenger rail performance measures are included in the CSRP:

- California State Government Code Section 14036. Section 14036 outlines specific content requirements for the CSRP, including revenue-related performance measures, expenses, ridership, and fare policies of the state-sponsored intercity passenger rail routes and feeder bus services.
- PRIIA Section 207 Performance Measures. In accordance with Section 207 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), the Federal Railroad Administration (FRA) and Amtrak have jointly issued a set of metrics and standards for intercity passenger rail service.

This section presents performance information for the three state-supported intercity passenger rail routes, including historic trends and future performance outlook. It also includes a discussion of major trends behind the performance measures and how these performance trends are being incorporated into intercity passenger rail improvement strategies outlined in Chapter 8.

5.3.1 California State Government Code Section 14036 Performance Measures

Section 14036 requires the CSRP to include a performance evaluation of all of the state-supported intercity passenger rail services in operation for the two prior years, including performance trends, potential for efficiency, effectiveness, and strategies to achieve improved performance. Table 5.6 presents the historic intercity passenger rail ridership and service levels for the state-supported routes.

Section 14036 also requires financial information for at least the two prior fiscal years, the current budget year, and forecasts for the nine following years. Table 5.7 lists the historical financial information for the state-supported routes. At this time financial projections for future years cannot be provided as operating costs under Section 209 of PRIIA for the first year of implementation in FFY 2013-2014 have not been determined. For more information on Section 209 see Section 5.3.2.

Section 14036 also requires another set of performance measures for gauging the levels and effectiveness of state support for state-supported routes. Tables 5.8, 5.9, and 5.10 provide these performance measures for the *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor* routes, respectively.

Table 5.6: State-Supported Routes – Ridership and Service Levels

	Actual							
	FFY 04	**FFY 05**	**FFY 06**	**FFY 07**	**FFY 08**	**FFY 09**	**FFY 10**	**FFY 11**
Pacific Surfliner **Route**								
Annual Ridership (thousands)[a]	2,345	2,520	2,658	2,707	2,899	2,593	2,614	2,787
Annual Passenger Miles (thousands)	194,932	201,915	218,372	222,446	240,761	213,656	215,640	230,759
On Time Performance	87.1%	72.9%	76.1%	74.8%	76.1%	83.1%	76.3%	77.5%
Frequency[b]								
San Diego – Los Angeles[c]	11	11	11	11	11	11	11	11
Los Angeles – Goleta	5	5	5	5	5	5	5	5
Goleta – San Luis Obispo	2	2	2	2	2	2	2	2
San Joaquin **Route**								
Annual Ridership (thousands)	739	756	800	805	950	929	978	1,067
Annual Passenger Miles (thousands)	113,754	115,621	120,615	120,914	139,005	133,712	139,405	156,428
On Time Performance	56.1%	63.5%	62.6%	67.9%	82.6%	89.6%	90.7%	89.5%
Frequency								
Oakland – Bakersfield	4	4	4	4	4	4	4	4
Sacramento – Bakersfield	2	2	2	2	2	2	2	2
Capitol Corridor **Route**								
Annual Ridership (thousands)	1,165	1,260	1,274	1,450	1,694	1,600	1,581	1,709
Annual Passenger Miles (thousands)	78,769	85,906	86,519	96,343	109,882	102,283	101,251	109,074
On Time Performance	85.6%	84.7%	72.7%	74.6%	86.0%	92.3%	93.1%	94.9%
Frequency								
San Jose – Oakland	4	4	7	7	7	7	7	7
Oakland – Sacramento[d]	12	12	16	16	16	16	16	16
Sacramento – Auburn	1	1	1	1	1	1	1	1
State-Supported Route Summary								
Annual Ridership (thousands)	4,249	4,537	4,731	4,962	5,542	5,122	5,172	5,563
Annual Passenger Miles (thousands)	387,455	403,442	425,506	439,704	489,648	449,651	456,296	496,260

Source: Caltrans rail operational database.

[a] Total ridership, including state and Amtrak shares.

[b] Service frequencies shown are for weekday service.

[c] One additional weekend round trip.

[d] Twelve weekend round trips.

Table 5.7: State-Supported Routes – Financial Operational Data

	Actual							
	FFY 04	**FFY 05**	**FFY 06**	**FFY 07**	**FFY 08**	**FFY 09**	**FFY 10**	**FFY 11**
Revenue (Million Dollars)								
Pacific Surfliner (State Portion)	$25.2	$28.1	$32.6	$35.5	$38.3	$34.9	$35.8	$40.3
San Joaquin	$21.9	$23.3	$26.5	$26.4	$31.3	$29.6	$33.2	$37.8
Capitol Corridor	$13.2	$15.2	$16.0	$19.3	$23.8	$23.5	$24.2	$27.1
Total Revenue	$60.3	$66.6	$75.1	$81.2	$93.3	$88.0	$93.2	$105.3
Expenses (Million Dollars)								
Pacific Surfliner (State Portion)	$45.6	$49.2	$57.8	$56.9	$63.0	$61.6	$67.0	$69.8
San Joaquin	$49.3	$50.8	$58.2	$60.6	$68.3	$65.1	$67.8	$69.8
Capitol Corridor	$35.9	$39.3	$41.5	$46.0	$53.3	$51.0	$53.9	$57.9
Total Expenses	$130.8	$139.3	$157.5	$163.5	$184.7	$177.7	$188.7	$197.5
Farebox Ratio								
Pacific Surfliner	55.2%	57.1%	56.4%	62.4%	60.8%	56.6%	53.5%	57.7%
San Joaquin	44.5%	46.0%	45.5%	43.6%	45.8%	45.5%	48.9%	54.2%
Capitol Corridor	36.6%	38.6%	38.6%	41.9%	44.6%	46.1%	44.9%	46.9%
State Costs (Million Dollars)								
Existing Routes								
Pacific Surfliner	20.4	21.2	25.2	21.4	24.7	26.8	31.2	29.6
San Joaquin	27.4	27.4	31.7	34.2	37.1	35.5	33.6	32.0
Capitol Corridor	22.8	24.1	25.5	26.7	29.6	27.5	29.7	30.2
Subtotal	70.5	72.7	82.4	82.3	91.3	89.7	94.5	91.7
Equipment Heavy Overhaul	10.1	13.5	13.8	14.0	13.8	13.2	12.7	16.1
Total	**80.6**	**86.2**	**96.2**	**96.3**	**105.1**	**102.9**	**107.2**	**107.8**

Source: Caltrans rail operational database.

Table 5.8: *Pacific Surfliner* Route Statutory Performance Data

Performance Measure	Actual							
	FFY 04	FFY 05	FFY 06	FFY 07	FFY 08	FFY 09	FFY 10	FFY 11
Total Annual Revenue (in Millions of Dollars)	$36.9	$39.7	$45.5	$49.5	$53.2	$48.4	$51.2	$57.6
Total Annual Expenses (in Millions of Dollars)	$67.3	$70.0	$81.2	$79.9	$88.5	$86.6	$95.7	$99.7
Revenue – State Portion[a] (in Millions of Dollars)	$25.2	$28.1	$32.6	$35.5	$38.3	$34.9	$35.8	$40.3
Expenses – State Portion (in Millions of Dollars)	$45.6	$49.2	$57.8	$56.9	$63.0	$61.6	$67.0	$69.8
Farebox Ratio – State Portion	55.2%	57.1%	56.4%	62.4%	60.8%	56.6%	53.5%	57.7%
Annual State Costs[b] (in Millions of Dollars)	$20.4	$21.2	$25.2	$21.4	$24.7	$26.8	$31.2	$29.6
State Costs – Administration (in Millions of Dollars)	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5
State Costs – Marketing (in Millions of Dollars)	$2.3	$2.3	$2.3	$2.3	$2.3	$2.3	$2.3	$2.3
State Cost per Passenger	$12.43	$11.99	$13.53	$11.29	$12.18	$14.75	$17.05	$15.16
State Cost per Passenger Mile	$0.15	$0.15	$0.16	$0.14	$0.15	$0.18	$0.21	$0.18
State Cost per Train Mile	$19.31	$19.41	$22.18	$18.85	$21.89	$23.35	$27.86	$26.38
Annual Ridership – Total Route	2,344,665	2,520,444	2,657,773	2,707,188	2,898,859	2,592,996	2,613,604	2,786,972
Annual Pass. Miles – Total Route	194,931,809	201,915,187	218,371,956	222,446,425	240,761,326	213,655,854	215,640,101	230,759,084
Annual Train Miles – Total Route	1,509,040	1,556,570	1,621,018	1,622,133	1,612,497	1,638,188	1,599,515	1,601,816
On-Time Performance	87.1%	72.9%	76.1%	74.8%	76.1%	83.1%	76.3%	77.5%
Frequency (Daily)								
San Diego-Los Angeles[c]	11	11	11	11	11	11	11	11
Los Angeles-Goleta	5	5	5	5	5	5	5	5
Goleta-San Luis Obispo	2	2	2	2	2	2	2	2

Source: Caltrans rail operational database.

[a] State portion measures of revenue, expenses, and farebox ratio reflect the 70 percent of the route that is state-supported.

[b] State costs do not include equipment lease costs, and may include minor capital project costs.

[c] One additional weekend round trip.

Table 5.9: *San Joaquin* Route Statutory Performance Data

Performance Measure	Actual							
	FFY 04	FFY 05	FFY 06	FFY 07	FFY 08	FFY 09	FFY 10	FFY 11
Annual Revenue (in Millions of Dollars)	$21.9	$23.3	$26.5	$26.4	$31.3	$29.6	$33.2	$37.8
Total Annual Expenses (in Millions of Dollars)	$49.3	$50.8	$58.2	$60.6	$68.3	$65.1	$67.8	$69.8
Farebox Ratio	44.5%	46.0%	45.5%	43.6%	45.8%	45.5%	48.9%	54.2%
Annual State Costs[a] (in Millions of Dollars)	$27.4	$27.4	$31.7	$34.2	$37.1	$35.5	$33.6	$32.0
State Costs–Administration (in Millions of Dollars)	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3
State Costs – Marketing (in Millions of Dollars)	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5	$1.5
State Cost per Passenger	$37.05	$36.26	$39.69	$42.47	$39.03	$38.17	$34.36	$29.96
State Cost per Passenger Mile	$0.24	$0.24	$0.26	$0.28	$0.27	$0.27	$0.24	$0.20
State Cost per Train Mile	$20.48	$20.46	$23.78	$25.56	$27.78	$26.65	$25.26	$24.02
Annual Ridership	738,540	755,854	799,879	804,785	949,611	929,172	977,834	1,067,441
Annual Passenger Miles	113,754,130	115,621,074	120,615,051	120,914,283	139,004,634	133,711,704	139,405,193	156,427,566
Annual Train Miles	1,336,105	1,339,711	1,334,763	1,337,330	1,334,289	1,330,956	1,330,280	1,331,481
On-Time Performance	56.1%	63.5%	62.6%	67.9%	82.6%	89.6%	90.7%	89.5%
Frequency (Daily)								
Oakland-Bakersfield	4	4	4	4	4	4	4	4
Sacramento-Bakersfield	2	2	2	2	2	2	2	2

Source: Caltrans rail operational database.

[a] State costs do not include equipment lease costs, and may include minor capital project costs.

Table 5.10: *Capitol Corridor* Route Statutory Performance Data

Performance Measure	Actual							
	FFY 04	FFY 05	FFY 06	FFY 07	FFY 08	FFY 09	FFY 10	FFY 11
Annual Revenue (in Millions of Dollars)	$13.2	$15.2	$16.0	$19.3	$23.8	$23.5	$24.2	$27.1
Total Annual Expenses (in Millions of Dollars)	$35.9	$39.3	$41.5	$46.0	$53.3	$51.0	$53.9	$57.9
Farebox Ratio	36.6%	38.6%	38.6%	41.9%	44.6%	46.1%	44.9%	46.9%
Annual State Costs[a] (in Millions of Dollars)	$22.8	$24.1	$25.5	$26.7	$29.6	$27.5	$29.7	$30.2
State Costs – Administration (in Millions of Dollars)	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3	$1.3
State Costs – Marketing (in Millions of Dollars)	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2
State Cost per Passenger	$19.54	$19.16	$20.01	$18.43	$17.46	$17.18	$18.78	$17.65
State Cost per Passenger Mile	$0.29	$0.28	$0.29	$0.28	$0.27	$0.27	$0.29	$0.28
State Cost per Train Mile	$25.29	$26.60	$27.22	$22.63	$24.88	$23.17	$25.06	$25.16
Annual Ridership	1,165,334	1,260,249	1,273,572	1,450,069	1,693,580	1,599,625	1,580,619	1,708,618
Annual Passenger Miles	78,768,674	85,905,730	86,518,775	96,343,111	109,881,568	102,282,980	101,250,743	109,073,594
Annual Train Miles	900,189	907,535	936,050	1,181,031	1,188,104	1,186,351	1,184,181	1,198,842
On-Time Performance	85.6%	84.7%	72.7%	74.6%	86.0%	92.3%	93.1%	94.9%
Frequency (Daily)								
San Jose-Oakland	4	4	7	7	7	7	7	7
Oakland-Sacramento[b]	12	12	16	16	16	16	16	16
Sacramento-Auburn	1	1	1	1	1	1	1	1

Source: Caltrans rail operational database.

[a] State costs do not include equipment lease costs, and may include minor capital project costs.

[b] Twelve weekend round trips.

5.3.2 PRIIA Section 207 Performance Measures

The FRA has required that this CSRP include, to the greatest extent possible, performance measures established through the collaborative process mandated by Section 207 of PRIIA. That section requires that the FRA and Amtrak, in consultation with states, rail labor and other groups and agencies, develop "new or improve existing metrics and minimum standards for measuring the performance and service quality of intercity passenger train operations, including cost recovery, on-time performance and minutes of delay, ridership, on-board services, stations, facilities, equipment, and other services." These metrics were officially adopted by the FRA and Amtrak, effective May 12, 2010. The FRA and Amtrak have subsequently produced quarterly reports on intercity passenger rail standards.

Some of the financial standards/metrics are not being collected, pending the full operation of Amtrak's new performance tracking system. Caltrans and the FRA have agreed that the performance measures shown in Table 5.11 are applicable for the CSRP. There are also some Section 207 measures for public benefits which are system-wide for Amtrak and not calculated by route.

Data from the quarterly reports[46] for each of the State's intercity passenger rail routes, as well as all long-distance Amtrak routes that serve California, are presented in Tables 5.12 to 5.18.

Since these measures are generated quarterly, and there are only six reports completed as of June 2012, more time needs to elapse to be able to examine the data for state intercity route trends. However, these performance metrics in the quarterly reports indicate how the state-supported routes compare with other long-distance train routes.

Exhibits 5.11 to 5.14 detail each of the four categories of Section 207 Metrics, with the exception of train delays. Under the "Financial" metric category, passenger-miles per train-mile is displayed. For "OTP," the all-stations OTP metric is displayed. Customer satisfaction indicator scores are graphed, and complaints received metric is graphed per "Other Service Quality."

Exhibit 5.11 compares intercity and long-distance route passenger-miles per train-mile, which measures passenger volumes per unit of train activity. The state-supported routes have fewer passenger-miles per train-mile than other long-distance trains, because these other trains tend to have more passenger capacity per train and travel longer distances.

Exhibit 5.12 compares all-stations OTP for all intercity and long-distance routes, which indicates the number of station stops at which a train arrived later than 15 minutes after its scheduled arrival, for a given route, as a percentage of total station stops along the route. State intercity routes perform at higher OTP rates than long-distance trains, in part because Caltrans is able to work closely with host freight railroads to identify mitigation measures that are more limited in total distance. A longer-distance train may have many more kinds of freight-passenger train conflicts to resolve, and Amtrak does not have sufficient resources to invest in capacity improvements on freight railroad properties.

[46] The first quarter of the SFY is October to December; the second quarter is January to March; the third quarter is April to June; the fourth quarter is July to September.

Table 5.11: PRIIA Section 207 Performance Standards Applicable for the CSRP

Metric/ Standard Category	Performance Metric/Standard	Scope	Applicable for CSRP?	Notes
Financial	Short-term avoidable operating costs	Route	No	Data not available until the avoidable costing methodology for the Amtrak Performance Tracking System has been completed
	Fully allocated operating cost covered by passenger-related revenue	Route	No	Data not available as the fully allocated cost components of the Amtrak Performance Tracking System system were implemented in October 2009 and eight quarters of data have not yet been accumulated
	Long-term avoidable operating loss	Route	No	Data not available until the avoidable costing methodology for the Amtrak Performance Tracking System has been completed
	Adjusted loss per passenger-mile	System	No	System measure, excludes state revenue
	Passenger-miles per train-mile	Route	Yes	
On-Time Performance	Change in effective speed	Route	Yes	
	Endpoint OTP	Route	Yes	
	All-stations OTP	Route	Yes	
Train Delays	Host responsible delays per 10,000 train-miles	Route and host	Yes	
Customer Satisfaction	Indicator scores: Overall Amtrak Personnel Information Given On-board Comfort On-board Cleanliness On-board Food Service	Route	Yes	
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	Yes	
	Complaints received	Route	Yes	
	Food-related complaints	Route	Yes	

Source: Caltrans memorandum to FRA, March 2012.

Table 5.12: *Pacific Surfliner* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	134	134	135	138	139	139
On-Time Performance	Change in effective speed (from 2008 baseline, mph) – last 4 Qs	Route	0.1	0.1	0	0.1	-0.3	0.1
	Endpoint OTP	Route	69.9%	77.8%	81.8%	81%	69.7%	76.9%
	All-stations OTP	Route	82.5%	86.2%	88.6%	88.2%	83%	84.9%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	1,112	923	801	986	1,248	1,100
		SCRRA	1,242	940	926	948	1,099	1,107
		NCTD	1,254	1,201	1,081	1,103	1,453	1,272
		UPRR	1,021	1,334	1,634	1,076	977	811
Customer Satisfaction Index Scores[a]	Overall	Route	88%	85%	87%	87%	87%	87%
	Amtrak Personnel		87%	86%	87%	84%	84%	84%
	Information Given		79%	77%	79%	81%	81%	81%
	On-board Comfort		87%	82%	86%	87%	87%	87%
	On-board Cleanliness		68%	65%	70%	72%	72%	72%
	On-board Food Service		71%	65%	67%	68%	68%	68%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.83	0.61	0.37	0.88	0.96	1.03
	Complaints received per 1,000 passengers (train related)	Route	1.82	1.38	1.31	1.2	1.78	1.86
	Food-related complaints per 1,000 passengers	Route	0.03	0.01	0.01	0.01	0.02	0.03

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were "very satisfied" with Amtrak's service along the corridor.

Table 5.13: *San Joaquin* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	103	103	105	108	111	113
On-Time Performance	Change in effective speed (from 2008 baseline, mph) – last 4 Qs	Route	1.3	1.2	1.3	1.2	0.8	1
	Endpoint OTP	Route	92.9%	91.4%	90.2%	88.5%	88%	88.4%
	All-stations OTP	Route	90.5%	89.8%	90.4%	87.3%	86.4%	87.3%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	682	679	661	696	736	700
		UPRR	819	689	827	747	748	876
Customer Satisfaction Index Scores [a]	Overall	Route	91%	92%	92%	89%	89%	89%
	Amtrak Personnel		86%	90%	91%	89%	89%	89%
	Information Given		81%	83%	82%	82%	82%	82%
	On-board Comfort		83%	86%	87%	85%	85%	85%
	On-board Cleanliness		66%	69%	70%	70%	70%	70%
	On-board Food Service		71%	81%	76%	76%	76%	76%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.09	0.51	0.34	0.57	0.48	0.28
	Complaints received per 1,000 passengers (train related)	Route	1.4	1.53	1.94	2.01	2.25	1.7
	Food-related complaints per 1,000 passengers	Route	0.01	0.04	0.01	0.01	0.04	0

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were “very satisfied” with Amtrak’s service along the corridor.

Table 5.14: *Capitol Corridor* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	86	86	86	87	89	90
On-Time Performance	Change in effective speed (from 2008 baseline, mph) – last 4 Qs	Route	1.5	1.7	2	2	1.8	1.8
	Endpoint OTP	Route	96.7%	95.5%	95.4%	94.4%	94.2%	94.1%
	All-stations OTP	Route	97.2%	97%	96.6%	95.9%	96.1%	95.3%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	UPRR	502	548	504	544	608	616
Customer Satisfaction Index Scores [a]	Overall	Route	90%	90%	91%	87%	87%	87%
	Amtrak Personnel		87%	93%	90%	88%	88%	88%
	Information Given		79%	83%	83%	80%	80%	80%
	On-board Comfort		89%	86%	86%	84%	84%	84%
	On-board Cleanliness		70%	70%	74%	69%	69%	69%
	On-board Food Service		69%	78%	75%	66%	66%	66%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.46	0.6	0.47	0.57	0.26	0.37
	Complaints received per 1,000 passengers (train related)	Route	0.16	0.07	0.15	0.16	0.12	0.19
	Food-related complaints per 1,000 passengers	Route	0	0	0	0	0	0

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were “very satisfied” with Amtrak’s service along the corridor.

Table 5.15: *Coast Starlight* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	221	219	220	222	221	220
On-Time Performance	Change in effective speed	Route	1.3	1.3	1.1	0.9	1.1	1.2
	Endpoint OTP	Route	87.5%	78.1%	65%	77.3%	84.2%	85.9%
	All-stations OTP	Route	74.7%	68.1%	55%	57.9%	61.5%	71.8%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	372	759	1295	1102	835	952
		SCRRA	2,458	1,637	319	1,488	1,640	1,809
		UPRR	821	843	1,316	980	986	908
Customer Satisfaction Index Scores [a]	Overall	Route	81%	84%	82%	77%	77%	77%
	Amtrak Personnel		81%	81%	79%	80%	80%	80%
	Information Given		73%	75%	70%	67%	67%	67%
	On-board Comfort		77%	79%	81%	76%	76%	76%
	On-board Cleanliness		58%	61%	61%	61%	61%	61%
	On-board Food Service		70%	69%	70%	68%	68%	68%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.75	0.67	1.37	1.08	0.63	0.59
	Complaints received per 1,000 passengers (train related)	Route	11.28	13.33	23.51	15.17	20.51	11.1
	Food-related complaints per 1,000 passengers	Route	0.88	0.77	1.61	1.1	2.63	0.72

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were “very satisfied” with Amtrak’s service along the corridor.

Table 5.16: *California Zephyr* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	163	164	167	171	173	174
On-Time Performance	Change in effective speed	Route	2.6	2.8	2.6	2.4	-1.3	2.5
	Endpoint OTP	Route	33.2%	81.1%	52.5%	49.5%	10.2%	32.6%
	All-stations OTP	Route	34.4%	51.2%	48.4%	40.7%	20.7%	41.2%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	1,531	1,038	868	1,372	2,883	1,716
		UPRR	840	777	897	982	1,175	784
Customer Satisfaction Index Scores [a]	Overall	Route	80%	85%	77%	82%	82%	82%
	Amtrak Personnel		84%	83%	79%	79%	79%	79%
	Information Given		72%	76%	68%	70%	70%	70%
	On-board Comfort		76%	77%	75%	78%	78%	78%
	On-board Cleanliness		58%	61%	50%	55%	55%	55%
	On-board Food Service		73%	71%	68%	67%	67%	67%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.71	0.62	1.21	0.95	1.12	0.81
	Complaints received per 1,000 passengers (train related)	Route	32.92	16.37	40.53	47.82	125.18	25.53
	Food-related complaints per 1,000 passengers	Route	1.89	0.62	0.75	4.99	6.98	1.7

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were “very satisfied” with Amtrak’s service along the corridor.

Table 5.17: *Southwest Chief* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	185	185	188	193	195	197
On-Time Performance	Change in effective speed	Route	0.6	0.4	0.2	0.1	-1	-0.4
	Endpoint OTP	Route	67.9%	83.2%	77.8%	81.9%	50.5%	69%
	All-stations OTP	Route	52.2%	65.2%	61.2%	55.8%	38.3%	52.7%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	491	409	454	470	756	610
		NMDOT	1,513	942	1,527	1,748	1,896	1,077
Customer Satisfaction Index Scores [a]	Overall	Route	78%	82%	82%	83%	83%	83%
	Amtrak Personnel		82%	83%	79%	84%	84%	84%
	Information Given		74%	72%	72%	71%	71%	71%
	On-board Comfort		73%	76%	76%	76%	76%	76%
	On-board Cleanliness		57%	59%	61%	58%	58%	58%
	On-board Food Service		72%	73%	70%	72%	72%	72%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.65	0.6	0.57	0.41	0.56	0.59
	Complaints received per 1,000 passengers (train related)	Route	28.52	17.2	24.47	16.41	37.13	13.83
	Food-related complaints per 1,000 passengers	Route	1.46	0.59	0.69	1.53	2.54	0.4

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were “very satisfied” with Amtrak’s service along the corridor.

Table 5.18: *Sunset Limited* Section 207 Performance Metrics

Metric/Standard Category	Performance Metric/Standard	Scope	FFY 2010 Q4	FFY 2011 Q1	FFY 2011 Q2	FFY 2011 Q3	FFY 2011 Q4	FFY 2012 Q1
Financial	Passenger-miles per train-mile	Route	117	119	122	127	130	132
On-Time Performance	Change in effective speed	Route	2.8	3	2.9	0.8	-0.6	0.1
	Endpoint OTP	Route	84.8%	89.9%	83.1%	82.1%	64.6%	73.1%
	All-stations OTP	Route	54.1%	62.3%	58.1%	58.1%	43.1%	52.9%
Train Delays	Host responsible delays per 10,000 train-miles (minutes)	BNSF	971	1,274	1,761	1,113	1,374	1,042
		UPRR	1,210	1,012	1,210	1,235	1,617	1,459
Customer Satisfaction Index Scores [a]	Overall	Route	81%	83%	88%	87%	87%	87%
	Amtrak Personnel		87%	81%	86%	85%	85%	85%
	Information Given		74%	70%	77%	73%	73%	73%
	On-board Comfort		80%	72%	84%	79%	79%	79%
	On-board Cleanliness		64%	62%	69%	65%	65%	65%
	On-board Food Service		78%	71%	78%	74%	74%	74%
Other Service Quality	Service interruptions per 10,000 train-miles due to equipment-related problems	Route	0.95	0.95	0.46	0.92	0.9	0.24
	Complaints received per 1,000 passengers (train related)	Route	32.52	12.79	11.94	32.83	36.16	22.62
	Food-related complaints per 1,000 passengers	Route	1.19	0.79	1.13	1.74	1.56	2.13

Source: FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

[a] The Customer Satisfaction Index indicates the percentage of passengers that were "very satisfied" with Amtrak's service along the corridor.

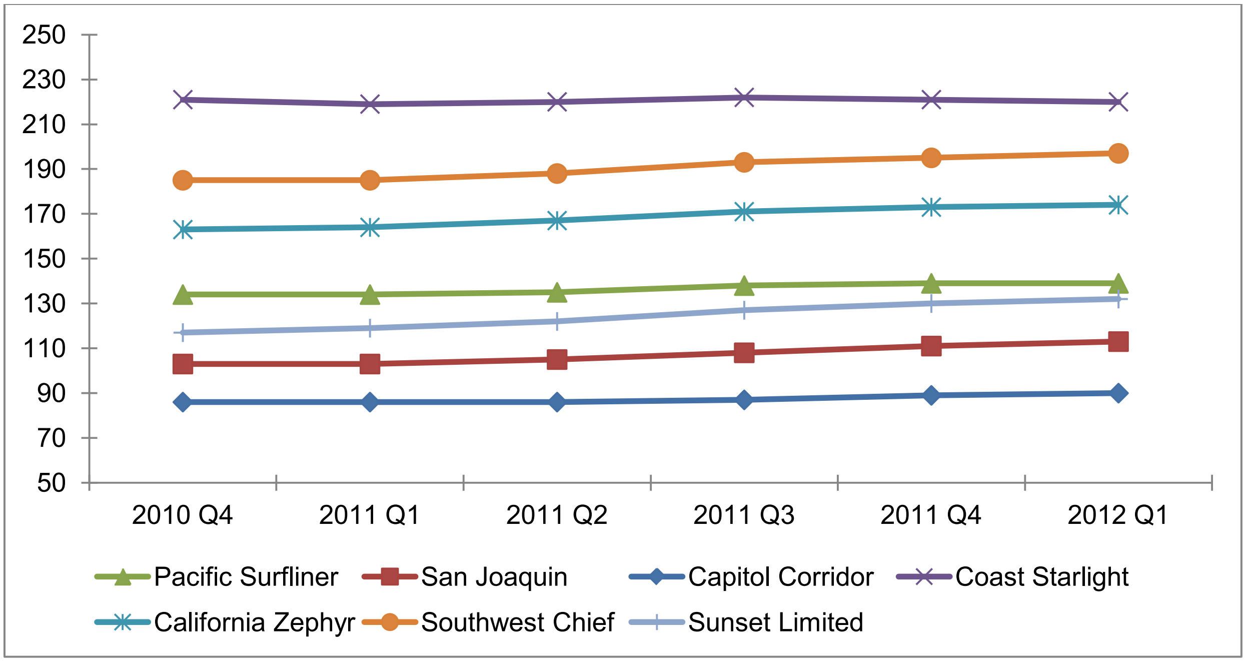

Exhibit 5.11: Passenger-Miles per Train-Mile

Source: Underlying data from FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

Note: Exhibit shows FFY data.

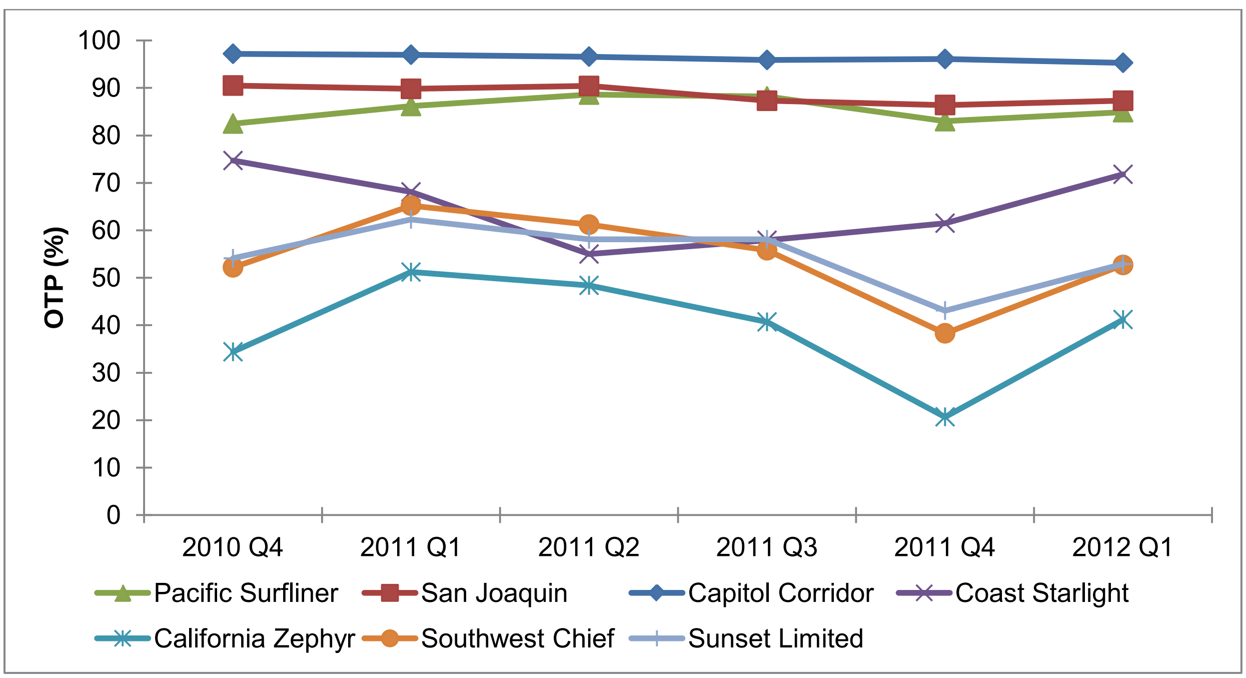

Exhibit 5.12: All-Stations On-Time Performance

Source: Underlying data from FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

Note: Exhibit shows FFY data.

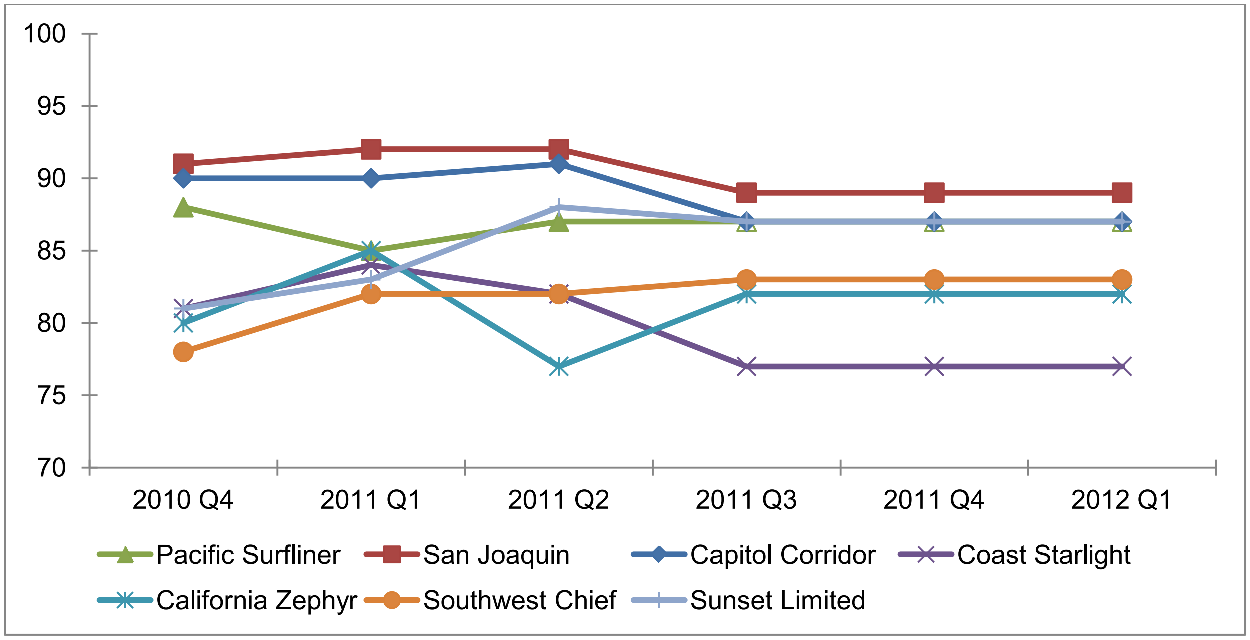

Exhibit 5.13: Overall Customer Satisfaction Index Scores

Source: Underlying data from FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

Note: Exhibit shows FFY data.
The Customer Satisfaction Index indicates the percentage of passengers that were "very satisfied" with Amtrak's service along the corridor in each area listed.

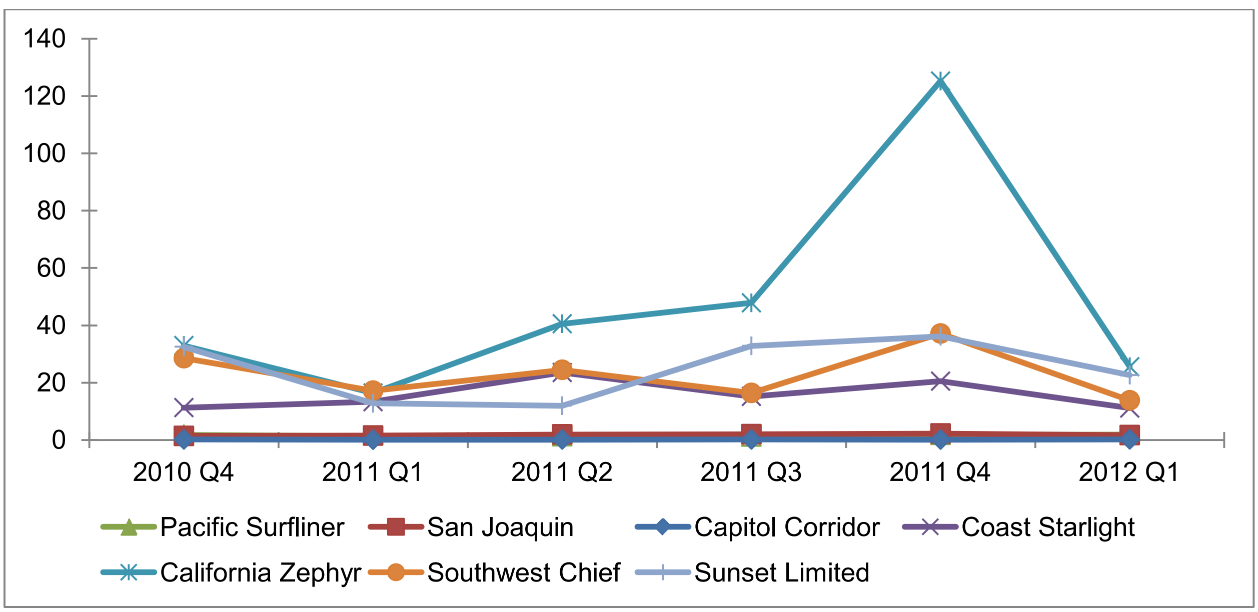

Exhibit 5.14: Train-Related Complaints per 1,000 Passengers

Source: Underlying data from FRA Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations.

Note: Exhibit shows FFY data.

Exhibit 5.13 compares intercity and long-distance route overall customer satisfaction scores, which measures the percentage of customer satisfaction surveys, where customers are "very satisfied" with the overall service on the train. This is a measure of on-board experience. Passengers on state-supported routes tend to be more satisfied with their on-board service than Amtrak long-distance route passengers.

Exhibit 5.14 compares the number of train-related customer complaints per 1,000 passengers for intercity and long-distance routes. Passengers on state-supported routes have very low complaint rates compared to Amtrak long-distance service. There tends to be a relationship between this measure and OTP shown on Exhibit 5.12, as lower OTP rates in the fourth quarter of 2011 for the *California Zephyr* were associated with a steep spike in customer complaints.

5.4 Institutional Issues

California's intercity passenger rail and commuter rail systems are owned, managed, and operated by a variety of agencies; many through partnership agreements or other formalized governance structures that delineate the roles and responsibilities of each agency. This section summarizes the institutional arrangements in place to manage each element of the State's existing passenger rail system. Also discussed are federal agencies which have regulatory, funding and technical support roles.

5.4.1 Roles

This section defines the roles and responsibilities of various state, regional, and federal actors in planning and managing California's existing intercity passenger rail and commuter rail systems.

Intercity Passenger Rail

As described previously, intercity passenger rail service in California includes three state-supported routes and four Amtrak long-distance routes. Table 5.19 summarizes the roles and responsibilities of the key players in funding, planning, administering, and operating these routes. Caltrans administers two of the state-supported routes (*Pacific Surfliner* and *San Joaquin*), and provides financial support for all three. Amtrak operates all three state-supported routes in addition to funding and operating the four long-distance routes that link California to other states (*Coast Starlight*, *California Zephyr*, *Southwest Chief*, and *Sunset Limited*). Additional details about the administration of the three state-supported routes are provided in the table.

Pacific Surfliner

Caltrans and Amtrak share responsibilities for operating the *Pacific Surfliner* route. Since Amtrak considers 30 percent of the *Pacific Surfliner* service to be a part of the national long-distance "basic service," the operating costs on this portion of the route are funded by Amtrak. The State funds the remaining 70 percent of the route's operating costs. The State also funds capital projects. Some of the costs of these projects are shared by local agencies as many of the projects have joint benefit to commuter and intercity rail. Between San Diego and Oxnard, both commuter rail and intercity rail operate on the corridor, and thus, most projects benefit both services. Between Oxnard and San Luis Obispo, only intercity rail service operates.

Beginning in November 1, 2013 (the start of the FFY 2014), Caltrans will be responsible for paying full costs for 100 percent of the *Pacific Surfliner* route's operating costs as a result of PRIIA Section 209 cost-sharing changes. Currently, the State pays full costs for only 70 percent of the *Pacific Surfliner* route. While the State now pays full costs for both the *Capitol Corridor* and the *San Joaquin* route. After November 1, 2014, under Section 209, the State will also pay capital costs for equipment and other capital facilities. Amtrak owns most of the equipment used on the *Pacific Surfliner* route, so there will be new capital costs on this route.

Table 5.19: Summary of Intercity Passenger Rail Roles and Responsibilities

	Pacific Surfliner	*San Joaquin*	*Capitol Corridor*	Amtrak Long-Distance Routes
Administration	Caltrans	Caltrans	CCJPA	Amtrak
Operations	Amtrak	Amtrak	Amtrak	Amtrak
Planning	Caltrans with advice from LOSSAN	Caltrans with advice from San Joaquin Valley Rail Committee	CCJPA	Amtrak
Funding				
Operating Funding	70% Caltrans 30% Amtrak Starting October 1, 2013, 100% Caltrans	Caltrans	Caltrans	Amtrak
Capital Funding	Caltrans and local agencies	Caltrans	Caltrans and local agencies	Amtrak
Equipment				
Ownership	Amtrak and Caltrans	Primarily Caltrans	Primarily Caltrans	Amtrak
Maintenance	Amtrak	Amtrak with oversight from CCJPA	Amtrak with oversight from CCJPA	Amtrak

Source: Caltrans; AECOM; Cambridge Systematics, Inc., 2013.

Caltrans is responsible for overseeing service on the route. Amtrak operates all trains and maintains all of the equipment. Caltrans provides marketing services for the route and coordinates some marketing services with Amtrak. Caltrans works in conjunction with Amtrak on scheduling, fare policy, and on-board services with Amtrak. Amtrak owns all of the locomotives and a majority of the cars, and the State owns 10 cars.

LOSSAN serves as a planning and advisory group to Caltrans for intercity passenger rail in southern California. Formed as a JPA in 1989, LOSSAN coordinates intercity passenger rail service between San Diego and San Luis Obispo with the goals of increasing ridership, revenue, capacity, reliability, and safety. Members include rail owners and operators and Regional Transportation Planning Agencies along the six-county coastal corridor.[47] SANDAG provides staff support to LOSSAN with financial assistance from the other member agencies. SB 1225 (Padilla 2012) authorized the LOSSAN JPA to transition the management of the *Pacific Surfliner* route from Caltrans to a system similar to that of the *Capitol Corridor*. SB 1225 also authorizes the Secretary of Transportation to enter into an agreement transferring certain responsibilities to the JPA.

[47] LOSSAN members include Caltrans, LACMTA, NCTD, OCTA, SANDAG, SDMTS, SLOCOG, SBCAG, and VCTC. The SCAG is an ex-officio member. Additional technical advisory committee members include BNSF, CPUC, SCRRA, and UPRR.

San Joaquin

Similar to the *Pacific Surfliner*, the State and Amtrak share responsibilities for operating the *San Joaquin* route. The State funds the operating and capital costs, while Amtrak operates the trains. Through an operating contract with Amtrak, Caltrans is responsible for service oversight and coordinates functions such as marketing, scheduling, and on-board services with Amtrak. The State owns all of the rail equipment, while Amtrak maintains it. The SJVRC coordinates closely with Caltrans and Amtrak to provide planning support for addressing current and future operational and safety issues, passenger services, rail facilities, and rail equipment needs along the route. The committee is comprised of elected officials and members of the public representing 13 counties along the *San Joaquin* route.[48] Caltrans Division of Rail (DOR) provides staff support to the SJVRC. Assembly Bill (AB) 1779 (Galgiani 2012) authorized the creation of a new JPA for the management of the *San Joaquin* route, similar to that of the *Capitol Corridor*. A JPA has been formed and state law authorizes the Secretary of the BTH to enter into an agreement transferring certain responsibilities to the JPA.

Capitol Corridor

The CCJPA assumed administration of the *Capitol Corridor* in July 1998. Caltrans continues to fund service operations and capital projects. The CCJPA is responsible for the oversight of the *Capitol Corridor* service and coordinates functions such as marketing, scheduling, and on-board services with Amtrak, who is responsible for operating the trains through an agreement with CCJPA. The State owns most of the rail equipment, while Amtrak is responsible for maintenance. The CCJPA oversees Amtrak's maintenance work. Through membership on the CCJPA Board, local agencies have an active role in planning and promoting the *Capitol Corridor*.[49] BART provides day-to-day management and administrative support to the CCJPA. The CCJPA is also supported by the two Metropolitan Planning Organizations in the *Capitol Corridor*: MTC and the SACOG.

Commuter Rail Service

Commuter rail serves local and regional transportation needs. The State's four existing commuter rail systems are owned, planned, and administered by local and regional transportation agencies. They are:

- COASTER. As part of an integrated public transit system in the North San Diego County region, NCTD operates COASTER commuter rail service along with the BREEZE bus system and the SPRINTER light rail line. The NCTD Board of Directors is comprised of one representative from each incorporated city in the District (Carlsbad, Del Mar, Encinitas, Escondido, Oceanside, Solana Beach, San Marcos, and Vista) plus one member from the San Diego County Board of Supervisors. Since 2002 with the passage of SB 1703, all planning, programming, development, and construction functions, are performed by SANDAG.
- Metrolink. Metrolink is governed by SCRRA, a JPA created in 1991 comprised of five county agencies throughout southern California: LACMTA, OCTA, RCTC, San Bernardino Associated Governments, and VCTC.[50] SCRRA is governed by an 11-member board composed of representatives from the five member agencies. Through an operating contract with SCRRA,

[48] The 13 counties along the San Joaquin route include Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Madera, Mariposa, Merced, Sacramento, San Joaquin, Stanislaus, and Tulare.

[49] The CCJPA Board consists of two representatives from each of the eight counties in the Capitol Corridor (Placer, Sacramento, Yolo, Solano, Contra Costa, San Francisco, Alameda and Santa Clara), represented by Placer County Transportation Planning Agency, Sacramento Regional Transit District, BART, SCVTA, Solano Transportation Authority, and the Yolo County Transportation District.

[50] Ex-officio member agencies include SCAG, SANDAG, and the State of California.

Amtrak supplies the train and engine crews that operate Metrolink trains.[51] SCRRA contracts with other companies for rail equipment maintenance, security, track and structure maintenance, and signal and communications maintenance.

- Caltrain. Caltrain commuter rail service is owned and operated by the PCJPB. Created through a joint powers agreement, the PCJPB is a partnership between SamTrans, SCVTA, and the City and County of San Francisco through the SFMTA. The nine-member board is the policy-making body for Caltrain and consists of three representatives from San Francisco, San Mateo, and Santa Clara counties. As the designated managing partner, SamTrans is responsible for contracting operations and maintaining and managing right-of-way and equipment. It is also responsible for recommending changes in fare structure, scheduling, and levels of service to the PCJPB, and preparing capital and operating budgets for presentation to the PCJPB.[52]
- Altamont Corridor Express (ACE). In June 2003, SJRRC, ACCMA, and SCVTA entered into a Cooperative Services Agreement that identified SJRRC as the owner, operator, and policy-making body of the ACE service and specified how the operations and capital projects for the ACE service would be funded by the three parties. The Cooperative Services Agreement dissolved the former ACE JPA created in May 1997 between the three member agencies. The SJRRC is governed by an eight-member Board of Directors appointed by SJCOG based on nominations by the local elected government.[53] As the owner/operator of the ACE service, SJRRC oversees the day-to-day management, planning, and support services necessary to operate the trains. SJRRC contracts operations and maintenance of the equipment.[54] An ACE Passenger Advisory Council, comprised of five experienced passengers, provides passenger feedback and input on ACE programs and services.

Federal Roles and Responsibilities

The FRA, the Federal Transit Administration (FTA), and the Surface Transportation Board (STB) each play a role in the State's passenger rail activities:

- Federal Railroad Administration: The FRA's passenger rail activities include administering federal grants for intercity passenger rail to Amtrak, states, and rail line operators through various grant programs (discussed in more detail in Chapter 10) and providing guidance and analysis of intercity passenger rail services and HSR. The FRA also plays a regulatory role in promoting safety on the nation's freight and intercity passenger rail network (described further in Section 5.4).
- Federal Transit Administration. The FTA provides financial and technical assistance to state and local commuter rail providers (as well as other local public transit modes). The FTA oversees grants to the transit providers (discussed in more detail in Chapter 10), ensuring that grant recipients are managing their programs in accordance with federal, statutory, and administrative requirements. Whereas, rolling stock is typically a state cost for intercity passenger rail service, the FTA can provide financial support to commuter railroads for rolling stock.

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[51] Metrolink, "History of Metrolink," http://www.metrolinktrains.com/agency/page/title/history, accessed June 8, 2012.

[52] PCJPB, October 1996, http://www.caltrain.com/Assets/Public/JPA_Agreement_and_Amendment_10-03-1996.pdf.

[53] SJRRC Commissioners represent San Joaquin County, the County of Alameda, the Cities of Stockton, Tracy, Lodi, Manteca, and Lathrop, and BART. Ex-officio members represent Caltrans District 10, San Joaquin Regional Transit District, and SJCOG.

[54] Altamont Commuter Express, "History of ACE," http://www.acerail.com/AboutUs/HistoryofACE.aspx, accessed June 8, 2012.

- Surface Transportation Board. For passenger rail, the STB serves as a mediator to resolve any disputes between Amtrak and the State related to the provision of state-supported intercity passenger rail service. The STB also can resolve disputes between Amtrak and a Class I railroad over provision of service. The STB is also empowered to investigate the causes of poor OTP or other service quality deficiencies of intercity passenger rail caused by the operator, host freight railroad, or managing entity. Where warranted, the STB may award damages to be paid by the host freight railroad to Amtrak or the service sponsor for use toward capital or operating expenditures to help achieve minimum performance standards on the route. The STB is also authorized to conduct nonbinding mediation related to commuter rail service in situations where a public transportation authority is unable to reach agreement with a rail carrier on trackage rights or other related services provided by the rail carrier.

Section 5.4 provides additional detail on the roles of federal agencies specifically related to safety and security of the passenger rail system.

5.4.2 Service Delivery

This section summarizes how passenger rail services are delivered, including the existing contractual arrangements for operations, equipment ownership, and maintenance. It also describes options for future operating relationships available under state and federal law.

Intercity Passenger Rail

Amtrak is solely responsible for operating and funding the long-distance routes that operate in California. The federal government provides operating subsidies for these routes, and Amtrak is responsible for securing capital funds for the routes. Amtrak owns and maintains all passenger rail equipment used on long-distance routes.

Caltrans and the CCJPA contract with Amtrak to operate the state-supported intercity passenger rail routes and maintain state-owned passenger rail equipment. Pursuant to the Rail Passenger Service Act of 1970 that formed Amtrak, Amtrak has a perpetual right to operate on all rail tracks in the U.S.

The State provides operating and capital funding for the three services (with the exception of the 30 percent of the *Pacific Surfliner* service considered part of Amtrak's national long-distance "basic service[55]") and owns all equipment in the northern California fleet (used by both the *San Joaquin* and *Capitol Corridor* routes). As described earlier for the *Pacific Surfliner* route, Amtrak owns all of the locomotives and 40 cars, while the State owns 10 cars. All equipment, whether owned by Amtrak or Caltrans, is maintained by Amtrak staff at the Amtrak-operated facility in Los Angeles and the Amtrak-Caltrans jointly owned facility in Oakland. Table 5.20 compares operating environments for state-supported routes.

Commuter Rail Service

For the State's four existing commuter rail services, this section summarizes right-of-way ownership and/or trackage rights agreements in place and identifies the designated contract operator, the equipment owner, and the entity responsible for equipment maintenance.

[55] Pursuant to PRIIA Section 209 decisions, as of the FFY 2014, Caltrans will be responsible for 100 percent of operating costs for the *Pacific Surfliner*.

Table 5.20: State-Supported Routes Operating Environment Comparison

	Pacific Surfliner	***San Joaquin***	***Capitol Corridor***
Route Length	351	365	168
Host Railroads	7	2	2
Commuter Rail Overlay	Segments shared with Metrolink and COASTER services	ACE transfer in Stockton	Shared with ACE and Caltrain into San Jose
Number of Tracks	Majority single track	Majority single track	Majority double track
Rolling Stock Ownership	Primarily Amtrak, some Caltrans	Caltrans	Caltrans
Ticket Sharing Arrangement	Rail2Rail agreement with Metrolink and COASTER; free transit transfer program; select ticket interlining between services	Free transfers to local transit	Free transfers to local transit
Cost Allocation	Modified fixed expenses, actual revenue	Modified fixed expenses, actual revenue	Modified fixed-price operating contract

Source: AECOM and Cambridge Systematics, 2012.

COASTER

COASTER service operates from Oceanside to San Diego via Carlsbad, Encinitas, and Solana Beach. NCTD owns the 41-mile portion of the LOSSAN rail corridor from the Orange/San Diego County border to the northern limits of the City of San Diego. The SDMTS owns the 22-mile portion of the corridor from the northern border of the city to downtown San Diego (Santa Fe Depot). Per agreement, the NCTD is responsible for maintaining both portions of the corridor and for dispatching trains operating on this line. TASI is the contract operator responsible for maintaining and operating the COASTER's seven locomotives and 28 bi-level passenger coaches, providing all on-board crews. The contract operator maintains COASTER rail equipment at the NCTD-owned Stuart Mesa Maintenance Facility on the Camp Pendleton Marine Corps Base.

Metrolink

The Metrolink system operates over rail rights-of-way owned by SCRRA member agencies, BNSF, UPRR and NCTD. SCRRA dispatches and maintains in excess of 60 percent of the territory over which it operates. On a daily basis, SCRRA currently dispatches 162 Metrolink trains,[56] up to 36 Amtrak intercity trains between Moorpark and Oceanside, and between 70 and 80 freight trains. Through a four-year contract beginning in 2010 (eligible for two potential three-year extensions), Amtrak supplies the train and engine crews to operate Metrolink service. Bombardier Transportation has performed rolling stock and equipment maintenance since 1998. Mass Electric Construction Company has provided communications and signal maintenance since Metrolink's formation in 1992, and provides back-office support for the operations center's dispatch system. Since 2009, Veolia Transportation Maintenance and Infrastructure

[56] Metrolink, "Metrolink Quarterly Fact Sheet," September 2011.

has provided track and structure inspection and maintenance, performing inspections of all main tracks twice a week to ensure compliance with FRA requirements.[57]

Caltrain

The PCJPB owns the rail right-of-way from San Francisco to San Jose (Tamien station), and has secured trackage rights to Gilroy through an agreement with UPRR that governs level of service on that segment. Caltrain operations are contracted to TASI through a five-year contract that began in SFY 2011-12. The major components of the contract include the daily staffing and operations of trains, as well as inspection and maintenance of tracks, the passenger rail vehicle fleet, right-of-way, the signal and communication network, stations, and other structures and facilities. Included in the operating contract is a clause that requires TransitAmerica to achieve certain performance standards related to management, safety, on-time performance, and other critical operations tasks to receive its full management fee.[58]

ACE

A trackage rights agreement between SJRRC and UPRR governs level of service and ACE payment requirements (about $1.5 million per year) for the rights to run passenger service on the tracks. ACE also uses about four miles of Caltrain track between Santa Clara and San Jose. As the owner and managing agency, SJRRC currently has a contract with Herzog Transit Services, Inc. for operations and maintenance of ACE equipment.

Future Options for Operating Relationships

This section describes alternative operating relationships possible under PRIIA that may impact California intercity passenger rail and commuter rail operations in the coming years.

PRIIA Section 209

Section 209 of PRIIA requires Amtrak to develop and implement a single, nationwide standardized methodology for establishing and allocating operating and capital costs associated with providing intercity passenger rail service on state-supported routes. Under a new nationally-applied cost allocation formula, required to go into effect in FFY 2013-14, the subsidy requirements for California's three state-supported intercity passenger rail routes may increase considerably. PRIIA requires that states pay the proportional share of costs associated with a state-supported route. In addition to taking on certain capital costs for Amtrak-owned equipment and facilities—such as the capital costs of the Amtrak-owned rolling stock used on the *Pacific Surfliner* route—will be charged to Caltrans as part of the annual operating cost of service. Final costs for state-supported services will be determined through contract negotiations between each state and Amtrak. At this time, the State pays 100 percent of the operating costs for the *San Joaquin* and *Capitol Corridor* routes and 70 percent of the operating costs for the *Pacific Surfliner* route (Amtrak pays the remaining 30 percent). As a result, under Section 209, the cost structure will change more for the *Pacific Surfliner* route, than it will for the other two routes. In addition, almost all of the equipment on the *San Joaquin* and *Capitol Corridor* routes is owned by the State, so additional capital equipment charges will not be incurred.

PRIIA Section 305

As required by Section 305 of PRIIA, a Next Generation Corridor Equipment Pool Committee developed a standardized specification for high-performance diesel locomotives and bi-level and single-level passenger rail cars. Caltrans received two grants totaling $168 million from the FRA (matched by $42 million of state funds) to make California among the first states to procure the nation's first

[57] Metrolink, "Metrolink…Southern California's Commuter of Choice – 'Big Four' Service Providers," April 2011.

[58] Caltrain, "Caltrain Board Approves TransitAmerica to Run Train System," September 1, 2011, http://www.caltrain.com/Page1156.aspx.

standardized bi-level rail cars.[59] The rail rolling stock acquisition consists of six diesel-electric locomotives and 42 bi-level passenger rail cars for use on three state-supported intercity rail passenger routes – the *Pacific Surfliner*, *San Joaquin,* and *Capitol Corridor*. Caltrans is the lead agency in the joint procurement of 130 bi-level cars to be used by California and Illinois, Michigan and Missouri. On November 19, 2012 Sumitomo Corporation of America with their car-builder subcontractor Nippon Sharyo was awarded the $352 million contract from Caltrans. Caltrans is purchasing 42 of the 130 cars, which will be delivered to California starting in 2015. The equipment purchased will increase capacity on the state-supported intercity rail corridors.

Enhanced Private Sector Involvement

PRIIA also addresses opportunities to increase private sector participation in operating and improving intercity passenger rail services. Under current law, the Rail Passenger Service Act of 1970 provides Amtrak with unique rights, including access to any rail line in the national rail network and use of host railroad facilities. It also allows for payments based on incremental costs (a fraction of host railroad charges for non-Amtrak passenger service which include host profit and other fees), and Amtrak priority over freight transportation (for both intercity and commuter rail service). At present, non-Amtrak operators do not benefit from the same rights and must work out agreements with the freight railroads individually. However, an Alternative Passenger Rail Service Pilot Program outlined in PRIIA Section 214 would allow rail carriers that own infrastructure over which Amtrak operates intercity passenger service to petition to be considered as a passenger rail service provider over the route in lieu of Amtrak for a period not to exceed five years. Pending a rulemaking decision by the FRA, the program remains vague and requires provisions for Amtrak employees adversely affected by the cessation of existing service in situations where a rail carrier takes over a route in lieu of Amtrak. However, the pilot program, if implemented, could expand competition for passenger rail services and give states a greater role in passenger rail decision-making.

5.4.3 Trends and Approaches

Approaches to administering rail programs are as varied as the programs themselves. In most cases, but not all, some form of responsibility is assumed within a state DOT, but the delivery of rail programs may be shared by various divisions within the DOT or by completely separate entities. Governance of rail programs can best be categorized by the responsible party, be it a state agency, transit agency, JPA, or commissions-either independent or housed within the DOT.

State Agency as Administrator

As noted, Caltrans serves as administrator for both the *Pacific Surfliner* and *San Joaquin*, overseeing Amtrak contracts while Amtrak operates all trains. Caltrans funds 70 percent of the operating deficit of the *Pacific Surfliner* with Amtrak funding the remaining 30 percent operating deficit[60] (operational costs minus farebox revenue). Additionally, Caltrans funds 100 percent of the operating deficit for both the *San Joaquin* and *Capitol Corridor*, and also pays for the majority of capital improvements to these services. Caltrans is responsible for oversight of services through its operating contract with Amtrak. The State owns most equipment used on the *San Joaquin* and *Capitol Corridor* while Amtrak maintains it. For the *Pacific Surfliner*, Amtrak owns all locomotives and a majority of the cars, and the State owns 10 cars. Amtrak maintains all equipment.

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[59] National Institute of Standards and Technology. Railcar Procurement Project Request for Information. January 2012.

[60] Pursuant to PRIIA Section 209 decisions, as of the FFY 2013, Caltrans will be responsible for 100 percent of operating costs for the *Pacific Surfliner*.

This institutional approach demonstrates significant state involvement in planning, finance, and operations and maintenance functions related to passenger rail service. While Caltrans presently provides oversight of services through an operating contract with Amtrak, they do not run operations. Caltrans serves primarily a financial and advisory role, while also owning rolling stock and some facilities.

Joint Powers Authorities

The CCJPA is responsible for the administration and management of the *Capitol Corridor*. The state funded, planned, and administered this route until July 1998, when the CCJPA assumed administrative responsibilities. The CCJPA has responsibility for the management of the route, while the State continues to fund the service operation and many capital projects. Amtrak operates the trains, but the CCJPA is responsible for the oversight of the corridor service through its operating contract with Amtrak. The CCJPA coordinates functions with Amtrak, such as marketing, scheduling, and on-board services. The State owns all equipment, while Amtrak maintains it and the CCJPA oversees Amtrak's maintenance work.

In addition to the CCJPA, Caltrain and Metrolink are also governed by separate JPAs. In 1991, the SCRRA was created to plan, design, construct, and administer the operation of regional passenger rail service, now called Metrolink. The SCRRA consists of five member agencies and three ex-officio member agencies with a board of 11 members. The SCRRA is an example of a JPA in which some assets are owned collectively, while the trackage in each county is owned separately.

The PCJPB assumed management of Caltrain from the State in 1992. The PCJPB currently includes nine members, three representatives from San Francisco, San Mateo, and Santa Clara counties. Similarly, this is an example of a JPA in which all assets are owned collectively.

SB 1225 (Padilla 2012) authorized the creation of a JPA for the management of the *Pacific Surfliner* route, and AB 1779 (Galgiani 2012) authorized the creation of a JPA for the management of the *San Joaquin* route. If a JPA is created, and state law authorizes the Secretary of the BTH to enter into an interagency transfer agreement transferring certain responsibilities for intercity passenger rail planning and operations to the JPA. At this time, the LOSSAN and San Joaquin JPAs have been formed. The San Joaquin JPA is required to protect existing services and facilities seeking to expand service as warranted by ridership and available revenue. Caltrans will continue to provide the funding necessary for service operations, administration, and marketing. Caltrans DOR will remain responsible for the development of the state rail plan and the coordination between the three state-supported intercity passenger rail services.

State law provides that Caltrans, with approval of the Secretary of the BTH, can enter into an interagency transfer agreement between June 30, 2014 and June 30, 2015.

Independent Authorities

Enacted by Chapter 796, Statutes of 1996 (SB 1420 (Kopp and Costa 1996)), the Authority was created as an independent body, "to direct the development and implementation of intercity HSR service that is fully integrated with the State's existing intercity rail and bus network, consisting of interlinked conventional and HSR lines and associated feeder buses." AB 1703 (Florez 2000) modified the Authority's exclusive authorization and responsibility for planning, construction, and operation of high-speed passenger service to cover speeds exceeding 125 mph. This also extended the tenure of the Authority through 2003. In 2002, the sunset date for the Authority was repealed making it a permanent authority. The Authority's Board of Directors is composed of nine members, with the governor appointing five, the Senate Committee on Rules appointing two, and the Speaker of the Assembly appointing two. In 2000, the Authority completed its business plan, entitled *Building a High-Speed Train System for California*, and in 2005, certified the Final Environmental Impact Report/Environmental Impact Study, which identified a (HSR) system and preferred system alternative.

In 2008, California voters approved Proposition 1A, also known as the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century. It is now Chapter 20 of the Streets and Highways Code. The bond act allocates $9 billion to the Authority to be used towards the planning and construction of a HSR system from San Francisco to the Los Angeles basin in under three hours at speeds capable of over 200 mph; and $950 million to the California Transportation Commission (CTC) to be spent on improvements to urban, commuter, and intercity rail systems that connect to the HSR system. In 2012, the Authority released the *California High-Speed Rail Program Revised 2012 Business Plan* (2012 Business Plan). The 2012 Business Plan estimates that the HSR system will cost $68.4 billion and outlines the Initial Operating Section as a 300-mile stretch connecting Merced to the San Fernando Valley, filling the north-south passenger rail gap. It also provides a summary of each phased implementation section, as discussed in later chapters, including cumulative cost and service start dates.

The 2012 Government Reorganization Plan, proposed by the governor and approved by the California State Legislature, will place the Authority within the new Transportation Agency. The reorganization is effective July 1, 2013.

Private Sector Involvement in Passenger Rail

Public agencies have long engaged private railroad companies to provide passenger rail services, particularly for commuter rail services. BNSF and UPRR continue to be responsible for operation of two commuter rail lines in the Chicago area for Metra. Some commuter rail operators have exchanged Amtrak operating contracts for private operators (Virginia Railway Express and MARC) and some have returned to Amtrak (Metrolink). North Carolina DOT contracts with a private firm for intercity passenger rail equipment maintenance. In California, Caltrain and COASTER are examples of exchanging contracts with Amtrak and private operators.

There are also private railroads proposing intercity passenger rail services. Iowa Pacific Holdings operates the Saratoga and North Creek Railway, which offers daily intercity passenger rail service in New York and weekend and special purpose tourist rail operations. The company also operates tourist railroads such as the Santa Cruz and Monterey Bay Railway. Florida East Coast Industries has formed a subsidiary, All Aboard Florida, to pursue intercity passenger rail operations from Jacksonville to southern Florida with proposed connections to Orlando. Chapter 8 of the CSRP also has information on a proposed private HSR operation between southern California and Las Vegas.

The Authority is evaluating private sector involvement in HSR services through public-private concession arrangements for operations and maintenance and financing. The 2012 Business Plan outlines the involvement of the private sector in constructing, operating and financing the early phases of implementation. The Authority had issued a Request for Expressions of Interest (RFEI) and received more than 1,100 responses. The responses identified the capability and interest of private entities related to development, financing, operations, project scale, risk appetite, and other factors. Following up on recent questions posed by stakeholders, the Authority reevaluated private-sector interest in early 2012 by interviewing a number of the respondents that indicated interest in investing in the project and through one-on-one interviews with firms that responded to the Request for Qualifications. Responses from the RFEI and recent discussions with interested companies confirmed the private sector's interest in the project and the conditions and timing required to attract significant private sector investment.

Examples in Other States

Strong State Authority

While California is home to a variety of institutional frameworks, other structures exist throughout the country with different considerations and roles for the State. For example, state Departments of Transportation (DOT) may operate commuter and intercity rail as an in-house or contracted out operations. This is essentially what is done by New Jersey Transit and New Mexico DOT's Rail Runner commuter rail service. This administrative structure gives strong control to the DOT or state agency in question.

North Carolina DOT provides an example an institutional framework by which all rail planning and administration for intercity passenger rail is done at the state level. The Rail Division in the Transportation Program and Asset Management Business Unit of North Carolina DOT is the agency responsible for passenger rail planning in North Carolina. The state has been making direct capital and operating investments in rail service since it began supporting Amtrak service in 1990. The Rail Division manages the following types of projects: rehabilitation and upgrading of existing rail infrastructure, design and installation of new rail infrastructure, design and construction of new railroad bridges and other structures. It also manages signal system installation, crossing signals and warning devices, grade separations, station construction and renovations, equipment procurement and rehabilitation, rail equipment maintenance, and rail service operations. Division programs and projects are monitored and reviewed by North Carolina DOT management (Deputy Secretary for Transit), the Board of Transportation (providing regular oversight and reviews projects and programs with the assistance of the Board's Multimodal Committee), and House and Senate Transportation and Appropriations Committees.

North Carolina DOT has a contractual agreement with Amtrak to subsidize the operations of the *Carolinian* and *Piedmont* service. North Carolina DOT is responsible for covering all of the losses incurred in the operation of these services. North Carolina DOT makes payments to Amtrak one month in advance, and quarterly adjustments are made to reflect actual revenue and fuel costs. As part of the agreement, North Carolina DOT owns and maintains the rail equipment used to operate the *Piedmont* service between Charlotte and Raleigh. North Carolina DOT has a fleet of refurbished passenger coaches and locomotives, which it stores and maintains in Capital Yard in Raleigh. As part of this arrangement, North Carolina has created the Piedmont Operations and Safety Committee, which is chaired by North Carolina DOT and includes representatives from Norfolk Southern, CSX, North Carolina Railroad Company, Amtrak, and Herzog.

Additionally, North Carolina DOT contracts with Herzog Transit Services to provide the regular maintenance functions for the rail equipment at a state-owned facility. North Carolina DOT employs a Rail Operations Manager who is responsible for overseeing the equipment maintenance functions performed by the contractor.

Regional Authorities

Establishment of a regional authority responsible for intercity passenger rail service administration can be seen with Amtrak's *Downeaster* route in New England. The *Downeaster* route began operations in Maine in December 2002. From its inception, the State of Maine provided operational funding for the route through federal CMAQ funds. A special purpose bi-state authority was created that is responsible for capital improvements, rolling stock, and railroad while also dealing with marketing, development, and coordination with local communities. This Northern New England Passenger Rail Authority (NNEPRA) was created by the Maine Legislature in 1995 to develop and provide passenger rail service between Maine and Boston and points within Maine. NNEPRA holds a 20-year contract with Amtrak for the operation of passenger rail service and receives an annual allocation of federal and state funds for operating costs and marketing expenses for the *Downeaster*.

A six-person NNEPRA staff supports a seven-member Board of Directors, appointed by the Governor, to develop the *Downeaster's* operating strategies, service planning activities, marketing programs, community relations, and food service. NNEPRA collaborates with the Maine DOT to achieve the objectives outlined in its comprehensive passenger transportation plan.[61] There is no formal allocation of planning responsibilities between the Maine DOT and NNEPRA. Instead, the two organizations work

[61] http://www.amtrakdowneaster.com/about-nnepra/board-of-directors.

together on all passenger rail planning projects, divvying up responsibilities and leadership on a project-by-project basis.[62]

NNEPRA is a third party to the operating agreement between Pan Am Railways and Amtrak for the provision of passenger rail service on the 78 miles of Pan Am mainline, and reimburses Amtrak for incremental maintenance costs and on-time performance incentives paid to Pan Am as attributed to the *Downeaster* service. NNEPRA holds a separate agreement with Pan Am to provide approximately $425,000 annually for capital maintenance projects agreed to benefit both passenger and freight operations. All of these costs are reflected in NNEPRA's annual operating budget.[63]

Transit-Led Agency Structures

Another possible structure is focused upon a lead role for a transit agency or regional authority, or led by a commission internal to the DOT. Examples of transit agency led structures for commuter rail include New York Metropolitan Transportation Authority's Long Island Railroad and MetroNorth Railroad, Southeast Pennsylvania Transportation Authority, and Massachusetts Bay Transportation Authority.

5.5 Safety and Security

5.5.1 Issues and Mandates

Protecting the safety and security of the passenger rail system is key to attracting and retaining ridership and ensuring efficient operation throughout the State. Passenger rail safety issues that result in injuries and fatalities are most commonly associated with grade crossings, trespassing on railroad property, and poor pedestrian conditions. Projects that improve safety include track and signal upgrades, gate and warning system activation, and grade separations that eliminate at-grade crossings of rail lines and roadways. In addition, safety can be improved through use of public awareness campaigns designed to educate the public about the risks of trespassing on railroad property and the importance of using caution around railroad tracks and trains. This section identifies the federal and state agencies with jurisdiction over passenger rail safety and security in California, and describes current mandates to improve the safety of the State's passenger rail system. Additional discussion of institutional relationships and safety regulations specific to freight rail safety and security is in Chapter 6.

Passenger Rail Safety Agencies

Passenger rail safety is regulated through a combination of federal and state authorities. Federal safety agencies include:

- FRA. The FRA's Office of Railroad Safety is the primary regulatory body responsible for promoting and regulating rail safety across the country. The Office executes its responsibilities by conducting safety inspections, collecting and analyzing rail-related accident/incident data, and enforcing existing safety laws and regulations. A Passenger Rail Division within the Office of Safety was established in 2009, charged with developing passenger rail-specific safety programs and initiatives. It coordinates and maintains FRA safety policies, regulations, and guidance for all safety matters related to commuter rail, intercity rail, and HSR.
- Transportation Security Administration (TSA). The TSA, housed within the Department of Homeland Security (DHS) and in cooperation with the U.S. DOT, is responsible for strengthening the security of the nation's transportation systems while ensuring the freedom of movement for people and commerce. As a result of the increased national attention to transportation security following the September 11, 2001 terrorist attacks, the Implementing Recommendations of the

[62] Nate Moulton, Rail Program Director, Maine Department of Transportation, November 16, 2010.

[63] Northern New England Passenger Rail Authority, FRA Grant Application, June 30, 2008.

9/11 Commission Act of 2007 established requirements for conducting a nationwide risk assessment of a terrorist attack on railroad carriers and the identification of risks to passenger and cargo security. The Act also required the TSA, in coordination with the U.S. DOT and other federal agencies, to develop a national strategy for railroad transportation security. TSA activities in passenger rail involve working with Amtrak and commuter rail operators on station security and in infrastructure protection with infrastructure owners (public and private), coordinated through the Mass Transit and Passenger Rail section of the Surface Transportation Division. Security discussions between the TSA, the Authority and the FRA to identify security considerations in system design and operations for California's HSR system will be conducted in parallel with FRA's development of safety regulations specific to the Authority proposed HSR operations.

- National Transportation Safety Board (NTSB). The NTSB is an independent agency responsible for investigating the cause of transportation accidents (all modes) and promoting transportation safety. With respect to rail, it is charged with investigating all railroad accidents involving passenger trains or any accident that results in at least one fatality or major property damage. While the NTSB can make recommendations aimed at preventing future accidents, it has no funding or regulatory enforcement authority.

In coordination with the federal agencies, several state agencies are responsible for overseeing the safety of California passenger rail operations:

- CPUC. The CPUC has regulatory and safety oversight over intercity passenger railroads (both high speed and conventional speed), commuter railroads, rail transit systems (both light and heavy), freight railroads, and all highway-rail crossings in the State. The agency coordinates with the FRA to ensure that railroads comply with federal railroad safety regulations. In addition, among other duties, the CPUC conducts design safety reviews of crossing projects, makes recommendations for mitigation measures, investigates railroad accidents, and responds to safety-related inquiries made by community officials, the general public, and railroad labor organizations. The CPUC also serves as California's State Safety Oversight Program administrative agency, providing oversight of transit operators' safety and security programs, as required by the FTA.
- Caltrans DOR. One of Caltrans' five strategic goals is to "provide the safest transportation system in the nation for users and workers." To support this goal, Caltrans DOR is responsible for monitoring Amtrak operating and maintenance contracts for Amtrak compliance with all safety regulations, inspecting rail equipment, facilities, and personnel. The DOR also carries out improvement projects for the federal Section 130 Crossing Improvement Program and the state Section 190 Grade Separation Program (discussed in more detail later in this section) to improve and construct rail/vehicle crossings for increased safety. In addition, the DOR coordinates its public education and awareness programs with the California affiliate of Operation Lifesaver, a national rail safety coalition to prevent collisions, injuries, and fatalities on and around railroad tracks and highway-rail grade crossings.[64]
- California Emergency Management Agency (Cal EMA). Established as part of the governor's office in 2009, Cal EMA is responsible for preparedness and response coordination to natural and manmade disasters. As part of its responsibilities, Cal EMA administers the California Transit Security Grant Program (described in more detail later in this section) for the State's intercity passenger rail and commuter rail systems.

[64] Operation Lifesaver, http://oli.org.

Rail Safety Improvement Act of 2008, Safety Mandates

The Rail Safety Improvement Act of 2008 (RSIA) was signed into federal law on October 16, 2008 in response to the collision of a Metrolink passenger train and a UPRR freight train the month prior.

RSIA, and the corresponding regulations issued by the FRA, mandate the installation of Positive Train Control (PTC) technology on all lines that carry regularly scheduled intercity or commuter rail passengers by December 2015. PTC is a predictive collision avoidance technology designed to prevent train to train collisions, over speed derailments, incursions into work zones, and movement of trains through a switch left in the wrong position. Using GPS technology, PTC is designed to improve the safe operation of passenger and freight railroads. Under the current federal mandate, all passenger rail service on a given corridor will have to cease operations if a PTC system is not installed prior to the 2015 deadline. RSIA and FRA regulations require railroads to submit a specified plan to the FRA on the status of their PTC implementation. In the first plan submittal required in April 2010, the railroads filed PTC Implementation Plans that provided information about the extent to which they will implement PTC and provided a timeframe for such implementation. Within California, Caltrans and Amtrak are installing PTC on all rail equipment used in the three state-supported routes.

RSIA also directed the FRA, as defined under Section 202, to identify the 10 states that have had the most highway-rail grade crossing collisions, on average, during 2006, 2007, and 2008. These states, of which California is one, are required to prepare and submit a highway-rail grade crossing safety action plan that:

- Identifies specific solutions for improving safety at crossings, including highway-rail grade crossing closures or grade separations.
- Focuses on crossings that have experienced multiple accidents or are at high risk for such accidents.
- Covers a five-year time period.

The safety action plans were to be submitted to the FRA by August 27, 2011. The CPUC has submitted an action plan to the FRA, which identifies a number of areas in which grade crossing initiatives are focused on passenger rail. The CPUC continues to work with the Authority to identify safety improvements along corridors to be shared by HSR vehicles without grade separations. The CPUC works with Caltrain and Metrolink to help implement pedestrian safety improvements at grade crossings along commuter rail routes. The CPUC also has jurisdiction over at-grade rail crossings on rail transit lines. Major objectives of the action plan include a comprehensive rail crossing inventory database, updating crossing inventory information, and improving the data-driven, risk-based project selection methodologies for Section 130 and other grade crossing safety funding programs. These objectives will affect grade crossings along intercity passenger rail routes and along rail transit lines, as well as all other freight rail lines throughout the State.

California Public Utilities Commission

In addition to the federal mandates, California has several state statutory mandates that affect rail safety. The Public Utilities Code requires the CPUC to conduct focused inspections and regular inspections of all railroad and light rail transit operations in the State.[65] The Public Utilities Code also requires the CPUC to conduct investigations of all rail accidents occurring within the State resulting in loss of life or injury to person or property.[66] These investigations are conducted alongside the NTSB.

[65] California Public Utilities Code, Sections 309.7, 421, 765.5, 778, 7711, 29047, 30646, 99152, and 100168.

[66] California Public Utilities Code, Section 315.

The California Local Community Rail Security Act of 2006 requires every operator of rail facilities in the State to submit a risk assessment to the CPUC and Cal EMA that identifies potential hazards and emergency response procedures. The Act also requires rail operators to develop and implement an infrastructure protection program, updated annually, to protect their rail facilities from acts of sabotage, terrorism, or other crimes.[67]

5.5.2 Crash Statistics

This section describes incidents and trends involving passenger rail, including highway-rail grade crossing incidents on commuter and intercity passenger rail routes. California is home to a disproportionate amount of accidents and passenger rail-related fatalities. For the time period between 2002 and 2011, total passenger accidents/incidents comprised over eight percent of the nation's total. Additionally, California is home to over 25 percent of total passenger rail-related fatalities over this same time. Efforts by the CPUC, including development of a Rail Safety Action Plan, have aimed to reduce the number or accidents, injuries, and fatalities throughout the State. However, the number of accidents and fatalities has declined only slightly over the past 10 years, with injuries actually rising from 284 in 2002 to 357 in 2011. Passenger-related accidents are down three percent since 2002, and fatalities are down four percent. While California experienced a marginal decline in accidents, nationwide accidents actually increased by over 13 percent.

Table 5.21 and Exhibit 5.15 show the passenger rail-related accidents and incidents that took place in California and the nation as a whole. Note the proportion of total highway-rail accidents that took place in California relative to the rest of the nation. The annual number of accidents that occurred at California crossings as a percent of the national total has not been below 16 percent over the last 10 years,[68] despite the fact that only five percent (7,924 of the 171,043 public crossings nationwide) are located in the State. In an effort to reduce hazards at crossings, the CPUC administers a number of programs, described in the following section.

Over the past 10 years, Amtrak accidents/incidents have accounted for approximately two-thirds of accidents occurring on passenger rail in California. Annual accidents on Amtrak have been relatively consistent from 2002 to 2011, with highway-rail incidents actually increasing from 22 to 28 percent of total incidents over that time period.

5.5.3 Safety and Security Programs and Projects

There are a variety of federal and state programs that improve the safety of passenger rail routes by providing resources for grade crossing protection and grade separations. In this section, federal safety and security programs related to passenger rail are described first, followed by state programs. Additional discussion of freight rail safety and security programs is included in Chapter 6 and Chapter 10, as is information on rail funding programs.

Federal Section 130 Crossing Improvement Program

The federal Section 130 Program (Title 23, United States Code, Section 130) provides federal funds to state and local governments and railroads to eliminate hazards at existing highway-rail grade crossings. The purpose of the Section 130 Program is to reduce the number, severity, and potential hazards to motorists, bicyclists, and pedestrians at public crossings. The Section 130 program is a cooperative effort between the Federal Highway Administration, Caltrans, the CPUC, railroad companies, and local agencies.

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67 California Public Utilities Code, Section 7665.

68 FRA Office of Safety Analysis.

Table 5.21: Average Annual Passenger Rail Accidents/Incidents, 2002 to 2011

Description	U.S.	California	California as a Percent of U.S. Total
Train Accidents (Includes collisions, derailments, and other accidents)	205	13	6%
Fatalities	6	4	67%
Injuries	174	21	12%
Highway-Rail Incidents	242	53	22%
Fatalities	72	18	25%
Injuries	178	37	21%
Other Incidents	3,438	254	7%
Fatalities	127	32	25%
Injuries	3,375	228	7%
Total Accidents/Incidents	3,885	319	8%
Total Fatalities	205	54	26%
Total Injuries	3,727	286	8%

Source: FRA Office of Safety Analysis.

Note: Passenger Rail is the sum of Commuter and Amtrak as well as Tourist, Excursion, and Historical railroads data.

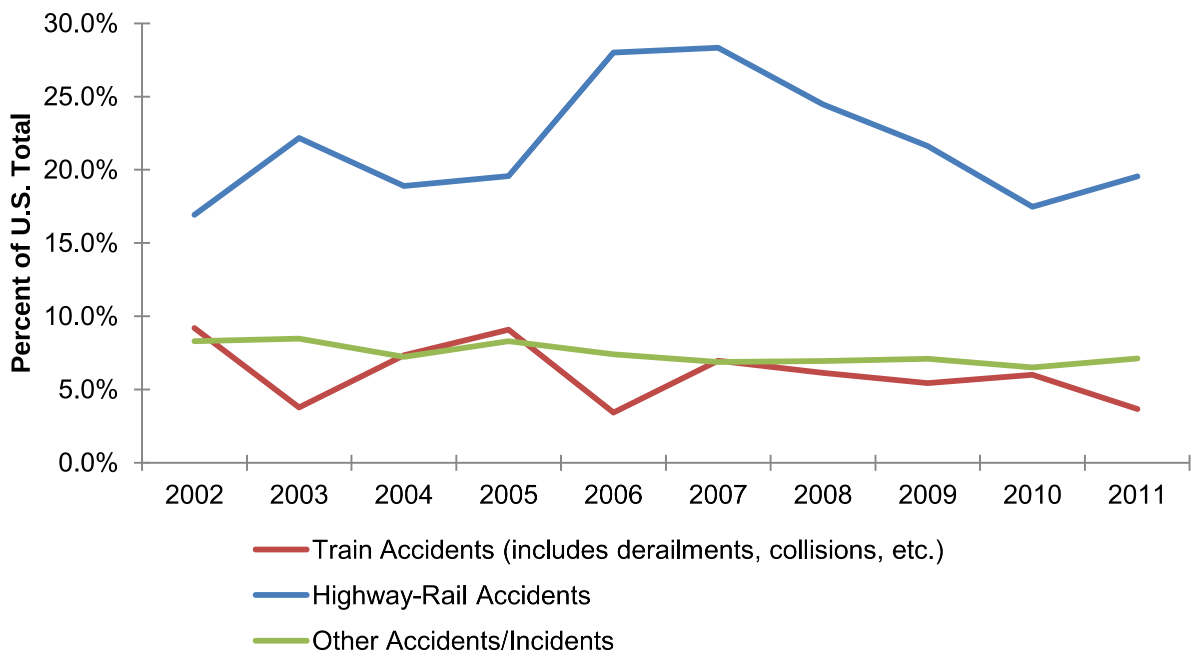

Exhibit 5.15: California Passenger Rail Accidents as a Percent of the National Total

Source: FRA, Office of Safety Analysis.

As the agency with jurisdiction over highway-rail crossings in the State, the CPUC identifies and prioritizes grade crossings for inclusion in the statewide funding list. Crossings are selected and prioritized based on their hazard potential as determined by the FRA's Web Accident Prediction System and crossing accident history and trends. Hazard potential is also determined using the CPUC's crossing database and input from CPUC staff, Caltrans, local agencies, and railroads. The CPUC provides an updated priority list of projects to Caltrans annually.[69] Caltrans is then responsible for programming the projects into the Federal Transportation Improvement Program, obligating the Section 130 funds, and developing and executing contracts with the railroad and/or local agency.

California receives approximately $15 million of Section 130 funds annually.[70] The federal share may amount to 100 percent for projects consisting of signing, pavement markings, active warning devices, the elimination of hazards, and crossing closures.[71]

Federal Section 1103(f) Railway-Highway Crossing Hazard Elimination in HSR Corridors Program

Section 1103(f) of SAFETEA-LU authorizes funding from the Surface Transportation Program for "Railway-Highway Crossing Hazard Elimination in High-Speed Rail Corridors." Congress has designated California's state-supported intercity passenger rail routes as one of the 11 HSR corridors nationwide eligible to compete for the discretionary Section 1103(f) grant funding. Congress previously authorized $15 million in funding per year for FFY 2009, 2010, and 2011, and has appropriated $7.1 million to date for FFY 2012.[72] These funds are available for grade crossing safety improvements located along the 11 federally-designated HSR corridors. While California did not receive any Section 1103(f) funding in FFY 2011, Caltrans received two grants for FFY 2012. Since FFY 1992 and 1993, Caltrans has received $9.5 million in federal funds from the program.

State Section 190 Grade Separation Program

The Section 190 Grade Separation Program is a state-funded safety program to eliminate at-grade railroad crossings. The program requires the State's annual budget to include $15 million for funding qualified grade crossing projects. Projects funded under this program include the alteration or reconstruction of existing separations or the construction of new grade separations to eliminate grade crossings.

The CPUC has jurisdiction over highway-rail crossings in the State and is responsible for developing a priority list of grade crossing projects every two years. CPUC solicits project nominations from local agencies, railroad companies, and Caltrans to identify potential projects. It then applies a formula that weights vehicular and train volumes at the crossing along with project costs, accident history, crossing geometrics, traffic delay, and other relevant factors to prioritize the list of projects. The current priority list for FFY 2011-2012 was adopted by the CPUC in June 2011.

Once the CPUC has established the prioritized list of grade separation projects, Caltrans is responsible for administering the $15 million annual program. While Caltrans distributes the available funding according to the priority ranking established by the CPUC (up to a yearly cap of $5 million per project), projects must also meet the following requirements to secure an allocation from Caltrans:

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[69] California Public Utilities Commission, CPUC Guidelines for the Federal Aid At-Grade Highway-Rail Crossing Program (Section 130 Program), November 2006.

[70] Caltrans Transportation Funding Opportunities Guidebook, *State and Federal Funds Available for Local Agency Projects*, August 25, 2008.

[71] Federal Railroad Administration, Highway-Rail Crossing Program. http://www.fra.dot.gov/rrs/pages/fp_86.shtml.

[72] Federal Railroad Administration, "Railway-Highway Crossing Hazard Elimination in High-Speed Rail Corridors."

- Application for funding must be sent to Caltrans by April 1.
- Authority to construct the project must be obtained from the CPUC.
- Environmental review documents must be complete.
- Construction, maintenance, railroad contribution, and any other necessary agreements with the railroads must be signed.
- Final construction plans must be complete.
- The remainder of the project cost must be procured.[73]

The State contribution for any project is limited to 80 percent of the estimated cost (capped at $5 million per year) and cumulative allocations may not exceed $20 million to any one project over a five-year period. If a project only receives a partial allocation because of limited funding, it will be automatically eligible for the balance of its funding in the following fiscal year. Projects that do not receive an allocation within the two-year life of the CPUC priority list must be renominated in order to remain eligible.

State Automatic Grade Crossing Warning Device Maintenance Fund

Railroads are responsible for maintaining automatic grade crossing warning devices. However, crossing agreements between railroads and local roadway authorities typically require the sharing of maintenance costs. The Automatic Grade Crossing Warning Device Maintenance Fund was established by the California State Legislature in 1965 to pay the local government's share of the costs of maintaining highway-rail crossing automatic warning devices. Where crossing agreements exist, the railroads perform the required maintenance during a given calendar year, and then file a claim with the CPUC for reimbursement of the local government's share of the maintenance costs.

State code requires Caltrans to set aside in its annual budget a minimum allocation of $1 million into the Automatic Grade Crossing Maintenance Fund for allocation to CPUC. Since 2007, however, the CTC has allocated $2 million annually to the Maintenance Fund in an attempt to narrow the gap between total claims and available funding. However, program claims continue to exceed fund allocations, as shown in Table 5.22.[74]

Table 5.22: Claims and Payments for the Grade Crossing Protection Maintenance Fund

Fiscal Year	Number of Crossings	Total Claims (Millions of Dollars)	Total Paid (Millions of Dollars)
2005-06	2,797	$4.09	$1.0
2006-07	2,788	$3.90	$1.0
2007-08	2,754	$3.85	$2.0
2008-09	2,702	$3.81	$2.0
2009-10	2,702	$3.83	$2.0

Source: CPUC, Grade Crossing Maintenance Fund Program, November 2010.

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[73] CPUC, Rail Crossings Engineering Section, "Grade Separation Program Overview," April 2011.

[74] CPUC, Rail Crossing Engineering Section, *Grade Crossing Maintenance Fund Program*, November 2010.

6.0 Existing Freight Rail System

Chapter 6 describes California's freight rail network. The chapter begins with an inventory of rail operators and their facilities and then describes of how the rail network functions for freight shipments and how freight rail demand is expected to change over time. Additionally, the chapter discusses rail capacity issues and provides an overview of the roles of federal, state, and local governments in the freight rail industry and regulations that impact freight rail operations in California.

6.1 Freight Rail Inventory

This section provides an overview of the rail companies that operate in California. Their essential physical characteristics are described, including intermodal terminals, tonnage volumes, train volumes, and signal systems. Given the importance of intermodal service to California's economy, brief descriptions of each of the on-dock, off-dock, near dock and inland facilities are provided. Finally, the section reviews some of the changes that have been made to the freight rail network through regulatory abandonment filings.

6.1.1 Railroad Companies

California's freight railroad system consists of two Class I railroads and 29 short line railroads. This freight rail network supports the operations of industries throughout the State and links California with domestic and international markets. California's rail network moved 176 million tons of commodities in 2007, of which 99.3 million originated in the State and 58.3 million terminated in the State. According to the Association of American Railroads (AAR), California ranked eighth among states in terms of rail tons originated in 2010.

For purposes of classification, railroads are typically divided into three groups (classes).[75] Using the 2010 definitions as the basis, the three railroad classes are as follows:

1. Class I. Class I railroads generate more than $399 million in annual operating revenues. BNSF Railway Company (BNSF) and Union Pacific Railroad (UPRR) are the only Class I railroads in California. These two Class I railroads handle a majority of the State's freight rail traffic and own and operate most of the track mileage (79 percent) in California (shown in Exhibit 6.1).
2. Class II. Class II railroads, commonly referred to as regional railroads by the AAR, generate between $31.9 million and $399 million in annual operating revenues. At present, there are no Class II railroads operating in California.
3. Class III. Class III railroads, commonly called "short line" railroads, generate less than $31.9 million in annual operating revenues and engage in line-haul movement. This category also includes all switching and terminal railroads—regardless of their operational or revenue characteristics—that engage primarily in switching services for other railroads. There are 26 active short line railroads in California (shown in Exhibit 6.2). These include two firms whose primary business is operating passenger trains.

75 Railroads are typically classified by size and geographic reach. Classifications are developed by the Surface Transportation Board (STB) based on operating revenue and are important not only for identifying the railroad's significance, but also for financial and statistical reporting.

Exhibit 6.1: California Class I Rail System, 2012

Sources: California Department of Transportation (Caltrans), 2013 and Esri, 2012.

Note: Map indicates rail lines over which Class I railroads operate and the underlying track owner, which includes public agencies. Exhibits 6.3 and 6.4 show where each Class I railroad operates, including trackage rights.

Exhibit 6.2: California Regional and Short Line Rail System, 2012

Sources: Caltrans, 2013 and Esri, 2012.

Note: Rail lines with less than 10 miles of track in operation are not shown on this map.

Ownership structure is another means of classifying railroads. Ownership takes on many different forms, all of which are represented by one or more California railroads. The five most common ownership models are as follows:

- Class I Parent(s). Typically a switching or terminal railroad that is owned by one or more Class I railroads. For example, BNSF and UPRR jointly own the Oakland Terminal Railway Company and the Central California Traction Company.
- Industry. Usually operated for one industry, but can provide service to other unrelated firms. The most common owners have been mineral, steel, and forest products companies. California is home to several industry-owned railroads, including the Trona Railway, currently owned by Searles Valley Minerals/Nirma, and the Southwest Portland Cement Railroad, owned by CEMEX.
- Holding Company. A railroad that is owned by a corporation with multiple short line properties. An example of a holding company is Genesee & Wyoming Inc., which operates over 100 short lines throughout North America, 6 of which are located in California. These include; the Arizona and California Railroad, the California Northern Railroad, the Central Oregon and Pacific Railroad, the San Joaquin Valley Railroad, the San Diego, and Imperial Valley Railroad and the Ventura County Railroad.
- Public. This includes state and county/city/municipality-owned railroads, as well as federally-owned (typically for military purposes) railroads. At present, there are approximately six U.S. military and government railroads in California.
- Independent. A railroad that is independently owned and operated (e.g., Santa Maria Valley Railroad and the Sierra Northern Railway) with the underlying infrastructure either directly owned by the operator or by a third party, such as a Class I railroad or public agency. Four of the active short line railroads in California are independently owned.

When interpreting information on trackage rights and miles operated, it is important to keep in mind that not all trackage may be owned by the railroad in question. Rail carriers often negotiate rights for one carrier to use another carrier's tracks. The nature of these arrangements varies. Trackage rights, whereby the tenant gains access to operate their own trains over specific line segments of the owning railroad, is one common arrangement. Under trackage rights, the line's owner is compensated through a contractually set fee schedule.[76] These arrangements generally arise through three situations:

- Mergers where a carrier obtains rights to serve locations that would otherwise lose competitive service.
- Line sales where the selling carrier seeks to retain access.
- Strategies to mutually gain operational flexibility and capacity.

In California, extensive trackage rights arrangements exist between freight carriers as well as with track-owning public agencies. For instance, BNSF operates 2,130 miles of track in California. Of this total, BNSF owns 1,155 miles and BNSF gains access to use 975 miles through trackage rights. While some of this mileage predates the modern era (notably the Tehachapi corridor between Bakersfield and Mojave), most are more recent, having resulted from the UPRR-Southern Pacific (SP) merger and line sales to public agencies during the 1990s. These mergers include the Los Angeles-San Diego corridor between Fullerton and San Diego; lines operated by the Southern California Regional Railroad Authority

[76] Blaszak, Michael W., ABC's of Railroading, Trackage and Haulage Rights – How Railroads Extend Their Reach, Trains, May 1, 2006.

(SCRRA) from Los Angeles to Palmdale, San Bernardino and Moorpark; and Caltrain between San Francisco and San Jose.

The Alameda Corridor, a publicly owned, 20-mile freight corridor connects the San Pedro Bay Ports, including the Port of Los Angeles (POLA) and the Port of Long Beach (POLB), with the transcontinental rail network. To date, this is the largest freight-rail infrastructure project completed through a public/private partnership mode. Both BNSF and UPRR hold trackage rights on this line and pay a fee per container for its use.

Class I Railroads

This section provides a description of the two Class I railroads operating in California, including information about their routes, terminals, and characteristics of their rail traffic. Table 6.1 summarizes key operating statistics.

Union Pacific Railroad

The UPRR operates 31,900 route-miles of track in 23 states. UPRR is the largest railroad in California by number of employees, payroll, and miles operated, as shown in Table 6.1. The UPRR was established in 1862 when President Lincoln signed the Pacific Railway Act, which called for construction of a transcontinental railroad connecting the eastern and western United States. The first leg envisioned was a segment to connect Council Bluffs, Iowa with San Francisco. In the subsequent decades, UPRR grew by building additional trackage and acquiring other railroads. Specifically in 1982, UPRR acquired the Western Pacific Railroad and gained access to the San Francisco Bay Area from Salt Lake City. In 1996, UPRR absorbed the Southern Pacific Railroad, California's largest and most dominant railway at the time, and acquired its present network configuration.

Today, UPRR operates an expansive network of rail lines that serves diverse regions of California, including the agriculturally rich San Joaquin Valley, the Port of Oakland, the San Francisco Bay Area, and the Los Angeles metropolitan area, as shown in Exhibit 6.3. For its carload services, UPRR operates two system classification yards at West Colton in southern California and Roseville in northern California, and three regional yards in Lathrop (San Joaquin County), Commerce (Los Angeles County), and Yermo (San Bernardino County). System classification yards process high volumes of cars typically 1,000 or more daily, from origins and destinations throughout a rail network. Regional yards stage traffic for nearby industries, and typically handle smaller traffic volumes. Intermodal services are available at six dedicated UPRR terminals, located in Oakland, Stockton, and the Los Angeles and Long Beach region. UPRR also has shared use of the on-dock rail terminals at the POLA/POLB with BNSF. These terminals are discussed in more detail in Section 6.1.3.

In railroad parlance, the freight network consists of subdivisions, branches, and secondary lines. Subdivisions are major components of the regional and national network, connecting major population centers and terminals, while branches and secondary lines generally extend from a subdivision and terminate at a single point or connection to another railroad. Table 6.2 lists UPRR's subdivisions and their ownership characteristics (if not UPRR), and the table indicates any trackage rights arrangements with other freight railroads.

Table 6.1: Class I Railroad Operating Characteristics

Name	Employees	Payroll (Millions of Dollars)	Track Miles Owned	Track Miles w/Trackage Rights	Total Miles Operated	Originating Carloads	Terminating Carloads
BNSF	2,983	$210	1,155	975	2,130	1,636,623	1,669,449
UPRR	4,741	$400	2,773	515	3,288	1,423,857	1,510,030

Sources: UPRR California Fact Sheets, 2011; BNSF California Fact Sheets, 2010; 10-K Filings, 2011.

Exhibit 6.3: Union Pacific Rail Operating System, 2012

Sources: Oak Ridge National Laboratory (ORNL) Rail Network and Esri, 2012.

Table 6.2: Union Pacific Railroad Operating Subdivisions

Subdivision	Tenant/Ownership[a]
Alhambra	
Canyon	
Canyon/Winnemucca	BNSF (tenant)
Cima	
Coast	BNSF (tenant)
Fresno	
Los Angeles	
Martinez	BNSF (tenant)
Mojave (UPRR)	BNSF (tenant)
Niles	
Oakland	
Roseville	
Sacramento	BNSF (tenant)
Santa Barbara	
SCRRA River	SCRRA Member Agency (owner)
SCRRA Valley	SCRRA Member Agency (owner)
Tracy	
Valley	BNSF (tenant)
Ventura	SCRRA Member Agency (owner)
Yuma	BNSF (tenant)

Source: UPRR California Fact Sheets, 2011.

[a] Except where indicated, UPRR is the owner of the subdivision. Tenants who have operating rights on UPRR-owned track are also indicated.

In 2011, UPRR handled approximately three million carloads in California, with a workforce of five thousand employees. This traffic consisted of a mix of intermodal and carload traffic, reflecting the great diversity of domestic and international trade that makes up California's economy. A substantial fraction of UPRR's California volume consists of intermodal containers moving between Asia and the POLA, POLB, and the Port of Oakland. Commodity movements are discussed in Section 6.2.

BNSF Railway Company

BNSF is North America's largest intermodal carrier. BNSF handled over 4.5 million trailers and containers in 2011, compared to UPRR's 3.6 million.[77,78] With a workforce of close to 3,000 employees, BNSF operates more than 32,000 route-miles of track in the western two-thirds of the United States, generating millions in revenue. Today's BNSF is the product of nearly 400 different railroad lines that merged or were acquired over the course of 160 years, eventually culminating in the merger of two large railroads, the Atchison, Topeka and Santa Fe Railway ("Santa Fe") and the Burlington Northern Railroad in 1996.[79] The vast majority of BNSF's California network came from the former Santa Fe. In addition to its own routes, BNSF holds trackage rights over the UPRR between Salt Lake City and the San Francisco Bay Area, as well as in the San Joaquin Valley as a result of the UPRR-Southern Pacific Railroad merger.

BNSF operates more than 2,000 track miles within California. These operations occur on 1,155 miles owned by BNSF and 975 miles of track on which BNSF holds trackage rights (Exhibit 6.4). Over 1.6 million BNSF carloads originated and terminated within California in 2011. Major BNSF freight hubs include 11 carload yards (including its major facility at Barstow), 5 dedicated intermodal terminals, and the shared on-dock rail facilities at the POLA and POLB (discussed in Section 6.1.3). Table 6.3 lists BNSF's subdivisions and indicates any trackage rights sharing agreements with other freight railroads.

[77] Union Pacific Railroad. Union Pacific Railroad: Weekly Carloads and Intermodal Traffic Report, Week 52 (Week of December 25, 2011 through December 31, 2011; Week of December 26, 2010 through January 1, 2011).

[78] BNSF Railway. BNSF Railway: Weekly Intermodal and Carload Units Report Week 52 (Week Ending December 31, 2011; Week Ending January 1, 2011).

[79] BNSF Railway. *Our Railroad* (http://www.bnsf.com/about-bnsf/our-railroad/).

Exhibit 6.4: BNSF Railway Operating System, 2012

Sources: ORNL Rail Network and Esri, 2012.

Table 6.3: BNSF Railway Operating Subdivisions

Subdivision	Tenant/Ownership[a]
Bakersfield	
Cajon/Winnemucca	UPRR (tenant)
Gateway	
Mojave	
Needles	UPRR (tenant)
San Bernardino	UPRR (tenant)
San Gabriel	SCRRA Member Agency (owner)
Stockton	
River-West Bank	SCRRA Member Agency (owner)

Source: BNSF California Fact Sheets, 2010.

[a] Except where indicated, BNSF is the owner of the subdivision. Tenants who have operating rights on BNSF-owned track are also indicated.

California serves as a gateway to BNSF's Transcontinental Corridor (TRANSCON), which links the POLA and POLB with Chicago. Consumer products, which include everything from food and automobile products to agricultural and industrial products, represent the majority of BNSF's transported commodities.[80]

Regional and Short Line Freight Railroads

California has 18 short line railroads and 8 switching and terminal railroads operating over 823 route-miles. Table 6.4 illustrates that these railroads vary widely in terms of mileage, ownership, volume, and markets served.

California's larger local railroads include the California Northern Railroad, San Joaquin Valley Railroad, the Arizona and California Railroad, and the Trona Railway. Appendix C provides additional information on short line railroads (where sufficient information is available).

6.1.2 Rail System Characteristics

This section examines the extent, type, and characteristics of the Class I and short line freight rail infrastructure in California.[81] For each rail segment, the following characteristics are defined:

- Signal Type. Signal type refers to the type of train control signal system equipped on each rail segment. It focuses on three signal types (of varying complexity and sophistication): Manual Block (MAN), Automatic Block Signalizing (ABS), and Centralized Traffic Control.
- Federal Railroad Administration (FRA) Density in Gross Ton-Miles (GTM) per mile/ORNL Mainline Class. This refers to the combined weight of locomotives and all trailing cars and their contents, multiplied by the number of route-miles traveled, and divided by the number of route-miles of the line.
- Number of (Intermodal/Carload/Total) Freight Trains. This is indicative of demand in terms of train movements, transportation-related energy consumption, and track maintenance needs.

This inventory is presented in Exhibit 6.5 for four geographic regions: Central Coast, Central Valley, northern California, and southern California.

[80] BNSF State Fact Sheet for the State of California, 2010.

[81] The ORNL network, supplemented with other data and reports where noted, was the primary data source for this analysis.

Table 6.4: Regional and Short Line Railroads Operating Characteristics

Name	Standard Carrier Alpha Code (SCAC)	Parent Company	Total Operated Miles	Annual Carloads
Regional and Local Railroads				
Arizona & California Railroad Company	ARZC	Genesee & Wyoming Inc.	133	12,000
California Northern Railroad	CFNR	Genesee & Wyoming Inc.	261	25,000
Central Oregon & Pacific Railroad	CORP	Genesee & Wyoming Inc.	389 (60 in CA)	17,000
Fillmore and Western[a]	FWRY	Independent	28	N/A
Lake County Railway	LCR/LCY	Frontier Rail		N/A
Napa Valley Wine Train[a]	NVRR	Independent	18	N/A
Northwestern Pacific	NWP	Independent	62	1,000
Pacific Sun Railroad, LLC	PSRR	Watco	62	N/A
Sacramento Valley Railroad	SAV	Patriot Rail	7	N/A
San Diego & Imperial Valley Railroad	SDIY	Genesee & Wyoming Inc.	41	6,000
San Joaquin Valley Railroad Company	SJVR	Genesee & Wyoming Inc.	417	N/A
Santa Cruz and Monterey Bay Railway Company	SCMB	Iowa Pacific Holdings	31	300
Santa Maria Valley Railroad	SMV	Independent	14	N/A
Sierra Northern Railway	SERA	Independent	105	6,000
Stockton Terminal & Eastern Railroad	STE	OmniTrax	25	N/A
Trona Railway Company	TRC	Searles Valley Minerals/Nirma	31	20,000
Ventura County Railroad Company	VCRR	Genesee & Wyoming Inc.	17	2,000
West Isle Line, Inc.	WFS	Western Farm Service	5	N/A
Switching and Terminal Railroads				
Central California Traction	CCT	BNSF/UPRR	96	55,000
Los Angeles Junction Railway Company	LAJ	BNSF	64	N/A
Modesto & Empire Traction Company	MET	Independent	33	30,000
Oakland Terminal Railway	OTR	BNSF/UPRR	10	N/A
Pacific Harbor Line, Inc.	Pacific Harbor Line, Inc (PHL)	Anacostia & Pacific	59	40,000 (excluding intermodal)
Quincy Railroad	QRR	Independent	3	N/A
Richmond Pacific Railroad Corporation	RPRC	Indep. – Levin Richmond Terminal	10	17,000
Southwest Portland Cement Railroad (Mojave Northern Railroad)	SWPC	CEMEX	N/A	N/A

[a] Primarily passenger operator, but does handle some freight.

Sources: AAR, *Freight Railroads in California*; Railroad websites and stakeholder interviews; and AECOM Existing Rail Conditions Inventory.

Exhibit 6.5: Rail Line Regional Classification, 2012

Sources: ORNL Rail Network and Esri, 2012.

Train Control Signal Type

Several different types of train control signals, of varying complexity, are in use on the State's freight rail system. These train control signal types range from manual methods to methods relying on a central dispatcher and electrical circuit control. The three most common types of train control in California include the following:

1. MAN or No Signal or Track Warrant Control (TWC). A basic train control system that requires the train crew to obtain permission or warrants before entering a section of track. Crews receive track warrants by radio, phone, or electronic transmission from dispatcher.
2. ABS. A system that provides protection from rear-end collisions by indicating occupancy of subsequent sections of track through electrically operated track circuits and signals. Trains are controlled over a route with ABS in a manner similar to unsignaled territory, using track warrants issued from a central dispatching office.
3. Centralized Traffic Control. A system that uses electrical circuits in the tracks to monitor the location of trains, allowing railroad dispatchers to control train movements from a remote location.

In California, 2,339 miles of track (68 percent of total statewide rail miles) are equipped with Centralized Traffic Control as their primary control system. About 893 miles (26 percent) are equipped with ABS, and the remaining 212 miles (6 percent) are manually controlled. Exhibit 6.6 shows the distribution of signal types across the rail mainlines. Centralized Traffic Control is installed on the most densely traveled corridors, including BNSF's TRANSCON corridor and UPRR's Sunset and Donner Pass routes.

Gross Ton-Miles Per Mile

GTM per mile is a measure of freight rail volume moving on each rail segment, where a higher GTM number reflects higher volumes of freight. It refers to the combined weight of locomotives and all trailing cars and their contents in revenue freight trains, multiplied by the number of route-miles traveled, and divided by the line's total route-miles.[82] Exhibit 6.7 illustrates the tonnage density of California's rail network obtained using the FRA density designation data found in the ORNL National Rail Network. Due to a large demand for rail service at the POLA and POLB (almost 40 percent of containerized cargo at the San Pedro Bay Ports is directly shipped by rail) and surrounding areas, California's highest tonnage mainlines are located in southern California. Ton-miles per mile are also high in the Central Valley region, as well as several locations in northern California, including the Martinez, Roseville, Canyon, and Valley subdivisions.

Other northern California locations, including BNSF's Gateway and Tracy subdivisions, as well as parts of BNSF's San Diego subdivision, have low freight tonnage. The Central Coast region, which contains the lightly used UPRR Coast Line route, has the least volume.

[82] Revenue freight trains are trains run by carriers on behalf of paying customers. Non-revenue freight trains fall into several categories, and include repositioning moves of empty carloads and light locomotives to loading points (such as the accommodation of an imbalance in traffic) and transportation of materials on the railroad's own behalf (typically for maintenance of way). Non-revenue traffic usually accounts for a small portion (less than 10 percent) of total volume, although in some locations where there is a large traffic imbalance, it can account for a much higher portion.

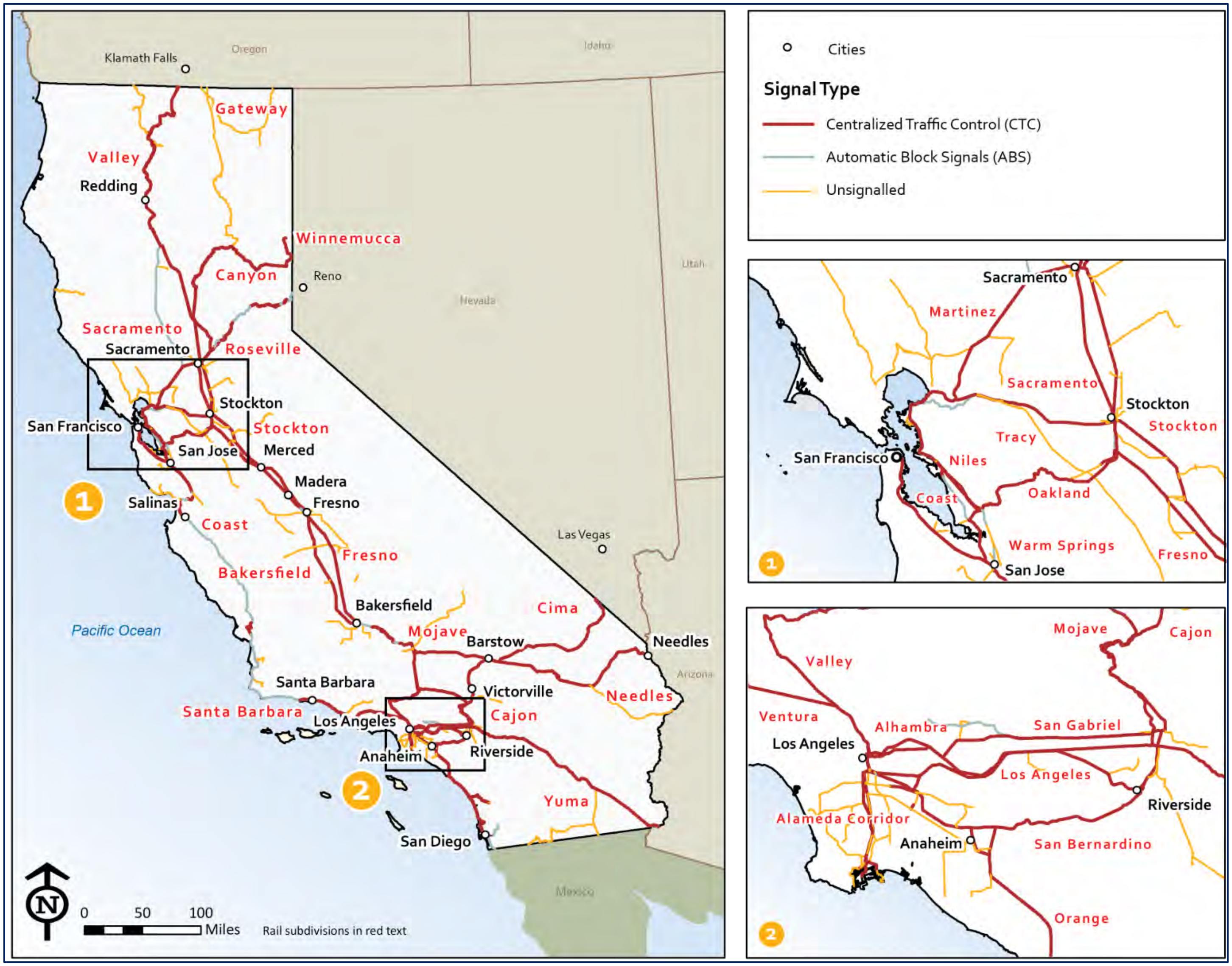

Exhibit 6.6: Class I Rail System: Signal Types, 2012

Sources: Cambridge Systematics' modeled ORNL Rail Network used in Network Assignment and Esri, 2012.

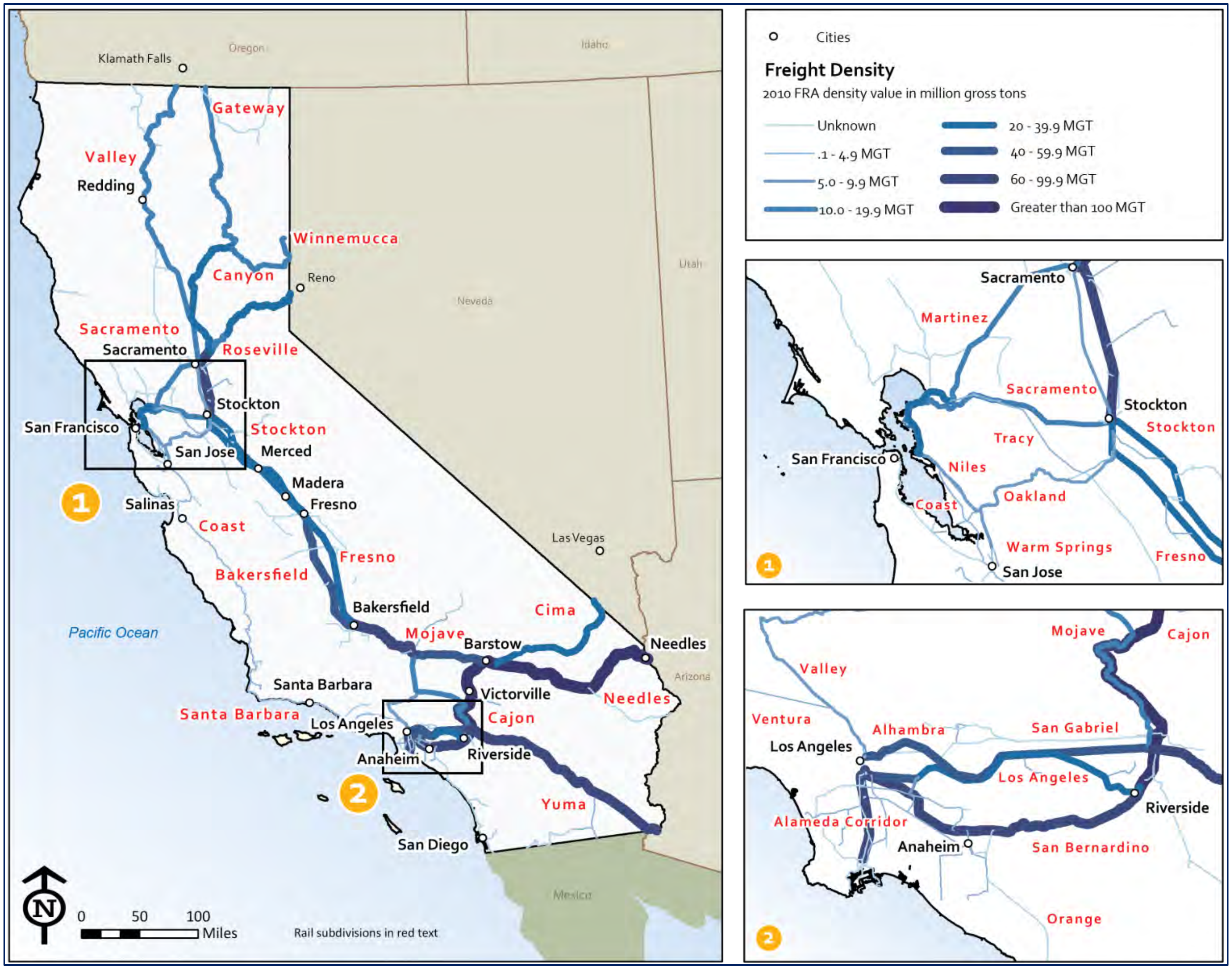

Exhibit 6.7: Class I Main Line FRA Density, 2006

MGTM = Million gross ton-miles.

Sources: Cambridge Systematics' modeled ORNL Rail Network used in Network Assignment and Esri, 2012.

Estimated Train Volumes

While GTM indicate density of freight tonnage moving on the rail system, the number of trains operating over a segment indicates the utilization of its infrastructure. Existing freight traffic in terms of daily train counts by subdivision and segment on Class I mainlines is shown in Exhibit 6.8.

Certain regions see many more freight trains per day than other regions. For example, BNSF's Needles subdivision in southern California carries up to 64 freight trains per day on certain segments, and its Cajon subdivision carries up to 52 trains per day. In the Central Valley, the busiest segment of UPRR's Fresno subdivision sees approximately 40 freight trains per day. In contrast, freight traffic in northern California is highest on UPRR's Roseville subdivision, which carries up to 32 trains per day, and the Central Coast region has no segments with more than 6 freight trains per day.

6.1.3 Intermodal Terminals

In a multimodal supply chain, trains carrying containers and trailers represent one link in the intermodal chain that connects shippers with receivers, together with container ships and trucks. Intermodal rail terminals are established to facilitate transfer of containers and trailers between modes (ship to rail, truck to rail, and vice versa). In California, the majority of intermodal rail traffic is associated with the Port of Oakland, POLA, and POLB; a sizeable but smaller volume is related to wholly North American Free Trade Agreement (NAFTA) traffic.

Intermodal service is typically described as either container-on-flat car or trailer-on-flat car (TOFC). Containers can generally be double-stacked onto container carrying railcars (subject to certain limitations based on container length) depending on the vertical clearance required along the rail corridor. In California, all primary intermodal corridors have sufficient vertical clearances for double-stack service. Double stacking is not possible with TOFC. In discussing intermodal traffic, it is useful to draw distinctions between the different types of equipment commonly used in this service:

- International containers come in 3 standard sizes based on the length of the container: 20-foot, 40-foot, and 45-foot long containers. Container sizes are standardized by international convention to ensure that the containers can be efficiently used internationally across the full spectrum of surface transportation modes.
- Domestic containers are only used in the NAFTA region. They are designed to take advantage of the longer lengths that North American highways permit and are most commonly 53 feet long. International shipments are often transloaded from an international to domestic container at or near the seaport due to supply chain efficiency and transportation cost advantages.
- Trailers, with permanently attached wheels and kingpin, were once the most common type of rail intermodal equipment. Since the 1980s, the proportion of intermodal traffic handled in trailers has steadily declined as the logistical advantage of not needing to manage a chassis pool at every intermodal terminal has been superseded by the cost advantages of double stack operations. Trailers are now only used in specialty applications, such as by United Postal Service and other truckload and less-than-truckload trucking companies with very stringent service requirements.

Intermodal facilities are often dedicated to particular types of traffic, such as international or domestic, or by equipment type (e.g., container or trailer). High freight volumes have made this specialization more operationally and economically attractive. For example, containers can be loaded directly onto railcars from a ship at an on-dock terminal or they can be transported ("drayed") by truck to near-dock or off-dock facilities for loading onto railcars.

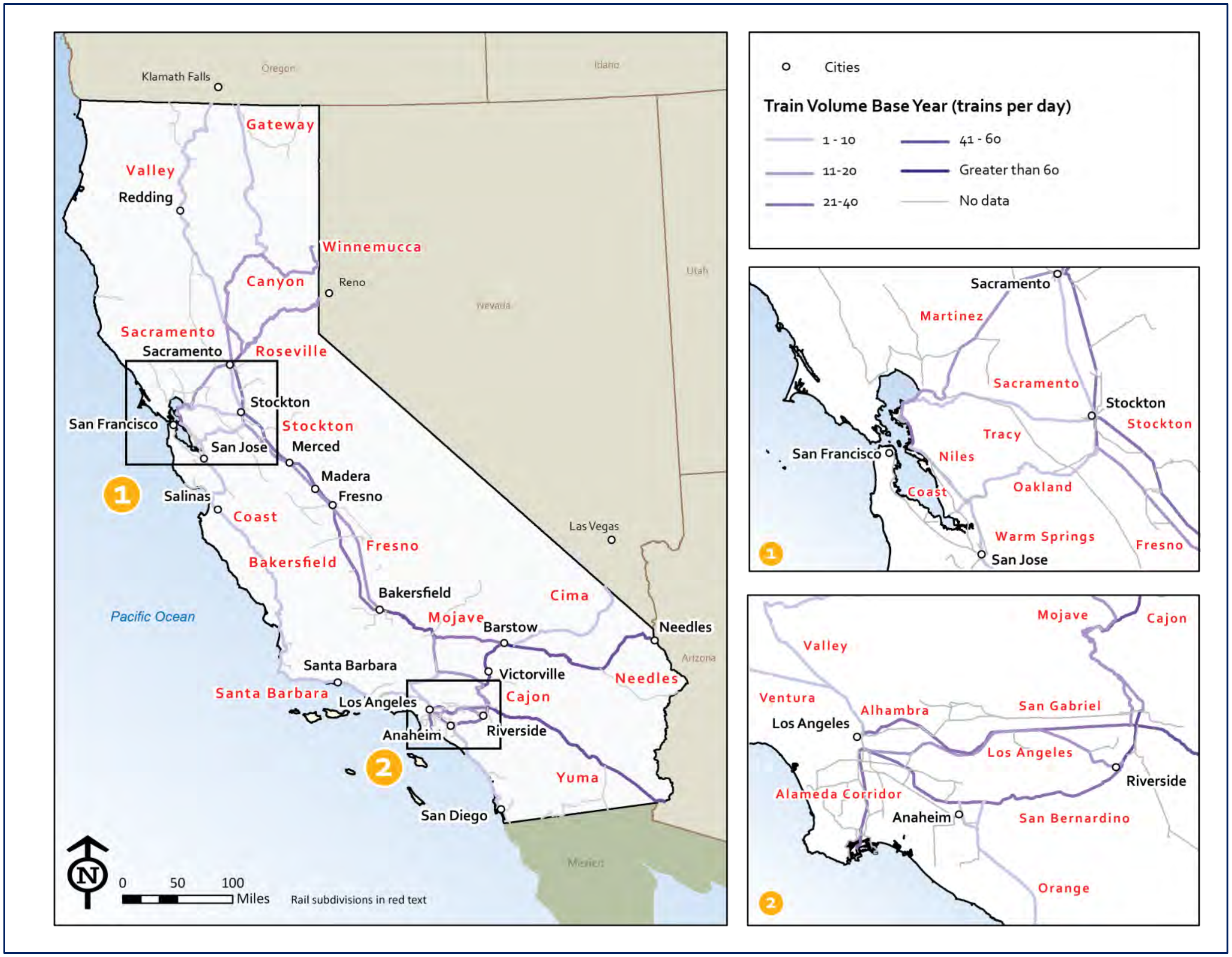

Exhibit 6.8: Estimated 2007 Annual Train Volumes

Sources: Cambridge Systematics' Base Year Train Volumes Assessment using Assignment on Cambridge Systematics' modeled ORNL Rail Network and Esri, 2012.

Due to the nature of intermodal shipping, the intermodal rail terminals in California are concentrated in port regions, including San Pedro Bay (home to the POLA and POLB serving southern California) and San Francisco Bay (home to the Port of Oakland serving northern California). Three rail intermodal facilities are located in the San Joaquin Valley, which primarily serve the Central Coast and Central Valley regions and are focused on domestic rail traffic. Key attributes of the intermodal rail terminals are provided in Table 6.5. A more detailed discussion of each terminal follows.

Southern California Region

On-Dock Intermodal Terminals

On-dock intermodal rail terminals are located within a marine port terminal. There are a total of nine on-dock intermodal facilities at the San Pedro Bay Ports, with four at the POLA and five at the POLB. Each on-dock intermodal terminal provides dedicated service for the carriers at the terminal. The on-dock intermodal terminals located at the POLA and the POLB are summarized in Table 6.6.[83]

Table 6.5: Intermodal Rail Facility Characteristics

Name	Facility Type	Railroad	Data Year	Yard Capacity (Lifts)
Southern California				
City of Industry	Off-Dock	UPRR	2010	232,000
East Los Angeles	Off-Dock	UPRR	2010	650,000
Hobart	Off-Dock	BNSF	2010	1,700,000
Intermodal Container Transfer Facility (ICTF)	Near-Dock	UPRR	2010	822,200
Los Angeles Transportation Center (LATC)	Off-Dock	UPRR	2010	340,000
POLA/POLB On-Dock Intermodal Facilities	On-Dock	BNSF/UPRR	N/A	N/A
San Bernardino	Off-Dock	BNSF	2010	660,000
Northern California				
Fresno (FRESCA)	Inland	BNSF	N/A	N/A
Lathrop	Inland	UPRR	Design Capacity	730,000
Oakland International Gateway (OIG)	Near-Dock	BNSF	Current	300,000
Railport-Oakland	Near-Dock	UPRR	Current	450,000
Stockton/Mariposa	Inland	BNSF	Design Capacity	300,000

Sources: Wilbur Smith Associates, *Multi-County Goods Movement Action Plan*, prepared for Los Angeles Metropolitan Transportation Authority, Orange County Transportation Authority, San Bernardino Associated Governments, Riverside County Transportation Commission, Imperial County Transportation Commission, Ventura County Transportation Commission, and San Diego Association of Governments, 2008; *I-710 Railroads Goods Movement Study*, 2009; and San Joaquin Valley Goods Movement Study and Consultant Analysis.

[83] Cambridge Systematics and URS Corporation, Technical Memorandum – I-*710 Railroad Goods Movement Study*, 2009.

Table 6.6: On-Dock Intermodal Terminals at the Ports of Los Angeles and Long Beach

POLB	POLA
Pier T, operated by Hanjin	Terminal Island Container Intermodal Facility, operated by Evergreen and Nippon Yusen Kaisha
Pier A, operated by Mediterranean Shipping Company	Pier 400, operated by Maersk
Pier F, operated by Long Beach Container Terminal on behalf of Orient Overseas Container Line	Pier 300, operated by American President Lines
Pier G, operated for K-Line	Yang Ming/China Shipping West Basin Terminal
Pier J, operated for COSCO	

Sources: Wilbur Smith Associates, *Multi-County Goods Movement Action Plan*, 2008; and I-*710 Railroads Goods Movement Study*, 2009.

The on-dock terminals are served by the short line PHL although Class I crews can bring unit trains into these on-dock yards without PHL assistance.[84] PHL handles the switching of all intermodal trains on port property, including the placement for loading and unloading, and assembly of trains for inland destinations on behalf of BNSF and UPRR.[85] Together, the on-dock terminals handle a significant amount of containers (1.84 million lifts in 2010) with volumes projected to reach 6.3 million lifts by 2035. Through its elimination of truck drayage between port and terminal, on-dock rail intermodal transfer is perhaps the most efficient way to handle trainloads of international intermodal containers. However, with the amount of on-dock space currently available (current capacity is approximately 2.74 million lifts), it is expected that both POLA and POLB will not be able to accommodate projected future demand without additional on- and off-dock capacity. Both POLA and POLB have expansion plans that would increase on-dock capacity sufficiently to meet future demand for on-dock movement. However, the total demand for international intermodal cargo movement will still exceed the available capacity of on-dock terminals. Additional capacity at near-dock and off-dock terminals will be required to meet this demand.

Near-Dock Terminals

Near-dock terminals (facilities that are within a five-mile radius of the port terminal) are essential for providing additional container handling capacity. At present, there is one existing intermodal facility (the ICTF) and one planned facility (the Southern California International Gateway (SCIG)) near the San Pedro Bay Ports.[86]

- ICTF. Situated five miles north of the San Pedro Bay ports near the I-405/I-710 interchange in Long Beach, ICTF was completed in 1985 at a cost of $55 million for exclusive use by UPRR's predecessor SP. In addition to handling intermodal containers from the port, ICTF also processes approximately 4,000 lifts per year of domestic containers. However, lease agreements restrict the use of the ICTF to handle primarily international containers. The nearby Dolores Yard storage facility and computerized inventory allows ICTF to handle large volumes of containers efficiently.

[84] A unit train is a train composed of cars that are all carrying the same commodity and are all going to the same location. This eliminates the need for the train to stop at intermediate locations to switch cars to other trains going to different locations and reduces the time and cost of the shipment.

[85] Anacostia & Pacific. *Pacific Harbor Line is… Running the Rails*, undated.

[86] The SCIG terminal and a proposed expansion of the ICTF are discussed in the Chapter 9 discussion of the freight rail investment program.

In 2010, the ICTF had a lift volume of 421,744 containers, including 417,992 marine containers (about 15 percent of the total marine container lifts in the region). This volume represented about 51 percent of the ICTF yard's estimated capacity of 822,200 lifts per year.

Off-Dock Terminals

Off-dock intermodal facilities are rail yards located more than five miles from port terminals. They provide additional capacity for handling port-related (international) containers as well as domestic containers (both transloaded international cargo and pure domestic cargo) and trailers. There are five off-dock intermodal facilities in southern California. Two of these terminals are operated by BNSF and three by UPRR. UPRR's off-dock yards are located in close proximity to each other due to inherited infrastructure from the Southern Pacific Railroad acquisition. BNSF's Hobart Yard and UPRR's East Los Angeles Yard primarily handle containers. Off-dock facilities are anticipated to handle increasing numbers of domestic and transloaded containers due to increased demand from national consumer markets and growth of transloading as a logistics strategy. On-dock and near-dock terminals are expected to handle the majority of international containers.

- City of Industry Intermodal Facility. UPRR's City of Industry Intermodal Facility is located near Los Angeles, midway on the UPRR Alhambra Subdivision. In 2010, it handled 231,279 lifts, of which only 103 were marine containers. This yard is essentially at capacity.
- East Los Angeles Intermodal Facility. UPRR's East Los Angeles Intermodal Facility is situated in the City of Commerce at the western end of the UPRR Los Angeles Subdivision. It handled 411,469 lifts in 2010, of which only 36,862 were marine containers and 374,607 were transloaded containers, domestic containers, or trailers. Capacity of this yard is 650,000 lifts per year.
- Hobart Yard. In terms of throughput, BNSF's Hobart Yard is the largest intermodal facility in North America. Located near downtown Los Angeles in the City of Commerce, this terminal has a capacity to handle 1.7 million lifts annually. In 2010, Hobart Yard handled a total of 966,474 lifts, of which 448,455 were marine containers and 518,019 were transloaded containers, domestic containers, and trailers.
- LATC. The LATC is situated on the east side of the Los Angeles River across from the Los Angeles Union Passenger Terminal, at the west end of UPRR's Alhambra Subdivision. This facility is the only intermodal terminal in the region from which Pacific Northwest service is operated.[87] In 2010, it handled 184,023 lifts, of which only 8,757 were marine containers and 175,266 were transloaded containers, domestic containers, and trailers. In the future, all of the volumes handled at this terminal are expected to be domestic and transloaded containers. Capacity of this yard is 340,000 lifts per year.
- San Bernardino Intermodal Yard. Operated by BNSF, the San Bernardino Intermodal Yard primarily serves domestic traffic, as well as international traffic that has been processed through nearby warehouse and transloading operations. In 2010, it handled 427,572 lifts, of which only 137 were marine container lifts. With an annual lift capacity of 660,000, increased capacity of the yard through expansion is constrained by the surrounding residential areas. However, capacity can likely be increased through a reconfiguration and implementation of modern concepts, similar to what was accomplished by BNSF in Seattle, WA and Memphis, TN.

[87] Cambridge Systematics and URS Corporation, Technical Memorandum – *I-710 Railroads Goods Movement Study*, 2009.

Bay Area and Central Valley

Intermodal traffic in northern California is anchored by the Port of Oakland, which serves as a gateway for international container shipping in the Bay Area. The Port of Oakland has two intermodal rail terminals to facilitate container traffic. Three additional public intermodal terminals are located in the San Joaquin Valley.

Near-Dock Terminals

Since there are no on-dock intermodal terminals at the Port of Oakland, containers must be drayed by truck between ships and two near-dock terminals, the OIG and Railport.

- OIG. Completed in 2002, the OIG is a near-dock intermodal terminal owned by the Port of Oakland and operated by BNSF. It is located adjacent to UPRR's Railport and the container ship docks that line the Oakland harbor. Constructed at a cost of $38 million, OIG features 13,300 feet of loading and unloading track that can accommodate 410 40-foot containers at a time, and a capacity of 300,000 lifts annually.[88] The construction of OIG eliminated the 12-mile trip over local roads between the port and BNSF's former Richmond Intermodal Facility. The former Richmond Intermodal Facility now functions as a yard for merchandise and bulk commodity trains.
- Railport – Oakland. A near-dock terminal operated by UPRR, Railport is located adjacent to OIG. This facility functions similarly to OIG, and directly connects to regional warehouse facilities, where container goods are unloaded, sorted, consolidated, and sometimes stored for short periods of time. Railport's current capacity is 450,000 lifts annually.

The combined 750,000 lift capacity of OIG and Railport is insufficient to meet the demand projected for the next decade. The Port of Oakland is developing the Outer Harbor Intermodal Terminal (OHIT) Rail Access project to address this expected capacity shortfall. This $499 million initiative will expand and improve intermodal rail terminal capacity.[89] Thus far, the OHIT has received $242 million in commitments from the California Trade Corridor Improvement Fund (TCIF) and a $15 million federal Transportation Investment Generating Economic Recovery (TIGER) Fiscal Year (FY) 2012 grant.[90]

Inland Terminals

Three inland terminals serve the warehouses and distribution centers in the Central Valley. Rail intermodal service at the inland terminals consists of domestic trailers, domestic containers, and international containers moving between rail intermodal facilities on specialized rail cars. The three inland intermodal terminals include UPRR's Lathrop (French Camp) facility and BNSF's Mariposa and Fresno facilities.

- Fresno Intermodal Facility. BNSF's Fresno Intermodal Facility is located in south Fresno, providing service between Central Valley locations and other states.
- Lathrop Intermodal Facility. The Lathrop Intermodal Facility is a UPRR yard located in French Camp. It was built in 1993 to replace UPRR's Stockton Intermodal Facility, which had outgrown the available footprint. This terminal, which primarily functions as a transfer point for agricultural

[88] Port of Oakland. Terminal Specifications: Burlington Northern Santa Fe Railway.

[89] Port of Oakland, City of Oakland, Outer Harbor Intermodal Terminal Rail Access: TIGER 2012 Funding Application.

[90] Port of Oakland. Press release: U.S. Secretary of Transportation Ray LaHood and California Governor Edmund G. Brown, Jr. mark $15 million federal TIGER grant for Port of Oakland Army Base Redevelopment Project: Federal grant for port's first phase rail project to boost regional economy, July 9, 2012.

and other domestic cargo, has reached its capacity of 270,000 cargo lifts annually. As a result, a two-phase expansion is planned to increase capacity to 730,000 lifts. The first phase, originally planned to start in 2011, will increase the lift capacity to 400,000, and the second phase, starting in 2020, will increase capacity to 730,000 lifts annually.[91] This expansion has not started as it is pending action from the U.S. Army Corps of Engineers.

- Stockton Intermodal Facility/Mariposa. The Stockton Intermodal facility, constructed in 2001, is located just south of the City of Stockton in the County of San Joaquin. The facility has container and trailer parking places, storage tracks, and an intermodal capacity of 300,000 lifts annually.[92] Loaded international containers arrive at the facility carrying either imported goods going to East Coast or Gulf Coast ports or domestic goods for San Joaquin Valley customers. There is no rail intermodal connection between Stockton and other Central Valley locations and the ports.

6.1.4 Inactive and Abandoned Rail Lines

The previous sections described existing rail infrastructure currently in operation. This section describes rail infrastructure that is no longer in use and classified as out of service or abandoned. The difference between these two terms is important:

- On out-of-service or inactive lines, rail traffic has ceased, but the line has not been legally abandoned. Usually, the track has remained in place, thus permitting resumption of service in the future with little or no regulatory requirements.
- Abandoned lines have been granted approval to permanently discontinue service through a federal process that is administered by the U.S. STB. Once abandoned, the right-of-way (ROW) is freed for other uses, including rail banking (e.g., preservation for potential future use as a rail line), reversion to line-side property owners, or redevelopment as a trail or transit line. Rail lines are usually abandoned because they are unprofitable to run due to declining shipments and revenue sources either on the line alone, or in the larger region.

As developable land is scarce and sold at a premium, abandoned rail lines and adjacent ROW offer one way to accommodate the need for passenger rail service, nonmotorized transport, and recreational services. This section first provides an overview of abandonments in California and provides a table of recent abandonments.

Abandonments Overview

While loss of rail service and trackage can be crippling to businesses and communities, California has lost less trackage than other parts of the U.S., particularly the Midwest and East. In general, abandonments reached their peak in the mid-1980s. During this time, the large railroads were working to improve their financial performance, and traffic density was an important factor. While the most marginal lines were abandoned, many were sold or leased to short line operators. Subsequently, these operators either succeeded in improving the lines' financial performance through lower costs and more customer responsive service, or were eventually forced to cease operations. Thus, where abandonment applications were once primarily a Class I phenomenon, in recent years, a growing portion of line

[91] San Joaquin County Community Development Department. Request for Proposal: Environmental Impact Report No. PA-0900185 for the Union Pacific Modernization Project, which includes Permit Application No. PA-0900184 for the expansion and modernization of an existing intermodal facility in two phases over a 10-year period.

[92] Khouri, Jeff; Christie, Graham; Schubel, Gene; and Fleming, John. *Stockton Intermodal Facility at Stockton, California*, AREMA 2001.

abandonments has been filed by short lines. Appendix C lists abandonment filings in California from 2005 to 2010.

6.2 Freight Demand

This section describes how freight rail services are used in various industries and how usage is expected to change over time. The section includes information about how freight moves by rail between California and other domestic markets and concludes with a report of freight rail operational trends and issues.

6.2.1 Freight Demand Drivers

Though many of freight's socioeconomic drivers are reviewed in Section 2.4.1, it is important to reiterate the types of industries that are responsible for—and create—the bulk of the freight rail commodity flows. A region's goods movement system reflects the industries and businesses that make up its economy. Heavy, low-value materials tend to be carried by transportation modes such as rail that can move large volumes at a low cost per-ton, while high-value materials favor transportation modes that provide the quickest delivery possible. Industries and businesses can be divided into two groups:

- Goods Movement-Dependent Industries. Businesses that rely on transportation as a key part of their business model. They may receive daily shipments of raw supplies to support their manufacturing process, or require daily delivery of their own refined or finished product to market. The agriculture, manufacturing, wholesale (and retail) trade, construction, transportation and warehousing (including utilities), and mining sectors rely on California's freight rail system and are the focus of goods movement analysis.
- Service Industries. Businesses that do not directly depend on the movement of raw or manufactured materials, but that do rely on nonrail shipments of materials, office products, or other small shipments of goods and supplies. This category includes industries such as government, education, health care, and other professional categories. Though these industries are important in the context of the passenger rail assessment, they are not part of the freight rail analysis.

In California, goods movement-dependent sectors accounted for about $1.52 trillion in output in 2008, led by manufacturing ($770 billion), construction ($179 billion), and retail trade ($175 billion).[93] Industry output is projected to grow at a rate of about 2.5 percent annually, reaching an output of almost $3.4 trillion in 2040. Manufacturing output will account for $1.7 trillion of this, wholesale trade will account for $517 billion, and retail trade will account for $461 billion. Since rail is the transportation mode of choice for many of the commodities associated with these sectors, demand for rail transportation services is anticipated to remain strong and grow through 2040. More details on these commodity movements follow. Appendix D summarizes the methodology and data sources used for this analysis.

6.2.2 Commodity Flows and Train Volumes

Commodity Flow Analysis – Volumes

As shown in Exhibit 6.9, roughly 176 million tons of commodities moved by rail in California in 2007, of which 99.3 million were inbound and 58.3 million were outbound. About 11.6 million tons moved between origins and destinations within California (also known as "CA Local"), and just over six million tons traveled through the State without stopping (also known as "CA Through").

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93 Economic data and forecasts were based on the TREDIS Model (Economic Development Research Group). Inputs generated as part of another Caltrans funded project.

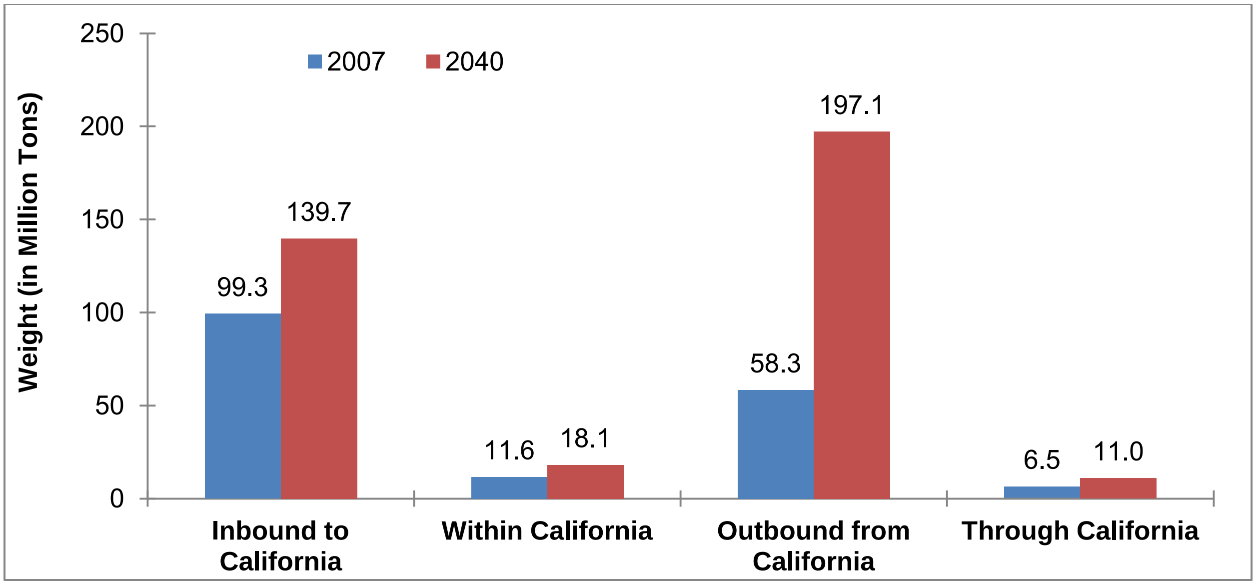

Exhibit 6.9: Directional Distribution of California Rail Tonnage

Source: Federal Highway Administration (FHWA), Freight Analysis Framework Version 3 (FAF3) database and STB Carload Waybill Sample.

By 2040, roughly 366 million tons are projected to move on the State's rail system. Outbound traffic is anticipated to grow to 197.1 tons, an annual growth rate of 3.8 percent. Inbound tonnage is anticipated to grow at a slower rate (1.0 percent), reaching 139.7 million tons by 2040. This imbalance in growth of outbound versus inbound cargo largely reflects the dominance of port-related intermodal cargo as a driver of growth in rail traffic for California. Rail service types (intermodal versus carload) and international versus domestic rail market trends are discussed later in this chapter. Appendix D provides county-to-county commodity flows.

Commodity Flow Analysis – Commodities

The numerous types of commodities carried on California's rail system reflect its diverse economy, as shown in Exhibits 6.10 and 6.11.

The most common commodity transported by rail in California in both 2007 and projected for 2040 is mixed freight (specific commodity not identified in shipping documents), the category under which approximately 80 percent of containerized goods are reported. Exhibit 6.10 shows that mixed freight represents over 40 percent of rail tonnage in 2007, and Exhibit 6.11 shows that this commodity will grow at a faster rate than all other commodities, representing over one-half of all rail tonnage by 2040. It should also be noted that domestic intermodal shipments of mixed freight are expected to grow rapidly over the forecast period. This trend reflects expectations of continuing growth in demand for rail intermodal services in long-haul markets and some continued shifting from carload to containerized freight.

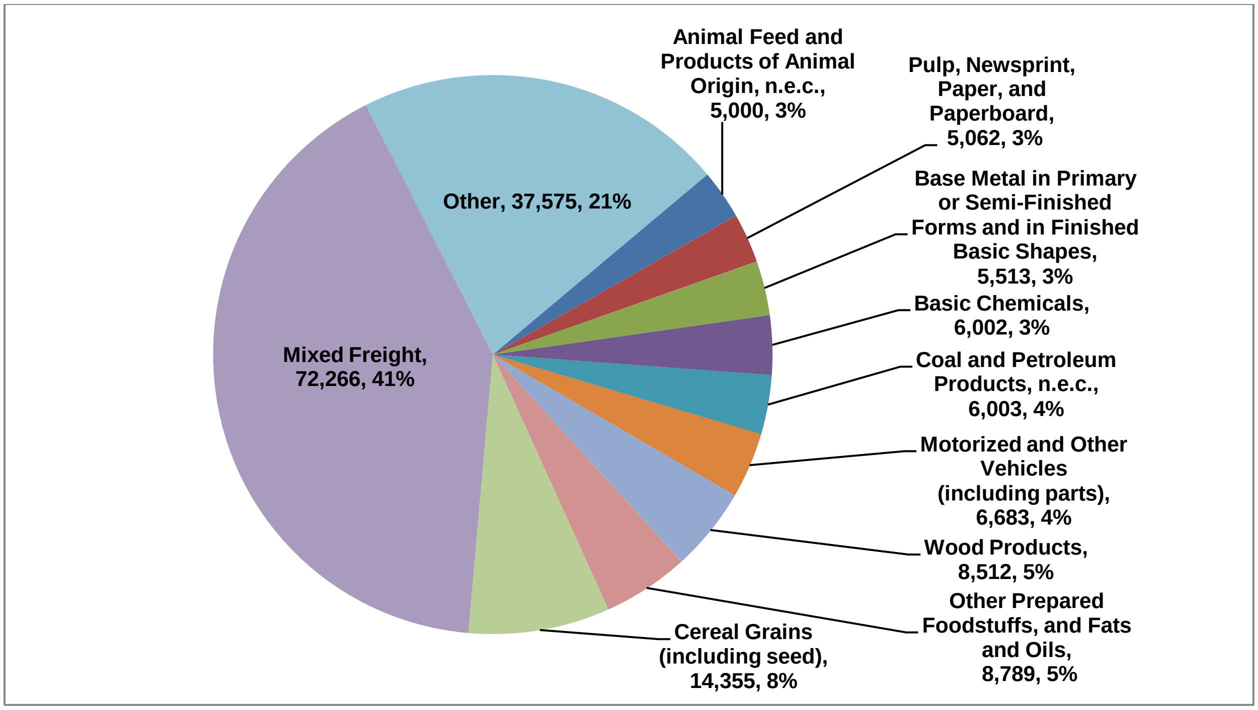

Exhibit 6.10: California's Top Rail Commodities, All Traffic, 2007

Source: Commodity flow assessment based on the STB Carload Waybill Sample.

Note: Values are in thousands of tons; n.e.c = Not Elsewhere Classified. Values include movements inbound, outbound, within, and through California.

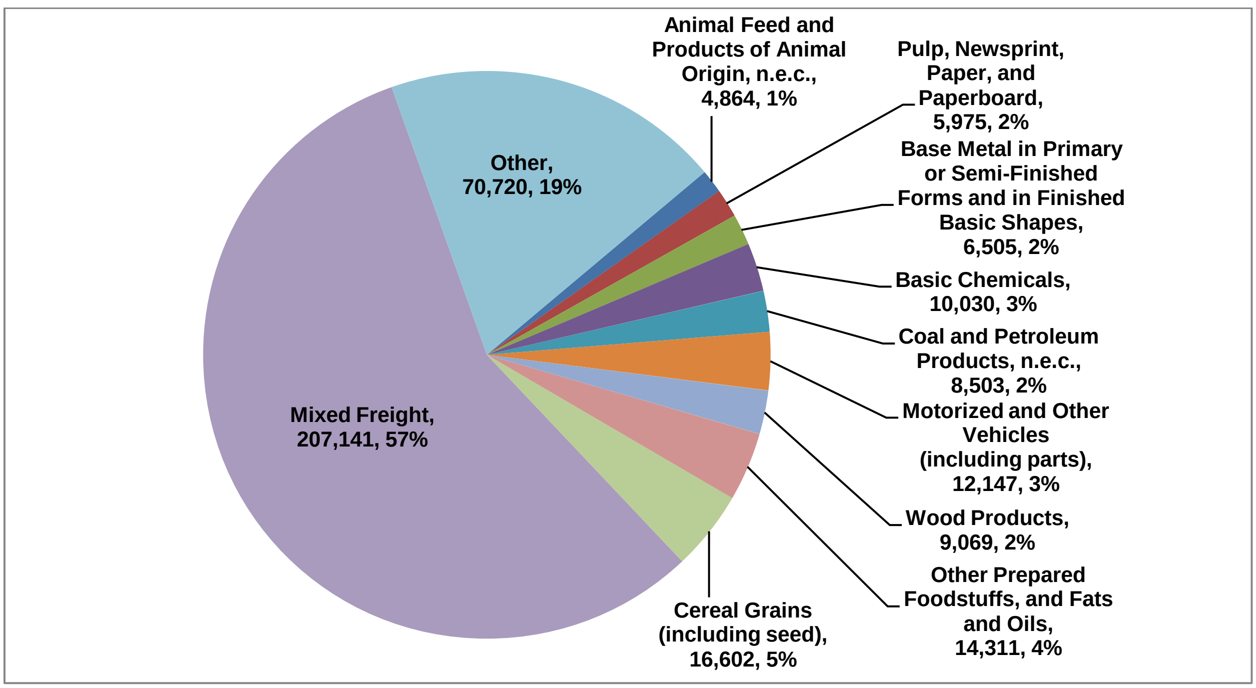

Exhibit 6.11: California's Top Rail Commodities, All Traffic, 2040

Source: Commodity flow assessment based on the STB Carload Waybill Sample.

Note: Values are in thousands of tons; n.e.c = Not Elsewhere Classified. Values include movements inbound, outbound, within, and through California.

Rail Service Splits – Carload and Intermodal

Another way to examine rail commodity movements is by the two major service types—intermodal and carload. Intermodal traffic is generally associated with containerized cargo, and involves the lifting of an entire box (container) from ship to rail or from truck to rail. Carload traffic, on the other hand, includes assembled motor vehicles, bulk, commodities (such as grain, coal, and plastic pellets) and general merchandise (such as lumber, bagged cement, etc.) that are loaded into individual railcars (as opposed to a container). Exhibit 6.12 shows the 2007 and 2040 tonnage splits of these two service types.

Port Traffic and Other Domestic Traffic

In 2007, carload moves comprised the majority (51.7 percent) of all moves in California, while intermodal moves comprised 48.3 percent. However, as already noted, intermodal traffic is expected to expand nearly three times faster than carload traffic between 2007 and 2040, accounting for 64.5 percent of rail moves by 2040. Discussed further in the next section, growth in port-related rail traffic is expected to be a major driver of this trend along with continued partnerships between trucking and rail in long-haul markets.

While intermodal service continues to grow in importance in California and the rest of the nation, carload service is still very important, particularly for the movement of automobiles, petroleum and chemical products, and select products manufactured by California's heavy industries, as well as agricultural products and related inputs. The emphasis on intermodal and unit train movements by Class I railroads has caused concern for some carload shippers, particularly in the San Joaquin Valley, that their access to service may be limited in the future. This is especially true for small-volume rail shippers.

While this does not appear to be as significant an issue in California as in other parts of the western U.S., it has created interest in the development of logistics hubs, truck-to-rail transload facilities, and various other types of consolidation services in order to encourage growth in carload services.

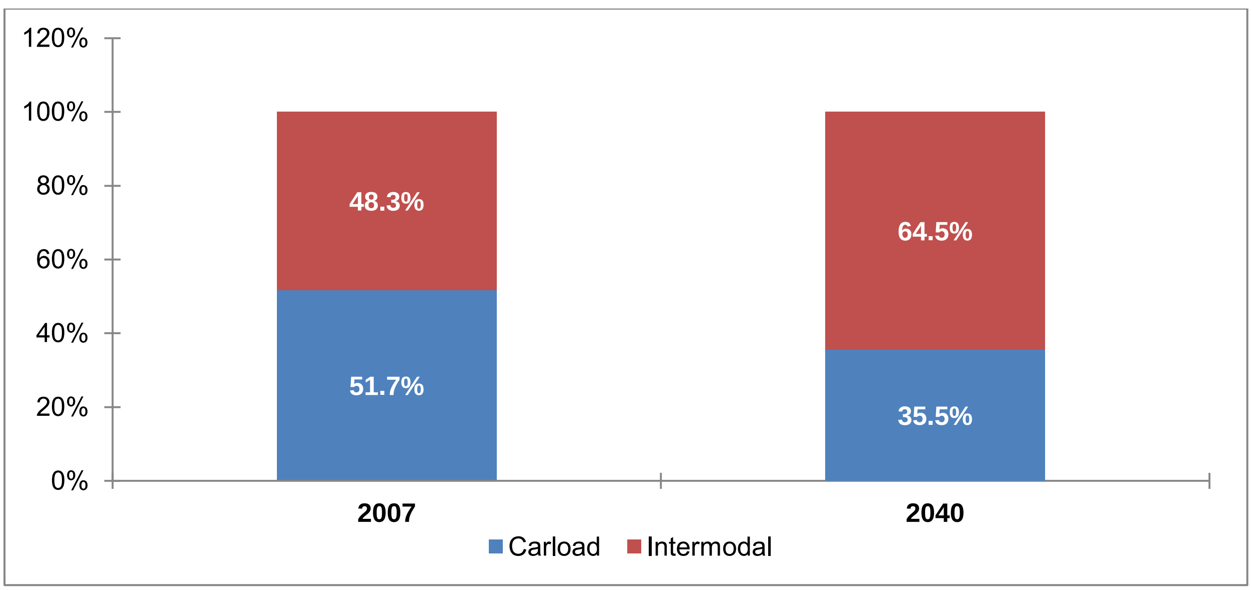

Exhibit 6.12: California Rail Tonnage by Rail Service Type

Sources: FHWA, FAF3 database and STB Carload Waybill Sample.

One successful example of this type of service is the RailEx service offered to agricultural shippers out of Delano. RailEx USA offers a large transload and distribution center facility in Delano tailored to the needs of agricultural shippers, coordinated with UPRR to provide coast-to-coast service to New York State. The facility allows shippers to consolidate with other shippers and achieve the benefits similar to "unit train" service. A number of similar concepts are under development to serve different industries and markets throughout the State.

California's rail system offers vital service to the State's deepwater and inland ports. Exhibit 6.13 shows the distribution of rail tonnage by market type (port traffic and other domestic traffic) in 2007 and 2040. Out of a total of 176 million tons moved in California in 2007, 108.1 million tons were domestic traffic and 67.6 million tons (about 38 percent) was directly associated with the POLA, POLB, and San Francisco/ Oakland.

Driven by an increasing volume of exports, the proportion of the State's traffic associated with these ports is expected to grow through 2040 as International growth is anticipated to outpace domestic volume growth. The annualized growth rates for POLA/POLB, San Francisco/Oakland ports, and Domestic/Other are 3.2 percent, 2.9 percent, and 1.5 percent, respectively. By 2040, the State's rail system is projected to feature greater port traffic (188.8 million tons) than domestic traffic (177.1 million tons). As discussed in Section 6.3, this growth in port-related traffic will create stresses on certain key rail corridors serving the ports, and will also create the need for additional intermodal terminal capacity (both on-dock and near-dock) in both POLA/POLB and the San Francisco Bay Area.

Key Trading Partners

Exhibit 6.14 summarizes the key trading partners for California's rail commodities. The nation is divided into several regions for this comparison:

- The East North Central region (Indiana, Illinois, Michigan, and Ohio) dominates trading both in current and future years, accounting for 25.6 percent of total rail flows in 2007 and about 31.2 percent by 2040. Trade is driven by traffic destined for the rail yards of Chicago, a central distribution and consolidation point for much rail-carried freight.

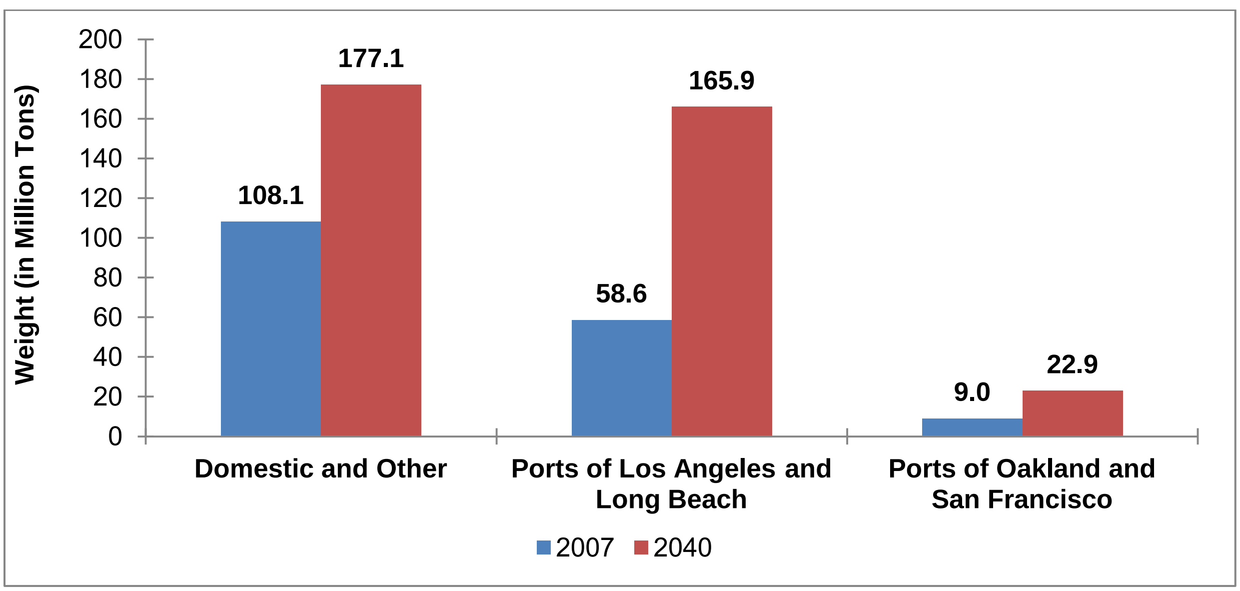

Exhibit 6.13: California Rail Tonnage by Rail Market Type

Sources: FHWA, FAF3 database and STB Carload Waybill Sample.

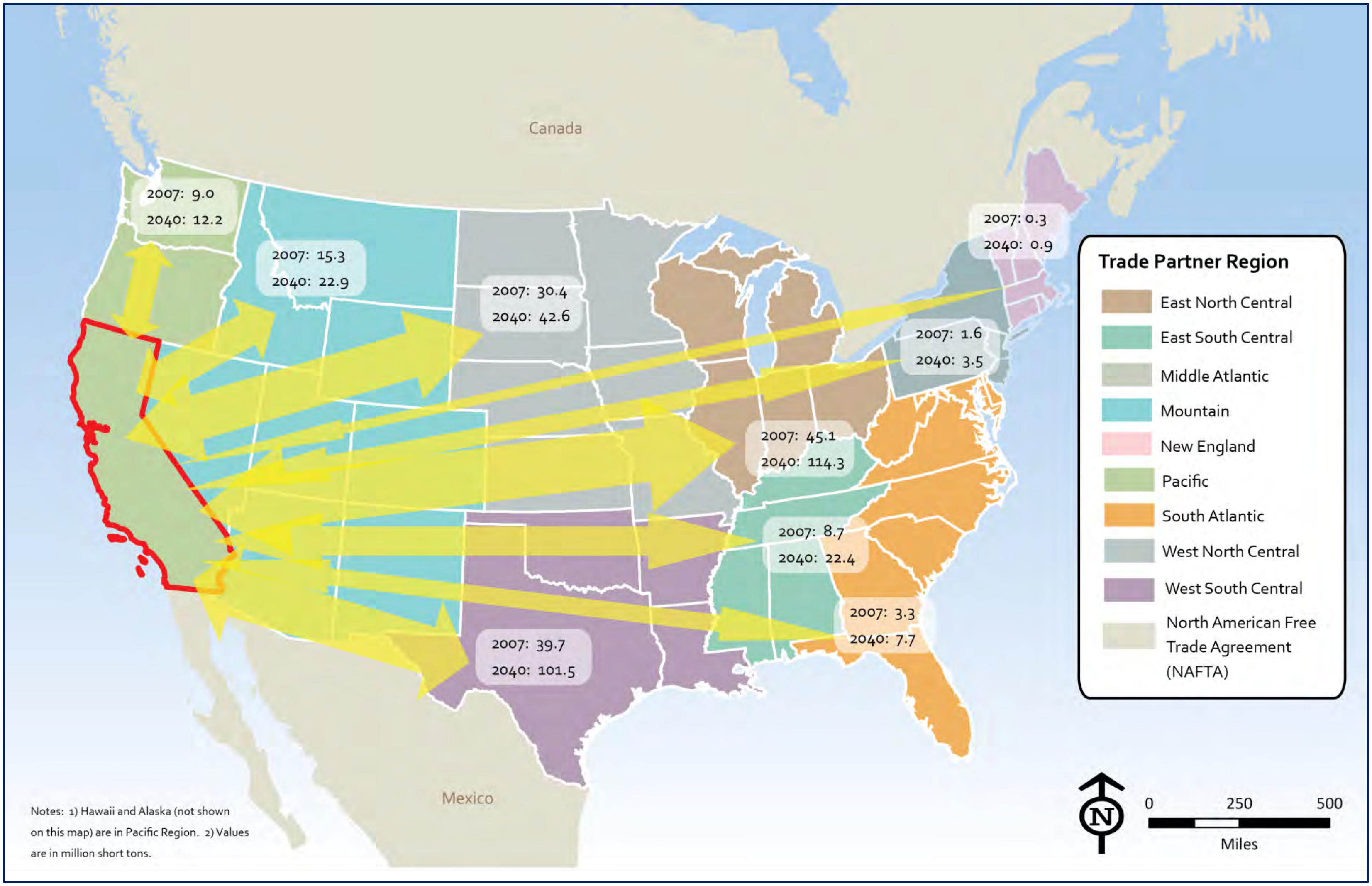

Exhibit 6.14: California Rail Trading Partner Tonnage Distribution

Sources: STB, Confidential Carload Waybill sample, 2007; FHWA, FAF3 commodity flow dataset; UC Davis' TREDIS Economic Forecasts for Caltrans; San Pedro Bay Ports Containerized Cargo Forecasts, 2009; San Francisco Bay Area Containerized Cargo Forecasts, 2009; and Esri, 2012.

- The West South Central region (Texas, Louisiana, Oklahoma, and Arkansas), where trade is driven by crude oil shipments to and from the refineries in these locations.
- The West North Central region (midwestern states such as Minnesota, North and South Dakota, and Iowa), where trade is driven by the mining and manufacturing materials for the growing extraction business in North Dakota, grain shipments from the Midwest, and deliveries of consumer products from West Coast manufacturers and ports.

  In the future, the key trading partners for rail-carried freight are projected to continue to be the East North Central region, the West South Central region, and the North Central region.

6.2.3 Current Freight Rail Operational Trends and Issues

This section provides an overview of major trends affecting freight rail. The topics discussed in this section include:

- International trade trends. This section examines significant trends in international trade and global logistics that could have important implications for freight rail in California.
- Freight rail context. This section examines the major internal and external trends affecting freight railroads, including logistics, customer base, regulation, and modal competitiveness.
- Issues specific to small railroads. This section describes the relationship between Class I railroads and small railroads and it presents critical system preservation issues.
- Positive Train Control (PTC). This section briefly describes the mandate requiring widespread installation of PTC systems the Rail Safety Improvement Act of 2008 (RSIA).
- Other issues. This section identifies issues that were brought up during discussions with rail industry stakeholders. Most of these issues are discussed elsewhere in the *California State Rail Plan* (CSRP) and thus, are only briefly noted in this section.

International Trade Trends

There are a number of significant trends in international trade and global logistics that could have important implications for freight rail in California. It was noted that international intermodal traffic is expected to be a major driver of demand for rail service in the State, especially on those Class I mainlines that link to the POLA, POLB, and the Port of Oakland. The CSRP uses forecasts of international intermodal cargo that are based on the most recent international trade forecasts prepared for the State's major container ports.[94]

The international intermodal cargo forecasts for the San Pedro Bay Ports (POLA and POLB), the most recent of these forecasts, were updated during the post-recession period and reflect slower growth in overall trade. Nonetheless, Pacific Rim trade, particularly trade with China, Taiwan, and Southeast Asia, is expected to dominate both import and export cargo shipped through California's container ports and will be a major source of the intermodal cargo traveling on California's rail system.

There has been speculation that supply chain risk management strategies and other economic factors could change future sourcing patterns and that this could impact Pacific Rim trade patterns. For example, there is growing evidence that factors such as rising costs of Chinese labor and transportation may lead

[94] A primary resource for much of the discussion of international cargo forecasts and the relationship of California's ports and those of the rest of North America is *San Pedro Bay Container Forecast Update*, The Tioga Group and IHS Global Insight, prepared for the POLB/POLA, 2009.

to a return of some manufacturing production to the NAFTA region and Central America. This could bring about a change in the balance of goods at U.S. gateways.

This trend has taken place in Mexico where manufacturing has gained substantially since the 2008-2009 recession. Currently most of Mexico's freight traffic moves by truck, but several private and public initiatives are pushing to shift more of this business to rail. A recent economic assessment suggested that by 2015, many goods destined for North American consumers will be just as economical to manufacture in parts of the U.S. compared to China.[95]

A 2008 white paper by Drewry Supply Chain Advisors also warned that China might decline as a load center for imports to the U.S., but was inconclusive about whether the shifts would likely be to Southeast Asian countries (which would still tend to favor routings through West Coast ports) or to Mexico and Central America (favoring Gulf Coast and South Atlantic ports).[96] It is also worth noting that growth in Chinese and Southeast Asian consumer markets will also likely continue to provide a source of export growth, providing more balanced rail flows on the California network. At the present time, export volumes exceed import volumes at the Port of Oakland and improved rail terminals (such as the planned investments at the OHIT) and line capacity (such as the Tehachapi Trade Corridor TCIF project) could facilitate continued growth in Pacific Rim exports. The POLA and POLB also have active programs to promote exports.

There is also continued concern in California about the potential implications of port improvements in Canada and Mexico to increase competition among West Coast ports. The initial success of the port at Prince Rupert, British Columbia is a clear signal that aggressive marketing and competitive rail rates and service offerings could present competition to California's ports. The situation in Mexico (where the APM Lazaro Cardenas Port is a potential new development and where the Port of Guyamas is proposing to link to the UPRR at Calexico and Nogales, Arizona) is more complex because of the lack of existing landside infrastructure reaching into major U.S. consumer markets.

To some degree, the reduced congestion at California ports due to the recession, continued investments in mainline capacity by the Western Class I railroads, and prospective expansion of intermodal terminal capacity at or near California container ports should help these ports compete more effectively with Canadian and Mexican ports in the future. The 2009 San Pedro Bay Ports' forecast update predicts significantly lower diversions of cargo to Pacific Northwest, Canadian, and Mexican ports due primarily to near- to mid-term reductions in demand and the associated lack of congestion in the southern California port and inland rail infrastructure.

A related issue, and one that has received considerably more attention in recent years, is the implication of the Panama Canal widening on California ports. It is clear that the market share of California ports will be affected by the increased capacity of the Panama Canal. This is clearly borne out by the San Pedro Bay port's *Beat the Canal* initiative, which seeks to improve efficiencies and lower costs for traffic handled through the ports. The San Pedro Bay Ports' forecast update estimated in their base case that approximately three percent of potential annual southern California cargo volume would be diverted to the East Coast and Gulf Coast via all-water routes through the Panama Canal. This continues trends that were already evident in 2010.

However, it should be noted that this increase in East Coast and Gulf Coast shares at the expense of the West Coast ports might be better characterized as a return to more historic balances among the coasts. Over the last 10 to 15 years, the West Coast share of U.S. container traffic had been increasing in part

[95] Duhigg, Charles, and Keith Bradsher, "How the U.S. lost out on iPhone work," *New York Times*, January 21, 2012.

[96] Drewry Supply Chain Advisors. *U.S. Transpacific Intermodal Today and Tomorrow* (White Paper), 2008.

because of congestion in the Panama Canal and the inability of the canal to accommodate the larger container vessels (so-called "Post-Panamax" ships) that were becoming popular among ship operators.

With the widening of the Panama Canal (expected to be completed in the 2014 to 2015 timeframe), this trend towards increasing West Coast share has been reversed and could stabilize in the near future. Rail and ocean rates (as well as rates for using the canal) along with the sourcing patterns of U.S. importers are likely to have a significant impact on this balance among the coasts in the future. Western Class I railroads are expected to price their services to retain as much of their high-value business as possible, and to compete aggressively with the all-water routes through the Panama Canal. A recent report by Leachman and Associates for the Southern California Association of Governments (SCAG) notes the importance of rail pricing strategies in driving market shares amongst West Coast ports; these types of pricing strategies will no doubt influence the impact of the Panama Canal.[97]

A final international trade and global supply chain trend that has important implications for rail freight traffic in California (and that has already been alluded to in this chapter) is the trend towards consolidation/deconsolidation supply chain strategies (also referred to as transloading). In this type of supply chain strategy, an importer defers decisions about where to direct shipments among their various regional distribution centers around the U.S. until goods arrive in the U.S. This is done so that the importer has tighter control over inventory. In this strategy, when imports arrive at a U.S. port in multiple international containers, these containers are unpacked, the goods sorted, and new loads combined in domestic containers to better match the inventory requirements of specific stores or regional distribution centers. These new shipments are loaded into larger domestic containers and often put on intermodal rail cars for inland shipment.

Substantial transloading infrastructure has been developed at the POLA, POLB, and Port of Oakland, and all three ports are investigating the potential for becoming more "transload friendly." Transloading also brings greater economic benefits to the regions around the ports because of the additional logistics and light manufacturing jobs that are associated with this type of supply chain.

As part of freight rail planning, it is important to respond to this growing transload activity by ensuring there is sufficient intermodal terminal capacity to handle this particular component of intermodal traffic. In recent years, ports and logistics service providers have worked together with the railroads to provide access to intermodal terminals at, or close to, the ports where these "domestic" loads can be handled. For example, the Port of Oakland has recently worked with local logistics service providers to develop transload warehouses at the former Oakland Army Base with direct access to near-dock intermodal terminals.

Freight Rail Context

The state of the rail industry is a reflection of its history as one of America's oldest large-scale geographically dispersed commercial enterprises. From its beginnings in the 1830s to World War I, the railroad industry had established itself as the dominant form of land transportation through its ability to move large volumes of passengers and freight much more rapidly and efficiently than any other mode. However, by the 1920s, when the rail network had reached its largest size of more than 250,000 miles, it was generally recognized that too many lines had been constructed and competition among railroads had weakened the financial outlook for the once all-powerful industry. Additionally, the trucking industry developed to the point where it could compete for freight business. It was also apparent that automobiles, buses, and—somewhat later—airplanes would attract most of the passenger traffic away from rail travel. The faster and more flexible highway began to make inroads into railroad traffic during the 1920s, a trend that continued largely unbroken—with the exception of World War II—for almost 70 years.

[97] Leachman & Associates. *Final Report – Port and Modal Elasticity Study*, prepared for Southern California Association of Governments, 2010.

By the 1990s, the size of the rail network had declined by almost one-half, and the rail industry's share of traffic and especially transportation revenue had dropped dramatically. Mergers, which had begun almost as soon as railroads were first constructed, have continued until only a handful of major carriers remained. As the primary railroad network was being consolidated, many lower-density lines were spun off as small railroads. By 2007, these railroads operated one-third (45,800 miles) of the 140,100-mile U.S. network, and, for commodities other than coal and intermodal, they handled 41.5 percent of all rail shipments in North America. Short lines generate a significant volume of revenue by performing a critical transportation function for local agriculture and industrial products shippers, connecting them to the Class I railroad mainline services.

In addition to rationalizing the network, the industry greatly improved operating efficiency through the use of better technologies for track, equipment, communications, and operations control. These improvements allowed for the economical operation of larger and heavier trains with smaller staffing levels, producing cost savings that were largely passed back to customers in the form of lower rates. The introduction of double-stack container trains and the modern automated intermodal terminal allowed railroads to remain competitive for long-haul shipments of general merchandise.

The net effect of these improvements allowed railroads to increase ton-miles and net-tons, but not revenue and commodity value transported. Whereas, railroads produced 28 percent of intercity freight ton-miles in 2005, they carried only 5 percent of the value of commodities transported by all modes in the U.S. The railroads' modest share of overall freight value and revenues produced is brought about by several factors, the most influential of which is the nature of the commodities handled by the railroads, service quality (trip times, reliability) vs. motor freight, and the markets served. Railroads attain their greatest efficiency and competitive advantage over other modes when handling large volumes over longer distances in point-to-point service. Thus, coal has been the single largest commodity hauled for many years, accounting for around 40 percent of originated tons, followed by chemicals, farm products, and nonmetallic minerals, with each being between 7 percent and 9 percent of total tons. Intermodal is in fifth place with over 6 percent of originated tons.[98]

Competitive pricing has been a critical factor in the railroads' ability to stabilize and at least maintain their market share. Rail rates to shippers dropped following economic deregulation in 1980, allowing the railroads to hold market share, but at the cost of revenue and profitability. In the 1980s, the railroads' estimated return on investment (ROI) was consistently substantially below that of other industries. This trend began to change following the 2001 to 2002 recession, reaching a high of 10.17 percent in 2007 for the Class I railroads as a whole. Industry's ROI slipped during the 2008 to 2009 recession, but has since recovered to 9.9 percent in 2010, 1.1 percent below the STB's 2010 calculated cost of capital.

While these rates of return may seem robust for transportation carriers, railroads carry the full burden of building and maintaining their own infrastructure, and are among the most capital intensive of all industries, with recent investment levels as a percentage of revenues devoted to capital in the range of 17 to 18 percent. By contrast, U.S. manufacturing industries spent an average of 3.5 percent, with the electric utility industry topping the group at 11.6 percent. And, with few exceptions, the rail industry must continue to make capital investments and maintain track, bridges, and locomotives across its network regardless of the business cycle. It cannot disinvest itself of mainline track or discontinue maintenance during recessions without ceasing revenue-generating service. This situation has also encouraged the railroads to be highly risk-averse.[99,100]

[98] The actual share is somewhat higher, as figures for the commodity-specific categories include some traffic that moves intermodally in addition to carload and unit train service.

[99] Surface Transportation Board. Docket No. Ex Parte 558 Railroad Cost of Capital.

[100] Surface Transportation Board. Docket No. Ex Parte 552 Railroad Revenue Adequacy.

The relatively low rates of return, high capital needs, and lack of liquidity has resulted in a persistent shortfall or gap between what the railroads “should” be investing out of their revenues to maintain the rail network, expand it, and grow market share and what they can afford to invest. During the 1990s, this shortfall was about $2 billion annually for the Class I railroads. From 2002 onward, the gap has narrowed to $1 billion annually, with the shortfall primarily impacting capacity expansion needs.

The rise in returns from 2003 onward has in part occurred due to a rapid rise in traffic volumes without associated increases in capacity among both the railroads and their highway competition. This allowed railroads to raise rates and generate greater profits, thereby boosting stock prices and generating greater attention on Wall Street. To deal with this new business environment, the railroads adopted a number of strategies:

- A primary strategy has been to focus on their “hook and haul” business—the high-density, long-haul freight movements where large volumes enable economies of scale in operation and keep service profitable. This means giving priority to intermodal container movements from West Coast ports, unit coal trains from the Powder River Basin (PRB), and unit grain trains to Pacific Northwest and Gulf ports. Railroads face especially strong political pressure to maintain capacity, service, and price in the energy and intermodal markets, so infrastructure expansion has been focused on the coal lines out of the PRB and the intermodal lines out of the POLA and POLB.
- A second strategy to increase prices and reduce service is to divest of lower-profit traffic has occurred across many rail markets, where growing bulk and intermodal traffic has squeezed out carload traffic. The use of such strategies to allocate rail service makes business sense from the railroads’ perspective, but for individual shippers and some short lines that are “captive” to a single railroad, higher rail rates and inferior service mean lower profits, smaller market share, and in some cases the risk of business failure.
- Because the carload business still accounts for a large and a profitable element of railroad business, the railroads are pushing a third strategy to encourage carload traffic consolidation at centers on their mainlines. Logistics parks, transload centers, and consolidation facilities enable the railroads to continue to provide carload service as a more operationally simple “hook and haul” operation. The Class I railroads also continue to transfer low-density branch lines to short line railroads, who can operate at lower cost and are generally able to provide more flexible and tailored service. This has been an effective strategy in maintaining rail services in some markets, but at the cost of transferring risk to the short line operators. In addition, where trucks are substituted for rail, the public may incur increased pavement and bridge maintenance costs that are not recovered through user fees.

Short Lines

In recent years, the short line industry has consisted of a mix of profitable and marginal performers. The volume of traffic handled by a short line has a direct impact on track maintenance levels, speeds, service reliability, and ultimately the financial viability of the short line service. High-volume markets and lines have done relatively well, while low-volume markets and lines have struggled. Consolidation of short line ownership and some consolidation of low-density lines and collector/distributor functions have improved the business outlook for short lines in some very low volume markets. Short lines in California and elsewhere are not meeting critical volume thresholds, and services along with investment in track and equipment are declining. Beyond volume, the short line industry faces three specific problems as discussed in the following sections.

Infrastructure Needs

Infrastructure conditions tend to be inferior to those of the large railroads. Track is not as well maintained with lighter-weight rail; tie and ballast conditions are inferior; short lines lack an active signaling system. As a result, train speeds on the mainlines are lower, typically 40 miles per hour (mph) or less for freight trains, and operations are less automated. Although these conditions are usually adequate for existing business, many carriers struggle to maintain track at minimal commercially acceptable levels, and are unable to accommodate modern rolling stock. With the large railroads moving from 263,000 (commonly referred to as 263K) to 286,000 pounds (286K) and 315,000 pounds (315K) as standard maximum car weights, the ability to handle standard modern rolling stock has become a particular concern. Absent accommodation of these heavier cars, the competitive position of many short lines will be substantially compromised. In California, only 42 percent of reported short line mileage (41 percent) can accommodate 286K railcars, 38 percent 263K, and another 19 percent at less than 263K. Public sector initiatives to address this issue have taken the form of a federal investment tax credit that was available between 2005 and 2010, explained in Section 6.4.

Railcar Availability

The availability of suitable railcars for short line shippers can be problematic. Although railcar supply for many car types has exceeded demand in recent years, some car types most commonly used by short lines are aging and not being replaced at levels necessary to sustain traffic. This is particularly the case for box cars, which are used to handle a variety of merchandise, with short lines carrying a disproportionate share of this traffic.

Pricing and Access Conditions

Short line railroads, with their narrow geographic coverage, must rely more heavily on connecting carriers to serve their customers' market needs. Key to the situation are the agreements between short lines and their Class I connections, which are the result of a line's prior history and present ownership. A short line may or may not have independent rate making authority (i.e., the ability to negotiate its own revenue levels for local and interchanged traffic). If carloads are interchanged with one or more railroads, traditionally each rail entity would be entitled to individually establish a rate for its participation in transporting a shipment. In the case of several short lines in California, this rate-setting ability is superseded or preempted by agreements with their Class I connections. These agreements, which were established when the line was spun off by the former Class I owner, often restrict independent rate making, car supply, and the interchange of cars to the line's original owner, even if connections to other Class I carriers are available. This process allows the seller to retain some benefits of unique access to businesses on the branch, often in return for favorable purchase terms. These rate and operating restrictions, or the ability of the short line to only interchange with one railroad due to lack of other connections, creates what is known as a "captive" short line.

Although most of these restrictive terms are contractually agreed relationships, with advantages or compensation accruing to both parties to the agreement, in a few cases the restrictions have led to ongoing inefficiencies. Examples include unintended increases in short-haul switching moves at or near the interchange point and insufficient revenue yields with detrimental effects on the carriers' ongoing viability. In some cases, short lines have had to forego new business that would have been logically routed onto another connecting Class I or divert natural rail traffic onto trucks to reach final destinations that are otherwise rail accessible.

Looking Ahead

Overall, California's railroads are stable, productive, and competitive and they have enough business to operate profitably. Railroad ROI, at least among Class I carriers, is now near a level sufficient to maintain the existing infrastructure, but it may not be sufficient to accommodate anticipated growth. Whether the industry can sustain its current position is contingent on a range of issues, of which three are worth watching:

1. Customer base.
2. Ongoing initiatives to modify economic regulation.
3. Shifting modal economics.

Each issue presents opportunities and challenges for the railroads. Each issue may also create uncertainty that will influence a railroad's willingness to invest.

Customer Base

The 2008 to 2009 recession saw substantial changes in the railroad's customer base. While the primary effects of a recession are cyclical, they can also impart profound long-term effects. The most dramatic example of a massive recession-induced change is that which occurred in the automobile industry. General Motors (GM) and Chrysler went through bankruptcy and reorganization, and other automakers also closed plants and restructured operations (including the GM/Toyota New United Motor Manufacturing Incorporated joint venture in Fremont). After dropping to a low of fewer than 10 million unit sales in 2009, annual automobile sales have recovered to around 14 million units at present, which is still 3 million less than the typical sales volume during the years prior to the recession. Not only is the automobile industry a railroad customer, many other rail-oriented industries, such as chemicals and steel, are suppliers to the auto industry.

The energy sector is undergoing a transformation that is unrelated to the recession. Coal, which has represented roughly one-quarter of the railroads' revenues and upward of 40 percent of their ton-miles, faces considerable uncertainty as the primary fuel for electricity generation. The recent development of major new natural gas fields in the Appalachians, North Dakota, and Texas has caused a dramatic drop in gas prices, with the energy equivalent price for gas now being roughly one-half that of coal. The combination of lower fuels cost, lower capital costs for new electricity-generating capacity, coal utility plants approaching retirement, and lower environmental impacts is leading to a shift in the preferred fuel source for electricity generation from coal to gas. Whereas coal accounted for over 50 percent of electricity generation capacity for decades, it is expected that 2013 will be the first year that natural gas will account for a greater share of electricity production than coal. Thus far, this has led to a drop of 15-percent or more in coal shipments by rail. In time, domestic coal consumption could drop by 50 percent from its peak. While impacts of this reduction are expected to disproportionately affect Appalachia, it has also led to a significant decline in PRB coal volumes as well. Partially in response to this decline, as well as expanding overseas markets for coal, producers and railroads have been advancing efforts to export coal to Asia from West Coast ports. At present, a major impediment to this effort is the lack of export dock facilities on the West Coast, the development of which has become a very contentious issue for environmental and other reasons. Thus, it is unclear to what extent coal will become a major West Coast export commodity.

Although the railroads may have been concerned by the drop in coal demand, new natural gas and oil well development has produced substantial and unforeseen traffic growth. The lack of pipeline capacity in some markets, notably North Dakota, and shifting energy markets has given the railroads entrée to the transport of crude oil in major volumes for the first time since the 19^{th} century. Unit trains of crude oil are being shipped regularly from North Dakota to refineries along the Gulf Coast, California, Oklahoma, and even the Canadian province of New Brunswick. It is not yet evident whether this will be a long-term trend. At the same time, the development of the new wells using hydraulic fracturing requires more inbound supplies than traditional wells. Fracturing sand, chemicals, and other commodities required for these wells are being shipped from locations throughout the U.S. by rail.

Economic Regulation

The Staggers Rail Act of 1980 substantively deregulated the rail industry, and formed the key underpinning in helping the rail industry achieve its present economic vitality. Over the years, the railroads have successfully fended off a series of legislative attempts at changing some fundamental conditions related to pricing, competitive access, and the application of antitrust statues in the merger approval process. However, in recent years pressures to make substantial modifications to the Staggers Rail Act have swelled, and both chambers of Congress— including the current one— have introduced legislation and conducted well-publicized hearings.

While these efforts have not borne fruit, the STB has responded to these pressures by making changes to their procedures to make them more attuned towards shippers. This more "shipper-friendly" attitude has also been evident in several recent decisions, which went in favor of shippers, that only a short time ago would likely have favored the railroads. Furthermore, in January of 2011, the STB announced that it would conduct a review of competition in the railroad industry and whether it causes substantive and quantifiable negative effects on industries that are heavily reliant on rail service.[101] How potential changes may impact the financial performance of the industry is not known, but they are unlikely to improve them.

Shifting Modal Economics

Challenges faced by motor freight, the railroads' primary competitor and sometime collaborator, stand to influence future rail traffic in a direction that could either benefit them or put them at a disadvantage. The rail industry's improving financial performance, which began in the early 1990s, is in part attributable to disproportionately steeper cost increases motor carriers have faced compared to railroads. Rising diesel prices, growing highway congestion, reduced driver utilization due to hours of service regulations, and a continuous shortage of long-haul truck drivers at prevailing wages increased motor freight's costs and narrowed the service gap. As a result, new intermodal business developed with long-haul trucking firms that would use the railroads to carry their shipments in some major lanes as a transparent substitute for over-the-road line-haul operation.

The impacts of evolving federal transportation policy add to the uncertainty of future business conditions for the industry. The Highway Trust Fund, which for decades has funded most capital investment in highways through user fees, is insolvent. Since FY 2009, and likely through FY 2014, the federal government will be using general funds to bridge shortfalls, but longer-term solutions are very much still in flux. However, some form of increased user fees seems inevitable, irrespective of how highway investments will be funded. While there is some agreement in the trucking industry about the need to increase these fees, some stakeholders are demanding a productivity boost in return through changes in federal truck size and weight regulations. The maximum weight has been set to 80,000 pounds since 1983, and longer combination vehicles have been limited to certain highways, located primarily in the West, since 1991.

The economic impact of a nationwide increase in truck size and weight on the rail industry has been a subject of discussion for many years. Any significant changes in truck size and weight beyond current limits that are broadly applicable will provide productivity gains to trucking firms that will tilt modal economics toward highway transport. Short lines are likely to bear the brunt of these impacts disproportionately, given their heavy orientation toward small volume carload traffic hauling commodities that are most readily divertible to truck.

[101] Boyd, John D., "STB's Nudge to Regulate." *Journal of Commerce,* May 9, 2011.

Positive Train Control

PTC refers to technology that is capable of preventing train-to-train collisions, over speed derailments, and casualties or injuries to roadway workers (e.g., maintenance-of-way workers, bridge workers, and signal maintainers). The technology combines:

- Precise real-time locating (usually with GPS) of all trains and other vehicles occupying track.
- Cataloging of infrastructure, including turnouts, crossing junctions, grades, and associated permissible speeds.
- Algorithms that calculate the effective safe braking characteristics for each train en-route in PTC territory.
- Wireless communications between all operating units, including engineers, dispatchers, and work crews.

The RSIA of 2008 mandated the widespread installation of PTC systems by December 2015 on all lines handling regularly scheduled passenger trains or toxic-by-inhalation hazardous (TIH) materials, or lines with freight volumes that are greater than five million gross ton miles annually. This requirement effectively mandates PTC on most of the Class I rail network. In California, UPRR's and BNSF's mainlines, along with a few short line segments that host regularly scheduled passenger service, will require PTC installation.

PTC implementation will be expensive and technically difficult. Costs are likely to far exceed the $10 billion projected in 2008. Additionally, the technical challenges that have been encountered are so complex that it is increasingly doubtful that the 2015 implementation deadline will be met at an industry-wide level. A recent FRA report confirms these challenges, and many freight railroads and passenger train operators have increased pressure on public decision-makers to extend the implementation deadline. However, thus far the deadline has remained firm.[102]

Other Concerns Facing California's Freight Railroads

Discussions with railroad stakeholders identified a number of concerns that will affect the future vitality of California's railroads. These include interactions between passenger and freight rail, weight limits and vertical clearance, and potential environmental impacts. Issues arising from interaction between passenger and freight trains are not unique, but have had greater impact in California than in many other states. All of these topics are discussed in detail elsewhere in the CSRP, and are briefly mentioned here.

- Interaction with Passenger Rail Service. Shared operations with passenger rail are a very important issue for freight operators. Chapter 7 highlights passenger/freight rail sharing conditions, system conflicts, and opportunities.
- Weight Limits and Vertical Clearance. Weight limits are primarily an issue for the smaller railroads, which have had to catch up to the large railroads to accommodate the heavier weight cars that are now standard. Vertical clearances primarily affect the use of double-stack trains, which offer greatly improved efficiencies for the handling of intermodal traffic. Most of California's primary rail network has sufficient clearances for domestic double stack service, with a few exceptions. These topics are discussed in Appendix D.
- Environmental Impacts. Railroad construction, operation, and maintenance are associated with variety of environmental and community effects. These issues are discussed in Chapter 10.

[102] Bowen, Douglas John, FRA says PTC deadline won't be met, *Railway Age,* August 15, 2012.

6.3 Freight Rail System Bottlenecks and Issues

As described earlier in this chapter, there are many Class I mainline corridors that are expected to experience significant growth in traffic over the timeframe of the CSRP. While growth in traditional carload markets is expected to be modest, intermodal growth, particularly international cargo moving through California's seaports, is expected be substantial in certain key corridors. This section describes the implications of this growth in terms of potential mainline capacity needs, intermodal terminal capacity needs, and operational issues throughout the State.

This section focuses on needs that are driven by freight rail traffic. As such, the analysis looks at mainline corridors and intermodal terminals that have current capacity and operational issues and focuses on how freight rail growth would lead to future capacity and operational issues. In Chapter 7, a more integrated treatment of freight and passenger capacity and operational issues is presented, incorporating detailed simulation of corridors that include intercity passenger services.

Many of the issues in this section are drawn from previous studies, including the *2012 SCAG Regional Transportation Plan*, the *2009 I-710 Railroad Goods Movement Study*, and the *2012 San Joaquin Valley Goods Movement Study*. Appendix E provides a full list of source documents and an overview of the CSRP capacity analysis methods.

Freight railroads have business incentives to resolve the issues and constraints identified in this section. Class I railroads have historically made, and continue to make, significant investments in the California freight rail system. However, the State also has an interest in ensuring that freight rail continues to play an important role in the statewide freight transportation system. Quality and availability of freight rail service is critical to important industries in the State and is one of the reasons why the California container ports have played such an important role in regional, state, and national economies. The importance of freight rail to the California economy is discussed in Chapter 2. However, several points with regard to the significance of particular capacity issues are worth noting here. The three major container ports in California (the POLB, the POLA, and the Port of Oakland) are major economic engines for the State. In addition to the direct, indirect, and induced economic activity associated with port and marine terminal operations, the growth in these ports is connected to an expanding logistics and distribution sector. For example, in southern California, the warehousing and freight transportation sectors contributed 311,000 jobs and accounted for $22 billion in Gross Regional Product.[103] In addition, the State benefits from trade-related jobs in manufacturing and value-added services connected to its ports. The Port of Oakland's growth has long been hindered by limitations in intermodal rail services. Limitations in on-dock and near dock terminal capacity have led to interest in development of the proposed OHIT. Addressing capacity issues in the Tehachapi Pass on the BNSF's transcontinental line is another critical project for improving access to the Port of Oakland. The southern California ports face similar issues with respect to on-dock and near-dock intermodal terminal capacity limitations and mainline constraints on both UPRR and BNSF subdivisions. If the constraints identified in the following section are not addressed, these ports stand to lose market share to other West Coast ports in North America and to diversions to East Coast and Gulf Coast ports via the expanded Panama Canal. Addressing mainline capacity constraints throughout California, and in the San Joaquin Valley in particular, is also important to a number of the State's industrial carload shippers and the food and agricultural products producers in the San Joaquin Valley.

In the recent past, the State and Class I railroads have collaborated on a number of projects that bring both public and private benefits. Whether the capacity and operational needs identified in this chapter are addressed by the private sector alone, or in partnership with Caltrans and other public entities, it is important to understand the impact of these issues on the performance of the freight rail system.

[103] *On the Move: Southern California Delivers the Goods*, Comprehensive Regional Goods Movement Study, prepared for the Southern California Association of Governments by Cambridge Systematics, February 2013.

Appendix E outlines issues related to the short line system (primarily, state of good repair), shipper issues (access to service), and rail system safety, while Chapter 7 describes rail grade crossing issues. Appendix H includes a listing of all of the necessary grade separation projects throughout California. Many of these grade crossings are along mainlines described in this chapter and the grade separations are an important component of the State's programs to expand rail services. Increasing traffic on the Class I mainlines will bring growing vehicular delay at crossings, emissions from idling vehicles, and potential safety hazards. Grade separation projects identified in Appendix H and discussed in Chapter 9 will help mitigate these impacts on communities.

6.4 Overview of Capacity Issues

Many rail carriers and public agencies have analyzed California's rail network for chokepoints and bottlenecks. This section describes main line and intermodal terminal chokepoints, drawing on available materials and stakeholder input.

6.4.1 Southern California Capacity and Chokepoint Issues and Needs

Exhibit 6.15 displays locations of previously identified bottlenecks and chokepoints. Chokepoints are identified by number on the map and discussed below. In the discussion below, the number identifying the bottleneck on the map is provided following the name of the bottleneck locations.

UPRR Mojave Subdivision, Kern Junction to Mojave (Tehachapi Trade Corridor) (1)

UPRR as owner and BNSF as tenant operate on this primary freight corridor through the Tehachapi Mountains. Seventy percent of the freight volume transported over this corridor originates in the Central Valley.

BNSF has been concerned about capacity constraints and their impact on future freight growth, because its trains that operate over this route tend to be more service-sensitive.[104] BNSF routes intermodal trains from the Port of Oakland and northern California over the Tehachapi Mountains to connect with their TRANSCON mainline in Barstow. As such, this location has also been identified as a constraint to growth of rail services to the Port of Oakland. The route through the mountains includes steep grades, extreme track curvature, and a single track through the majority of the corridor. Train volumes on this line are high, and are projected to approximately double, which will exacerbate existing capacity issues.

According to the American Society of Civil Engineers' *2012 Kern County Infrastructure Report Card*, the Tehachapi Trade Corridor has a rating of "At Capacity," indicating no room to serve increases in traffic. Improvements on this route have been approved to receive support under California's TCIF, and will include double-tracking, siding extensions, and signal system upgrades. Additional information on this project is provided in Chapter 9, Freight Investment Program.

BNSF San Bernardino Subdivision (2)

The BNSF San Bernardino Subdivision is the portion of the railroad's TRANSCON route that runs through much of the Los Angeles Basin (between downtown Los Angeles and San Bernardino). This subdivision has some of the busiest mainline segments in the western U.S. The section between Hobart Yard and Fullerton Junction is a high traffic segment for both freight and passenger trains (Metrolink commuter service, *Pacific Surfliner*, and Amtrak long-distance service). Most of BNSF's traffic on this segment is intermodal, and it is expected that future growth will be driven primarily by increasing cargo volumes at the POLA and POLB.

[104] Cambridge Systematics, Inc. *San Joaquin Valley Interregional Goods Movement Plan*, Task 4: Commodity Flow Profile (Technical Memorandum), 2012.

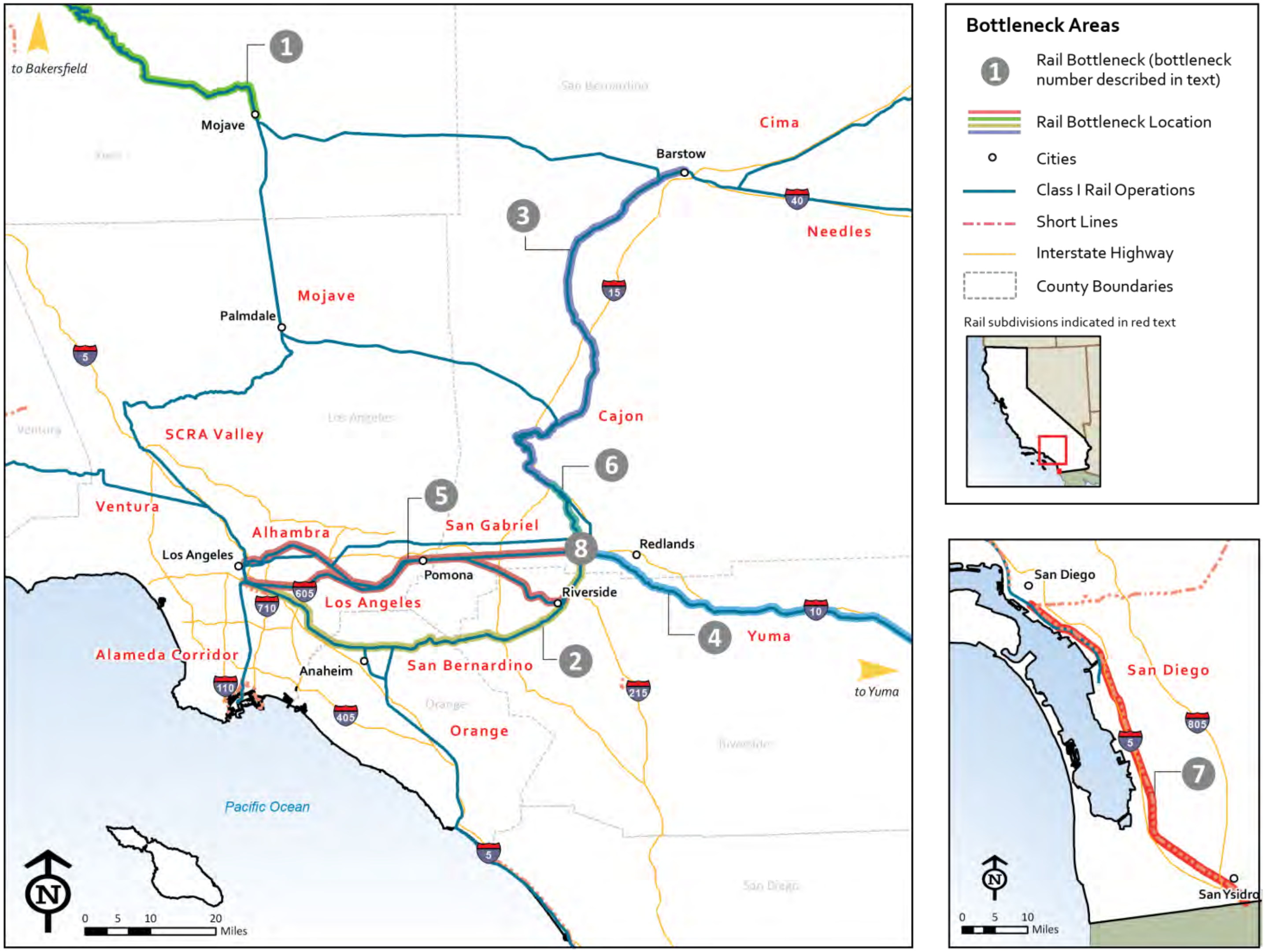

Exhibit 6.15: Southern California Rail Bottlenecks and Chokepoints

Sources: *SCAG Regional Transportation Plan Goods Movement Appendix* – 2012; *I-710 Railroad Goods Movement Study*, 2009; *Multi-County Goods Movement Action Plan Tech Memorandum 3* – 2008; *San Joaquin Valley Goods Movement Study Task 4* – 2012; *Bay Area Goods Movement Strategy* – 2007; *California Statewide Transportation System Needs Assessment* – 2011; *California State Rail Plan* – 2008; Esri, 2012.

A series of ongoing projects will provide triple track through most of this segment and, according to recent analysis conducted for the *I-710 Corridor Environmental Impact Report/Environmental Impact Statement* (EIR/EIS), should provide sufficient capacity to handle the projected growth in freight traffic in the absence of any expansion of passenger services. Since substantial growth in passenger traffic is contemplated for this segment, there is likely to be a need for four mainline tracks.[105]

Between Fullerton and west Riverside there are segments of double-track alternating with a segment of triple-track between Esperanza and Prado Dam. Based on the analysis conducted for the *I-710 Corridor EIR/EIS*, this segment is not likely to have sufficient capacity to handle growth in freight traffic assuming that current projections of port cargo growth are achieved. Additional desired growth in passenger traffic (Metrolink) over this segment would further exacerbate this problem.

The segment between west Riverside and Colton is either triple-tracked or there are plans to complete triple tracking. According to the projections in the *I-710 Corridor EIR/EIS*, this would provide sufficient capacity to accommodate projected freight train growth assuming that there are no additional passenger trains.

Rail simulation studies conducted by Dr. Robert Leachman for the *SCAG Comprehensive Regional Goods Movement Plan and Implementation Strategy* suggest a potentially different conclusion regarding the west Riverside to Colton segment of the BNSF San Bernardino Subdivision. This is the most heavily utilized line segment in the Los Angeles Basin with UPRR exercising trackage rights in addition to BNSF's own trains. The 2035 forecast for this segment projects 147 freight trains, a daily volume that would exceed capacity of a triple-track mainline, even without growth in passenger traffic. There is also a desire to significantly increase Metrolink service on routes that use this segment. Further discussion of the capacity needs and implications of growth in shared-use corridors is included in Chapter 7.

In general, adding passenger trains to the San Bernardino Subdivision would require considerable expansion of capacity according to most analyses.[106] The Leachman study for SCAG examined capacity needs in southern California assuming growth in *Pacific Surfliner* and Metrolink train volumes and determined that based on the current railroad routing practices there would be a need for four mainline tracks in the Hobart to Fullerton segment, three mainline tracks in the Fullerton to west Riverside segment, and four mainline tracks from west Riverside to Colton. The need for additional capacity to accommodate growth in freight and passenger service on the San Bernardino Subdivision was confirmed in the capacity analysis completed for this plan.

BNSF Cajon Subdivision (Barstow to Keenbrook) (3)

This is another segment of BNSF's TRANSCON corridor and carries high volumes of BNSF freight trains from the Los Angeles Basin to the rest of the U.S. UPRR also has trackage rights and operates trains via Salt Lake City and Las Vegas on this route, with some trains crossing over to the UPRR Mojave Subdivision via connections at Silverwood and Keenbrook. One daily Chicago-Los Angeles Amtrak long-distance train also operates on this route. BNSF has completed triple-tracking on the south side to Cajon Summit.

In consideration of the high level of growth in freight traffic anticipated on this line, capacity will likely need to be expanded to four main tracks in the segment between Keenbrook and Mojave Narrows.[107] Growth in traffic will also require additional capacity from Mojave Narrows to Barstow.[108]

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[105] Leachman, Robert. Regional Rail Simulation Findings, 2011.

[106] While Metrolink's long-range plans call for considerable expansion of service in this corridor, the use of BNSF track to accommodate this expansion would need to be negotiated beyond the current slots available to Metrolink.

[107] Leachman, Op cit.

UPRR Sunset Route (Yuma Subdivision) (4)

The Sunset Route runs southeast from Colton Crossing and continues through Riverside and Imperial counties traveling east to El Paso. When the UPRR acquired this route in the merger with the Southern Pacific in 1996, less than one-quarter of the route was double-tracked.

With anticipated growth in intermodal traffic originating at the POLA and POLB, UPRR announced a long-term program to double-track the route from Los Angeles to El Paso. As of late 2010, UPRR had built 292 miles of new mainline double-track. The line is double-tracked from Colton to Indio with additional segments double-tracked in Imperial County.

UPRR Alhambra and Los Angeles Subdivisions (5)

The UPRR Alhambra and Los Angeles Subdivisions are roughly parallel mainlines that represent the UPRR's primary routes through the Los Angeles Basin.

The Los Angeles Subdivision serves Metrolink trains in addition to the freight trains operated by UPRR. In essence, these two parallel routes are operated as a paired double-track railroad with westbound trains routed on the Alhambra Subdivision to Pomona and with the option of using either the Alhambra or the Los Angeles Subdivision west of Pomona depending on the time of day and volume of commuter trains on the Los Angeles Subdivision. Since the UPRR has this operating flexibility, it is appropriate to consider capacity needs for the two subdivisions in combination. The UPRR has completed double-tracking of the Alhambra Subdivision east of Pomona, which should alleviate any future capacity needs.

According to the *I-710 EIR/EIS*, there should be sufficient capacity on the UPRR Alhambra and Los Angeles Subdivisions without growth in passenger traffic. But, according to Leachman's analysis for SCAG, taking projected growth in passenger trains into account, portions of the Los Angeles Subdivision both east and west of Pomona will require additional capacity. The Alhambra Subdivision is expected to experience capacity constraints between Pomona and the City of Industry by 2035. Since these capacity needs are related to assumptions about integrated passenger and freight operations in the future and potential future operating plans involving the UPRR and Metrolink, they are discussed further in Chapter 7.

UPRR Mojave Subdivision, Rancho to Keenbrook (Cajon Area) (6)

According to the analysis conducted by Leachman for SCAG, the section of the UPRR Mojave Subdivision from Rancho to the Keenbrook connection with the BNSF Cajon Subdivision (over which UPRR operates via trackage rights) are expected to need additional capacity to accommodate modest growth in freight traffic.

San Diego and Arizona Eastern Railroad (7)

There is a TCIF project planned for this railroad to address mainline capacity as well as rail yard capacity constraints at San Ysidro Rail Yard. This congestion arises from increasing demand of bulk commodities both in San Diego and Baja California in Mexico. This represents the only non-Class I capacity issue previously identified.[109]

Colton Crossing (8)

The Colton Crossing rail bottleneck affects both passenger and freight operations in southern California. It is a complicated crossing because of conflicting train movements from BNSF in one direction and

[108] Ibid. This capacity constraint was also verified in the non-simulation capacity analysis conducted by Cambridge Systematics, Inc.

[109] California Department of Transportation. Trade Corridors Improvement Fund: Detailed Project Description, January 24, 2012.

UPRR in another. BNSF trains moving north/south between the San Bernardino Subdivision and the Cajon Subdivision (including UPRR trains operating via trackage rights) cross UPRR trains moving from the Alhambra Subdivision to the Yuma Subdivision and to/from the east on the Sunset Route. The crossing is at-grade so trains must wait for the crossing to clear in one direction before they can cross in the other direction.

As this location is along the major mainline routes that connect both UPRR and BNSF traffic in the Los Angeles Basin with points east, there is already substantial traffic and delay at the crossing that is anticipated to grow significantly worse if the crossing is not eliminated through a rail grade separation. A project to undertake this separation, funded by a combination of TCIF, TIGER, and railroad sources, is currently under construction. Completion of this project, anticipated in 2014, will ensure the long-term ability of the primary UPRR and BNSF routes into southern California to handle future freight and passenger traffic with improved performance.

Intermodal Terminal Capacity and Access Issues

As previously described in Section 6.1.3, the Los Angeles Basin has six intermodal terminals in addition to the on-dock terminals at the POLA and POLB. Both ports are planning to increase the share of international intermodal traffic handled at on-dock yards. But, a substantial amount of intermodal traffic will still be handled at off-dock yards.

In addition to "pure" international intermodal traffic (what the railroads refer to as Inland Point Intermodal traffic), a growing fraction of international cargo is transloaded from international containers to domestic containers and then shipped intermodally. It is difficult to determine how much of railroad domestic intermodal cargo is actually transload cargo, but it is clear that growth in port cargo will drive demand for intermodal lift capacity in the Los Angeles Basin.

As of 2010, off-dock intermodal terminals and on-dock rail yards at the POLA and POLB had a combined capacity of approximately 7 million lifts per year. Based on current port cargo growth forecasts and projected growth in transload and domestic intermodal traffic, by 2035, demand for intermodal lifts in the Los Angeles Basin could exceed 13,305,000 annual lifts, or almost double current capacity. The ports have projects in various stages of development that would significantly expand on-dock lift capacity. More detail about intermodal terminal investments is discussed in Chapter 9.

6.4.2 Northern California Capacity and Chokepoint Issues and Needs

Exhibit 6.16 displays location of northern California bottleneck and chokepoint issues. In the discussion below, the number identifying the bottleneck on the map is provided following the names of the bottleneck locations.

UPRR Martinez Subdivision (Oakland to Martinez) (9)

The UPRR Martinez Subdivision between Oakland and Martinez is one of the busiest segments of the northern California rail system. In addition to UPRR's own traffic, BNSF connects to the Port of Oakland via trackage rights on this portion of the Martinez Subdivision, and various state-supported intercity services (*San Joaquin*, *Capitol Corridor*, and long-distance) account for 44 weekday movements over this segment, as well. Currently, there are no additional slots available to increase passenger train volumes but there is a desire to do so. Freight traffic on this line increased with the rerouting of port-related traffic from the Oakland subdivision (Oakland to Stockton via Niles Junction) after UPRR gained access to this more direct route to Sacramento and points north and east as part of the SP acquisition.

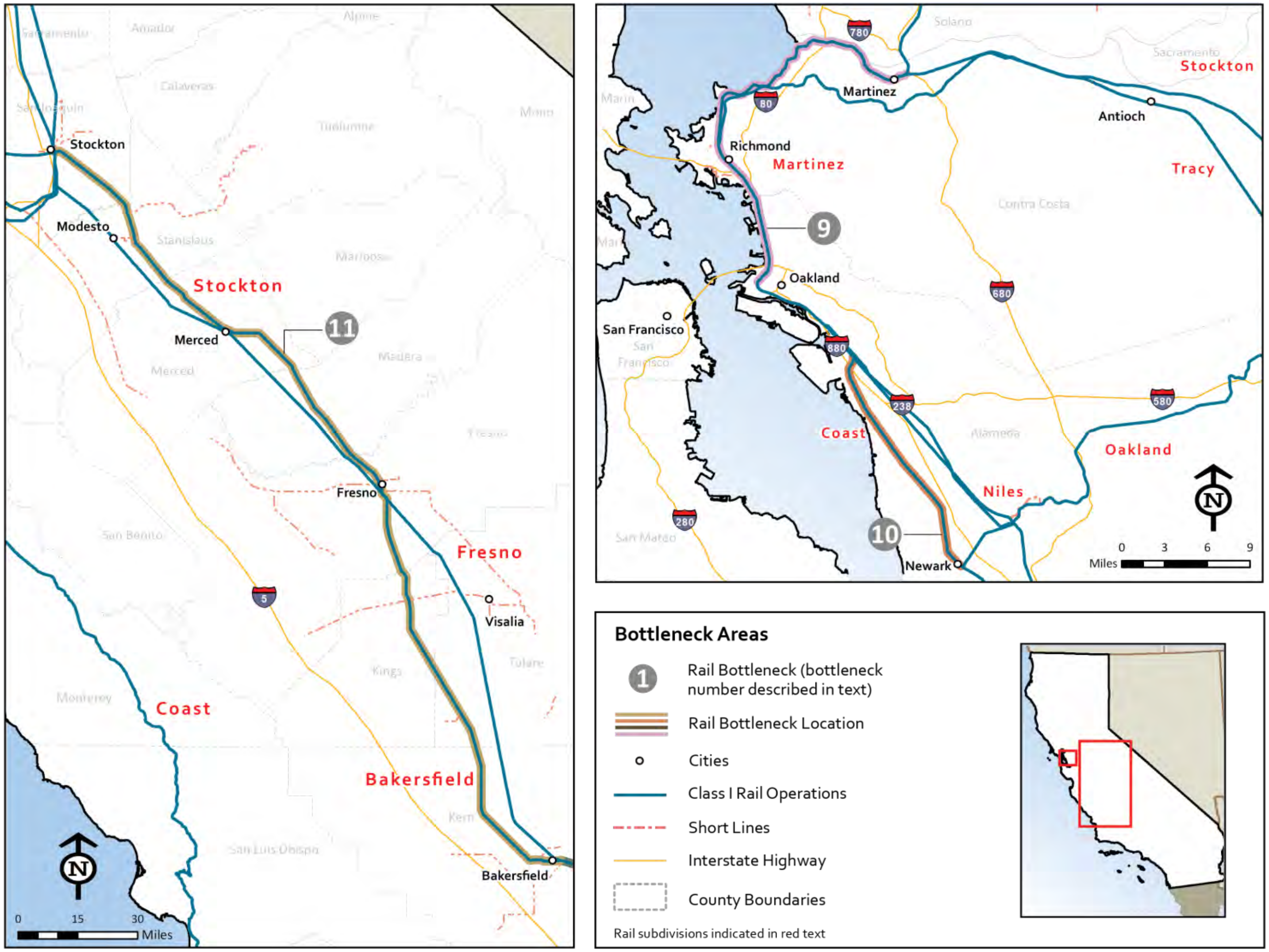

Exhibit 6.16: Northern California Rail Bottlenecks and Chokepoints

Source: *SCAG Regional Transportation Plan Goods Movement Appendix* – 2012; *I-710 Railroad Goods Movement* Study, 2009; *Multi-County Goods Movement Action Plan Tech Memorandum 3* – 2008; *San Joaquin Valley Goods Movement Study Task 4* – 2012; *Bay Area Goods Movement Strategy* – 2007; *California Statewide Transportation System Needs Assessment* – 2011; *California State Rail Plan* – 2008; Esri, 2012.

This is a double-track segment with sufficient projected demand to require at least one additional track. With the completion of work on Donner Summit, which has the potential to increase traffic on this route, the Port of Oakland sees capacity issues on this segment as an impediment to increased freight rail service and associated expansion of port activity.[110] There are a number of improvements that have been proposed for this segment, including the Richmond Rail Connector (TCIF #2) project, which are presented in the investment program discussion.

UPRR Oakland Subdivision (10)

UPRR's Oakland Subdivision is currently a relatively uncongested low-volume freight route, with the biggest capacity constraint being the west end between Elmhurst and Newark.[111] On this portion, traffic from UPRR's Coast Line and the Oakland Subdivision from Stockton are combined over a single track.

In light of the congestion on the Martinez Subdivision, there is potential for UPRR to use the Oakland Subdivision as a reliever route. But this could put pressure on the route's limited capacity, which could affect the portion of the Oakland Subdivision from Niles Junction to Stockton. This segment of the line has other capacity-related issues related to track class and geometry that limit speeds and potentially limit double-stack operations.

BNSF Mainline Stockton to Bakersfield (San Joaquin Corridor) (11)

This is BNSF's route from northern California to its TRANSCON corridor via the Tehachapi Pass, and thus must accommodate anticipated intermodal traffic growth from both domestic and international cargo. The *San Joaquin Corridor Strategic Plan* identified many sections that will require double-tracking through the medium term (5 to 10 years), with eventual double-tracking of the entire line in the long term. The capacity needs in this corridor are driven by both passenger and freight service expansion and the future operation of passenger service will be influenced by the high-speed rail concepts.

Intermodal Terminal Capacity and Access Issues

The Port of Oakland is working to resolve several intermodal terminal capacity and access issues through the construction of a new OHIT on the site of the former Oakland Army Base. The port is currently served by two primary intermodal terminals—BNSF's OIG and UPRR's Railport. Together, these two intermodal terminals have a capacity of approximately 700,000 lifts (1 million 20-foot equivalent units, or TEUs).

In 2008, the Port of Oakland projected that it would need to increase lift capacity by an additional two million TEUs to accommodate growth in overall cargo volumes and shift a larger share of its inland moves to intermodal rail.[112] While recent slowdowns in trade-related traffic are likely to postpone this need for additional capacity beyond the 2025 timeframe (as originally projected), this additional capacity will nevertheless be required during the timeframe of this CSRP.

In addition, there is a significant access bottleneck at the Port of Oakland's existing intermodal terminals. In order to access the OIG, BNSF trains must cross through the UPRR terminal and cross UPRR tracks at-grade. This movement causes significant delays and operational issues for both railroads.[113] The OHIT development has been selected to receive TCIF funding, and the terminal access improvements

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[110] Cambridge Systematics, Inc., Bay Area Goods Movement Strategy: Strategic Directions for Bay Area Goods Movement Planning, 2007.

[111] EarthTech, Korve Engineering. Bay Area Regional Rail Plan, Technical Memorandum 4g: Summary of Capacity Issues on Bay Area Regional Railroad System, 2007.

[112] Port of Oakland, 2008 TCIF Funding Nomination for the OHIT.

[113] Port of Oakland, City of Oakland. Outer Harbor Intermodal Terminal Rail Access: TIGER 2012 Funding Application.

are the subject of a recent TIGER award. More information about these projects is presented in the Investment Program section of this plan.

6.5 Institutional Structure of Freight Rail Programs

6.5.1 Roles

Freight Rail Governance in the United States

California's freight railroads are owned and operated by private companies ranging in size from the large, transcontinental Class I railroads (BNSF and UPRR) to short line holding companies such as Genesee & Wyoming Inc. and Omnitrax and small independent firms such as the Richmond Terminal Company and the Northwestern Pacific. Unlike other freight carriers, which utilize public infrastructure such as roads and airfields for their operations, most North American railroads operate as integrated systems and have full responsibility for building and maintaining the infrastructure, and operating service over it.

Freight railroads are also unique by the fact that they fall under federal regulation (initially established through the Interstate Commerce Act in 1887), and as such, are exempt from many kinds of state or local regulations that might affect other businesses. For example, states and local governments can set speed limits for trucks on public roads, but cannot set limits on railroad operating speeds. Likewise, states cannot interfere with economic regulation of railroads—this is reserved for the federal government through the STB. Many other laws, including employee labor and retirement, are also covered federally.

Because railroads are interstate in nature and, thus, a federal responsibility, the influence of state and local governments is limited. However, state and local governments can make a state more or less attractive to rail carriers. The primary areas of state involvement include:

- Taxation. States set property and income tax rates for operations that occur within their jurisdictions. Rail-owned property that serves a transportation purpose is typically taxed at a single statewide rate, with proceeds channeled to the communities in which the activity occurs. Active rail-owned property that does not serve a transportation purpose is subject to local tax levies.
- Safety. Railroad safety regulation is reserved for the federal government through the FRA. However, states are authorized to participate in a program that allows state employees to augment federal rail inspectors. In participating states, inspectors are trained and certified by the FRA to assist the FRA in special enforcement activities and in general rail safety work. Some states generate funds to offset the costs of these safety activities through a rail-related fee. In addition, states can impose regulations that supplement those specified by the FRA. However, implementation and enforcement of such regulation can be difficult and contentious, as carriers view them as an unnecessary burden given the need to operate in a consistent manner throughout their multistate systems.
- Freight Rail Assistance and Related Economic Development Initiatives. States offer a variety of incentives to support railroad line preservation, capacity expansion, and economic development. These include loan guarantees, tax credits, direct investments, and matching grants to leverage private investments by railroads and shippers. Public investments that leverage private funds can reduce the costs faced by a railroad or other entity, thereby making a project's financial rate of return more favorable.
- Highway-Rail Grade Crossings. The FHWA Section 130 program, which provides dedicated funding for rail/highway grade crossing safety improvements, assigns state departments of transportation (DOT) the task of disbursing these funds within their jurisdiction. This includes determining the locations where active crossing devices will be installed and assembling the

funding necessary for the improvements. Costs associated with installation, upgrading, or replacement of an active device are, generally, the responsibility of public agencies, with the operation and maintenance of the device the responsibility of the railroad. Many states augment federal grade crossing funds with state resources.

Beyond these specific areas, regulations that generally apply to all businesses operating in a state can also apply to railroads on issues that are not specifically under federal purview. Thus, railroads are subject to a broad range of state-level regulations in areas such as environmental safety, engineering standards for structures, and land use.

State Involvement in the Freight Rail System

As previously discussed, freight railroads in California are owned and operated by private companies who are responsible for building and maintaining the system on which they operate. Therefore, the history of state involvement in the freight rail system is somewhat fragmented, and no single, formalized approach to public-sector involvement in the freight rail system exists. Because of this, states across the country utilize various approaches to conduct freight rail planning activities and to provide funding.

For example, California, Washington, and Illinois have rail divisions within the DOT that focus on passenger and/or freight rail issues, while other states carry out passenger and freight rail planning through a separate agency attached to the DOT. Most states have an office responsible for freight programs, as well as state funding for freight rail projects.

Table 6.7 outlines different institutional approaches to rail planning and financing, comparing California to several other states. Appendix F provides examples of other state arrangements.

Table 6.7: Different State Approaches to Freight Rail Governance

Characteristics	California	Washington	Illinois	Michigan	Minnesota	New York	Florida	North Carolina	Ohio
Rail Division in DOT	✓	✓	✓	✓	✓	✓	✓	✓	
Separate agency attached to DOT									✓
Office responsible for freight programs	✓	✓	✓		✓	✓	✓	✓	✓
Rail freight programs in DOT				✓					
State funding for freight rail projects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Office responsible for rail safety			✓		✓	✓		✓	
Separate rail safety agency	✓	✓					✓		✓
Office responsible for grade crossings			✓		✓	✓		✓	✓
Separate grade crossing agency	✓	✓		✓			✓		
Rail Division	✓		✓				✓	✓	
Freight, Rail and Waterways					✓				
Freight and Passenger Rail Bureau						✓			
Rail Development Commission									✓
State Rail and Marine Office		✓							

Source: *Minnesota Comprehensive Statewide Freight and Passenger Rail Plan*, Minnesota Department of Transportation website.

Several California state agencies have ongoing roles and responsibilities as they relate to the freight rail industry. The role of Caltrans and the California Transportation Commission (CTC) are described here.

- Caltrans[114]. As Caltrans' mandate is to handle the State's transportation issues, it is one of four state agencies that have considerable and ongoing interaction with the rail industry. Caltrans is the state agency responsible for highway, bridge, passenger rail, and freight rail transportation planning, construction, and maintenance. Caltrans consists of 6 divisions in the Planning and Modal Programs and is divided into 12 geographic districts with offices located throughout the State. Divisions that have significant interactions with freight rail carriers include:
    - Division of Rail (DOR). The DOR manages and coordinates intercity passenger rail services that help to improve California's air quality and reduce highway congestion and fuel consumption. DOR manages two state-supported routes operated by Amtrak, and financially supports a third. DOR does not oversee any freight rail projects or functions. However, the Office of Rail Capital Project Development, Operations, and Marketing oversee capital passenger projects which require coordination with other entities including freight railroads.
    - Division of Transportation Planning (DOTP). The DOTP contains an Office of System and Freight Planning. The Freight Planning Branch, with the support of Freight Planning Liaisons in the 12 Caltrans districts, develops multi-modal strategies, policies, and methodologies to improve the freight transportation system in California. With respect to freight rail, the Freight Planning Branch is required, under Section 14036 of California Government Code, to work with DOR to prepare a 10-year State Rail Plan, updated biennially. This study is a result of this requirement. The Freight Planning Branch also prepares a multimodal, statewide freight plan—the *California Freight Mobility Plan* (CFMP)—an update to the *Goods Movement Action Plan* done in two phases in 2005 and 2007. The CFMP relies on the freight section of the CSRP for inputs with respect to freight rail. Likewise, the CSRP relies on inputs from the CFMP to ensure that the freight rail system reflects a broader multimodal vision for freight transportation in the State.
- CTC. The CTC is the transportation funding and policy setting agency in California, mainly responsible for the programming and allocating of funds for the construction of highway, passenger rail, and transit improvements throughout California. It was established in 1978 by Assembly Bill 402 (Chapter 1106, Statutes of 1977), in an effort to unify the creation of California transportation policy in a single decision-making body. The Commission replaced and assumed the responsibilities of four independent bodies: the California Highway Commission, the State Transportation Board, the State Aeronautics Board, and the California Toll Bridge Authority. Caltrans is informed about CTC policies and procedures through the Office of California Transportation Commission Liaison.
    - The CTC influences freight rail projects in California through the Proposition 1B TCIF funding program. Proposition 1B is a bond fund that was approved by California voters in November 2006 (Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006) that authorized the issuance of $19.925 billion in state general obligation bonds for specific transportation programs intended to relieve congestion, facilitate goods movement, improve air quality, and enhance safety.

[114] In April 2012, Governor Brown announced a reorganization of state agencies that include Caltrans. As this is being written, information has not yet become available describing how the reorganization will affect rail-related functions. However, it does include the creation of a new Transportation Agency that is expected to coordinate the State's transportation efforts.

- o The TCIF is one of the key programs under Proposition 1B that specifically focuses on infrastructure improvement along federally designated "Trade Corridors of National Significance." It makes $2 billion available to the CTC upon appropriation in the annual budget bill by the California State Legislature.
- o The TCIF projects selected by the CTC in the initial round of project submissions are in various stages of project delivery and the CTC continues to monitor the program and make changes in funding allocations as each projects' status changes. The Colton Crossing project is an example of a freight rail project that has dedicated TCIF funding.

Other agencies involved in rail system planning are included in Appendix F.

Federal Roles in Freight Rail

At least nine federal departments, agencies, and boards are involved in freight rail-related matters. The United States Department of Transportation (U.S. DOT) has the most extensive involvement, both directly with the carriers and indirectly in conjunction with the state DOTs and regional jurisdictions. Table 6.8 summarizes the purpose and engagements of the agencies that most significantly impact freight railroads.

6.5.2 Statutes Affecting Freight Rail

A variety of federal and state statutes impact freight rail operations in California. Some of these statutes, such as those related to safety and administered by the FRA, directly affect the management of freight rail operations and infrastructure. Other types of regulations, including environmental, safety, and security, deal more with the context in which freight rail operates. Economic regulation, overseen by the STB, has a direct bearing on how business decisions are made by the railroads.

- RSIA. The RSIA of 2008 mandated the implementation of PTC technology on major Class I rail lines by 2015. With its mandate to oversee railroad safety, the FRA provides federal oversight for PTC implementation. The current status of PTC and its implementation in California is discussed in Sections 2.4 and 6.2.3.
- PRIIA. The PRIIA of 2008 led to the provision of capital funding for intercity passenger rail in the ARRA. Notably for freight, PRIIA tasked the STB to adjudicate disputes regarding service performance between passenger service providers. The legislation also tasked states with establishing or designating a state rail transportation authority that will develop statewide rail plans that encompass freight and passenger rail, and establish priorities and implementation strategies. The FRA has primary responsibility for PRIIA, although other government departments and agencies, including the STB, have significant roles.
- Investment Tax Credits. Investment tax credits are tax credits for short lines that are contained in the Federal Internal Revenue Code Section 45G, starting in 2004. The tax credit is given to Class II and Class III railroads for track maintenance with an amount equal to 50 percent of the annual maintenance expenditure.

Table 6.8: Federal Agencies Impacting the Freight Rail Industry

Agency	Scope of Activity	Authorities/Responsibilities
FRA	Train/Track Safety	• Develop and enforce basic operating rules for train safety, tank car safety, railroad industrial hygiene, rail equipment safety, and grade crossing safety and trespass prevention. • Oversee employee hours of service regulations and signal and train control regulations. • Responsible for track inspection/audit. • Rail movement of spent nuclear fuel and radioactive waste.
	Rail Funding/ Financing	• Oversee Railroad Rehabilitation and Improvement Financing program. • Manage the Passenger Rail Improvement and Investment Act (PRIIA). • Manage the RSIA of 2008. • Manage American Recovery and Reinvestment Act (ARRA) as it relates to intercity passenger and freight railroads.
STB	Administrative Authority	• Mediate conflicts between passenger and freight rail operators. • Settle railroad rate and service disputes. • Review proposed restructuring transactions, including railroad mergers, acquisitions, abandonments, and construction.
Pipeline and Hazardous Material Safety Administration (PHMSA)	Hazardous Materials Safety	• Regulate and enact rules that ensure safe movement of hazardous materials. • Track data on hazardous materials. • Permit, inspect, and enforce safety of hazardous materials.
Department of Homeland Security (DHS)	Rail Security	• Establish requirements for national rail security strategy and risk assessment. • Track hazardous materials shipments. • Create railroad requirements for developing institutional risk assessments. • Conduct programs for rail security training. • Conduct rail security research and development.
Environmental Protection Agency	Environmental Regulation	• Regulate locomotive emissions standards.

Source: Cambridge Systematics, Inc., 2013.

This section summarizes recent legislation affecting freight rail in California. Most of the statutes apply not only to freight rail, but also to passenger service operating over shared-use infrastructure. Thus, these also are discussed in the passenger context in Sections 5.3.2 and 5.4. Section 6.2.3 provides an overview of economic regulations affecting freight rail.

- The Moving Ahead for Progress in the 21st Century Act (MAP-21). The MAP-21 law was signed by President Obama on July 6, 2012. MAP-21 funds surface transportation programs at over $105 billion for FY 2013 and 2014, a very small increase over the amount funded through the last surface transportation authorization, Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), in 2005.[115] Freight movement features prominently throughout MAP-21, consolidating certain programs into a focused freight program called the "National Freight Network Program," a step that will allow for more federal funding to address freight projects. Although MAP-21 does not include a rail-specific title, it does have implications for freight rail through many of the multimodal freight planning and policy provisions. For example, Section 1115 establishes National Freight Policy and calls for the development of a National Freight Strategic Plan. Both provisions recognize the need for a multimodal freight system and the provision calling for creation of the National Freight Strategic Plan calls for identification of major trade gateways, providing access to energy production areas, and creation of a process for addressing multistate projects and projects to improve intermodal connectivity. All of these requirements of the National Freight Strategic Plan have relevance for freight rail in California. Section 1117-1118 calls for the establishment of State Freight Advisory Committees and State Freight Plans that are intended to be comprehensive and multimodal. MAP-21 also provides increased funding for rail/highway grade separations.[116]

- State Sales Tax Exemption for Railroad Equipment. Section 6411 of the *California Revenue and Taxation Code* (RTC) exempts component parts of railroad equipment that are owned or leased by a common carrier when purchased outside of California. This results in an estimated annual $200,000 revenue loss to the State. RTC Section 6368.5 exempts the sale or lease of rail freight cars used in interstate or foreign commerce. The revenue loss to the State from this exemption has not been calculated.

  The sales tax exemption is not unusual, as many other states allow railroad equipment purchases to be exempt from state sales taxes. Nebraska, Iowa, Kansas, and Illinois exempt such equipment, whether it is rolling stock, rail, wheels, or railroad ties. Arkansas exempts only rolling stock purchases from sales tax.

6.5.3 Public Initiatives for Rail Freight

Freight Rail Assistance Programs

Numerous states across the nation have adopted freight rail assistance programs designed to address short line rail needs, to recognize the important role that rail has in job creation and economic development, and, in some cases, to formalize the State's participation in funding rail projects. More than 30 states have some kind of freight rail assistance program in place; however, California is not one of these states.

A summary of select state programs is provided in Table 6.9. This includes information from Kansas, Oregon, Wisconsin, Washington, Iowa, and Indiana, and suggests different approaches to state involvement in helping to finance short line and Class I rail improvement projects. Appendix F provides additional program details.

[115] Federal Highway Administration, Moving Ahead for Progress in the 21st Century Act (MAP-21): A Summary of Highway Provisions, 2012.

[116] *Summary of Moving Ahead for Progress in the 21st Century (MAP-21)* (http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=6d1e2690-6bc7-4e13-9169-0e7bc2ca0098).

Table 6.9: State Assistance Programs

State	Funding Amount	Funding Cycle	Eligibility
Indiana Industrial Rail Service Fund	$1.5 million (in 2010)	Annual	Class II and Class III railroads, or port authorities
Iowa Railroad Revolving Loan and Grant Program	At least $2 million	Annual	Industries, railroads, local governments, or economic development agencies
Kansas State Rail Service Improvement Fund	$5 million	Annual	Railroads and port authorities
Oregon *Connect*Oregon	$40 million-$100 million	Bi-annual	Class I and short line railroads
Washington State Freight Rail Assistance Program	$2.75 million	Bi-annual	Ports, Industries, railroads, local governments, or economic development agencies
Wisconsin Freight Rail Infrastructure Improvement Program	$112 million since 1992	Annual	County, municipality, or town, a railroad, or a current or potential user of freight railroad service
Wisconsin Freight Rail Preservation Program	$30 million	Bi-annual	

Source: Cambridge Systematics, Inc., 2013.

Public Private Partnerships

Even though freight rail services are operated by private-sector entities, public-sector entities, including state and local authorities, can sometimes justify involvement in funding rail freight projects if there is a demonstrable public benefit in terms of job creation or retention, economic development, safety, or environmental enhancement.

A Public-Private Partnership (PPP or P3) is an increasingly popular method for harnessing public-sector participation. PPPs represent a broad category of financing mechanisms that have been used with mixed success in numerous states throughout the nation. Currently, 23 states have enacted statutes that enable the use of various PPP approaches for transportation infrastructure development, as shown in Exhibit 6.17.[117]

California already has authorizing legislation, and in fact, since 2009 (and extending until 2017) regional transportation agencies and Caltrans are authorized to enter into an unlimited number of PPPs.[118] This newly revised legislation recognizes the ability of PPPs to facilitate the delivery of projects that accelerate goods movement, improve air quality, and support California's economic development.

[117] Federal Highway Administration Office of Innovative Program Delivery, *P3 Defined* (http://www.fhwa.dot.gov/ipd/p3/defined/index.htm).

[118] California Department of Transportation, *Public-Private Partnerships (PPP)* (http://www.dot.ca.gov/hq/innovfinance/Public-Private%20Partnerships/PPP_main.html).

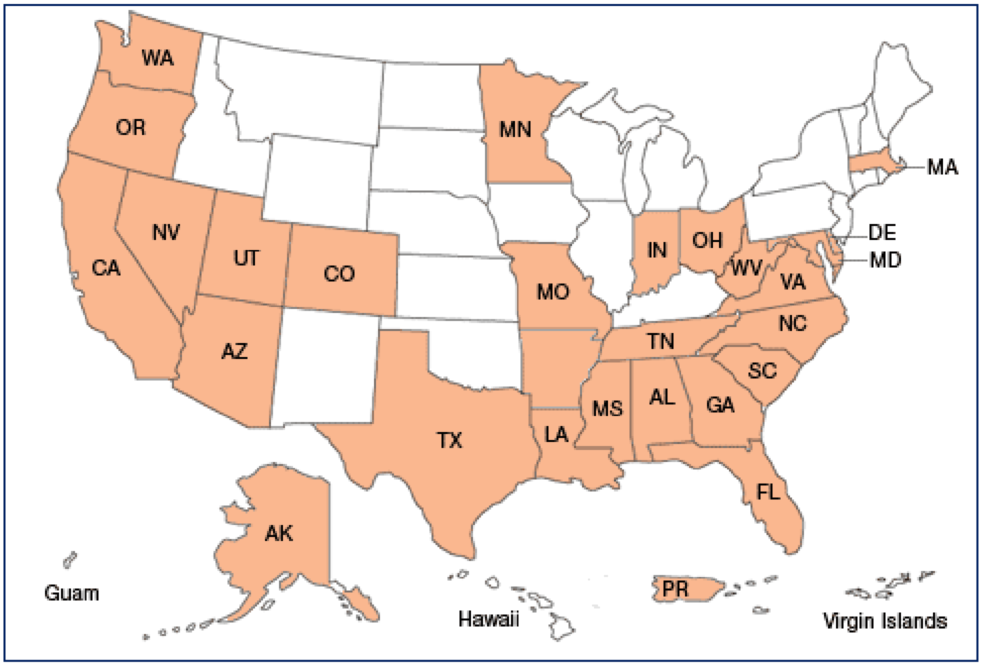

Exhibit 6.17: States with Statutes Authorizing Transportation Project PPPs

There are a number of ways to approach a PPP, as outlined in Table 6.10. These vary based on the responsible party throughout various stages of project development (design, construction, maintenance, operations, financing, and ownership), as well as the amount of risk that each partner is prepared to assume.

Appendix F highlights several PPPs that demonstrate the mutual benefit that is created through public and private sector partnerships.

6.5.4 Freight Rail Safety and Security

Institutional Relationships and Freight Rail Safety Regulations

Many of the federal and state agencies with passenger rail safety and security jurisdiction provide the same oversight for the State's freight rail system. The six key agencies involved in freight rail safety are as follows:

- FRA. The FRA's Office of Railroad Safety is the primary regulatory body responsible for promulgating and enforcing rail safety regulations. The FRA also conducts research and development in support of improved railroad safety and collects rail accident/incident data from the railroads. Within the Office of Railroad Safety, the Hazardous Materials Division oversees the movement of hazardous materials by rail throughout the country.
- PHMSA. The PHMSA under the U.S. DOT regulates the rail transportation of poisonous by inhalation (PIH) materials carried in tank cars. A 2009 rule mandates commodity-specific improvements in safety features and design standards for newly manufactured DOT specification tank cars. The rule also imposes a 50 mph maximum speed restriction on all loaded PIH tank cars and allows for an increased gross weight of tank cars to accommodate enhanced safety measures.

Table 6.10: Public-Private Partnership Infrastructure Approaches

Approach	Description
Traditional	
Design-Bid-Build (DBB)	The traditional method of project delivery in which the design and construction are awarded separately and sequentially to private firms.
PPP Approaches	
Design-Build (DB)	Combines the design and construction phases into a single fixed-fee contract, thus potentially saving time and cost, improving quality, and sharing risk more equitably than the DBB method.
Private Contract Fee Services/Maintenance	Contracts to private companies for services typically performed in-house (e.g., planning and environmental studies, program and financial management, operations and maintenance, etc.)
Construction Manager @ Risk (CM@R)	A contracted construction manager provides constructability, pricing, and sequencing analysis during the design phase. The design team is contracted separately. The CM stays on through the build phase and can negotiate with construction firms to implement the design.
Design-Build with a Warranty	A DB project for which the design builder guarantees to meet material workmanship and/or performance measures for a specified period after the project has been delivered.
Design-Build-Operate-Maintain (DBOM), Build-Operate-Transfer, or Build-Transfer-Operate	The selected contractor designs, constructs, operates, and maintains the facility for a specified period of time meeting specified performance requirements. These delivery approaches increase incentives for high-quality projects because the contractor is responsible for operation of the facility after construction. The public sector retains financial risk, and compensation to the private partner can be in the form of availability payments.
Design-Build-Finance (DBF), Design-Build-Finance-Operate (DBFO), or Design-Build-Finance-Operate-Maintain (DBFOM)	DBF, DBFO, and DBFOM are variations of the DB or DBOM methods for which the private partner provides some or all of the project financing. The project sponsor retains ownership of the facility. Private sector compensation can be in the form of tolls (both traffic and revenue risk transfer) or through shadow tolls (traffic risk transfer only).
Long-Term Lease Agreements/Concessions (Brownfield)	Publicly financed existing facilities are leased to private sector concessionaires for specified time periods. The concessionaire may pay an upfront fee to the public agency in return for revenue generated by the facility. The concessionaire must operate and maintain the facility and may be required to make capital improvements.
Full Privatization	
Build-Own-Operate	Design, construction, operation, and maintenance of the facility are the responsibility of the contractor. The contractor owns the facility and retains all operating revenue risk and surplus revenues for the life of the facility. The Build-Own-Operate-Transfer method is similar, but the infrastructure is transferred to the public agency after a specified time period.
Asset Sale	Public entity fully transfers ownership of publicly financed facilities to the private sector indefinitely.

Source: *Minnesota Comprehensive Statewide Freight and Passenger Rail Plan*.

- Transportation Security Administration (TSA). The TSA, housed within the DHS, is responsible for strengthening the security of the nation's transportation systems. As part of this role, the TSA funds security initiatives for freight rail carriers that transport security-sensitive materials through high-threat urban areas, as described under Freight Rail Security Grant Program in this section.
- National Transportation Safety Board (NTSB). The NTSB is an independent agency responsible for investigating any rail accidents that result in at least one fatality or major property damage. While the NTSB can make recommendations aimed at preventing future accidents and set safety priorities, it has no funding or regulatory enforcement authority.
- California Public Utilities Commission (PUC). The California PUC has regulatory and safety oversight over freight railroads, passenger railroads (intercity and commuter), rail transit systems, and all highway/rail crossings in the State. While state regulations of freight and passenger rail systems are largely preempted by federal regulation, the California PUC participates in the State Rail Safety Participation Program of the FRA. This program allows state inspectors to act as agents of the FRA in the enforcement of federal regulations within California. In addition to enforcement, the California PUC conducts design safety reviews of crossing projects, makes recommendations for mitigation measures, participates in NTSB accident investigations, and responds to safety-related inquiries made by community officials, the general public, and railroad labor organizations.
- Caltrans DOR. The DOR is responsible for inspecting state-owned passenger equipment and Amtrak facilities, and personnel to evaluate compliance with federal and state safety standards. As described in Section 5.4, DOR administers the federal Section 130 Crossing Improvement Program, the State Section 190 Grade Separation Program, and the Railway-Highway Crossing Hazard Elimination in High-Speed Rail Corridors Program (1103 funds).

Appendix F provides additional safety information, including California statistics and mandates.

7.0 Passenger and Freight Rail Integration

Since the arrival of railroads in California in 1856, passenger and freight trains have operated on the same tracks throughout the State. This shared arrangement facilitated more recent passenger rail service expansion that began in the 1970s. At that time, many of the State's main lines had excess capacity and could accommodate new passenger service with little impact on freight traffic. In the ensuing years, mounting freight and passenger volumes have resulted in a primary network that is operating with far less slack capacity. Going forward, the interaction between freight and passenger train traffic may lead to different outcomes based on the nature of the traffic handled at particular bottlenecks and the expected passenger and freight train volumes. This chapter integrates results from the examination of existing passenger and freight systems (Chapters 5 and 6, respectively).

7.1 Identification of Shared-Use Corridors

7.1.1 Shared-Use Corridor Definitions

Intercity and commuter railroad operations in "shared-use" corridors are quite common across the country. A shared-use corridor generally involves passenger and freight operations using the same track plant. As defined by the Federal Railroad Administration (FRA), shared-use corridors can take on three different forms:

1. Shared tracks. In this form, the trains of two or more service providers operate over the same tracks. The most common arrangement is that of a freight carrier and an intercity or regional passenger service provider all sharing the same track, with dispatching performed by the track owner.[119]
2. Shared ROW (ROW). In this form, two rail services are operated independently on separate parallel tracks having a track centerline separation of less than 30 feet. Separation of 30 feet or less triggers the application of certain FRA safety regulations. Separation also may be referenced in shared-corridor agreements between railroads, for example, as limiting the kinds of permitted operation or requiring specific safety precautions. An example of this type of operation is on the Southern California Regional Rail Authority (SCRRA) Metrolink system between Palmdale and Lancaster, where SCRRA's line is operated separately from the parallel Union Pacific Railroad (UPRR) freight line.
3. Shared corridors. In this form, two rail services are operated independently on separate parallel tracks having a track centerline separation between 30 and 200 feet. Two hundred feet is considered the outer limit of separation where an accident on one line could interfere with operations on the other. Shared ROW operations exist on a broad scale in several metropolitan regions where FRA-compliant railroads share ROW with rapid transit systems (e.g., Washington, D.C., New Jersey, and Chicago, among others).

California's shared-use rail operations take place on shared track (configuration 1), with the exception of the SCRRA line segment between Palmdale and Lancaster. This situation is expected to change with high-speed rail (HSR) implementation. Some HSR sections will be classified as shared ROW or shared

[119] "Time of day separation" is a distinct category of shared tracks that is not covered in this overall definition. Such an arrangement is required when the passenger rail vehicles are not compliant with FRA standards. California hosts two such operations: the San Diego Trolley on two branches, and the SPRINTER between Oceanside and Escondido.

corridors. Chapter 7 primarily focuses on shared-track arrangements, given their current predominance in California.

7.1.2 Present Shared-Track-Corridors

The majority of current shared-track operations involve passenger services operating over tracks owned by the BNSF Railway (BNSF) and UPRR. These operations include all three state-supported routes (portions of the *Pacific Surfliner*, *San Joaquin* and *Capitol Corridor*) and the four Amtrak long-distance trains operating in the State. In addition, extensive passenger operations occur over tracks owned by the Peninsula Corridor Joint Powers Board, the SCRRA member agencies, North County Transit District (NCTD), and the San Diego Metropolitan Transit System (SDMTS). In most instances, the Class I carriers that had previously owned these routes continue to provide freight service over them.

Exhibit 7.1 displays current daily train volumes on California's shared-track corridors.[120] The freight train volumes are peak daily estimates for the year 2007.[121] Passenger train volumes are based on average weekday service schedules as of August 2012. As shown in the exhibit, train volumes are highest in southern California, on Caltrain between San Francisco and San Jose, along parts of the *Capitol Corridor*, and in portions of the San Joaquin Valley.

Traffic characteristics affect the usable capacity of a particular line. These characteristics include the train type mix, train performance, and peaking characteristics. These and other operating parameters are taken into account in detailed capacity analyses, such as those carried out for the Service Development Plans (SDP) described in Section 7.4.

The importance of each demand characteristic is as follows:

- Total Traffic. For a given number of tracks and signal control type, an increase in the number of trains on a shared-track corridor may constrain train scheduling, leading to increased train delays. Total daily trains are used as a measure of the total traffic.
- Train Mix. Compared to passenger trains, freight trains are typically much longer, accelerate and decelerate more slowly, and run at lower top speeds. Trains of greatly varying speeds and performance characteristics complicate train dispatching, resulting in passenger trains being sidelined or forced to reduce speeds in order to meet or pass a freight train. Passenger train throughput on shared tracks tends to be lower than on passenger-only corridors. Freight trains as a percentage of total daily trains are used as a train mix indicator.
- Peaking Characteristics. Train scheduling is very difficult during time periods when freight and passenger train volumes are at their maximum. Commuter trains generally operate more frequently during morning and evening commute times. Freight and intercity passenger rail operations tend to be spread more evenly throughout the day. Peak-period commuter trains have great potential to create rail system congestion under shared-track usage. Therefore, the ratio of peak-hour commuter trains to total daily trains is used to indicate rail traffic peaking.

[120] Detailed descriptions of existing passenger and freight rail services and infrastructure systems (routes, tracks, signal control type, yards/terminals, stations, etc.) are provided in Chapters 5 and 6.

[121] Volumes for 2007 are shown because of inconsistent data for more recent years. Although a substantial volume drop-off occurred during the 2008-2009 recession, most of the traffic recovered by 2012. Year 2012 peak daily freight train volumes are believed to be close to pre-recession 2007 levels.

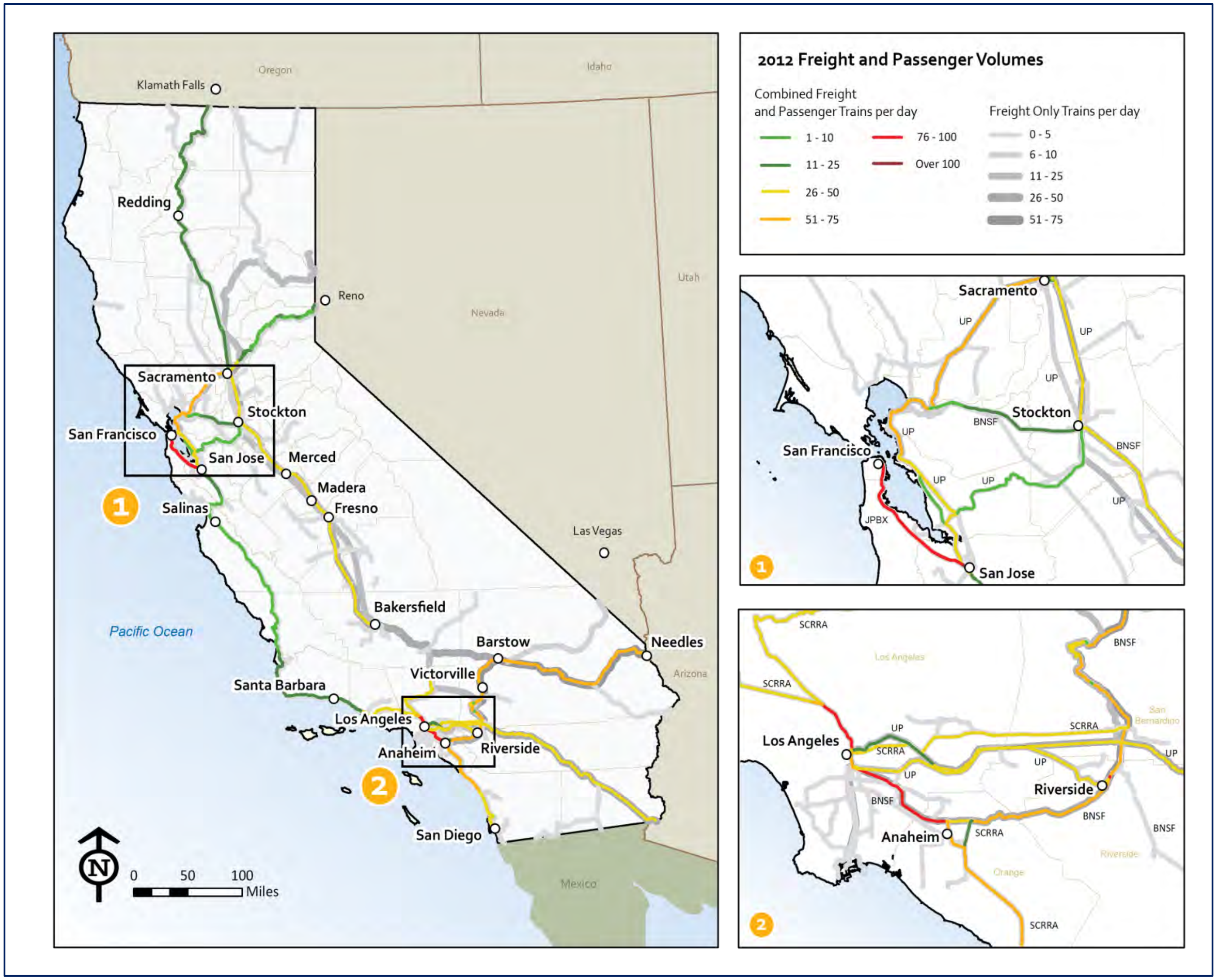

Exhibit 7.1: Current Daily Train Volumes on California's Shared-Track Rail Corridors

Sources: Oak Ridge National Laboratory (ORNL) Rail Network; Cambridge Systematics, Inc., 2013; Esri, 2012.

Note: The freight train volumes shown in this exhibit are year 2007 daily estimates. Passenger volumes current as of August 2012.

7.2 Future Demand in Shared-Track Corridors

This section briefly describes proposed passenger rail services in California and it presents the overall passenger and freight train demand in 2020 and 2025 on the shared-track corridors. It also discusses future demand characteristics around California.

7.2.1 Future Rail Services

Future Passenger Rail Services

Exhibit 7.2 shows current and future intercity passenger services operating over shared track. Project development is actively occurring for some of these routes, while other routes are in the feasibility analysis stage. These potential additions are as follows:

- Extensions of existing *Capitol Corridor* or *San Joaquin* services to Salinas, Redding, and/or Reno.
- Three new conventional intercity rail services:
    - *Coast Daylight* between Los Angeles and San Francisco over the existing UPRR Coast Line.
    - Coachella Valley over the UPRR's Sunset Route between Los Angeles and the Coachella Valley.
    - The X Train between Fullerton and Las Vegas over BNSF and UPRR tracks. This privately financed venture is projected to begin regular operations in 2014 on a weekend only schedule.

Several new commuter rail lines that will be using shared track are in various stages of development. These proposed lines are as follows:

- SCRRA Metrolink:
    - Riverside to South Perris over tracks owned by Riverside County Transportation Commission (RCTC).
    - Cross-county all-stop service between Los Angeles and San Diego.
    - San Bernardino to the University of Redlands over tracks owned by San Bernardino Associated Governments.
    - Lancaster to Rosemond/Edwards Air Force Base, an extension of Metrolink's Antelope Valley line, over ROW owned by the Los Angeles County Metropolitan Transportation Authority (LACMTA) and UPRR.
- Ventura to Santa Barbara commuter rail service, operating over the UPRR's Coast Line, which is anticipated to be operated as a stand-alone service under contract by Metrolink.
- Sonoma Marin Area Rail Transit (SMART) using the shared track of SMART and the North Coast Rail Authority (NCRA).
- San Francisco to Monterey, Marina, and Castroville over tracks owned by the Transportation Agency for Monterey County.
- Dumbarton Rail Corridor between Redwood City and Newark, connecting the East Bay with San Francisco, the Peninsula, and the South Bay over tracks owned by the San Mateo County Transportation Authority and UPRR.

Exhibit 7.2: Existing and Proposed Intercity Passenger Rail Services in Shared-Track Rail Corridors

Sources: Caltrans, 2013 and Esri, 2012.

Section 8.1 provides more detailed discussion on each of these proposed systems.

The two planned HSR lines take different approaches to the use of rail corridors. The California HSR service between the Bay Area, Central Valley, and southern California will consist of a mix of dedicated and shared corridors. Inside the Bay Area, HSR will jointly use a shared-track corridor with Caltrain between San Francisco and Santa Clara. The Authority is investigating the possibility of a shared-track passenger rail corridor with Metrolink and *Pacific Surfliner* between Los Angeles and Anaheim. As presently conceived, the proposed XpressWest (formerly DesertXpress) between Victorville and Las Vegas foresees reliance on a wholly dedicated HSR ROW.

The first California HSR construction section will include up to 130 miles of new HSR tracks on dedicated ROW from Madera to north of Bakersfield. This segment will become available for expedited interim intercity service between Madera and Bakersfield, concurrent with continued service on the existing BNSF route. Once HSR is operational, interim conventional intercity service over the new segment would cease, and up to six *San Joaquin* service trains will continue over the existing BNSF daily in each direction.

Future Freight Rail Services

Overall freight demand is anticipated to grow throughout California's main line network, thereby exacerbating existing issues and conflicts on tracks jointly used by freight and passenger trains. Off of the main lines, on tracks operated primarily by California's short lines and regional railroads, volume growth is expected to be more modest. Thus, preservation of these light-density lines is important to the railroads and Caltrans. There will likely be some minor revitalization and/or expansion of freight rail services on short line and regional railroad corridors that host passenger rail service currently or in the future. However, this growth should be readily accommodated without interference unless these volumes dramatically increase.

For existing freight rail services, growth in mainline train volumes was estimated using 2007 Rail Waybill data, the Freight Analysis Framework Version 3.0 commodity flows database, Transportation Economic Development Impact System economic forecasts, and the Association of American Railroads *National Freight Rail Infrastructure Capacity and Investment Study* (2007).

7.2.2 Statewide

Year 2020 and 2025 projected daily train volumes on the shared-track corridors are indicated in Exhibits 7.3 and 7.4. Comparing these figures with the current year overall demand shown in Exhibit 7.1 illustrates these key changes:

- Train volumes will increase on the main lines throughout the State. The transcontinental trade corridors that pass through Needles, Yuma, and Donner Summit will all experience large increases in freight train volumes.
- Among the existing passenger rail services, the Caltrain and Altamont Corridor Express (ACE) corridors are expected to have high increases in train volumes.
- In southern California, the LOSSAN segment south of Fullerton to San Diego will become one of the highest volume lines in the State, with in excess of 75 daily trains by 2025.
- Among the new passenger services, the largest increase in passenger train volumes are expected to take place where HSR service operates along shared corridors, including the corridor between San Fernando and Los Angeles and between Los Angeles and Anaheim. Large increases in passenger train volumes are also expected over shared track, such as the segment between San Jose and San Francisco.

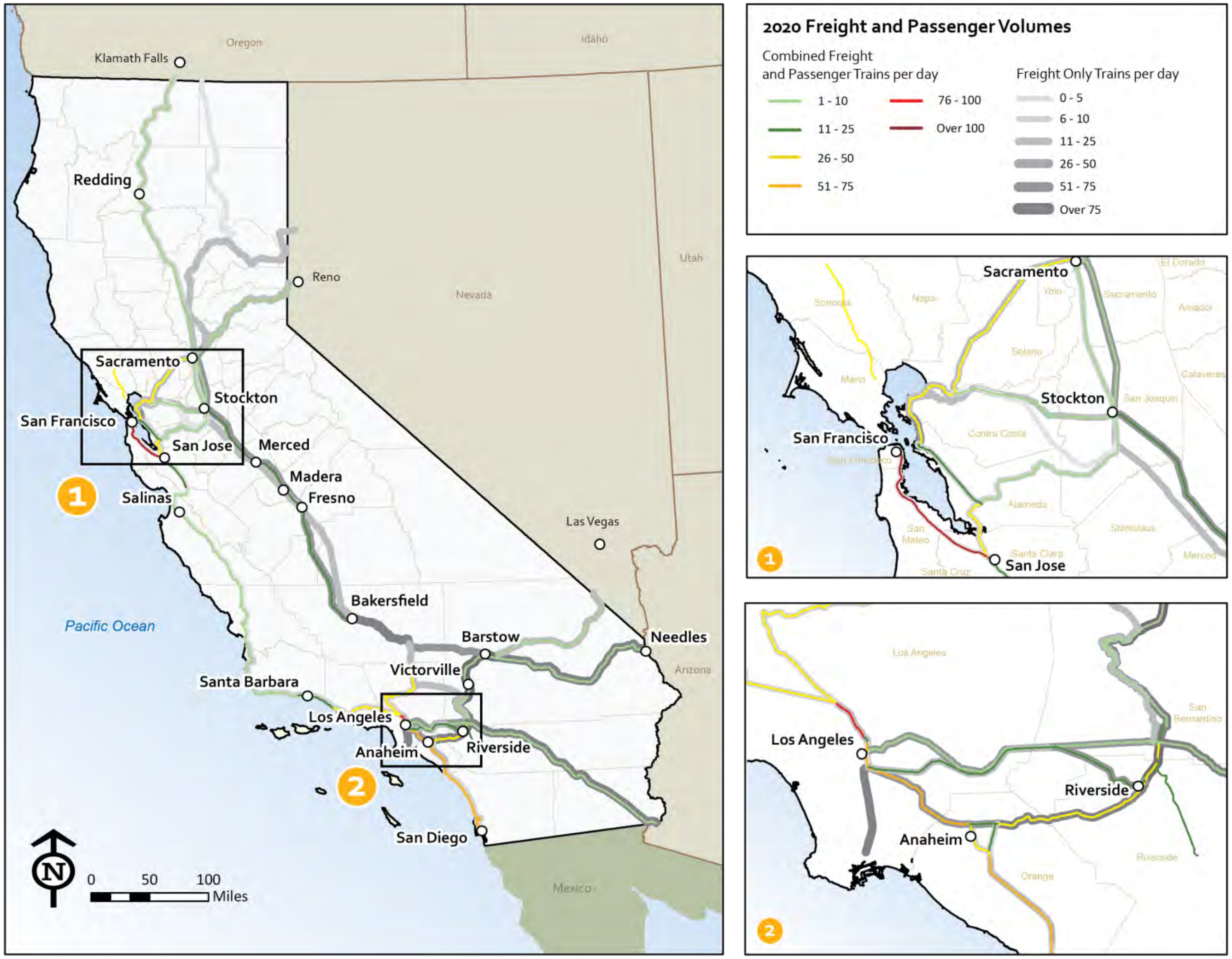

Exhibit 7.3: Projected 2020 Daily Train Volumes on California's Shared-Track Rail Corridors

Sources: California High-Speed Rail Program Revised 2012 Business Plan (2012 Business Plan); Amtrak; Caltrans Draft Service Development Plan – Pacific Surfliner North; LOSSAN Strategic Implementation Plan, April 2012; Capitol Corridor Joint Powers Authority; ORNL Rail Network; Esri, 2012; Cambridge Systematics, Inc., 2013.

Note: Volumes shown are the maximum number of trains anticipated by 2020.

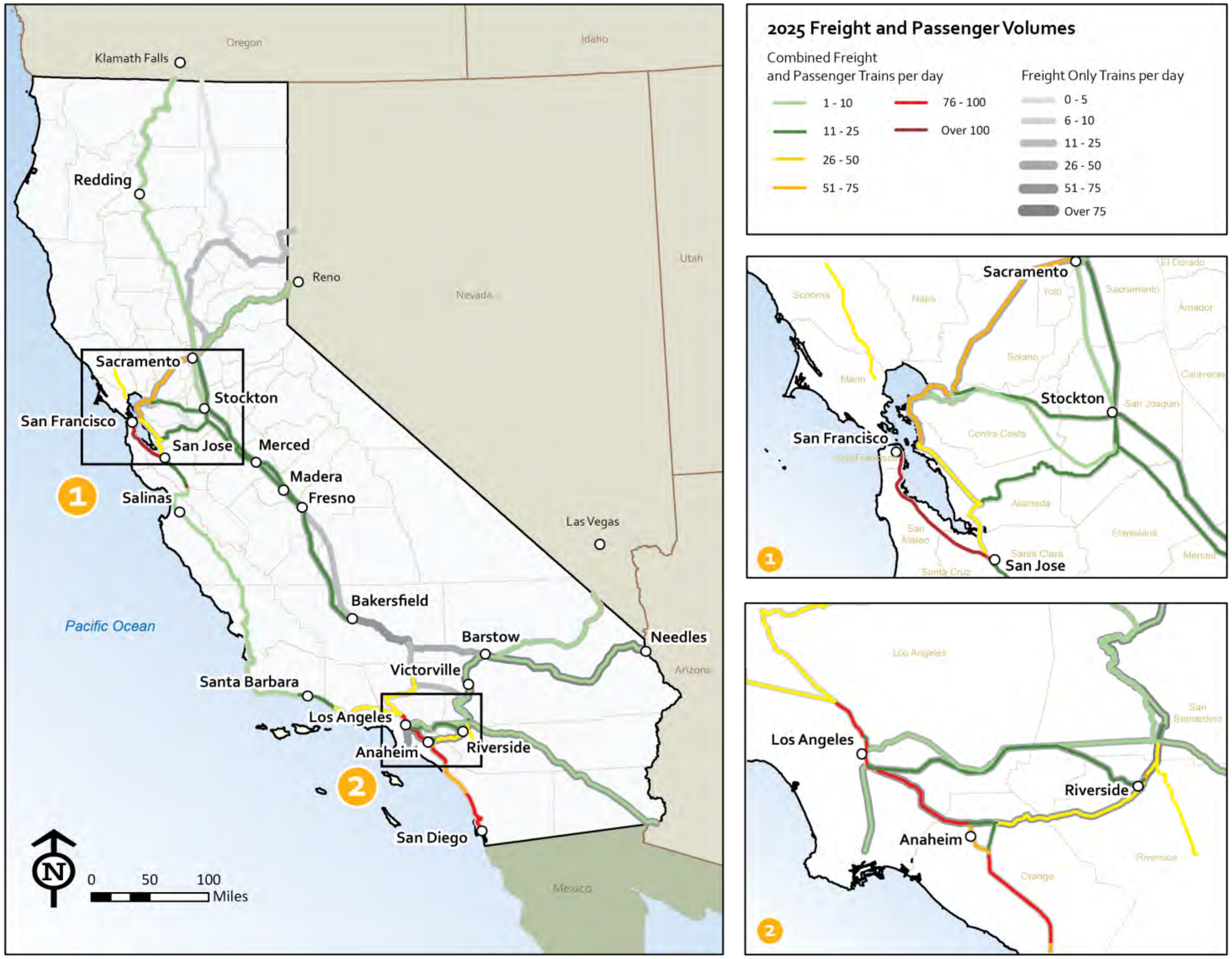

Exhibit 7.4: Projected 2025 Daily Train Volumes on California's Shared-Track Rail Corridors

Sources: 2012 Business Plan; Amtrak; Caltrans *Draft Service Development Plan – Pacific Surfliner North; LOSSAN Strategic Implementation Plan*, April 2012; Capitol Corridor Joint Powers Authority; ORNL Rail Network; Esri, 2012; Cambridge Systematics, Inc., 2013.

Note: Train volumes on shared-track corridors included in the HSR corridor blended service plan indicate the maximum values.

7.3 Evaluation Thresholds and Criteria

Section 7.2 identified freight and passenger train volume forecasts on shared-track corridors. Some of these corridors have high freight train counts with little passenger traffic. It is not uncommon for the Class I railroad owners to undertake the investments necessary to accommodate future freight train growth. In other corridors with high passenger train counts, heavy peak-period passenger train scheduling, and much less freight traffic, public sector investments that focus on passenger train movements may be required and may require adjustments to freight rail expansion. In all cases, including corridors with heavy but balanced freight and passenger traffic, responsibilities are negotiated so that passenger rail expansion is balanced with expected freight train growth.

In negotiating public sector access to private freight rail corridors, the freight railroads apply a set of overall principles to most commuter, intercity, or high-speed passenger rail improvements or expansions. The principles cover subjects such as: separation of freight and passenger tracks; safety; customer access; liability; capacity, and compensation.

Given this starting position of the freight railroads in access negotiations with public agencies in California, the shared-track corridors with greater than average freight rail train counts, growing passenger train counts, and/or high percentages of peak-period passenger train services may pose the biggest challenges for passenger rail implementation. By studying the characteristics of the segments with shared track, the following evaluation criteria were employed to identify corridors with these most pressing challenges:

- Total train count over 30. The balance between freight and passenger traffic is important, but corridors with lower train counts (passenger and freight combined) may not require as significant a public sector investment. For the purposes of this chapter, a total train count of 30 or more effectively screened out a large percentage of corridor segments, and is used as a measure of growing importance for rail operations, and a scale of operations that may require additional levels of coordination.
- Combined freight and passenger train counts of more than 10. Some corridors will experience growth primarily in freight volumes or in passenger volumes, but a measure of at least 10 passenger or 10 freight trains per day also screens out corridor segments that pose fewer challenges in freight/passenger integration issues. This criterion focuses on corridors with growing traffic, but with higher coordination obligations between freight and passenger operators.
- More than 30 percent commuter trains as percent of total train volumes. By examining shared-track segments, this measure identifies corridors with peak volumes of passenger train counts, which pose scheduling and dispatching issues for freight railroad operators in shared-track corridors.

The following corridors meet these criteria:

- Stockton to Martinez, San Joaquin Valley (BNSF, UPRR). Northern California Unified Rail Service (NCURS) effects, modest freight train counts.
- Sacramento to Stockton (UPRR) to Bakersfield, San Joaquin Valley (BNSF). Heavier freight train traffic in a critical freight corridor, NCURS effects.
- Oakland to Sacramento to Roseville, northern California (UPRR). Modest freight rail traffic, high *Capitol Corridor* train frequencies.
- San Rafael to Santa Rosa, SMART, and Northwestern Pacific Railroad. Heavy commuter traffic.

- Downtown Burbank to Ventura, Central Coast (SCRRA member agencies, UPRR). Modest freight train counts, high numbers of commuter trains.
- Los Angeles to Downtown Burbank, southern California (LACMTA). Modest freight traffic, very heavy commuter traffic.
- Los Angeles to Colton, southern California (UPRR, SCRRA member agencies): High freight and passenger train counts, including commuter rail.
- Los Angeles to Riverside, southern California (UPRR, BNSF). Substantial freight train counts in critical cross country traffic lanes matched with high commuter rail frequencies.
- Los Angeles to Fullerton and Laguna Niguel, southern California (BNSF, Orange County Transportation Authority). Heavy intercity and commuter traffic, the only main line freight corridor to San Diego region.
- Oceanside to San Diego, southern California (NCTD and SDMTS). Heavy intercity and commuter traffic, the only main line freight corridor serving the San Diego region.

Of these corridors, only the Los Angeles to Riverside and the Los Angeles to Colton corridors are not part of a corridor being thoroughly examined through a formal SDP. The SDP process includes extensive operational modeling to identify capacity and operational improvements to accommodate projected passenger and freight rail traffic. The other corridors in Los Angeles are the subject of a goods movement study being conducted by the Southern California Association of Governments (SCAG), which involves extensive operational modeling to identify the types of capacity improvements necessary to balance high freight and commuter traffic. The Los Angeles to Downtown Burbank segment is also being examined by the California High-Speed Rail Authority (Authority) as part of its analysis of blended service. The Stockton-Martinez and Sacramento-Bakersfield corridors are part of ongoing efforts by the Authority, regional planning organizations, and commuter rail operators to plan for implementation of the NCURS approach identified in the 2012 Business Plan.

7.4 System Conflicts and Opportunities

7.4.1 Key Demand-Related Issues in Shared-Track Rail Corridors

Table 7.1 indicates the key issues identified based on the corridor-wide discussions of current and future demand. The table is organized by geographic location and intercity corridor name. All of the intercity corridors are affected by growing commuter-rail volumes with their peak-volume related impacts. Growing passenger train volumes will also have to compete with growth in freight for infrastructure capacity in multiple locations in southern California and the Central Valley.

Table 7.1: Key Demand-Related Issues in Shared-Track Rail Corridors

Location	Corridor Name	Issues
San Joaquin Valley	Stockton – Madera	• Moderate current demand, but large growth in demand due to NCURS planning and transcontinental trade growth. • Peaking on UPRR Fresno subdivision in the future from ACE extension and expansion imposes time constraints on scheduling and reduces availability of capacity that is currently available to freight rail. • Even mix of trains in current and future years necessitates coordinated scheduling to minimize delays.
	Sacramento-Stockton	• Moderate current and future demand, but peaking on UPRR Sacramento subdivision in the future imposes time constraints on scheduling and reduces availability of capacity that is currently available to freight rail. • Even mix of trains in future years necessitates coordinated scheduling to minimize delays.
Bay Area	San Jose – Santa Clara *Capitol Corridor*	• Very high current demand and large growth in demand due to Caltrain improvements, NCURS planning for ACE, and *Capitol Corridor* improvements. • Severe peaking likely due to Caltrain and ACE trains, which imposes time constraints on scheduling and reduces available capacity for noncommuter rail.
	Oakland – Martinez *Capitol Corridor* and *San Joaquin*	• High current demand and projected large growth in demand due to NCURS planning (*San Joaquin*) service plans, as well as projected transcontinental trade growth. • Even mix of trains in current and future years necessitates coordinated scheduling to minimize delays. • Coordinated timetables will be needed between various intercity passenger rail services.
	San Rafael to Santa Rosa *SMART*	• Service on single track railroad requires passing sidings, limits frequency. • Short station blocks limit train length.
Southern California	Downtown Burbank – Ventura *Pacific Surfliner*	• Moderate current and future demand, but severe peaking likely due to Metrolink trains, which imposes time constraints on scheduling and reduces available capacity for noncommuter rail. • Coordinated timetables will be needed between commuter and intercity passenger rail.
	Los Angeles – Downtown Burbank *Pacific Surfliner*	• High current demand, and large growth in demand due to increase in frequencies of Metrolink and *Pacific Surfliner* passenger rail services. • Severe peaking likely due to Metrolink trains, which imposes time constraints on scheduling and reduces available capacity for noncommuter rail. • Coordinated timetables will be needed between commuter and intercity passenger rail. • Coordination with HSR for southern California sections.

Table 7.1: Key Demand-Related Issues in Shared-Track Rail Corridors (continued)

Location	Corridor Name	Issues
Southern California (continued)	Hobart – Fullerton *Pacific Surfliner*	• Very high current and large growth in demand due to transcontinental trade growth and increase in frequencies of Metrolink and *Pacific Surfliner* passenger rail services. • During periods of high volumes through Hobart Yard, passenger and freight operations are impacted when freight trains are staged on the main line. • Severe peaking likely due to Metrolink trains, which imposes time constraints on scheduling and reduces available capacity for noncommuter rail. • Even mix of trains in current and future years necessitates coordinated scheduling to minimize delays. • Coordinated timetables will be needed between commuter and intercity passenger rail. • Coordination with HSR for southern California sections.
	Laguna Niguel – San Diego *Pacific Surfliner*	• Moderate current demand, however, large growth in demand due to increase in frequencies of COASTER and *Pacific Surfliner* passenger rail services. • Coordinated timetables will be needed between commuter and intercity passenger rail • Environmental constraints that limit the ability to fully double-track this segment, leading to difficulties coordinating passenger and freight operations on single track
	Los Angeles – Colton: W. Riverside – Colton	• Very high current demand and large growth in demand due to transcontinental trade growth. • Severe peaking likely due to Metrolink trains, which imposes time constraints on scheduling and reduces available capacity for noncommuter rail. • Even mix of trains in current and future years necessitates coordinated scheduling to minimize delays. • Coordination with HSR for southern California sections.
	Los Angeles – Colton: Pomona – Montclair (Shared Corridor)	• Moderate current demand, however, large growth in demand due to transcontinental trade growth. • Vehicular delay and safety impacts at grade crossings are likely to be much higher than the present. • Coordination with HSR for southern California sections.
	San Bernardino – Barstow & Barstow – Needles: Victorville – Yermo	• High current demand and large growth in demand due to transcontinental trade growth

Source: Cambridge Systematics, Inc., 2013.

7.4.2 Shared-Track Corridor Performance: Freight Rail Influences

Chapter 6 identified 11 freight rail system bottlenecks based on the 2012 *SCAG Regional Transportation Plan*, the 2009 *I-710 Railroad Goods Movement Stud*y and the 2012 *San Joaquin Valley Goods Movement Study.* These were used to develop the list of freight rail system improvements shown in Chapter 9. Their possible effects on the performance of shared-track operations are shown in Table 7.2.

7.4.3 Shared-Track Corridor Performance: Passenger Rail Influences

Passenger rail system improvements are detailed in Chapter 8. Demand and capacity characteristics for each passenger rail corridor are detailed in Appendix G.

If the described capacity constraints are overcome and the needed operational and safety improvements are made, then the future on-time performance for all passenger rail services sharing the tracks can be either maintained at the current level or improved. This can also reduce conflicts with freight rail and the need to schedule them. Thus, addressing passenger rail issues and needs on shared-track corridors improves efficiency, reliability, and safety of both passenger and freight rail.

Table 7.2: Possible Freight Rail Effects on Shared-Track Corridor Performance

Bottleneck/ Issue Location	Passenger Corridor(s)	Description of Freight Rail System Bottleneck/Issue	Possible Effects on Shared-Track Corridors
1. UPRR Mojave Subdivision, Kern Junction to Mojave (Tehachapi Trade Corridor)	N/A	The transcontinental trade corridor route through the Tehachapi mountains includes steep grades, extreme track curvature, and a single track through the majority of the corridor. BNSF has been concerned about capacity constraints and their impact on future freight growth. Improvements on this route have been approved to receive support under California's Trade Corridor Improvement Fund (TCIF), and will include double-tracking, siding extensions, and signal system upgrades.	The BNSF Mojave subdivision is not part of the shared-track corridor system (which starts at Bakersfield). Therefore, this issue/suggested improvement has no effect on the shared-track corridor system.
2. BNSF San Bernardino Subdivision	*Pacific Surfliner* South Metrolink Amtrak Long Distance	The BNSF San Bernardino subdivision has some of the busiest mainline segments in the western U.S. According to recent analysis conducted for the *I-710 Corridor Environmental Impact Report/Environmental Impact Statement* (EIR/EIS), there is likely to be sufficient capacity to handle the growth in freight traffic in the absence of any expansion of passenger services. However, there is also a desire to significantly increase Metrolink service on routes that use this segment. The Leachman study for SCAG examined capacity needs in southern California and determined that there would be a need for four mainline tracks in the Hobart to Fullerton segment, three mainline tracks in the Fullerton to West Riverside segment, and four mainline tracks from West Riverside to Colton.	The location described refers to portions of the *Pacific Surfliner* South and Los Angeles – Colton shared-track corridors. The stated traffic is in agreement with the current and future demand discussed in this chapter. Sufficient capacity is needed to handle the future train volumes, including improvements to service frequencies on Metrolink lines, for both passenger and freight rail services. In this particular corridor, this helps minimize traffic breakdowns in peak traffic conditions, and therefore, avoid excessive delays to trains and loss of revenue due to mode shift (passenger rail to auto/bus and freight rail to truck).
3. BNSF Cajon Subdivision (Barstow to Keenbrook)	Amtrak Long Distance XTrain	The BNSF Cajon subdivision carries high volumes of freight trains from the Los Angeles Basin to the rest of the U.S. Due to the need for tracks with different grades and in consideration of the high level of growth in freight traffic anticipated on this line, there will likely be a need to expand capacity to four main tracks in the segment between Keenbrook and Mojave Narrows, with additional capacity from Mojave Narrows to Barstow as well.	The location described refers to the San Bernardino – Barstow shared-track corridor. The stated traffic is in agreement with the current and future demand discussed in this chapter. Steep grades affect the operating speed of freight trains. Thus multiple tracks will be needed to help both passenger and freight trains when the freight trains most often operate on the less steep tracks.

Table 7.2: Possible Freight Rail Effects on Shared-Track Corridor Performance (continued)

Bottleneck/ Issue Location	Passenger Corridor(s)	Description of Freight Rail System Bottleneck/Issue	Possible Effects on Shared-Track Corridors
4. UPRR Sunset Route (Yuma Subdivision)	Los Angeles to Coachella Valley Amtrak Long Distance	The Sunset Route runs southeast from Colton Crossing and continues through Riverside and Imperial counties traveling east to El Paso. With anticipated growth in intermodal traffic originating at the Ports of Los Angeles and Long Beach, UPRR has set a program to construct two main tracks along the entire route from Los Angeles to El Paso. The line is double-tracked from Colton to Indio with additional segments in Imperial County.	This route would be used for the proposed Coachella Valley service. The location described refers to Colton – Indio and Indio – Yuma (Arizona) shared-track corridors. The stated traffic is in agreement with the current and future demand discussed in this chapter. Sufficient capacity is needed to handle the future train volumes for both passenger and freight rail services. In this particular corridor, this helps avoid delays to trains, especially freight rail. There will likely be a minor improvement in performance of *Sunset Limited* passenger rail services.
5. UPRR Alhambra and Los Angeles Subdivisions	Los Angeles to Coachella Valley Metrolink Amtrak Long Distance	The UPRR Alhambra and Los Angeles subdivisions are two parallel routes operated as a paired double-track railroad. The UPRR has an active project to double-track the Alhambra subdivision east of Pomona, which should alleviate future capacity needs. According to the *I-710 EIR/EIS*, there should be sufficient capacity on these two mainlines without growth in passenger traffic. According to Leachman's analysis for SCAG, taking into account projected growth in passenger trains, portions of the Los Angeles subdivision both east and west of Pomona will require additional capacity; and the Alhambra Subdivision will experience capacity constraints between Pomona and the City of Industry by 2035.	This route would be used for the proposed Coachella Valley service. The location described refers to two of the subcorridors of the Los Angeles – Colton shared-track corridor. Chapter 6 did not contain full demand information for this shared-track corridor. However, based on this chapter, both *Sunset Limited* Amtrak services on the UPRR Alhambra subdivision and Metrolink Riverside Line services on the UPRR Los Angeles subdivision are not expected to grow much compared to the total demand; therefore, the findings on capacity constraints in Chapter 6 are still valid. Sufficient capacity is needed to handle the future train volumes for both passenger and freight rail services. In this particular corridor, this helps avoid delays to trains, especially freight rail and Metrolink passenger rail. There will likely be a minor improvement in the performance of *Sunset Limited* services.

Table 7.2: Possible Freight Rail Effects on Shared-Track Corridor Performance (continued)

Bottleneck/ Issue Location	Passenger Corridor(s)	Description of Freight Rail System Bottleneck/Issue	Possible Effects on Shared-Track Corridors
6. UPRR Mojave Subdivision, Rancho to Keenbrook (Cajon Area)	N/A	According to the analysis conducted by Leachman for SCAG, the section of the UPRR Mojave subdivision from Rancho to the Keenbrook connection with the BNSF Cajon subdivision (over which UPRR operates via trackage rights) will need additional capacity to accommodate modest growth in freight traffic.	The portion of the UPRR Mojave subdivision described is not part of the shared-track corridor system. Hence, this issue/suggested improvement has no effect on the shared-track corridor system.
7. San Diego and Arizona Eastern Railroad	N/A	There is a TCIF project planned for this railroad to address mainline capacity, as well as a rail yard capacity constraint at the San Ysidro Rail Yard. This congestion arises from increasing demand of bulk commodities both in San Diego and Baja California in Mexico. This represents the only capacity issue for a non-Class I railroad previously identified.	The location described is not part of the shared-track corridor system. Hence, this issue/suggested improvement has no effect on the shared-track corridor system.
8. Colton Crossing	Los Angeles – Coachella Valley Metrolink Amtrak Long Distance	This is a major rail bottleneck with impacts to both passenger and freight operations in southern California. BNSF trains moving north/south between the San Bernardino subdivision and the Cajon subdivision (including UPRR trains operating via trackage rights) cross UPRR trains moving from the Alhambra subdivision to the Yuma subdivision, and to/from the east on the Sunset Route. The crossing is at-grade so trains must wait for the crossing to clear in one direction before they can cross in the other direction. A project to grade-separate this crossing, funded by a combination of the TCIF program, Transportation Improvements Generating Economic Recovery (TIGER) grants, and railroad sources, is currently under construction. Completion of this project, anticipated in 2014, will ensure that the primary UPRR and BNSF routes into southern California can handle future freight and passenger traffic with improved performance.	The location described is an intersection of two Los Angeles – Colton shared-track subcorridors. The stated traffic is in agreement with the current and future demand discussed in this chapter. A rail-rail grade separation project benefits both freight and passenger rail services. In this particular corridor, it will facilitate high volumes of BNSF and UPRR traffic, as well as small volumes of passenger rail traffic including Amtrak's *Sunset Limited* and *Southwest Chief* services, the proposed Coachella Valley routes, and Metrolink's Inland Empire–Orange County Line.

Table 7.2: Possible Freight Rail Effects on Shared-Track Corridor Performance (continued)

Bottleneck/ Issue Location	Passenger Corridor(s)	Description of Freight Rail System Bottleneck/Issue	Possible Effects on Shared-Track Corridors
9. UPRR Martinez Subdivision (Oakland to Martinez)	*Capitol Corridor* *San Joaquin* Amtrak Long Distance	This is one of the busiest segments of the northern California rail system. Already consisting of two main tracks, there is sufficient projected demand to require at least one additional track. With the completion of work on Donner Summit and the potential to increase traffic on this route, the Port of Oakland sees capacity issues on this segment as an impediment to increased freight rail service and associated expansion of port activity. There are a number of improvements that have been proposed for this segment that are presented in the investment program discussion.	The location described refers to the Oakland – Martinez shared-track corridor. The stated traffic is in agreement with the current demand discussed in this chapter. In the future, the corridor is expected to have two major growth contributors: freight rail (driven by growth in transcontinental trade) and *San Joaquin* passenger rail service (driven by growth in demand due to the NCURS plan). Sufficient track capacity on the UPRR Martinez subdivision is needed to accommodate this growth. If sufficient capacity is not provided, then the corridor will face traffic breakdowns, resulting in excessive delays to trains, and either a shift of traffic to alternate routes (e.g., via Niles Junction) or loss of revenue due to mode shift (passenger rail to auto/bus and freight rail to truck).
10. UPRR Oakland Subdivision	N/A	Currently, the biggest capacity constraint on the Oakland subdivision is at the west end between Elmhurst and Newark. This is a relatively low-volume freight route and congestion is not a serious problem today. Traffic from UPRR's Coast Line and the Oakland subdivision from Stockton combine on this portion of the Oakland Subdivision, but the railroad is single-track in this segment. In light of the congestion on the Martinez subdivision, there is potential for UPRR to use this as a reliever route, but this could put more pressure on the limited capacity, also affecting the portion of the Oakland subdivision from Niles Junction to Stockton. This segment of the line has other capacity-related issues due to track class and geometry that limit speeds and potentially limit double-stack operations.	The location described refers to a portion of the San Jose – Oakland shared-track corridor. The stated traffic is in agreement with the current demand discussed in this chapter. In the future, the corridor is expected to have one major contributor, namely, *Capitol Corridor* passenger rail service (driven by growth in demand for intercity travel). In addition, as explained above, there is a likelihood of a shift in traffic from the UPRR Martinez subdivision. Increased line capacity and track condition/class improvement are needed in this subcorridor to accommodate the growth and potential shift in rail traffic. If improvements are not made, the corridor will face traffic breakdowns, resulting in excessive delays to trains and loss of revenue due to mode shift (passenger rail to auto/bus and freight rail to truck).

Table 7.2: Possible Freight Rail Effects on Shared-Track Corridor Performance (continued)

Bottleneck/ Issue Location	Passenger Corridor(s)	Description of Freight Rail System Bottleneck/Issue	Possible Effects on Shared-Track Corridors
11. BNSF Mainline Stockton to Bakersfield (*San Joaquin*)	*San Joaquin*	A number of sources have identified capacity constraints on the *San Joaquin* route as a potential constraint for both freight and passenger service. This BNSF route must accommodate anticipated growth in intermodal traffic from both domestic and international cargo. The *San Joaquin Corridor Strategic Plan* identified many sections that will require double-tracking through the mid-term timeframe, with eventual double-tracking of the entire line in the long term. The capacity needs in this corridor are driven by both passenger and freight service expansion, and the future operation of passenger service will be strongly influenced by the HSR concepts.	The location described refers to the Stockton – Bakersfield shared-track corridor. The stated traffic is in agreement with the current and future demand discussed in this chapter. Sufficient capacity is needed to handle the future train volumes, including the growth in freight rail (driven by growth in transcontinental trade) and *San Joaquin* service frequencies. In this particular corridor, this will help minimize traffic breakdowns, and will avoid excessive delays to trains and loss of revenue due to mode shift (passenger rail to auto/bus and freight rail to truck).

Source: Cambridge Systematics, Inc., 2013.

7.5 Total System Connectivity

This section suggests some high-level issues associated with connectivity within the shared-track operations identified in this chapter. Chapters 8 and 9 include more details on corridors and projects for expansion of passenger and freight railroad services. Chapter 8 includes a discussion of passenger rail stations, how they function, and how stations vary according to their connections to other passenger modes. Chapter 9 describes intermodal access projects suggested in goods movement studies conducted at the regional level in the State.

7.5.1 Passenger Rail Connectivity

A number of rail stations will face increasingly complex passenger connection needs. As the Authority, Caltrans, and regional rail operators and planners discuss how to integrate HSR with other rail services, connectivity will be a key element of future coordination. Some examples of passenger rail connectivity issues are discussed the following subsections.

Fresno

Fresno has historically had two main rail stations located nearly a mile apart on different rail lines. *San Joaquin* trains currently use the BNSF station at the eastern edge of downtown. Those *San Joaquin* trains providing interim service on the first construction section of the Initial Operating Section (IOS) would use a newly constructed passenger station adjacent to the historic Southern Pacific station on the western edge of downtown. Trains providing local service would continue to use the BNSF station. In this operating scenario, the higher speed and local trains would meet at common station locations in Bakersfield and Madera. After initiation of high-speed service on the IOS, *San Joaquin* trains would return to the BNSF station while HSR trains would continue to use the new station on the western edge of downtown.

Fresno is planning to construct a regional transit center in the vicinity of the new HSR station, which would offer bus connections to local and regional destinations. Coordinated signage and ticketing will be very important to providing passengers with seamless transfers between services, and equipping them to make accurate connections.

Los Angeles Union Station

Southern California's primary rail and transit hub, Los Angeles Union Station (LAUS) has had explosive growth in passenger volume in recent years. The station serves the Amtrak *Pacific Surfliner* route and long-distance trains, Metrolink regional rail services, LACMTA's Gold and Red lines, and numerous intercity and local bus routes. With the coming of HSR, along with expanded Metrolink regional and *Pacific Surfliner* service, capacity of the existing track plant will be insufficient.

A major impediment to train capacity at LAUS is that the station is a terminal, requiring trains to reverse direction upon departure. Current plans call for converting eight platform tracks to run-through operation, thereby greatly reducing required dwell times and increasing capacity. Run-through tracks are under study by LACMTA and are a potential candidate project for early implementation in the southern California Memorandum of Understanding. With additional train volumes, passenger facilities must also be expanded to handle far larger passenger volumes. These improvements will be undertaken in preparation for the arrival of HSR, which have been designated as one of the Southern California Potential Early Investment Projects (for HSR). See Table 8.8 in Chapter 8 for additional information.

Palmdale

Palmdale is currently a Metrolink station on the Antelope Valley Line. This station will expand its functions to include a HSR station connecting northern California and the Los Angeles basin as part of the IOS. It may also include a connection to the proposed XpressWest passenger rail network extending from its currently proposed terminus in Victorville. Under the aegis of the High Desert Corridor Joint Powers Authority, environmental analysis activities are underway on a corridor between Palmdale and Victorville that could serve as an extension of the proposed XpressWest. With far higher train volume and passenger counts associated with California HSR, the proposed XpressWest, and expanded Metrolink service, the scale of the station, connecting transit service, and pedestrian and highway wayfinding signage, would all need to be increased significantly.

San Francisco Transbay Transit Center

The Transbay Joint Powers Authority has been created to fund and construct a consolidated multimodal terminal that would serve as the regional transportation hub in downtown San Francisco. Currently under construction, the Transit Center is expected to serve as a terminus for electrified Caltrain and HSR services with travelers having direct access to existing bus and rail transit services, as well as connectivity to both San Francisco International Airport and Oakland International Airport.[122] Still awaiting funding is the tunnel segment connecting the new station and the existing Caltrain terminus at Fourth and King Street.

7.5.2 Freight Rail Connectivity

Chapter 9 includes information on freight rail projects and improvements; some of which will affect shared-track operations, as noted in Table 7.2. One of the major challenges for shared-track operations in urban areas in northern California (along the San Jose to Oakland corridor used by the *Capitol Corridor* service) and in southern California (along the UPRR Alhambra subdivision between Los Angeles and Colton or along the BNSF between Hobart and Fullerton) is the need to accommodate both growing passenger rail operations and expanded freight rail access to the State’s busy ports in Oakland, Los Angeles, and Long Beach. Chapter 6 details the freight train movements associated with growing international trade through the ports, and the economic dependence of both the State and the nation on reliable movement of containers into the rest of the United States, particularly into the Midwest and the South.

Some of the projects listed in Chapter 9 are associated with improving rail traffic within or near busy ports, with new on-dock or near-dock intermodal terminals to facilitate direct movement of containers from ships to rail, which support trade and reduce urban drayage by motor carriers. Intermodal terminals near the ports or inland can accommodate transloaded containers, as well as ocean-borne containers. The freight railroads are seeking to invest private capital into improved efficiencies through automation and new equipment, such as improved air quality/greenhouse gas emissions benefits through low-emission cranes, tractors, and switching locomotives. This port-related freight rail traffic, which is expected to grow in the future, will require capacity and slots along shared corridors used by intercity and commuter passenger rail. SDPs for intercity passenger rail and regional planning for commuter rail improvements (including those associated with the Bookend improvements of the HSR Blended Service Plan) will need to consider the ongoing needs of freight railroads to support trade-related freight rail that benefits the State’s economy.

[122] The diesel-hauled *Coast Daylight* service is expected to terminate at the Fourth and King Street Station, as the new Transbay Terminal will only be served by electric trains.

8.0 Passenger Rail Improvements

This chapter presents the planned projects and services to support and expand California's intercity, high-speed, and commuter passenger rail services.

The chapter is organized into eight sections:

1. Section 8.1 describes California High-Speed Rail Authority (Authority) improvements.
2. Section 8.2 describes improvements to the three existing state-supported intercity rail routes.
3. Section 8.3 describes proposed new intercity rail routes.
4. Section 8.4 describes extensions to existing state-supported intercity rail routes.
5. Section 8.5 describes other proposed passenger rail services.
6. Section 8.6 describes improvements and extensions to commuter rail services and proposed new services.
7. Section 8.7 summarizes connectivity plans or rail station improvements that will support projected passenger rail ridership through integration of rail stations with local land use and transportation plans.

Throughout this chapter, there are tables listing capital investments for specific corridors and services. The following conventions were used to format and complete these tables:

- For each corridor or service area, the most recent planning or programming documents were reviewed to identify projects related to passenger rail. Documents reviewed include: Regional Transportation Plans (RTP), corridor strategic plans, and corridor business plans, as well as programming documents such as the State Transportation Improvement Program (STIP), the Safe, Reliable, High-Speed Passenger Train Bond Act for the 21st Century (Proposition 1A) and the High-Speed Intercity Passenger Rail (HSIPR) program. The initial project list was reviewed to identify duplicate or overlapping projects. Therefore, all projects in the capital investment tables are listed in prior planning documents unless otherwise noted.
- Blended System planning is in the initial phases, so some projects are listed that have been discussed by the Northern California Rail Partners Working Group (NCRPWG) and the Southern California Rail Partners Working Group (SCRPWG). These projects are described in documents produced by those groups, but do not yet appear in formal planning documents. Many of these projects are still being analyzed in ongoing operations modeling analyses and studies previously discussed. Operations modeling is being conducted by the Class I railroads in northern California and by the Authority in conjunction with the SCRPWG in southern California.

  The proposed capital investments are grouped by timeframe into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes, except where noted otherwise. Each project's funding status falls into one of the five following categories:

  - Allocated. Total project cost has been allocated by action of the California Transportation Commission (CTC) or similar entity and is available for obligation and expenditure.
  - Partially Allocated. Some of the project cost has been allocated by the CTC or similar entity and is available for obligation and expenditure.
  - Programmed. Total project cost has been included in the STIP and/or similar programming documents, indicating that funds have been reserved for the project.

- Partially Programmed. Some of the project cost has been included in a programming document.
- Unfunded. The project has appeared in a planning document, but none of the project cost has been included in a programming document.

In order to be classified as a near-term project, the funding status is usually "Allocated", "Partially Allocated" or "Programmed." Mid-term projects are usually either "Partially Programmed" or "Unfunded." Long-term projects are usually "Unfunded" and have costs that are unlikely to be covered by existing funding streams within the next 25 years. These three timeframe categories are meant to be rough planning guides; they are not meant to limit the time period when a project may be initiated. Project cost estimates (where available) are reported in 2012 dollars.

- Projects on the *San Joaquin* and *Capitol Corridor* routes were grouped into the categories of "Joint Use" and "Non-Joint Use." Tracks used by one state-supported intercity route may be shared with another state-supported intercity route or a commuter service. Projects that benefit more than one of the services currently on the corridor are classified as joint use. For example, a double-tracking project would increase capacity and improve reliability for all of the services operating within the project segment. Projects that only benefit one of the services are classified as non-joint use. This classification was not used for the *Pacific Surfliner* route as almost all projects are joint use.

  In addition to the use categories, projects are listed by type as either "Track & Signal," "Facility," "Station," "Grade Crossing," "Grade Separation," or "Extension/New Route."

- The cost and scope of many of the projects listed in the tables are currently being refined or will be refined as the result of railroad operations simulation analyses. Also, additional simulation work will be needed to determine the benefit and priority of some of the projects listed in the capital investment tables.

8.1 High-Speed Passenger Rail

8.1.1 California High-Speed Rail Program Revised 2012 Business Plan

The California High-Speed Rail Authority (Authority) released a Draft Business Plan (Draft Plan) on November 1, 2011. The Draft Plan was intended to provide a road map for delivery and implementation of California's first high-speed rail (HSR) system. Following its release, Governor Brown affirmed the importance of moving forward with HSR as an essential investment in California's future. However, he and others called for changes and improvements to the Draft Plan including improved connectivity with urban, commuter, and intercity rail systems, enabling Californians across the State to realize the benefits of HSR sooner with reduced costs to taxpayers.

In revising the Draft Plan, the Authority studied how the HSR program could better fit into California's broader transportation system. During this time, the Authority solicited, reviewed, and addressed comments and concerns from civic leaders, stakeholders, and the general public.

This process discussing how to improve the HSR program revealed a number of consistent points:

- Broad support for a phased implementation strategy and the utilization of a blended approach to deliver the system would reduce costs and community impacts.

- Near-term Bookend investments (the Los Angeles Basin and San Francisco Bay Area metropolitan regions), a coordinated rail service in northern California, and early investments in existing rail systems statewide would produce immediate benefits and enhance the ultimate utility of HSR.
- Closing the existing rail gap across the Tehachapi Mountains between Bakersfield and the Los Angeles Basin, which is described in Section 2.1.2, would greatly connect and improve the State's transportation network.

The wide array of input, along with further analysis by the Authority, resulted in significant improvements to the Draft Plan. With these changes, the *California High-Speed Rail Program Revised 2012 Business Plan* (2012 Business Plan) provided an implementation strategy that delivers greater value, broader benefits, and earlier results by more quickly and effectively integrating HSR into an expanded and improved statewide rail network.

The overall passenger rail system will be significantly better because of two commitments in the 2012 Business Plan. The first is to build an Initial Operating Section (IOS) of HSR. The IOS, which is scheduled to be completed in 2022, will connect the Central Valley to the Los Angeles Basin via the San Fernando Valley. The IOS will bring initial high-speed, electric passenger rail operations to California. Second, the 2012 Business Plan provides for the integration, or blending, of the HSR project by upgrading existing rail systems to provide near-term benefits to passengers, while connecting to, and laying the foundation for, the future HSR system. Passengers will experience more options, faster travel times, and greater reliability and safety when accessing the statewide rail network. By leveraging new infrastructure and systems with existing and upgraded systems, taxpayers will benefit from greater cost efficiency and a more efficient use of state funding.

Benefits will be delivered sooner through the adoption of the Blended System through early investments in the Bookends. Across the State, transportation systems will be improved and jobs will be created through the implementation of those improvements. The Central Valley will see initial construction of the nation's first HSR system and will benefit from an expanded and integrated passenger rail system that utilizes the upgraded infrastructure. The San Francisco Bay Area will see improved safety, reliability, efficiency, and air quality through the long-awaited electrification of the Caltrain corridor, targeted for completion by Caltrain in 2019. Southern California will see near-term improvements in the Metrolink system as well as better connectivity of transit and rail services in Los Angeles, San Diego and the Inland Empire through cooperative early investments using allocations from the connectivity funding ($950 million) in Proposition 1A funds combined with other local, state, and federal sources. Additionally, northern California will see similar benefits achieved through the development of the Northern California Unified Rail Service (NCURS), and urban, commuter, and intercity system improvements funded from Proposition 1A.

Finally, the benefits of investing in HSR will be delivered at a significantly lower cost than previously estimated. By developing the HSR project using a blended approach, the Authority reduced the cost of delivering the system by almost $30 billion, currently estimated at $68.4 billion in the year-of-expenditure (YOE) shown in Table 8.1.

Table 8.1: High-Speed Rail Phased Implementation Costs (Planning Scenario)

Project Section	Incremental Cost (Billions 2012 Dollars)	Cumulative Cost (Billions 2012 Dollars)	Completion Date	Incremental Cost (Billions YOE Dollars)	Cumulative Cost (Billions YOE Dollars)
IOS (Merced to San Fernando Valley)	$27.1	$27.1	2021	$31.3	$31.3
Bay to Basin (San Jose to San Fernando Valley)	$14.6	$41.7	2026	$19.9	$51.2
Phase 1 Blended (San Francisco to Los Angeles/Anaheim)	$12.3	$54.0	2028	$17.2	$68.4

YOE = Year-of-Expenditure.

8.1.2 Phased Implementation

The 2012 Business Plan calls for implementation of the HSR system using a phased approach, while making early investments in the Bookends as part of the Blended System that will be used to connect the HSR system with San Francisco and Los Angeles. Delivery of Phase 1 Blended of the HSR system using the phased implementation is described in four key steps below and shown in Exhibit 8.1.

- Step 1 – Initial Construction and Early Investments. Located within the Initial Operation Section, initial construction of the HSR system consists of 130 miles of dedicated HSR track between Madera and north of Bakersfield. Over $5.8 billion ($2.6 billion in state and $3.2 billion in federal funding) was appropriated in 2012 in Senate Bill (SB) 1029 (Committee on Budget and Fiscal Review 2012) for the first construction section of the IOS. Once completed, a portion of the existing *San Joaquin* intercity rail service will be able to use this track to travel at higher speed while reducing travel times on the southern section of the intercity rail corridor. The operation of this interim *San Joaquin* service along the first construction section of the IOS is anticipated to begin in 2018 and will provide an immediate benefit to the State's passenger rail program.

  Integrated service investments will also be made in the Bookends of the HSR system in northern and southern California as part of the Blended System. In northern California, early investments will be made to the Bay Area's Caltrain corridor to electrify the system and upgrade advanced signaling systems, laying the groundwork for future HSR service between San Jose and San Francisco. In southern California, planned investments to existing rail corridors will benefit Metrolink, Amtrak, and future HSR system. Additional investments will be made to urban, commuter, and intercity rail systems across the State in order to provide connectivity to the HSR system. A description of these early capital investments, including the Bookend investments can be found in Section 8.1.3.

- Step 2 – The Initial Operating Section (IOS). The IOS will extend HSR infrastructure north to Merced and south through Bakersfield to the San Fernando Valley. Once the system reaches the Los Angeles Basin, riders will be able to use existing Metrolink and *Pacific Surfliner* rail service to travel to Los Angeles Union Station (LAUS) and to destinations throughout southern California, including the Inland Empire, San Diego, and the Central Coast. Service along the IOS is anticipated to begin in 2022.

Exhibit 8.1: California Statewide Rail Modernization Schematic

Source: Authority, 2013.

Note: This map is for illustrative purposes only and is subject to change.

- Step 3 – Bay to Basin. The Bay to Basin phase of the project will connect the Central Valley with San Jose and on to San Francisco via the upgraded Caltrain corridor completed as part of the project's Blended System investments in the Bookends. Upon completion of this phase in 2026, passengers will be able to travel between the Los Angeles Basin (San Fernando Valley) and San Francisco.
- Step 4 – Phase 1 Blended System. The Phase 1 Blended System will extend HSR infrastructure from San Francisco to LAUS and on to Anaheim. This service is expected to be operational in 2029.

Phase 2 of the HSR Project, which is still in the preliminary planning and development stages, will complete the statewide system approved by the voters by extending the system to Sacramento and San Diego. The final route for Phase 2 has not yet been selected, and all potential routes will be subject to extensive environmental review and input from stakeholders before a final route is selected.

8.1.3 Building a Statewide Rail Network through Early Investments

California's HSR system includes billions of dollars in infrastructure investment throughout the State as part of the Blended System and for connectivity projects providing early improvements to statewide rail systems, while simultaneously providing a future benefit to HSR. SB 1029, passed by the California State Legislature and signed by Governor Brown in July 2012, invests almost $2 billion from Proposition 1A into urban, commuter, and intercity rail projects across the State. This funding leverages approximately $5 billion in additional local, state, and federal funding for these projects.

Voters approved Proposition 1A in 2008 authorizing $9.95 billion in general obligation bonds for the HSR project; of that amount $950 million was reserved for capital improvements to intercity, commuter and urban rail projects that provide direct connectivity to the HSR system. The CTC is required to program and allocate the $950 million for intercity, commuter, and urban rail projects. The CTC developed guidelines and approved a project list in 2010 and then updated it in spring 2011.

SB 1029 made available an additional $1.1 billion in Proposition 1A funds for early improvement projects in the Phase 1 Blended System consistent with the Metropolitan Transportation Commission (MTC) Memorandum of Understanding (MOU) for $600 million approved on April 12, 2012 and the southern California MOU for $500 million also approved on April 12, 2012. The MTC MOU is for Caltrain electrification. The southern California MOU projects have not yet been finalized; currently there is a comprehensive list of potential projects. These projects are included in the Metrolink project list (Table 8.17) and *Pacific Surfliner* project list (Table 8.8) included later in this chapter. The projects are listed as "Southern California Potential Early Investment Projects."

SB 1029 also appropriated $819 of the $950 million in Proposition 1A funds. The remaining Proposition 1A connectivity funds had either been appropriated for Positive Train Control projects, reserved for administration, or reserved for future programming.

Table 8.2 provides a summary of rail infrastructure investments to be made throughout the State as a result of the HSR program. The table includes projects included in the CTC Proposition 1A connectivity program as well as projects in the MTC and southern California MOUs. These strategic investments will provide connectivity to the HSR system which will result in a streamlined transportation system, increased ridership, reduced congestion, more concentrated development, and improved air quality.

8.1.4 Northern and Southern California Unified Rail Service

In addition to securing funding for statewide rail infrastructure investments, the Authority is participating in the NCRPWG and the SCRPWG to plan the development and implementation of the NCURS and the southern California unified rail network. These two groups also collaborate to coordinate activities and exchange information.

The NCRPWG seeks to enhance passenger rail service from northern to southern California by promoting collaboration between the participating agencies and sharing of equipment, interlining trains, shared track capacity, common ticketing and public information services, and leveraging funding resources. The NCRPWG is made up of the following agencies:

- The Authority.
- California Department of Transportation (Caltrans).
- Federal Railroad Administration (FRA).
- Business, Transportation and Housing Agency (BTH).
- *Capitol Corridor* Joint Powers Authority (CCJPA).
- Peninsula Corridor Joint Powers Board (PCJPB).
- San Joaquin Regional Rail Commission (SJRRC)/Altamont Corridor Express (ACE).
- Sacramento Regional Transit District (RT).

These participating agencies have preliminarily identified capital improvements to their respective rail systems that would contribute to an integrated passenger rail system for the benefit of northern California rail passengers. These projects will support the initial construction section of the IOS from north of Bakersfield to Madera. The Authority and the NCRPWG developed a draft MOU for the NCURS. The MOU does not commit additional Proposition 1A bond funding to the NCURS above the amount committed in the original Proposition 1A. Projects that support the NCURS are on the CTC program of projects that are included in Table 8.2. The participating agencies will work to identify and secure project funding from federal, state, regional, and local resources.

The SCRPWG engages in similar activities as the NCRPWG for southern California. The SCRPWG is made up of the following agencies:

- The Authority.
- Caltrans.
- FRA.
- BTH.
- Los Angeles Metro.
- Southern California Association of Governments (SCAG).
- Metrolink.
- Orange County Transportation Authority (OCTA).
- San Bernardino Association of Governments (SANBAG).
- San Diego Association of Governments (SANDAG).
- Riverside County Transportation Commission (RCTC).

Table 8.2: Connectivity/Blended System Projects

Sponsoring Agency	Prop 1A Funding (Millions)	Project Description	Total Funding Leveraged[c] (Millions)
Caltrain (MTC MOU)	$600	Blended System Electrification of the Caltrain Corridor	$1,500
Caltrain	$106[b]	Advanced Signaling System (Positive Train Control (PTC))	$231
San Francisco Municipal Transportation Agency (SFMTA)	$61	Central Subway Project	$1,600
Bay Area Rapid Transit (BART)[a]	$145	Millbrae Station Upgrades for Connection to HSR/Rolling Stock Procurement Transferred $38 million share to Caltrain for PTC	$290
Santa Clara Valley Transportation Authority (SCVTA)	$0	Transferred $26 million share to Caltrain for PTC	N/A
ACE[a]	$11	Stockton Passenger Track Extension	$25
RT[a]	$30	Sacramento Intermodal Transit Facility Improvements	$60
CCJPA	$47	Oakland to San Jose Track Improvements	$248
CCJPA	$16	Roseville Station Relocation/Third Main Track Sacramento-Roseville	$28
Caltrans – San Joaquin Route	$41	Merced to LeGrande Double-Track	$41
Southern California/Authority (Southern California MOU)	$500	Blended System Regional Rail Projects	$1,000
Los Angeles County Metropolitan Transportation Authority (LACMTA)	$115	Regional Rail Connector to LAUS	$1,400
Southern California Regional Railroad Authority (SCRRA)/Metrolink	$89	Rolling Stock Procurement	$203
San Diego Metropolitan Transportation System (SDMTS)	$58	Blue Line Light Rail Improvement	$152
North County Transit District (NCTD)/COASTER	$18	PTC	$60
Total	**$1,837**[d]		**$6,838**

[a] Future funding available.

[b] Includes shares transferred from BART and SCVTA.

[c] All funding sources other than Prop. 1A.

[d] This amount does not include: amounts reserved for administration, appropriated prior to SB 1029 for Positive Train Control projects, or reserved for future programming.

The SCRPWG has developed a list of "Potential Early Investment Projects that Support the Development of the California High Speed Train." These projects will be partially funded by the $500 million in Proposition 1A bond funding. Projects that support the southern California unified rail network and are included in the CTC program of projects are included in Table 8.2. The participating agencies will work to identify and secure project funding from federal, state, regional, and local resources.

8.1.5 High-Speed Rail Capital Needs Moving Forward

The first construction section of the IOS is to be funded using a mix of federal and state funding. Approximately $3.2 billion in federal American Recovery and Reinvestment Act of 2009 (ARRA) and Federal Fiscal Year (FFY) 2010 funding, combined with $2.6 billion in Proposition 1A funding, will be used for acquisition and construction in the Central Valley. Additionally, $1.1 billion was appropriated in SB 1029 for early investments in the Blended System in the Bookends, as well as $819 million for urban, commuter, and intercity feeder systems. Once work begins on the first construction section of the IOS in 2013, the Authority will simultaneously begin efforts necessary to close the rail gap between Bakersfield and the San Fernando Valley.

Capital funding to develop the remaining phases of the HSR project will come from federal, state, local, and private sources. These funds will be available to the Authority at different times based on the development timeline of the system. The 2012 Business Plan identifies funding for completion of the IOS as coming from remaining Proposition 1A funds, as well as significant federal investments. Due to the project's environmental benefits, cap-and-trade funds are also available as a backstop against federal and local support to complete the IOS. Table 8.3 outlines the funding needed to complete the IOS by FRA cost categories.

Table 8.3: Initial Operating Section Costs (Planning Scenario)

FRA Standard cost categories	Category Cost (Millions 2012 Dollars)	Category Cost (Millions YOE Dollars)
10-Structures and track	$14,462	$16,858
Civil (10.04-10.06, 10.08, 10.18)	$1,484	$1,730
Structures (10.01-10.03, 10.07)	$11,836	$13,797
Track (10.09, 10.10, 10.14)	$1,144	$1,333
20-Stations, terminals, intermodal	$624	$727
30-Support facilities: yards, shops, administrative buildings	$438	$510
40-Sitework, right-of-way, land, existing improvements	$4,714	$5,288
Purchase or lease of real estate (40.07)	$1,475	$1,655
50-Communications and signaling	$523	$609
60-Electric traction	$1,716	$2,000
70-Vehicles	$880	$1,026
80-Professional services (applies to categories 10-60)	$2,833	$3,236
90-Unallocated contingency	$944	$1,077
100-Finance charges	$0	$0
Total	**$27,134**	**$31,331**

Once the IOS is complete and HSR becomes operational, anticipated operating revenues show that the HSR system can support private capital investments, with increased investment activity coming as additional phases are completed and revenues increase. In addition to state and private sources, a significant contribution of funds is needed from the federal government. While supported by the Obama Administration, there is substantial discussion underway within the federal government related to both overall transportation funding and HSR funding. Existing and potential options for new federal, state, and local programs are for HSR presented in Table 8.4.

Table 8.4: Potential Funding Sources

Funding Source	Description
ARRA and U.S. Department of Transportation (U.S. DOT) Annual Appropriations (Federal)	In February 2009, President Obama signed the ARRA. Using the Passenger Rail Investment and Improvement Act (PRIIA) of 2008 as a framework, Congress has provided total program funding of $10.1 billion for new high-speed and intercity passenger rail grants. California's HSR program has received an allocation of $3.5 billion, or 34 percent of these federal funding sources. In addition, based on the PRIIA framework, Congress allocated HSIPR funding through FFY 2009 and FFY 2010 appropriations.
Dedicated Passenger Rail Trust Fund (Federal)	The President's FFY 2013 budget request for the U.S. DOT outlined the Administration's six-year proposal, which includes the establishment of a Transportation Trust Fund with a new subaccount for passenger rail. The plan designated $35 billion for building new corridors or substantially improving existing corridors, at an average level of nearly $6 billion per year.
Federal Transportation Financing Programs	The federal government has several low-cost debt programs (borrowing tools) that may be accessed by the private sector (and in some instances, the public sector) to help reduce financing costs of the program. These programs include the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA), the Railroad Rehabilitation and Improvement Financing (RRIF) Program, and Private Activity Bonds.
Proposition 1A (State)	The Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century of 2008 (Proposition 1A) authorized the State to issue $9.95 billion of general obligation bonds, $9 billion of which will be used to develop a HSR system. This assumes that $8.2 billion is available for construction after environmental, planning, and support costs for the program are applied.
Cap-and-Trade Program Funds (State)	Assembly Bill (AB) 32 (Núñez 2006) mandates a reduction of statewide greenhouse gas (GHG) emissions to 1990 levels by 2020. In accordance with that law, California will implement a market-based cap-and-trade program. Funds from the program can be used to further the purposes of AB 32, including for development and construction of the HSR system. Use of these funds specifically for transportation infrastructure projects was authorized by AB 1532 (Pérez 2012).
Locally Generated and Other Revenues	Locally generated revenues can include funds from the use of transit-oriented development (TOD), in partnership with local jurisdictions. The Authority and its local municipal partners also plan to target private revenues from passenger stations and other sources of revenue derived from growth and economic activity supported by the project.

As outlined above, the HSR project will be constructed in phases, with each phase moving the project closer to completion. In total, the estimated cost to complete all phases of the HSR system is $68.4 billion (YOE) as illustrated in Table 8.1. However, once the cost of each phase is further divided into smaller sections, as shown in Table 8.3, the components of the system become smaller and capital funding for each much more attainable.

8.2 Improvements to Existing Intercity Routes

State-supported intercity passenger rail service currently operates on three routes: the *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor*. In the sections that follow, the capital planning process for each route is described and a list of capital projects for each route is included. Section 8.0 provides an explanation of the principles used to develop the capital project lists. As previously described in this chapter, the NCRPWG and the SCRPWG are overseeing planning studies and operations modeling to refine future service levels and capital requirements that would be needed for the HSR Blended System.

8.2.1 Multiple Corridor Capital Investments

There are currently several capital projects, such as new equipment and maintenance facilities, that benefit two or more of the existing intercity routes. These projects are listed in Table 8.5.

Multiple-corridor capital projects include a new maintenance facility in the Sacramento area and improvements to rolling stock and new equipment. Examples of rolling stock projects include new railcars and locomotives to replace aging stock and meet growing ridership demand; new bicycle storage areas in cab cars; equipment to provide a wireless network on trains for passenger and communications use; and locomotive upgrades to meet more stringent emissions standards.

8.2.2 Pacific Surfliner

The *Pacific Surfliner* route operates between San Luis Obispo and San Diego via Los Angeles. Since 1976, the State has invested over $1.2 billion in capital improvements to the route. Future *Pacific Surfliner* service plans have been developed in a collaborative effort by Caltrans and the Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency (LOSSAN). Caltrans and its regional and local partners have conducted joint corridor-wide planning activities over many years, the most recent example being the adopted *LOSSAN Corridorwide Strategic Implementation Plan* (April 2012).

The LOSSAN Rail Corridor Agency initiated the *Strategic Implementation Plan* as the first step in implementing a new corridorwide vision for passenger rail services, based on the *LOSSAN Corridor Strategic Assessment* (2010) and *LOSSAN Corridor Quick Improvement Study* (2008). Goals of the Plan include:

- Provide the infrastructure to meet current and future conventional and high-speed intercity, commuter, and freight demands in the corridor.
- Integrate regional fare policy.
- Develop more efficient dispatching of corridor services.
- Implement a strategy for seamless rail travel in the corridor.
- Identify and establish new services for unserved and underserved markets.
- Improve traveler information.
- Coordinate with long-distance passenger rail and connecting motorcoach services.

Table 8.5: Multiple Corridor Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	Corridor Section	Source Document
Near Term (2013–2015)					
Procure New Rail Cars (including locomotives)	Equipment	$100.0	Allocated	Systemwide	HSIPR
	Equipment	$68.0	Allocated	Systemwide	HSIPR (ARRA)
	Equipment	$42.0	Allocated	Systemwide	Proposition 1B Bond Funds – State
	Equipment	$108.0	Programmed	Systemwide	Proposition 1B Bond Funds – State
Cab Car Bicycle Storage (rolling stock)	Equipment	$8.23	Allocated	Multiple Corridor	HSIPR (ARRA)
Locomotive Emissions Upgrade (rolling stock)	Equipment	$13.29	Allocated	Multiple Corridor	HSIPR (ARRA)
Wireless Network for the northern California Intercity Passenger Rail Fleet	Equipment	$4.75	Allocated	Multiple Corridor	Proposition 1B Bond Funds – State
Sacramento Maintenance Facility – Property Acquisition	Facility	$25.45	Programmed	Multiple Corridor	STIP
	Facility	$4.55	Programmed	Multiple Corridor	Proposition 1B Bond Funds – State
Subtotal Near Term		**$374.27**			
Mid Term (2016–2020)					
Procure New Rail Cars and Locomotives for NCURS	Equipment	$268.32	Unfunded	Multiple Corridor	NCPWG
Subtotal Mid Term		**$268.32**			
Total		**$642.59**			

The *LOSSAN Corridorwide Strategic Implementation Plan* calls for completion of near-term capital work by 2014 to allow for the operation of additional *Pacific Surfliner* trains, including limited-stop; introduction of Ventura-Santa Barbara commuter service; Orange County intracounty Metrolink service; new through commuter trains between Los Angeles and San Diego making all stops; and additional mid-day COASTER and Metrolink service with timed connections in Oceanside.

By 2030, the Plan anticipates: hourly peak hour *Pacific Surfliner* service between Los Angeles and San Diego with most peak-period trips being limited-stop; additional commuter trains throughout the corridor, including through trains between Los Angeles and San Diego making all stops; an increase in both commuter and intercity service to Ventura and Santa Barbara counties; an increase in intercity service to

San Luis Obispo, a through service to San Francisco; and a near doubling of the number of overall train operations.

In the portion of the corridor north of LAUS, the *LOSSAN North Program Environmental Impact Report/Environmental Impact Statement* (EIR/EIS) and the *LOSSAN North Service Development Plan* (SDP), which together comprise a Corridor Investment Plan (CIP), are currently underway. South of LAUS, the *LOSSAN Final Program EIR/EIS* was completed in September 2007. Caltrans has an approved LOSSAN South SDP and is currently updating the document to incorporate more current information.

These plans, to the extent possible, identify specific service enhancements and supporting capital projects, and are used as the source for capital projects. The near-term projects focus on implementation of PTC, grade separation and crossing projects, adding second and third main tracks and some curve realignments. However, the near-term projects do not provide increased frequencies, aside from introduction of Orange County intracounty Metrolink service, four additional round trips on the COASTER, and a twelfth *Pacific Surfliner* round trip between Los Angeles and San Diego.

Capital investments in the *Pacific Surfliner* will provide infrastructure and service enhancements to a system operating beyond its design capacity. These investments will support several objectives:

- Providing additional capacity to serve corridor growth in a cost-effective manner with minimal impacts to local communities, natural resources, air quality, and improvements to reduce GHG emissions.
- Increasing use of intercity passenger rail service as part of a multi-modal strategy identified in regional and county goals and plans.
- Reducing running times to attract additional riders to provide a more attractive service.
- Improving the reliability and safety of rail service on the corridor.

Though operated as a single route, service levels vary north and south of Los Angeles, with higher train frequencies in the Los Angeles to San Diego portion. In addition, track ownership is different north and south of LAUS. For these reasons, the corridor has been divided into two parts in the discussion below. *Pacific Surfliner* north of LAUS refers to the San Luis Obispo to Los Angeles segment, and *Pacific Surfliner* south of LAUS refers to the Los Angeles to San Diego segment.

***Pacific Surfliner* North of LAUS (San Luis Obispo-Los Angeles)**

Proposed service increases for the northern portion of the *Pacific Surfliner* route are designed to address the forecasted rail system demand. Table 8.6 presents the proposed 2014 and 2030 train volumes in various segments of the corridor between the cities of Los Angeles and San Luis Obispo. Proposed train volumes are shown for intercity *Pacific Surfliner* trains and existing and proposed commuter rail services on the corridor. The proposed service increases are consistent with the planning documents cited above.

In the *LOSSAN Strategic Implementation Plan* and the *LOSSAN North SDP*, there are no planned increases in intercity rail service for 2014 on the northern portion of the route. Planned increase in service for 2030 includes two additional daily round trips from San Luis Obispo to LAUS; these trips would continue south to San Diego. This would bring daily round trip intercity rail service between LAUS and Goleta to seven and between Goleta and San Luis Obispo to four. Two of these trains would continue north to San Francisco as the *Coast Daylight*. These service levels would likely be achieved prior to 2030, however planning was not done at a more detailed level than 2014 and 2030.

Operations simulation modeling completed for the *Pacific Surfliner North SDP* indicates that the 2030 train volumes shown in Table 8.6 are feasible upon completion of the near-term and mid-term projects listed in Table 8.8.

The future service assumptions in Table 8.6 are for years 2014 and 2030 for consistency with the *LOSSAN Corridorwide Strategic Implementation Plan.* The ridership and revenue modeling process described in Chapter 10 applied these service assumptions for years 2020 and 2040 for consistency with other CSRP projections.

Planning for integrated HSR and conventional rail in the Los Angeles basin has been initiated since the release of the 2012 Business Plan; however, it has not yet been completed. Table 8.6 does not reflect additional train volumes required to uniquely serve the HSR IOS terminus in the San Fernando Valley in 2022. The primary impacted area is Burbank to LAUS. Additional analysis is currently underway by the Authority in conjunction with the SCRPWG.

More than 80 percent of the *Pacific Surfliner* route north of LAUS operates on a single-track rail line. Sidings are limited in number and length, and in some instances are not connected to the mainline track on both ends. These limitations frequently require passenger trains to pull into sidings, wait, and then back out onto the mainline to proceed. In addition, many sections of single track still use Automatic Block Signaling (ABS) controls and manual switches, which require dispatch approval to proceed. Key improvements planned for this portion of the route include:

Table 8.6: Future LOSSAN North Corridor Weekday Train Volumes (Round Trips)

Weekday Service	LAUS-Burbank/ Bob Hope Airport		Burbank/ Bob Hope Airport-Moorpark		Moorpark-E. Ventura		E. Ventura-Goleta		Goleta-San Luis Obispo	
	2014	**2030**	**2014**	**2030**	**2014**	**2030**	**2014**	**2030**	**2014**	**2030**
Pacific Surfliner[a]	5	7	5	7	5	7	5	7	2	4
Coast Starlight	1	1	1	1	1	1	1	1	1	1
Metrolink Ventura County Line	15	22	7	18	3	9	–	–	–	–
Metrolink Antelope Valley Line[b]	15	23	–	–	–	–	–	–	–	–
Ventura-Santa Barbara Commuter Service[c]	–	–	–	–	–	–	1	4	–	–
Total	36	53	13	26	9	17	7	12	3	5

[a] 2030 volumes include timeslots for proposed *Coast Daylight*: one daytime round trip and one overnight round trip.

[b] Antelope Valley trains operate on the *Pacific Surfliner* route between LAUS and Burbank Junction.

[c] Commuter service would extend north to the Goleta Station where *Pacific Surfliner* storage and light maintenance facilities are located.

Source: Los *Angeles-San Diego-San Luis Obispo Corridorwide Strategic Implementation Plan: Final Report*, April 2012; Business Case Operations Analysis Technical Memorandum.

- Double-Tracking. Additional segments of mainline tracks in heavy rail traffic areas will enable trains to operate more efficiently with increased on-time performance. New mainline track segments will also allow increased train frequencies, improved operational reliability, increased capacity, and decreased train delays.
- Siding and Siding Extensions. Constrained length and siding availability impact peak-period intercity and commuter passenger travel between Moorpark and Oxnard and all rail travel between Gaviota and San Luis Obispo. Siding constraints have become more noticeable in recent years as freight lengths have increased to meet operational needs and market demand. The combination of longer freight trains and constrained sidings has resulted in passenger trains being dispatched onto a siding when trains meet. The *Pacific Surfliner* planning partners have identified several projects to add or extend passing sidings with a minimum length of 10,000 feet. As sidings are lengthened, they will also be upgraded to permit higher speed operations.
- Other Track Upgrades. Improvements such as curve realignments, grade-crossing improvements, grade separations, and capitalized maintenance are necessary to maintain the corridor as a FRA Class IV railroad. In addition to system infrastructure improvements, there are ongoing rail and tie replacement needs. Union Pacific Railroad (UPRR) has made and continues to make infrastructure upgrades that maintain the rail line at FRA standards. However, segments north of Goleta are characterized by single-track operations, short sidings or lack of sidings, manually-thrown switches, and an outdated signaling system. Many of these segments are older and require a high level of maintenance to operate at maximum allowable speeds.
- Signal Upgrades. The signal system between Los Angeles and Goleta is state-of-the-art Centralized Traffic Control train control (see Chapter 6). North of North Ellwood, the signal system is ABS, which affects the number of trains that can safely operate in these track sections. Some locations, such as the Gaviota siding, have what is referred to as “island” Centralized Traffic Control that is controlled remotely by the dispatcher.

Pacific Surfliner **South of LAUS (Los Angeles-San Diego)**

Proposed service increases for the portion of the *Pacific Surfliner* route south of LAUS are designed to address the forecasted rail system demand. Table 8.7 presents the proposed 2014 and 2030 train volumes in various segments of the corridor between the cities of Los Angeles and San Diego for intercity *Pacific Surfliner* trains and existing and proposed commuter rail services on the corridor. The train volumes represent more frequent *Pacific Surfliner* and Metrolink services, consistent with the planning documents cited above. The rail improvements discussed in the following section will be required to accommodate forecasted rail activity.

In the *LOSSAN Strategic Implementation Plan*, the 2014 service is planned to increase from 11 round trips operated in State Fiscal Year (SFY) 2012-13 to 12 round trips. Planned 2030 service increases include 6 additional daily round trips from San Diego to LAUS. This would increase daily round trip intercity rail service from 12 to 18, which is consistent with the long-term vision for hourly intercity rail service. Most of the peak-period trips would be limited-stop express. As noted above, 2 of the new trains would continue north to Goleta, with 1 of the trips continuing to San Francisco as the *Coast Daylight*. These service levels would likely be achieved prior to 2030, however, planning was not done at a more detailed level than 2014 and 2030.

Ongoing operations simulation modeling for the LOSSAN corridor indicates that the 2030 train volumes shown in Table 8.7 may be feasible upon completion of the near-term and mid-term projects listed in Table 8.8.

The future service assumptions in Table 8.7 are for years 2014 and 2030 for consistency with the *LOSSAN Corridorwide Strategic Implementation Plan*. The ridership and revenue modeling process described in Chapter 10 applied these service assumptions for years 2020 and 2040 for consistency with other CSRP projections.

Integrated HSR and conventional rail planning in the Los Angeles basin has been initiated since the release of the 2012 Business Plan, and this work is still ongoing. Table 8.7 does not reflect additional train volumes that may be required to serve conventional rail passengers south of LAUS that connect to HSR service. The Authority, in conjunction with the SCRPWG, is currently conducting additional analysis.

Key investment categories in this portion of the route include:

- Second or Third Main Track Construction. Additional segments of mainline tracks in areas of heavy rail traffic will allow trains to travel at up to their maximum allowed speed. The benefits of additional main tracks are increased train frequencies, improved operational reliability, increased capacity, and decreased train delays. Caltrans and BNSF Railway (BNSF) have been working on the state-funded $160 million, 17-mile Triple Track Project between Soto Junction and Fullerton on the *Pacific Surfliner* corridor since the late 1990s. Upon completion, this project will allow the operation of up to 150 freight and passenger trains per day. The project includes construction of 6 grade separations, 2 of which are funded and underway. Double main track is proposed on the San Diego Subdivision to eliminate a single-track section between 2 existing sidings and replace an aging single-track bridge over the San Luis Rey River.
- Siding and Siding Extensions. Constrained siding availability and length impact peak-period passenger travel in southern Orange County and northern San Diego County.

Table 8.7: Future LOSSAN South Corridor Weekday Train Volumes (Round Trips)

	LAUS-Fullerton		Fullerton-Orange		Orange-Laguna Niguel/Mission Viejo		Laguna Niguel/Mission Viejo-Oceanside		Oceanside-San Diego	
Weekday Service	**2014**	**2030**	**2014**	**2030**	**2014**	**2030**	**2014**	**2030**	**2014**	**2030**
Pacific Surfliner	12	18	12	18	12	18	12	18	12	18
Southwest Chief	1	1	–	–	–	–	–	–	–	–
Metrolink Orange County Line	10	14	10	14	10	14	5	7	–	–
Metrolink Inland Empire-Orange County Line	–	–	–	–	8	14	3	2	–	–
Metrolink 91 Line	6	16	–	–	–	–	–	–	–	–
Metrolink Orange County Intra-County Line	–	–	5	7	5	7	–	–	–	–
COASTER	–	–	–	–	–	–	–	–	16	27
Total	**29**	**49**	**27**	**39**	**35**	**53**	**20**	**27**	**28**	**45**

Source: *LOSSAN Corridorwide Strategic Implementation Plan: Final Report*, April 2012, Business Case Operations Analysis Technical Memorandum.

- Other Track Upgrades: Track conditions range from FRA Class V (80 to 90 mph) in Orange County (Santa Ana to San Juan Capistrano) and San Diego County (CP (Control Point) Songs to CP East Brook, Oceanside to Encinitas, and several short segments) to FRA Class IV (60 to 79 mph) in Orange County.[123] In addition, there are ongoing rail and tie replacement needs. Areas of the corridor in southern Orange County and northern San Diego County are characterized by single-track operations and short sidings or lack of sidings. These areas also have many tight curves. Curve realignment projects allow increased train speeds and prolong the rail life, which in turn reduces the frequency and cost of track repairs.
- Grade Separations. These improvements eliminate at-grade crossings of rail and highway systems. Because cars and trucks are less sensitive to grades than trains, typically a grade separation is designed with the roadway relocated under or over the rail line. Grade separations reduce accidents and increase train performance, while providing community benefits, such as reduced noise (through the elimination of the need to sound the train's horn) and improved local traffic flow by reducing vehicular delays at crossings. Grade separations also facilitate pedestrian and bicycle activity, which help to reduce GHG emissions.

Pacific Surfliner Capital Projects

Table 8.8 lists planned investments by timeframe for the *Pacific Surfliner* route. The introduction to Chapter 8 provides an explanation of the principles used to develop the capital project lists. Projects are assembled from published plans such as the *LOSSAN Corridorwide Strategic Implementation Plan*. The projects are grouped into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes. Where available, project cost estimates are reported in 2012 dollars.

The *Pacific Surfliner* corridor is a "joint use" corridor, with most segments currently shared with commuter service or planned to be shared with commuter rail service. Between Ventura and Oceanside, the corridor is shared with Metrolink; and south of Oceanside, it is shared with COASTER. Between San Luis Obispo and LAUS, the corridor is planned to be shared with the *Coast Daylight* and between Goleta and East Ventura with the proposed Ventura – Santa Barbara commuter service.

Most projects listed in the table would benefit commuter services in addition to the *Pacific Surfliner*, Projects that would only benefit the commuter routes are not listed in the table. Instead, these projects are listed in the section that describes the commuter service. For example, a parking structure at a COASTER station would appear in the COASTER table, but not the *Pacific Surfliner* table.

The funding status must be fully or partially "Allocated" or "Programmed" in order to be classified as a near-term project. The county where the project is located is listed along with the programming or planning document where the project appears.

Next Steps

Future service levels and capital project requirements along the *Pacific Surfliner* route will be further developed through continuing studies by the SCRPWG. Proposed frequency increases and related passenger rail improvements need to be verified by the capacity analyses that are currently underway. For those route segments that travel over privately-owned track, agreement on the necessary capital improvements will need to be reached with the freight railroads. The participating agencies also need to identify and secure project funding from federal, state, regional, and local resources.

[123] The FRA track classes are defined in Section 6.

Table 8.8: *Pacific Surfliner* Corridor Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015)					
Grover Beach Station expansion (new bus facilities, parking, and bike facilities)	Station	$1.23	Programmed (PTMISEA)	San Luis Obispo	Proposition 1B-Public Transportation Modernization, Improvement, and Service Enhancement Account (PTMISEA)
Ortega siding (reconstruction)	Track & Signal	$20.00	Partially programmed	Santa Barbara	HSIPR (ARRA) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)* STIP Intercity Rail Capital Projects Database (IRCP) Santa Barbara County Measure A
Seacliff siding extension and curve realignment	Track & Signal	$28.00	Partially programmed	Ventura	HSIPR *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)* STIP IRCP Santa Barbara County Measure A
Camarillo Station improvements (platform and pedestrian circulation, passenger station building/restrooms, and related construction of new siding between Oxnard and Camarillo)	Track & Signal	$4.42[a]	n/a	Ventura	SCAG RTP in the Federal Transportation Improvement Program (FTIP)
Moorpark Station and Simi Valley Station grade crossing improvements	Grade crossing	$0.75[a]	n/a	Ventura	SCAG RTP in the FTIP
CP Bernson (De Soto) to CP Raymer second main track and Northridge Station second platform	Track & Signal	$72.96 $71.00 State $1.56 Federal $0.39 Other	Partially allocated	Los Angeles	HSIPR STIP Proposition 1B (Intercity Rail Improvement (IRI)) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)* IRCP
New CP Raymer universal crossover	Track & Signal	$5.00[a]	n/a	Los Angeles	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015), continued					
Van Nuys Station Second Platform	Station	$40.00 $0.80 Federal	Partially allocated	Los Angeles	HSIPR
Vanowen Street/Buena Vista Street SCRRA crossing improvements (Burbank)	Grade crossing	$3.21[a]	n/a	Los Angeles	SCAG RTP (financially-constrained)
Doran Street/San Fernando Road SCRRA crossing grade separation (Glendale)	Grade separation	$40.00[a]	Partially programmed	Los Angeles	ARRA Proposition 1A Southern California Potential Early Investment Projects
West Broadway/Brazil Street/San Fernando Road SCRRA grade crossing improvements (Glendale)	Grade crossing	$60.14 $56.63 State $1.68 Federal $1.83 Other	Allocated	Los Angeles	SCAG RTP in the FTIP Caltrans Reporting Information System (CRIS)
Riverside Drive grade separation replacement (Los Angeles)	Grade separation	$57.73 $5.00 State $44.32 Federal $8.41 Other	Allocated	Los Angeles	CRIS IRCP
North Spring Street grade separation reconstruction (Los Angeles)	Grade separation	$49.26 $5.78 State $31.75 Federal $11.73 Other	Allocated	Los Angeles	CRIS IRCP
Pico Rivera to Santa Fe Springs third main track (Los Angeles to Fullerton third main track, Segment 7)	Track & Signal	$37.50	Programmed	Los Angeles	HSIPR (ARRA) Proposition 1B (Intercity Rail Improvement)
La Mirada to Valley View third main track (Los Angeles to Fullerton third main track, Segment 8)	Track & Signal	$30.50	Programmed	Los Angeles	Proposition 1B (Intercity Rail Improvement)
State College Boulevard/Howell Street SCRRA crossing grade separation (Anaheim)	Grade separation	$92.00[a]	Programmed – Trade Corridor Improvement Fund (TCIF)	Orange	Proposition 1B-TCIF Southern California Potential Early Investment Projects

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015), continued					
New passing siding between Laguna Niguel/Mission Viejo Station and San Juan Capistrano Station (La Zanja)	Track & Signal	$26.80	Programmed	Orange	SCAG RTP in the FTIP *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
San Clemente Beach Trail grade crossing improvements	Grade crossing	$4.50	Allocated	Orange	Proposition 1B (Highway-Railroad Crossing Safety Account) Proposition 116 Local funds CRIS
Positive Train Control (San Onofre to San Diego)	Track & Signal	$88.00	Allocated	San Diego	HSIPR (PRIIA) Proposition 1A
CP San Onofre to CP Pulgas second main track (Phase 1)	Track & Signal	$38.00	Allocated	San Diego	STIP Proposition 1B (Intercity Rail Improvement)
Oceanside through tracks	Track & Signal	$19.50	Allocated (HSIPR, local)	San Diego	HSIPR (ARRA) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Poinsettia Station improvements	Track & Signal	$13.00	Allocated (Federal Transit Administration (FTA), local)	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
CP Cardiff to CP Craven second main track (San Elijo Lagoon)	Track & Signal	$76.10	Allocated (FRA, local)	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Solana Beach Station parking expansion	Station	$27.00	Partially allocated	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Los Penasquitos Lagoon bridge replacements	Track & Signal	$24.00	Partially allocated	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Sorrento Valley double-track	Track & Signal	$33.00	Programmed	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015), continued					
CP Elvira to CP Morena double-track	Track & Signal	$90.50	Partially allocated (FRA, FTA, Traffic Congestion Relief Program (TCRP), local)	San Diego	HSIPR (PRIIA) *San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)* Southern California Potential Early Investment Projects
Subtotal (Near Term)	–	**$460.74**	–	–	–
Mid Term (2016-2020)					
San Luis Obispo to Santa Barbara track upgrades (maximum speed 79 mph)	Track & Signal	$90.00	n/a	San Luis Obispo, Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Installation of powered switches at Grover, Callender, Surf, and Sudden	Track & Signal	n/a	n/a	San Luis Obispo, Santa Barbara	UPRR
Extension of Guadalupe siding and installation of island Centralized Traffic Control	Track & Signal	$23.60	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Narlon siding	Track & Signal	n/a	n/a	Santa Barbara	Union Pacific Railroad
Upgrades at Narlon, Honda, and Concepcion sidings (powered switches, track/tie replacement, and island Centralized Traffic Control)	Track & Signal	$35.40	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Tangair siding, curve realignment, and installation of island Centralized Traffic Control	Track & Signal	$14.00	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Concepcion siding	Track & Signal	n/a	n/a	Santa Barbara	UPRR
New Sandyland siding	Track & Signal	$20.00	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
New siding at Carpinteria Station	Track & Signal	$11.80	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Ventura County farm grade crossing improvements	Grade crossing	$0.60	n/a	Ventura	SCAG RTP in the FTIP
East Ventura Curve realignment	Track & Signal	$2.40	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
Santa Clara River curve realignment	Track & Signal	$7.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Leesdale siding	Track & Signal	$17.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
CP West Camarillo curve realignments	Track & Signal	$6.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
Strathearn siding curve realignment	Track & Signal	$1.20	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
Vanowen Street/West Empire Avenue/Clybourn Avenue SCRRA crossing grade separation (Burbank/Los Angeles)	Grade separation	n/a	n/a	Los Angeles	SCAG RTP in the FTIP
Burbank Junction track realignment and high-speed switches[c]	Track & Signal	$10.00	n/a	Los Angeles	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Burbank siding	Track & Signal	$7.00	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Burbank to Los Angeles third main track	Track & Signal	$145.00	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Sonora Avenue/Air Way SCRRA crossing improvements (Glendale)	Grade crossing	$3.70[a]	n/a	Los Angeles	SCAG RTP in the FTIP
Grandview Avenue/San Fernando Road/Air Way SCRRA crossing grade separation (Glendale)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Chevy Chase Drive/Alger Street SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Relocation of Glendale Slide	Track & Signal	$3.30[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Redesign of Glendale Station	Station	$20.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
North Main Street SCRRA crossing improvements (Los Angeles)[b]	Grade crossing	$5.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
North Main Street grade separation (Los Angeles)[b]	Grade separation	$91.28[a]	n/a	Los Angeles	SCAG RTP (financially-constrained)
Southern California Regional Interconnector Project – LAUS run-through tracks	Extension/ new route	$350.00	n/a	Los Angeles	Southern California Potential Early Investment Projects
Hobart Flyover (UPRR/BNSF San Pedro Junction)	Track & Signal	$95.00	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Hobart to Commerce fourth main track	Track & Signal	$25.00	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Basta to Fullerton Junction fourth main track	Track & Signal	$100.00	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Orangethorpe Avenue SCRRA crossing grade separation (Anaheim)	Grade separation	$99.00[a]	Allocated	Orange	Proposition 1B (Trade Corridor Improvement Fund) Southern California Potential Early Investment Projects
Sycamore Street SCRRA crossing closure (Anaheim)	Grade crossing	$2.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
Broadway SCRRA crossing improvements (Anaheim)	Grade crossing	$5.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
Santa Ana Street SCRRA crossing closure (Anaheim)	Grade crossing	$2.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
South Street SCRRA crossing improvements (Anaheim)	Grade crossing	$5.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
Vermont Avenue SCRRA crossing improvements (Anaheim)	Grade crossing	$5.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
Orange County supplemental signal system (maximum speed 110 mph)	Track & Signal	$15.00	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Santa Ana Station expansion	Station	n/a	n/a	Orange	SCAG RTP in the FTIP

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
New CP on Metrolink Orange Subdivision at Fourth Street (MP 175.7), new powered No. 10 turnout to UPRR spur approximately 0.5 mile south of Santa Ana Station, and new powered derail on UPRR connecting track	Track & Signal	$4.00[a]	n/a	Orange	SCAG RTP in the FTIP
Irvine Station improvements (auxiliary siding and platform, new holding track, and new crossover)	Station	$17.00	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
San Diego County cab signal system (maximum speed 110 mph)	Track & Signal	$4.00	n/a	San Diego	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
San Diego County lagoon bridge replacements (tbd)	Track & Signal	$20.00[a]	n/a	San Diego	Southern California Potential Early Investment Projects
San Diego County grade crossing safety improvements and future quiet zones	Grade crossing	$66.00[a]	n/a	San Diego	Southern California Potential Early Investment Projects
CP San Onofre to CP Pulgas second main track (Phase 2)	Track & Signal	$36.00	Partially programmed	San Diego	STIP Southern California Potential Early Investment Projects
CP Eastbrook to CP Shell double-track (San Luis Rey River Bridge replacement)	Track & Signal	$53.00	Partially allocated (HSIPR, local)	San Diego	HSIPR San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report) Southern California Potential Early Investment Projects
Oceanside Station parking expansion	Station	$25.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Carlsbad Village double-track (CP Longboard to CP Farr)	Track & Signal	$49.50	Partially allocated (HSIPR, local)	San Diego	HSIPR (PRIIA) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
CP Ponto to CP Moonlight second main track and Batiquitos Lagoon Bridge replacement	Track & Signal	$48.50	Partially allocated (local)	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
CP Moonlight to CP Swami second main track	Track & Signal	$22.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
New grade-separated pedestrian crossings in Encinitas (Hillcrest Drive, El Portal Street, and Montgomery Avenue)	Grade separation	$12.00	Partially allocated	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
San Dieguito double-track and bridge replacement (CP Valley to CP Crosby), and Del Mar Fairgrounds special events platform	Track & Signal	$110.00[a]	Partially allocated (HSIPR, local)	San Diego	HSIPR (PRIIA) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Del Mar Bluffs stabilization (Phase 4)	Track & Signal	$21.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Sorrento to Miramar (CP Pines to CP Cumbres (Miramar)) curve realignment and second main track (Phase 2)	Track & Signal	$98.00	Partially allocated (FRA, STIP, local)	San Diego	HSIPR (PRIIA) STIP *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Airport Intermodal Transportation Center	Station	$165.00[a]	Partially allocated (local)	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
San Diego Station (Santa Fe Depot) rehabilitation	Station	$20.00	n/a	San Diego	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
San Diego Station (Santa Fe Depot) parking expansion	Station	$8.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
New San Diego layover facility	Maintenance facilities	$32.00	n/a	San Diego	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Subtotal (Mid Term)	–	**$1,249.48**	–	–	–
Long Term (2021-2040)					
South San Luis Obispo to Goleta continuous Centralized Traffic Control	Track & Signal	$295.00	n/a	San Luis Obispo, Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Hadley to Callender Curve Realignments	Track & Signal	$290.00	n/a	San Luis Obispo	*LOSSAN North Corridor Strategic Plan (Final)*
Grover Beach Station second platform and track	Station	$75.00[a]	n/a	San Luis Obispo	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Long Term (2021-2040), continued					
MP 276 track realignment and Highway 1 overpass replacement	Track & Signal	$23.60	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Waldorf siding	Track & Signal	$25.00[a]	n/a	Santa Barbara	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Extension of Devon siding	Track & Signal	$15.00[a]	n/a	Santa Barbara	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Devon to Tangair curve realignments	Track & Signal	$231.00	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Santa Barbara County curve realignments (Surf to Arguello, Sudden to Concepcion, Concepcion to Gato Curve, San Augustine to Sacate, Gaviota to Tajiguas, Tajiguas to Ellwood)	Track & Signal	$677.00	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
Extension of Capitan siding	Track & Signal	$15.00[a]	n/a	Santa Barbara	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Extension of Goleta siding	Track & Signal	$11.80	n/a	Santa Barbara	*LOSSAN North Corridor Strategic Plan (Final)*
New Rincon siding	Track & Signal	$11.80	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
East Ventura Wye second main track	Track & Signal	$55.00[a]	n/a	Ventura	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Oxnard Station second platform	Station	$20.00[a]	n/a	Ventura	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Oxnard to Camarillo second main track	Track & Signal	$17.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
New North Camarillo crossover	Track & Signal	$1.20	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
MP 423 to CP Las Posas second main track	Track & Signal	$60.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
CP Strathearn to Simi Valley second main track	Track & Signal	$50.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Long Term (2021-2040), continued					
Los Angeles Avenue/Argus Avenue/Ralston Street SCRRA crossing grade separation (Simi Valley)	Grade separation	$110.00	n/a	Ventura	*LOSSAN North Corridor Strategic Plan (Final)*
Simi Valley to CP Davis (Hasson) second main track (extension of Santa Susana siding)	Track & Signal	$40.00[a]	n/a	Ventura	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
DT Junction and Los Nietos Junction track realignment (diamond crossing elimination)	Track & Signal	$130.00	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Ball Road SCRRA crossing grade separation (Anaheim)	Grade separation	$95.00[a]	n/a	Orange	Southern California Potential Early Investment Projects
North Main Street SCRRA crossing grade separation (Orange)	Grade separation	$69.00[a]	n/a	Orange	SCAG RTP (financially-unconstrained) Rail and Facilities Program Update (Orange County Transportation Authority)
Orange Junction curve realignment	Track & Signal	$2.00	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
East 17th Street/Lincoln Avenue SCRRA crossing grade separation (Santa Ana)	Grade separation	$89.00[a]	n/a	Orange	Rail and Facilities Program Update (Orange County Transportation Authority)
East Santa Ana Boulevard SCRRA crossing grade separation (Santa Ana)	Grade separation	$74.00[a]	n/a	Orange	SCAG RTP in the FTIP Rail and Facilities Program Update (Orange County Transportation Authority)
South Grand Avenue/East Hunter Avenue SCRRA crossing grade separation (Santa Ana)	Grade separation	$72.00[a]	n/a	Orange	SCAG RTP (financially-unconstrained) Rail and Facilities Program Update (Orange County Transportation Authority)
Red Hill Avenue/Edinger Avenue SCRRA crossing grade separation (Tustin)	Grade separation	n/a	n/a	Orange	SCAG RTP in the FTIP
Irvine third main track	Track & Signal	$75.00[a]	n/a	Orange	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Irvine Station enhancements to accommodate Amtrak, Metrolink, fixed-route bus service, and the Irvine Guideway	Station	$205.00	n/a	Orange	SCAG RTP (financially-unconstrained) 2011 CTC Needs Assessment

Table 8.8: *Pacific Surfliner* Corridor Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Long Term (2021-2040), continued					
New double-track tunnel between San Juan Capistrano Station and San Diego County border	Track & Signal	n/a	n/a	Orange	SCAG RTP (financially-unconstrained)
Extension of Serra siding	Track & Signal	$15.00[a]	n/a	Orange	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
MP 200 curve realignment (at Pacific Coast Highway)	Track & Signal	$4.00	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
CP "Trestles" to CP Songs second main track	Track & Signal	$38.00[a]	n/a	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Leucadia Boulevard/Highway 101/North Vulcan Avenue grade separation (Encinitas)	Grade separation	$160.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Grade-separated crossing at Birmingham Drive or Chesterfield Drive	Grade separation	n/a	n/a	San Diego	City of Encinitas
New double-track Del Mar Tunnel (Camino del Mar option or I-5/Penasquitos option)	Track & Signal	$987.00	n/a	San Diego	San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)
Los Penasquitos Lagoon second main track (CP Sorrento to CP Torrey)	Track & Signal	$87.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
New double-track UTC Tunnel (I-5 option or UTC option)	Track & Signal	$2,490.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Taylor Street grade separation (San Diego (Old Town) Station)	Grade separation	$90.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
New Downtown San Diego rail trench and grade separations	Grade separation	$300.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Subtotal (Long Term)	–	**$308.20**	–	–	–
Subtotal (North)	–	**$2,018.42**	–	–	–

[a] Source document does not specify cost year. A review of available information concerning project scope concluded that no cost escalation or other adjustments are necessary.

[b] Some elements of the project scope may be duplicated by other projects listed here.

[c] The scope of the Burbank Junction track realignment and high-speed switches project is subject to change based on the results of modeling efforts by the Authority.

8.2.3 San Joaquin Route

The *San Joaquin* route operates between Bakersfield and Sacramento/Oakland. Caltrans has invested almost $460 million since 1976 to increase and improve service on the route. Currently, the *San Joaquin* route passenger train operations consist of six daily round trip trains on the Bakersfield-Stockton segment, four daily round trips on the Stockton-Oakland segment, and two daily round trip trains on the Stockton-Sacramento segment. Extensive connecting Amtrak Thruway bus service supports train operations. Thruway bus service connects the *San Joaquin* intercity rail route's southern train terminus, Bakersfield, with Los Angeles. All trains at Stockton are met by a thruway bus continuing either to Oakland or Sacramento (whichever terminus that the train does not serve). The thruway bus system extends north to Redding, east to Reno and Las Vegas, Nevada, south to Indio, and to California coast destinations from Arcata to San Diego. In SFY 2011–12, 46 percent of *San Joaquin* route passengers used a bus on at least one end of their trip.

The key documents describing projects and plans for the corridor are the *San Joaquin Corridor Strategic Plan* released by Caltrans in 2008 and the *San Joaquin Corridor Programmatic Environmental Impact Report – 2035 Vision – Initial Study* (Initial Study) released November 2012. The remainder of the EIR is in progress. The Initial Study examines expansion from the current 6 daily round trips to 8 or 11 round trips operating at speeds up to 90 mph on the Bakersfield–Stockton segment of the line. To Oakland 6 to 10 round trips are studied and to Sacramento 3 to 6 round trips are studied.

The Authority's 2012 Business Plan describes the NCURS concept wherein *San Joaquin* trains would use the first construction section of the IOS between Madera and just north of Bakersfield. Caltrans is developing a short-term SDP which will be completed at the same time as this CSRP. The SDP describes one set of potential scenarios for *San Joaquin* route NCURS service operation. The planning scenarios developed in the SDP are also used in the CSRP. In the near term, it is expected that some *San Joaquin* route trains will operate over the first construction section of the IOS.

For planning purposes, operating scenarios have been developed for 2020 for up to 11 trains operating on the first construction section of the IOS at speeds up to 125 mph. These planning scenarios include up to 6 trains operating on the current BNSF route that would stop at the existing Hanford, Corcoran, and Wasco Amtrak stations. Madera is the terminus for 5 of these trains, and Oakland is the terminus for the sixth train. The range of service levels included in the initial operating scenarios is summarized in Chapter 10. These service levels are studied in the *San Joaquin* SDP.

Additional work will be needed to determine the appropriate number of *San Joaquin* trains that would use the first construction section of the IOS and the BNSF line during the interim period until HSR begins to operate on the IOS. Additional work will also be needed to determine the number of trains that would continue to operate on the BNSF line in parallel to the IOS once HSR service is initiated.

Planning for the Blended System in northern California commenced in the spring of 2012 once the Authority's 2012 Business Plan was released. The NCRPWG (described in Section 8.1.4), working in cooperation with the CSRP process, participated in the determination of planning scenarios for the initiation of service on the first construction section of the IOS. The Caltrans SDP will be the first formal planning document to examine the NCURS. In conjunction with this work, additional capacity analysis is currently underway by the BNSF and the UPRR to verify proposed frequency increases and related passenger rail improvements. In a related study, the Authority, passenger rail operators, and the two Class 1 railroads are participating in an analysis of the Stockton diamond area where the *San Joaquin* service and freight railroad operations share a common intersection.

Table 8.9 lists planned investments by timeframe for the *San Joaquin* route. Because planning for the NCURS (and 2025 and 2040 *San Joaquin* route service once HSR has started) is in the initial phases, all the capital projects necessary for integrated conventional intercity, HSR, and commuter rail in northern California have not yet been identified. However, BNSF has been working closely with Caltrans to

Table 8.9: *San Joaquin* Route Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Joint Use Projects					
Mid Term (2016-2018)					
Stockton Hub Track Upgrades/Related Facilities	Track & Signal	$100.00[b]	n/a	San Joaquin	NCRPWG
Subtotal (Joint Use Projects, Mid-term)	–	**$100.00**	–	–	–
Subtotal (Joint Use Projects)	–	**$100.00**	–	–	–
Non-Joint Use Projects					
Near Term (2013-2015)					
Positive Train Control (Port Chicago to Bakersfield)	Track & Signal	$24.50	Partially allocated	Contra Costa, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, Kern	Proposition 1A San Joaquin Corridor Strategic Plan (2008)
Mid-route layover facility	Facility	$14.60	Programmed	Fresno	STIP Proposition 1B (Intercity Rail Improvement)
Subtotal (Non-Joint Use Projects, Near-term)	–	**$39.10**	–	–	–
Non-Joint Use Projects					
Mid Term (2016-2018)					
Merced to Le Grand second main track (segments 1)	Track & Signal	$40.40	n/a	Merced	Proposition 1A, *San Joaquin Corridor Strategic Plan (2008),* Northern California Rail Partners Working Group; BNSF Capacity Analysis
Stockton to Escalon second main track (segments 3-4)	Track & Signal	$54.00[(1)]	n/a	San Joaquin, Merced	STIP, SJCOG RTP (financially-constrained) *San Joaquin Corridor Strategic Plan* (March 2008), Northern California Rail Partners Working Group; BNSF Capacity Analysis
Madera Co. track improvements	Track & Signal	$27.32[(1)]	n/a	Madera	Northern California Rail Partners Working Group(Authority project)

Table 8.9: *San Joaquin* Route Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Non-Joint Use Projects					
Mid Term (2016-2018), continued					
Jastro to Una Segment 1	Track & Signal	$42.00[(1)]	n/a	Kern	*San Joaquin Corridor Strategic Plan (2008)*, Northern California Rail Partners Working Group; BNSF Capacity Analysis
Port Chicago to Oakley second main track	Track & Signal	$55.00[(1)]	n/a	Contra Costa	STIP, TCRP, Proposition 1B (Intercity Rail Improvement), *San Joaquin Corridor Strategic Plan (2008)*, Northern California Rail Partners Working Group; BNSF Capacity Analysis
Una – Shafter (Segment 2)	Track & Signal	$22.00	n/a	Kern	*San Joaquin Corridor Strategic Plan (2008)*, Northern California Rail Partners Working Group; BNSF Capacity Analysis
Subtotal (Non-Joint Use Projects, Mid-term)	–	**$240.72**	–	–	–
Non-Joint Use Projects					
Long Term (2019-2040)					
New Sacramento 65th Street Station	Station	n/a	n/a	Sacramento	RT
New Elk Grove Station	Station	$8.50[a]	n/a	Sacramento	Sacramento Area Council of Governments (SACOG) RTP (financially-constrained)
Port Chicago to Pittsburg transfer modifications (BNSF/UPRR track connection)	Track & Signal	$18.00	n/a	Contra Costa	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Merced to Le Grand second main track (segments 2-3)	Track & Signal	$24.10	n/a	Merced	Proposition 1A, *San Joaquin Corridor Strategic Plan (2008),* Northern California Rail Partners Working Group

Table 8.9: *San Joaquin* Route Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Non-Joint Use Projects					
Long Term (2019-2040), continued					
Stockton to Escalon second main track (segments 1-2)	Track & Signal	36.00	n/a	San Joaquin, Merced	STIP, SJCOG RTP (financially-constrained) *San Joaquin Corridor Strategic Plan* (March 2008), Northern California Rail Partners Working Group
Bixler Curve Realignment	Track & Signal	$18.00	n/a	Contra Costa	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Extension of Orwood siding	Track & Signal	$20.00	n/a	Contra Costa	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Lodi to Akers second main track	Track & Signal	$50.00	n/a	San Joaquin	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Planada to Madera second main track and curve realignments	Track & Signal	$190.00	n/a	Merced, Madera	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Extension of Pittsburg siding	Track & Signal	NA	n/a	Contra Costa	*San Joaquin Corridor Strategic Plan* (March 2008)
Corridor-Wide Signal Upgrades (90 mph)	Track & Signal	$55.00	n/a	Contra Costa, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, Kern	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*

Table 8.9: *San Joaquin* Route Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Non-Joint Use Projects					
Long Term (2019-2040), continued					
Holt to Stockton second main track	Track & Signal	$75.00	n/a	San Joaquin	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Modesto curve realignment and Riverbank to Dry Creek Bridge second main track	Track & Signal	$60.00	n/a	Stanislaus	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Merced River Curve Realignment	Track & Signal	$13.00	n/a	Merced	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Winton to Merced second main track	Track & Signal	$52.00	n/a	Merced	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Fresno grade crossing improvements (eight locations), diamond crossing replacement (Sunmaid and Calwa), and second main track (Figarden to San Joaquin River)	Track & Signal	$46.00	n/a	Fresno	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Gregg Double-track	Track & Signal	$23.40	n/a	Madera	*San Joaquin Corridor Strategic Plan* (March 2008)
Fig Garden Double-track	Track & Signal	$27.00	n/a	Fresno	*San Joaquin Corridor Strategic Plan* (March 2008)

Table 8.9: *San Joaquin* Route Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Non-Joint Use Projects					
Long Term (2019-2040), continued					
New Hammond siding (MP 999.4)	Track & Signal	$3.00	n/a	Fresno	*San Joaquin Corridor Strategic Plan* (March 2008) California Passenger Rail System: 20-Year Improvement Plan Technical Report
Conejo to Hanford curve realignments, West Conejo to West Shirley track Improvements, and Hanford diamond crossing replacement	Track & Signal	$90.00	n/a	Fresno, Kings	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Corcoran to Angiola second main track	Track & Signal	$63.00	n/a	Kings	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*; BNSF Capacity Analysis
Ballico to Denair Second Main Track	Track & Signal	$36.00	n/a	Stanislaus, Merced	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Bowles to West Conejo passenger-only second main track	Track & Signal	$52.00	n/a	Fresno	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Allensworth–Corcoran	Track & Signal	$130.00	n/a	Kings, Tulare, Kern	*San Joaquin Corridor Strategic Plan* (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*; BNSF Capacity Analysis
Wasco to Shafter second main track	Track & Signal	$70.00	n/a	Kern	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*; BNSF Capacity Analysis

Table 8.9: *San Joaquin* Route Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source Document
Non-Joint Use Projects					
Long Term (2019-2040), continued					
Jastro Curve Realignment	Track & Signal	$50.00	n/a	Kern	San Joaquin Corridor Strategic Plan (March 2008) *California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Gregg–Madera Double-track (11 trains at 90 mph)	Track & Signal	$40.00	n/a	Madera	BNSF Capacity Analysis
Oakley–Port Chicago Double-track (11 trains at 90 mph)	Track & Signal	$37.60	n/a	Contra Costa	BNSF Capacity Analysis
Elmo – Sandrino Double-track (11 trains at 90 mph)	Track & Signal	$45.00	n/a	Kern	BNSF Capacity Analysis
Improvements from Stockton – Sacramento to allow additional service	Track & Signal	NA	n/a	Sacramento, San Joaquin	Initial Study
Subtotal (Non-Joint Use Projects, Long Term)	–	**$1,332.60**	–	–	–
Subtotal (Non-Joint Use Projects)	–	**$1,612.42**	–	–	–
Total – All Projects	–	**$1,712.42**	–	–	–

[a] Original project cost from source document is a YOE cost estimate and may include contingency or other assumptions. As a result, no cost escalation or other adjustments were made for YOE costs.

[b] Original project cost from source document assumes 2013 dollars. Cost escalation between 2012 and 2013 is assumed to be negligible, and no adjustments were made for costs provided in 2013 dollars.

[c] Some elements of the project scope may be duplicated by other projects listed here.

identify and develop costs for the track projects that would be necessary to implement between 8 and 11 trains on the *San Joaquin* route at 79 mph and 90 mph. For the most part, these projects would be necessary for the scenarios studied in this CSRP for year 2020 when *San Joaquin* trains are planned to run on the first construction section of the IOS.

In Table 8.9 under the column "Source Document," the source is indicated as BNSF cost estimate. Not all of these projects are programmed or have received allocations, so they are included as mid-term projects because of their importance in the NCURS. Projects not required for the "Blended Service" are defined as long-term projects. These projects are described in more detail in the San Joaquin SDP.

Some additional track projects would be necessary in 2020 that were not studied by the BNSF, including the Stockton Hub project. Additional track work would likely be necessary between just north of Bakersfield (where some trains would move over to the IOS) and Bakersfield. On that short segment of BNSF track, between 10 and 17 trains are planned to operate.

The key objectives of proposed route improvements include:

- Increasing passenger train frequencies.
- Improving passenger safety systemwide.
- Increasing ridership.
- Contributing to California's goals for reducing GHG emissions from transportation.
- Improving multi-modal connectivity.
- Increasing the maximum operating speed of conventional passenger trains in all corridor segments from 79 mph to 90 mph.
- Installing new infrastructure, such as additional layover or maintenance facilities, to support expansion of future train operations.

Planned investments include track and signal improvements, bridges, maintenance and layover facilities, and station improvements. The proposed investments throughout the route generally fall into one of four categories:

- Track and Signal/Train Control Improvements. Includes double-tracking, additional mainline track, panelized turnouts, improved sidings to support intercity passenger rail service and service connections to HSR. Improved and additional track could allow top speeds between 79 to 90 mph.
- Grade Crossings. There are over 210 grade crossings that may need to be upgraded to allow the *San Joaquin* route to operate at speeds in excess of 90 mph, although no specific grade crossing projects have yet been developed.
- Bridges. Improvements to existing bridges, increases in bridge capacity, and potentially new bridges.
- Station Improvements. Passenger station improvements include new platforms or extensions, covered shelters, lighting, improved bus circulation, and upgrades to passenger vehicle parking and loading areas.

Table 8.9 lists proposed capital improvements by timeframe for the *San Joaquin* route. The proposed projects have been grouped into near-term (2013 to 2014), mid-term (2015 to 2018), and long-term (2018 to 2040) time frames in keeping with the project identification protocol used in the San Joaquin SDP (2013). The project cost estimates (where available) are reported in 2012 dollars. Projects are also grouped into the categories of "Joint Use" and "Non-Joint Use." In the *San Joaquin* route, the only joint use segment listed on the table is between the Stockton Cabral Station and the south end of the UPRR Stockton yard, which is currently shared with ACE commuter service. The section between Oakland and Martinez is shared with *Capitol Corridor* trains; improvements in this section are listed in the *Capitol Corridor* project table.

Projects are listed as either "Track & Signal," "Facility," or "Station." Funding status is listed as one of five categories as described above for the *Pacific Surfliner*. The project location is listed by county, and the programming or planning document where the project appears is also given.

Next Steps

Further development of the San Joaquin route will be an integral component of ongoing planning for the Blended System in northern California. The NCRPWG will continue studies to refine future service levels and capital project requirements for implementation of the NCURS. The participating agencies also need to identify and secure project funding from federal, state, regional, and local resources.

Proposed frequency increases and related passenger rail improvements need to be verified by the capacity analyses currently underway by the BNSF and the UPRR. Possible improvements in the Stockton diamond area will also need to be identified as part of a separate ongoing study. The results of these studies, as well as the 2013 San Joaquin SDP, will be the basis for determining the appropriate number of *San Joaquin* trains that would use the first construction section of the IOS and the BNSF line during the interim period until HSR begins to operate on the IOS. For those route segments that travel over privately-owned track, agreement on the necessary capital improvements will need to be reached with the freight railroads.

8.2.4 Capitol Corridor

Key objectives of the *Capitol Corridor* investments include:

- Increasing passenger train capacity systemwide through service frequency improvements.
- Increasing reliability and safety.
- Providing faster service and expanding passenger capacity by increasing train speeds from 79 to 90 mph (with possible long-term goal of 110 mph).

Track maintenance is the CCJPA's highest priority short-term capital investment. This program is pivotal in ensuring that the *Capitol Corridor* service remains the top on-time performing intercity passenger rail service in the nation.[124]

The CCJPA is supporting several rail capacity projects to keep pace with growing demand for existing services. Third track and siding investments, signal improvements, and station expansions will allow for increased passenger service. For example, addition of a third mainline track on UPRR section between Sacramento and Roseville will facilitate conventional passenger rail service expansion in Sacramento and Placer counties. The CCJPA also envisions increasing top train speeds from the current 79 mph to 90 mph, where local conditions allow. In southern Alameda County, rail siding extensions, universal crossovers, and a double-track project near Industrial Parkway will address rail congestion in the Oakland

[124] *Capitol Corridor Joint Powers Authority 2012-2014 Business Plan*, Sacramento, California, 2012.

to San Jose segment. Additional capacity analysis is currently underway by the UPRR to verify some of these passenger rail improvements.

The *Capitol Corridor* is included in the NCURS plan, and will provide connections in Sacramento, Martinez, Oakland, and San Jose. The 2012 Business Plan calls for early infrastructure investment in the *Capitol Corridor* and service coordination with the *San Joaquin* and ACE routes. The NCURS is slated to begin in 2018, providing additional service frequencies, travel time improvements, and reliability benefits before full HSR infrastructure and service are in place.

Key planned investments include:

- Double-tracking and Siding Improvements. Double-tracking and siding improvements are planned to increase capacity and improve safety along the corridor. Planned improvements between Sacramento and Oakland include double-track and siding upgrades, along with additional crossovers, to improve travel speeds and service reliability.
- Signal Improvements and PTC. The PTC implementation is a crucial short-term capital project. Caltrans Division of Rail (DOR), as owner of the rail cars and locomotives in *Capitol Corridor* service, has initiated a work program to install on-board PTC equipment on the northern California fleet used by both the *Capitol Corridor* route and *San Joaquin* route. Additionally, UPRR and Caltrain (as railroad owners) have begun to install wayside PTC equipment along their respective railroad tracks. The CCJPA will continue to support and build on these improvements for the *Capitol Corridor*.
- Station Improvements. Station projects are planned or underway throughout the corridor. In order to provide the best location for connecting services, some station relocations are planned as part of track extensions or improvements. The CCJPA is overseeing the Roseville station relocation as part of a third track expansion project between Sacramento and Roseville. Other projects are sponsored by local jurisdictions but use state and other funding, such as the completed Fairfield-Vacaville, San Jose Diridon, and Sacramento stations. Possible future station improvements include Union City platforms and a new Hercules station.
- Other Long-term Improvements. Additional track upgrades may lead to even faster travel speeds (110 mph) and express routes between Sacramento and Oakland. Adding a third or fourth mainline track in some sections would improve capacity, especially where freight and passenger services face limited infrastructure. Other potential long-term projects include new crossings of the Carquinez Strait and the Alviso wetlands to improve service reliability and provide environmental enhancement. Potentially new rail alignments between Martinez and Richmond will be considered as coordinated with new crossings of the Carquinez Strait and in response to future adaptation to sea level rise in the current Martinez to Richmond route.

Table 8.10 lists the planned projects, by timeframe, for the *Capitol Corridor*. The projects are grouped into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes. Project cost estimates (where available) are reported in 2012 dollars. The timeframe categories are general groupings only and may change based on the future availability of funding.

Table 8.10: *Capitol Corridor* Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Joint Use Projects					
Near Term (2013-2015)					
Sacramento Valley Intermodal Station (Phase 1): track realignment, platform relocation, pedestrian/bike tunnel	Station	$77.66	Partially allocated	Sacramento	HSIPR Proposition 1B (TCIF) SACOG RTP (financially-constrained)
Martinez Intermodal Station (Phase 3): Parking structure and automobile/pedestrian bridge	Station	$20.00[a]	n/a	Contra Costa	Metropolitan Transportation Commission (MTC) RTP (financially-constrained)
New Hercules Intermodal Station: track/platform improvements, station building and plaza, access improvements, surface parking	Station	$43.84	Partially allocated	Contra Costa	STIP TCRP MTC RTP (financially-constrained) IRCP
New Hercules Intermodal Station: parking structure	Station	$35.00[a]	n/a	Contra Costa	MTC RTP (financially-constrained)
Subtotal (Joint Use Projects, Near Term)	–	**$176.50**	–	–	–
Joint Use Projects					
Mid Term (2016-2020)					
Sacramento Valley Intermodal Station (Phase 2): Light rail transit (LRT) and bus station relocation, passenger connection enhancements, vehicle/bike parking relocation	Station	$25.66[a]	Programmed (1A)	Sacramento	Proposition 1A SACOG RTP (financially-constrained)
Sacramento Valley Intermodal Station (Phase 2b): rehabilitation of historic depot	Station	$28.50	Allocated (STIP)	Sacramento	STIP SACOG RTP (financially-constrained)
Sacramento Valley Intermodal Station (Phase 3): terminal facilities expansion	Station	$237.50	n/a	Sacramento	SACOG RTP (financially-constrained)

Table 8.10: *Capitol Corridor* Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Joint Use Projects					
Mid Term (2016-2020), continued					
Oakland to San Jose Track Improvement Program Phase 2:	Track & Signal	$313.60	Partially programmed	Alameda	STIP Proposition 1B, Proposition 1, HSIPR, Local *Capitol Corridor Service FY 2012-13 – FY 2013-14 Business Plan Update*
Fremont/Centerville Station full platform extension (Track 2)	Station	$0.90	n/a	Alameda	
Caltrain terminal improvements at San Jose Diridon Station	Station	$206.40[a]	n/a	Santa Clara	MTC RTP (financially-constrained)
Subtotal (Joint Use Projects, Mid Term)	–	**$812.56**	–	–	–
Joint Use Projects					
Long Term (2021-2040)					
Oakland (Jack London Square) to Embarcadero third main track	Track & Signal	$29.60	n/a	Alameda	*Capitol Corridor Service FY 2008-09 – FY 2009-10 Business Plan Update*
Oakland (Jack London Square) to Elmhurst third main track	Track & Signal	$41.70	n/a	Alameda	*Capitol Corridor Service FY 2008-09 – FY 2009-10 Business Plan Update*
Positive Train Control[d]	Track & Signal	$35.00[b]	n/a	n/a	*Capitol Corridor Service FY 2012-13 – FY 2013-14 Business Plan Update*
Subtotal (Joint Use Projects, Long Term)	–	**$106.30**	–	–	–
Subtotal (Joint Use Projects)	–	**$1,095.36**	–	–	–

Table 8.10: *Capitol Corridor* Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Non-Joint Use Projects					
Near Term (2013-2015)					
Fairfield/Vacaville Intermodal Station (Phases 1, 2, and 3)	Station	$39.97	Partially allocated	Solano	STIP MTC RTP (financially-constrained)
Fairfield/Vacaville Intermodal Station improvements (Phase 1): parking lot	Station	$13.00a	n/a	Solano	MTC RTP (financially-constrained)
Subtotal (Non-Joint Use Projects, Near Term)	–	**$52.97**	–	–	–
Non-Joint Use Projects					
Mid Term (2016-2020)					
Auburn Multi-modal Station platform extension	Station	$1.42[a]	n/a	Placer, Sacramento	SACOG RTP (financially-constrained)
Rocklin Multi-modal Station park-and-ride lot (Phase 1)	Station	$0.58[a]	n/a	Placer	SACOG RTP (financially-constrained)
Rocklin Multi-modal Station park-and-ride expansion	Station	$1.23	Allocated (PTMISEA)	Placer	Proposition 1B ((PTMISEA)
Davis Multi-modal Station improvements	Station	$26.40	n/a	Yolo	SACOG RTP (financially-constrained)
Fairfield/Vacaville Intermodal Station improvements (Phase 2): parking structure	Station	$11.00[a]	n/a	Solano	MTC RTP (financially-constrained)
Martinez Rail Corridor improvements	Track & Signal	$36.00[a]	n/a	Contra Costa	MTC RTP (financially-constrained)
Richmond Intermodal Station east-side transportation improvements	Station	$19.00[a]	n/a	Contra Costa	MTC RTP (financially-constrained)
Richmond BART Station TOD east-side transportation improvements	Station	$11.00[a]	n/a	Contra Costa	MTC RTP (financially-constrained)
Union City Intermodal Station infrastructure improvements	Station	$27.00[a]	n/a	Alameda	MTC RTP (financially-constrained)
Union City BART Station TOD and UPRR pedestrian grade separation	Station	$86.00[a]	n/a	Alameda	MTC RTP (financially-constrained)
Subtotal (Non-Joint Use Projects, Mid Term)	–	**$219.63**	–	–	–

Table 8.10: *Capitol Corridor* Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Non-Joint Use Projects					
Long Term (2021-2040)					
Donner Pass Phase Improvements for Placer County Service Expansion	Track & Signal	$51.00	n/a	Nevada, Placer	*Capitol Corridor Service FY 2012-13 – FY 2013-14 Business Plan Update*
Roseville to Sacramento third main track	Track & Signal	$270.00	Partially allocated	Placer, Sacramento	STIP Proposition 1A *Capitol Corridor Service FY 2012-13 – FY 2013-14 Business Plan Update*
Capital Maintenance Phase 4	Track & Signal	$8.00	n/a	Placer, Sacramento	*Capitol Corridor Service FY 2012-13 – FY 2013-14 Business Plan Update*
Grade-separated platform access at existing stations (Roseville, Davis, Suisun, Berkeley)	Station	$60.40	n/a	Placer, Yolo, Solano, Alameda	*Capitol Corridor Service FY 2008-09 – FY 2009-10 Business Plan Update*
Sacramento to Martinez track infrastructure improvements	Track & Signal	$41.70	n/a	Sacramento, Yolo, Solano, Contra Costa	*Capitol Corridor Service FY 2008-09 – FY 2009-10 Business Plan Update*
Subtotal (Non-Joint Use Projects, Long Term)	–	**$431.10**	–	–	–
Subtotal (Non-Joint Use Projects)	–	**$703.70**	–	–	–
TOTAL – Entire Corridor	–	**$1,799.06**	–	–	–

[a] Original project cost from source document is a YOE cost estimate and may include contingency or other assumptions. As a result, no cost escalation or other adjustments were made for YOE costs.

[b] Source document does not specify cost year. A review of available information concerning project scope concluded that no cost escalation or other adjustments are necessary.

[c] Bahia – Benicia second main track has been dropped from consideration for the time being due to the location of the rail line adjacent to marshland, which would have required substantial environmental mitigations exceeding the available funding for the project. As a result, a new crossover has been proposed between Bahia and Benicia instead.

[d] Project also contains some elements that are non-joint use.

Projects are also grouped into the categories of "Joint Use" and "Non-Joint Use." There are four joint-use sections of the *Capitol Corridor*:

- Sacramento Valley Station. Shared with the *San Joaquin* route.
- Martinez to Oakland. Shared with the *San Joaquin* route.
- Niles to Santa Clara. Shared with ACE commuter service.
- Santa Clara to San Jose. Shared with ACE, Caltrain and the proposed *Coast Daylight*.

Projects that only benefit commuter routes are not listed in the table, but are listed in the section that describes the commuter service. Projects are listed as "Track & Signal," "Station," "Grade Separation" or "Structure." Funding status is listed as one of five categories as described above for the *Pacific Surfliner*. The project location is listed by county, and the programming or planning document where the project appears is also given.

8.3 Proposed New Intercity Rail Routes

This section describes proposed *Coast Daylight* and Coachella Valley intercity rail routes. Potential intercity rail service corridors have been identified for inclusion in the CSRP and future funding. Exhibit 8.2 depicts conceptual alignments for these two new route proposals, the route extensions proposals (described in Section 8.4), and other intercity rail proposals (described in Section 8.5).

An evaluation process and criteria have been identified to assess new corridors proposed for inclusion in the CSRP. The criteria reflect inputs related to the Multi-State Rail Planning study efforts undertaken by the FRA. The resulting criteria, providing both quantitative and qualitative information, are grouped into six evaluation categories. These criteria address the full range of issues determining the viability of future intercity passenger rail service in the proposed corridors:

1. Public and policy support as documented in adopted agency, board, and council positions and plans.
2. Travel market support as demonstrated by local and regional growth and demographics.
3. Travel demand as supported by current travel patterns and future travel projections.
4. Corridor infrastructure opportunities and constraints as shown by available right-of-way (ROW), track ownership and operating relationships, level of freight activity, and range and condition of the operating infrastructure.
5. Passenger facilities supporting future service implementation as demonstrated by existing and/or planned stations and local access services.
6. Environmental impacts and benefits as identified by existing environmental documents and/or a high-level assessment of possible environmental impacts and benefits.

The following provides an overview of the above criteria as applied to the two proposed intercity passenger rail routes, and the next steps to be taken.

Exhibit 8.2: Proposed New Passenger Rail Routes and Current Route Extensions

Sources: Caltrans, 2013 and Esri, 2012.

8.3.1 Coast Daylight

The *Coast Daylight* service is a proposed intercity route to connect San Francisco, San Jose, Salinas, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles. The existing Amtrak *Coast Starlight* service, operating between Los Angeles and the Pacific Northwest, serves some intrastate travel markets between Los Angeles and the Bay Area. However, the *Coast Starlight* operates once per day in each direction with service to eight cities between Los Angeles and San Jose, then continuing to serve Oakland and points north. The proposed *Coast Daylight* would provide reliable intercity service for interregional travel along the coast corridor with twice as many stops as the *Coast Starlight*.

The *LOSSAN Corridorwide Strategic Implementation Plan* (April 2012) includes the introduction of intercity service between Los Angeles and San Francisco by 2030 in its "Preferred Service Plan" and identifies track capacity improvements requested by UPRR as key to implementation of the service.

For many years, there has been interest in providing additional coast route service to better link California's two largest metropolitan areas. In 1992, Assembly Resolution (AR) 39 was passed requesting a Coast Corridor intercity rail corridor upgrade study be conducted by the regional transportation planning agencies along the Corridor in cooperation with Caltrans. As a result, concerned local agencies formed the Coast Rail Coordinating Council (CRCC) that was staffed by the San Luis Obispo Council of Governments. This resulted in a *Coast Rail Improvement Study*. Then in 1996, the *Coast Route Infrastructure Assessment Report* was completed. In 2000, the CRCC issued a *Coast Daylight* Implementation Plan that envisions daily service from San Francisco to Los Angeles. An SDP for the Coast Corridor was completed in 2013 in conjunction with the 2013 CSRP. A program level EIR/EIS is in progress and expected to be completed in 2014.

Coast Daylight service would support several statewide transportation objectives:

- Provide additional capacity to serve corridor growth in a cost-effective manner with minimal impacts to local communities, natural resources, and air quality and GHG emissions.
- Increase the use of intercity passenger rail service as part of a multi-modal strategy identified in regional and county goals and plans.
- Improve rail operations by reducing travel times and increasing reliability and safety.
- Provide early implementation of a "one-seat" ride from downtown San Francisco to downtown Los Angeles.
- Connect the Central Coast to HSR and other transportation options available in the Los Angeles Basin and San Francisco Bay Area.

The 474-mile *Coast Corridor* would serve a mix of regional travelers and intercity leisure travelers. Currently, there is no single passenger rail line that provides end-to-end service in this corridor. Existing passenger rail services includes daily Amtrak *Pacific Surfliner*, *Coast Starlight* service, Caltrain commuter rail service in the northern portion of the corridor, and SCRRA Metrolink commuter rail service in the southern portion. This existing rail corridor is owned and operated by wide range of entities along its length, with UPRR being the primary owner/operator. The following segments make up the track that is defined as the *Coast Corridor*:

- The PCJPB trackage between San Francisco and San Jose.
- The UPRR "Coast Subdivision" between San Jose and San Luis Obispo.
- The UPRR "Santa Barbara Subdivision" between San Luis Obispo and Las Posas just west of Moorpark.

- The SCRRA “Ventura Subdivision” between Las Posas and Burbank Junction.
- The SCRRA “Valley Subdivision” between Burbank Junction and Control Point Taylor.
- The SCRRA “River Subdivision” between Control Point Taylor and LAUS.

Freight rail services are operated by UPRR, and this line is considered a “secondary” or “relief” line to the much busier Central Valley line to the east. Despite its low traffic density, this line offers important redundancy to the Central Valley line.

The existing long-haul *Coast Starlight* service operating through the corridor along the coast is not scheduled to serve the needs of intrastate travelers between Los Angeles and the Bay Area. The *Coast Starlight* trains are subject to service delays especially in the southbound direction because they originate in Seattle. The counties of San Francisco and San Mateo, with a combined population of over 1.5 million people, do not have access to a “one seat ride” to Los Angeles. There is strong long-term support for this service from elected officials, regional agencies, and communities along the corridor. This operational feasibility of the intercity passenger service has been evaluated through many studies including the recently prepared *Pacific Surfliner* North and *Coast Daylight* SDPs.

Significant population and employment growth is projected for counties along the corridor. Over the next 30 years, the population along the San Francisco-Los Angeles corridor is expected to increase by 32.4 percent to 5.0 million residents. Los Angeles County will have the largest population increase (3.3 million) followed by Santa Clara County (633,500), Ventura County (309,600), San Francisco County (228,100), and San Mateo County (171,600). The corridor is projected to experience major employment growth with 1.9 million new jobs generated by 2040. As with population, Los Angeles County will have the largest increase in the number of new jobs (1.1 million) followed by Santa Clara County (245,500), San Francisco County (198,700), Ventura County (162,000), and San Mateo County (101,600).

Coast Daylight service is proposed to initially operate with one daily round trip as an extension of the state-supported *Pacific Surfliner* service. A pair of existing midday trains would operate beyond San Luis Obispo to San Jose and San Francisco. Expansion of the *Coast Daylight* service to two daily round trips will be accomplished by adding a new overnight train between San Francisco and Los Angeles.

Outside the urbanized commuter rail territories, most of the route has only single track. Double-tracking exists between San Francisco and a point 10 miles south of San Jose, and between LAUS and Moorpark. Sidings are limited in number and length, and significant sections still use ABS signal control and manual switches, requiring dispatch approval to proceed.

The proposed service requires additional infrastructure investments between Gilroy and San Luis Obispo. Service north of Gilroy and south of San Luis Obispo can be accommodated with infrastructure investments that are proposed for other intercity and commuter passenger rail services.

Table 8.11 includes the *Coast Daylight* capital investments for signal upgrades, rolling stock upgrades, and station improvements that have been identified in the SDP and previous planning studies. The projects are grouped into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes. Project cost estimates (where available) are reported in 2012 dollars. The segment between San Francisco and Gilroy is primarily used by Caltrain commuter rail service. Improvements in this segment are listed in the Caltrain project table. Projects are listed as either “Track & Signal,” “Station” or “Rolling Stock.” Funding status is listed as one of the five categories as described in Section 8.0. The county where the project is located is listed, along with the programming or planning document where the project appears. UPRR has expressed guarded interest in additional passenger rail activity in this corridor with infrastructure improvements. The CRCC and the UPRR have been discussing the potential for service. The existing passenger and freight rail activity is already straining the corridor’s single and double-track infrastructure capacity.

Table 8.11: Coast Corridor Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015) and Mid Term (2016-2020)					
Implement CTC between McKay and Santa Margarita (MP 202.3 to 229.6)	Track & Signal	n/a	n/a	n/a	2013 Coast Corridor SDP
New Soledad Multimodal Station	Station	$4.00	n/a	Monterey	AMBAG RTP (financially-constrained)
New King City Multimodal Station	Station	n/a	n/a	Monterey	King City Multimodal Transportation Center Development Strategy
Rolling stock (one trainset with locomotive)	Rolling stock	n/a	n/a	n/a	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Subtotal (Mid Term)	–	**n/a**	–	–	–
Long Term (2021-2040)					
Rolling stock (two trainsets with locomotives)	Rolling stock	n/a	n/a	n/a	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Subtotal (Long Term)	–	–	–	–	–
TOTAL – Entire Corridor	–	**n/a**	–	–	–

[a] Some project scope elements may be duplicated by other projects listed here.

Of the 29 proposed stations, 25 are existing Amtrak or Caltrain stations, and 4 are proposed new stations. The new Pajaro and Castroville stations and the improvements to Salinas Station are projects associated with the *Capitol Corridor* Extension to Salinas. Tentative station sites have been identified for *Coast Daylight* service in Soledad and King City, and construction of the new stations and related facilities would primarily occur within existing developed areas. Planning, environmental review, design and construction of the stations are the responsibility of the respective local jurisdictions. King City is planning a multimodal transit center, including reestablishment of the historic 1886 "King's Station", in conjunction with Monterey-Salinas Transit, Association of Monterey Bay Area Governments, UPRR, Coast Rail Coordinating Council, and U.S. Army Fort Hunter-Liggett.

Next Steps

UPRR has expressed conditional support for increased passenger rail activity in this corridor with the provision of supporting infrastructure improvements. UPRR and Caltrans have separately commissioned operation simulation studies to identify potential operational issues arising from additional passenger service. Additionally, operation simulation work was done as part of the SDP. The next step is to discuss the operation modeling results with UPRR with the goal of agreement on the necessary capital improvements. Service initiation is contingent upon agreement on capital projects and an operating agreement with UPRR and securing necessary capital and operating funding. Amtrak is committed to providing equipment (locomotive, passenger cars) for the service, and the CRCC is advocating an April 2015 start date.

Operational impacts of *Coast Daylight* service in the Caltrain corridor, which will be upgraded to accommodate HSR, have not been analyzed to date and are the subject of future planning efforts.

8.3.2 Coachella Valley Route

The Coachella Valley service is a proposed intercity route between LAUS and Riverside County with potential stops at LAUS, Fullerton, Riverside, Redlands/Loma Linda, Beaumont/Banning, Palm Springs, Rancho Mirage, and Indio.[125] Many of the stations to support the service exist today. Four new stations are needed in the future, including the Indio Transit Center, which needs to be converted into a multi-modal facility with train platforms.

Intercity rail service in the Coachella Valley has been studied since 1991. That year, the RCTC completed the first in a series of studies evaluating the feasibility of operating one or two daily round trips between Los Angeles and Indio. Additional studies were completed in 1993, 1999, 2005, and 2010. As part of the development of the CSRP, Caltrans has commissioned an initial planning study of providing passenger rail service in the corridor.

Coachella Valley Association of Governments (CVAG)

The CVAG serves as the regional planning agency leading development and implementation of the Coachella Valley regional transportation program, which includes the proposed Coachella Valley Corridor passenger rail service. While no funding is currently identified for this future service, the CVAG Executive Committee recently (April 29, 2013) directed staff to establish a 90 percent bus transit/10 percent passenger rail service funding allocation split for Coachella Valley Transportation Development Act funds to be phased in over a 3 to 4 year period. In addition an MOU will be established between RCTC and Coachella Valley Association of Governments to develop a Coachella Valley Rail Fund that will use both the Transportation Development Act funds and additional state and local funds to conduct station development studies and provide initial capital funding for station development.

[125] Southern California Association of Governments, 2012-2035 Regional Transportation Plan Passenger Rail Appendix, April 2012.

Over the years, strong local and regional support has been expressed for extending intercity rail service to the fast-growing Coachella Valley in the southeastern portion of Riverside County. Support for this project is provided by the SCAG, SCRRA, the RCTC, the Coachella Valley Association of Governments, and all of the eight cities with proposed stations.

The proposed service corridor runs through four southern California counties: Los Angeles, Orange, San Bernardino and Riverside. The western portion of the corridor is densely developed with many residential communities and employment centers. The Riverside-Indio portion of the corridor is rapidly developing. Riverside County's population doubled between 1990 and 2010. In addition, the Coachella Valley has a significant number of popular destinations that attract a high number of visitors. Over the next 30 years, population in the Los Angeles-Indio corridor is expected to increase by 5.8 million residents. Riverside County will experience the largest percentage of population growth (52.4 percent). The corridor is projected to experience major employment growth with Riverside County gaining 300,000 jobs. The existing travel market is substantial with 1.5 billion annual trips in 2000. Furthermore, the travel market is projected to add more than 300 million additional trips by 2030, and another 100 million by 2040 (1.82 billion total).

Currently, limited long distance Amtrak service is provided through all or a portion of this proposed service corridor by the *Sunset Limited* and *Southwest Chief*. The *Sunset Limited* connects LAUS and New Orleans via stations in California at Pomona, Ontario, and Palm Springs, and provides three round trips a week. Per the May 2012 schedule, the tri-weekly trains arrive at the Palm Springs Station at inconvenient times for rail passengers. The *Southwest Chief* service operates daily between LAUS, Fullerton, and downtown Riverside, but turns north to operate through Cajon Pass, and does not serve the eastern portion of the corridor. It also travels at inconvenient times for regional travelers. A high level of weekday commuter rail service, operated by SCRRA (Metrolink), is provided between LAUS and downtown Riverside via the 91 Line. However, there are no commuter rail operations east of the Riverside-Downtown Station to the Coachella Valley.

The western portion of the proposed service corridor is owned and operated by BNSF for passenger and freight service. BNSF's cooperation is needed to operate Amtrak service over this portion. The eastern portion of the proposed service corridor is owned and operated by UPRR, and is a heavily-traveled freight corridor connecting the Los Angeles-Long Beach ports with destinations in Arizona, New Mexico, Texas, and Louisiana. Introduction of increased passenger service in this busy corridor would require UPRR's cooperation. It should be noted that UPRR has consistently stated their opposition to the introduction of passenger rail service in this Corridor.

In December 2011, daily Amtrak Thruway bus service connecting to the *Pacific Surfliner* route at Fullerton was initiated. This service provides connections east through the Coachella Valley with one daily round trip between Fullerton and Palm Springs, and one daily trip from Fullerton to Indio. Demonstrating the ridership potential of this corridor, ridership has grown by approximately 170 percent in the first 10 months of operations.

The existing double-track infrastructure is in "good" condition and no additional ROW should be required. Increased passenger rail activity may necessitate minor upgrades to the dispatch and possibly signal system and new sidings/turnouts. No new large-scale infrastructure requirements were considered necessary at this level of analysis. Layover space for the overnight storage of the passenger rail vehicles would be provided at the new Indio Station, where former railroad land has been acquired for this purpose. The proposed corridor would operate with eight stations – four existing and four new. For the four new stations, property has been acquired at one location, and site options have been identified for the other stations. Caltrans owns land in one of the new station areas.

Because the proposed corridor operations would occur within an existing railroad ROW, minimal environmental impacts are anticipated. A program level EIR/EIS would be required for any federal funding. Required state level environmental review would need to be completed. Construction of the four new stations and related facilities would primarily occur within existing developed areas or on former railroad property. Coachella Valley was included in the list of nonattainment and maintenance areas for ozone and PM_{10} in the 2012 RTP. Introduction of rail service travel alternatives in this congested area would reduce mobile source emissions, and have air quality and climate change benefits.

As shown in Table 8.12 and based on the *2010 Coachella Valley Rail Study Update* capital cost estimates are $75 million for station and layover facility costs and $80 million in equipment costs. These figures do not include capital upgrade costs that might be included in operating agreements negotiated with the BNSF and UPRR.

A 1999 study, commissioned by the Coachella Valley Association of Governments, noted that existing infrastructure would likely support both freight and passenger capacity.[126] The 2010 *Coachella Valley Rail Study Update* estimated an annual operating cost of $11.4 million (in 2010 dollars) based on two round trips between LAUS and Indio. This estimate assumes the use of one locomotive, one cab car, one food service car, and five coaches. The same study estimated annual revenue of $3.2 million, which would result in an annual subsidy requirement of $8.2 million.

Table 8.12: Coachella Valley Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Rolling stock (two sets, each consisting of a locomotive, cab car, food service car, and five coach cars)	Rolling stock	$80	n/a	n/a	*2010 Coachella Valley Rail Study Update* (April 2010)
Stations (Redlands/Loma Linda, Banning/Beaumont, Cabazon, Rancho Mirage/Palm Desert, Palm Springs (upgrade), Indio)	Station	$60	n/a	n/a	*2010 Coachella Valley Rail Study Update* (April 2010)
Layover facilities	Maintenance facilities	$15	n/a	n/a	*2010 Coachella Valley Rail Study Update* (April 2010)
Total – Entire Corridor	–	**$155**	–	–	–

[126] Coachella Valley Association of Governments, *Coachella Valley Passenger Rail Feasibility Study*, February 1999.

Next Steps

The expected increase in population and employment in the corridor coupled with the significant growth in Amtrak Thruway bus service ridership between Fullerton and the cities of Palm Springs and Indio – 170 percent in the first 10 months of operation – indicates the potential viability of this proposed service corridor. The main challenge to implementation of passenger rail service in this corridor is securing the cooperation of the UPRR.

The next steps in moving forward to intercity rail service implementation include:

- Evaluate the alternatives identified in the initial planning study conducted by Caltrans through preparation of an SDP. The SDP would develop ridership and revenue data for the two build alternatives, identify capital improvements necessary for the service alternatives based on capacity modeling and prior studies, and identify operating costs. Based on this data, the SDP would determine which service option is more feasible and cost effective and it would identify a projected date for the start of service.
- Complete a programmatic EIR/EIS for the Coachella Valley intercity rail route to support selection and implementation of the preferred build alternative.
- Resolve operational and capital improvement issues, including system projects necessary for implementation of passenger service through focused discussions with Metro and SCRRA (LAUS to West Redondo Junction), BNSF (West Redondo Junction to Colton Crossing), and UPRR (Colton Crossing to Indio).
- Continue discussions with local jurisdictions and UPRR regarding development of the four proposed stations to be located in Redlands/Loma Linda, Banning/Beaumont, Rancho Mirage (possible use of the Caltrans-owned site), and Indio.
- Identify potential sources of funding for capital and operational costs.
- Review and recommend the appropriate organizational options for implementing and managing the service.

8.4 Extensions to Existing Intercity Rail Service

This section describes proposed extensions of existing intercity rail routes:

- *Capitol Corridor* service between San Jose and Salinas.
- *Capitol Corridor* service between Auburn and Reno.
- *San Joaquin* service between Sacramento and Redding.

Potential extensions of existing intercity rail service routes have been identified by regional transportation agencies, elected officials, and stakeholders for consideration for inclusion in the CSRP and future funding. As described in Section 8.3, an evaluation process and criteria have been identified to assess new corridors proposed for inclusion in the CSRP. This process and criteria have also been applied to proposed route extensions. The following provides an overview of three proposed extensions to existing intercity passenger rail routes and the next steps to be taken.

8.4.1 *Capitol Corridor* Extension to Salinas

The Transportation Agency for Monterey County (TAMC) and the CCJPA are exploring an extension of existing Sacramento-San Jose passenger rail service to Salinas. The extension would include stops in Gilroy, Pajaro, Castroville, and Salinas. The proposed service plan includes an initial two daily round trips, with potential expansion to up to six daily round trips as demand warrants. The CCJPA has proposed to include this extension in its administrative responsibilities, and the regional agencies have since been collaborating to determine the preferred institutional arrangement to provide train service. The service would operate on existing UPRR ROW and the one-way distance of this service addition between San Jose and Salinas would be approximately 70 miles. The agencies have explored trackage rights agreements with UPRR for the tracks between Gilroy and Salinas. The agencies have also held discussions with the SCVTA and Caltrain about accommodating the Salinas extension with the current Caltrain service on the segment between San Jose and Gilroy. The project is currently in the environmental review phase.

This proposed service is an outgrowth of multi-agency coordination and a thorough, multi-year Alternatives Analysis process. TAMC adopted a resolution endorsing the Extension of Rail Service to Monterey County (formerly known as the "Caltrain Extension to Monterey County Project"), with stations in Salinas, Castroville, and Pajaro as the Locally Preferred Alternative for the Highway 101 corridor on January 31, 2007. The Transportation Concept Report for U.S. Route 101 identified the proposed Rail Extension to Monterey County as being an integral element for managing travel demand in the Highway 101 Corridor. Funding for the Rail Extension to Monterey County is identified in the Traffic Congestion Relief Act of 2000 and the Proposition 116 Rail Bond and the Public Transportation.

The extension to Salinas is in the 2010 Monterey County RTP (adopted on May 26, 2010) and the 2010 AMBAG Metropolitan Transportation Plan (called the "Monterey Bay Area Mobility 2035 Metropolitan Transportation Plan"). Table 8.13 presents the proposed *Capitol Corridor* Extension to Salinas station capital investments as provided by TAMC. Project cost estimates (where available) are reported in 2012 dollars.

TAMC, as the lead agency under the California Environmental Quality Act (CEQA), certified the final EIR on August 23, 2006 and the CTC, as a responsible agency, approved TAMC's Final EIR on September 7, 2006.

Table 8.13: *Capitol Corridor* Extension to Salinas Proposed Station Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Improvements to Gilroy Station	Station	$18.00 [a]	n/a	Santa Clara	CTC Agenda, June 11, 2013
New Pajaro Station	Station	$23.00[a]	n/a	Monterey	CTC Agenda, June 27-28, 2012
New Castroville Station	Station	$21.00 [a]	n/a	Monterey	CTC Agenda, June 27-28, 2012
Improvements to Salinas Station	Station	$66.00[a]	n/a	Monterey	CTC Agenda, June 27-28, 2012

[a] Preliminary cost estimate provided by the sponsoring agency, TAMC.

Next Steps

TAMC is now working on the National Environmental Policy Act (NEPA) document. TAMC and CCJPA are negotiating with UPRR, SCVTA and Caltrain for the track rights to operate the service. Service initiation is contingent upon an operating agreement with UPRR, SCVTA, and Caltrain, and securing necessary capital and operating funding.

8.4.2 *Capitol Corridor* Extension to Reno

Intercity rail service from Sacramento east to Reno, Nevada would provide up to two daily round trips to the Truckee/Tahoe and Reno/Sparks tourist areas. Service would provide relief to the highly congested I-80 Corridor. This 151-mile proposed corridor is part of a longer rail route served by Amtrak's *California Zephyr* service between San Francisco and Chicago (2,438 miles). Currently, daily *California Zephyr* service provides viable long-distance service with the daily eastbound train arriving at Sacramento at 11:09 a.m. and the westbound train at 2:12 p.m. In addition, Amtrak Thruway bus service (Route 20A) provides three daily round trips for passengers traveling between Sacramento and Reno, with stops at Colfax, Truckee, and Reno, terminating in Sparks. The Amtrak Thruway service is heavily used with the SFY 2010-11 numbers showing 67,900 annual passengers. In addition, the 35 miles between Sacramento and Auburn are also served by one daily round trip of Amtrak's *Capitol Corridor* service.

There is strong support for the corridor service from regional agencies in California and Nevada, including SACOG, the Placer County Transportation Planning Agency, the CCJPA, the Nevada County Transportation Commission, and the Washoe County Regional Transportation Commission. This project is included in the Placer County Transportation Planning Agency 2035 RTP as the "*Capitol Corridor* Rail Replacement and Expansion" to be completed by 2035. In 1995, Caltrans, in cooperation with the Nevada Department of Transportation (NDOT), completed the *Sacramento-Tahoe Intercity Rail Study*. The study concluded that extending *Capitol Corridor* service to include stops in Colfax, Soda Springs, Truckee, Reno, and Sparks would be technically feasible, provide economic benefits, expand transportation capacity in the congested and constrained I-80 corridor, and increase the rail farebox recovery ratio. In 2002, the CCJPA and the Placer County Transportation Planning Agency initiated a study to extend the *Capitol Corridor* route to Reno. The study was intended to provide current ridership, revenue, and train operating cost estimates for the train extension, and the capital costs for station and track improvements. However, the study was suspended in March 2005 as a result of UPRR's decision to terminate additional network modeling or consider operation of new passenger train service to Reno.

Both ends of this proposed service corridor have significant residential and commercial development. Additionally, the communities along I-80 are projected to experience significant increases in population as land in the corridor is developed with housing for Bay Area commuters. Destinations in the Truckee/Tahoe and Reno/Sparks areas attract an increasing number of recreational trips which also impact the existing transportation infrastructure along the Sacramento-Reno corridor. Future planning for the California portion of the Sacramento-Reno Corridor is provided by SACOG. The Metropolitan Transportation Plan (MTP)/Sustainable Communities Strategy (SCS) 2035 projects population to grow by approximately 871,200 residents (39.3 percent) with a total population of 3.1 million residents in 2035. Employment is expected to increase by approximately 361,100 jobs (37.4 percent) with a total of 1.3 million jobs in 2035.

In this corridor, the tracks extending east through Donner Pass in the Sierra Nevada mountain range are owned by the UPRR and are heavily used for freight activity. Increased passenger rail service would require UPRR's cooperation, which has not been provided in previous study efforts. The track quality was rated as "medium" due to lower operational speeds through the significant grade changes as the alignment passes through mountainous terrain. No additional ROW requirements or major infrastructure improvements were identified at this level of analysis, but future study efforts, including a detailed operational analysis, may identify the need for additional ROW and major improvements in some mountain areas to accommodate a third track or sidings for increased passenger service. All of the five stations proposed to be served by the new rail service are existing Amtrak rail and Thruway bus stations with structures and passenger facilities. The addition of one daily round trip would occur within the existing UPRR ROW and no environmental impacts are anticipated. Increasing passenger rail service in the Sacramento-Reno corridor would provide an alternative to automobile travel in this constrained corridor, alleviating congestion and providing air quality and climate change benefits.

Next Steps

Possible implementation of passenger rail service in this corridor was identified in the previous CSRP. However, UPRR – the owner/operator of the rail ROW – declined to consider additional passenger rail operations (beyond the daily *California Zephyr*) in this heavily-utilized freight corridor. Securing the cooperation of the UPRR is the key challenge. UPRR has expressed concerns that adding more rail travel in this corridor may require infrastructure improvements due to the challenging alignment, steep grades, and constrained ROW availability through the Sierra Nevada mountains. While adding one daily train does not appear to warrant major infrastructure projects, UPRR is reluctant to open the door to passenger rail service. Increased Amtrak Thruway bus service ridership would provide a strong case for discussing future passenger rail operations with UPRR.

8.4.3 *San Joaquin* Extension to Redding

Operation of intercity rail service north from Sacramento to Redding would extend state-supported intercity rail service to a fast growing northern California area not presently served by passenger rail service. The 160-mile proposed corridor, owned by UPRR, is a portion of a longer rail route served by the *Coast Starlight* service between Los Angeles and Seattle (1,377 miles). Currently, the daily southbound *Coast Starlight* train arrives at the Redding Station at 2:21 a.m., while the northbound train leaves at 3:14 a.m., providing inconvenient access for travelers arriving by rail. Amtrak Thruway bus service (Route 3) provides four daily round trips for passengers traveling north from Sacramento to corridor communities. Select trips continue to Stockton for a connection with *San Joaquin* service. Local and regional support has been expressed for this project from the North State Super Region, representing 16 northern counties, and from the Rail Passenger Association of California. This corridor was studied in the *Northern Sacramento Valley Intercity Passenger Rail Feasibility Study, Interim Findings Report* (1995). However, the project is not included in the regional transportation plan prepared by SACOG. Further study of this route was deferred due to UPRR’s decision not to consider operation of new passenger service.

The northern Sacramento Valley has a rapidly growing population as agricultural land is increasingly converted to residential development. The city of Redding serves as the urban hub for the northern part of the State. In Chico, the California State University provides a focus for activity, employment, and residential growth. All of the corridor’s highways experience heavy truck traffic and increasing congestion.

Growth in this corridor is projected to be significant, as identified in the *MTP/SCS 2035* prepared by SACOG. However, the total population and employment numbers for this corridor are relatively small when compared to the growth increases expected in other corridors under study. It should be noted that the Amtrak Thruway service is heavily used with the SFY 2010-11 numbers showing 140,210 annual riders.

The proposed service would operate along the UPRR-owned ROW which serves a medium level of freight activity. Operation of increased passenger rail service would require UPRR’s cooperation, which was not provided in the previous study effort. The track quality is “good” with no additional ROW requirements or major infrastructure improvements identified at this level of analysis. Of the four stations proposed to be served by the new rail service, three are existing Amtrak stations, while the fourth is a platform-only station. The addition of one daily round trip would occur within the existing UPRR ROW. Furthermore, no new facilities are anticipated and therefore there would be no environmental impacts. Reduced congestion along the SR 99 and Interstate 5 corridors would confer air quality and climate change benefits.

Next Steps

Possible implementation of passenger rail service in this corridor was identified in the previous CSRP. However, UPRR–the owner/operator of this rail ROW—declined to consider additional passenger rail operations in this corridor beyond the daily *Coast Starlight*. Increasing Amtrak Thruway bus service and ridership would build a strong case to discuss future passenger rail operations with the UPRR.

8.5 Other Proposed Passenger Rail Services

Three proposed passenger rail services at various stages of development fall outside of the categories of state-supported intercity rail routes. Two of the proposed services, privately funded and sponsored, would connect destinations in southern California with Las Vegas. The *X Train* is proposed to connect the Los Angeles Basin and Las Vegas using existing tracks. The proposed XpressWest HSR would connect Victorville and Las Vegas with an entirely new line. Service on the Santa Cruz Branch Line in Santa Cruz County has also been proposed, but the type and length of operations remain to be defined.

8.5.1 Proposed *X Train* Service

In late 2012, Las Vegas Railway Express, Inc. (LVRE) announced plans to provide a new passenger rail service connecting the Los Angeles Basin and Las Vegas starting in late 2013. Branded as the *X Train*, this service would run between a new station in Downtown Las Vegas and Fullerton Station in Orange County, where passengers could transfer to and from Metrolink and *Pacific Surfliner* trains to access other parts of Greater Los Angeles.

Unlike the XpressWest HSR proposal, the *X Train* will use existing tracks on the entire route. LVRE announced in November 2012 that it had signed a conditional agreement with UPRR that grants *X Train* trackage rights on UPRR-owned ROW between Las Vegas and Daggett, California.[127] Travel time would be approximately five hours one-way, and the proposed schedule calls for trains departing Fullerton Station at 12:00 p.m. on Thursdays and Fridays and Las Vegas on Sundays at 1:00 p.m. and 5:00 p.m.

The service would be primarily designed to attract young adults, with an array of luxury features and on-board entertainment options including large-screen televisions, reclining seats, and lounges. Tickets would be priced low at approximately $99 one-way to cater to cost-conscious passengers, and will cover food and beverages offered on the train. Passengers will also be able to book hotel rooms, connecting transportation, and tickets for entertainment events in Las Vegas through *X Train*. Ticketing will be integrated with Amtrak's nationwide ticketing system.

The privately-funded project is estimated to require approximately $100 million in capital investments, including construction of the new station in Las Vegas and acquisition and refurbishment of 2 secondhand

[127] LVRE, *Las Vegas Railway Express (OTCQB: XTRN) Signs Right of Way Access Agreement with Union Pacific Railroad*, November 16, 2012, http://www.marketwire.com/press-release/Las-Vegas-Railway-Express-OTCQB-XTRN-Signs-Right-Way-Access-Agreement-With-Union-OTCQB-XTRN-1727469.htm.

trainsets (16 bi-level passenger cars).[128] As of October 2012, 12 of the cars have already been purchased and are awaiting refurbishment.[129]

Next Steps

Implementation of *X Train* passenger rail service is contingent upon an agreement with Amtrak to use BNSF tracks between Daggett and Fullerton, which is the route of the *Southwest Chief*.

8.5.2 Proposed XpressWest High-Speed Rail and High Desert Corridor

This section describes the proposed XpressWest HSR route between Victorville in San Bernardino County and Las Vegas, with a second phase extending to Palmdale in Los Angeles County. Since discontinuation of Amtrak's *Desert Wind* service in 1997, which provided a connection between Los Angeles and Las Vegas, this corridor has been without passenger rail service. Over the years, there have been many planning efforts to reintroduce rail service connecting the two cities. Studies have proposed a range of technologies including conventional HSR, conventional intercity rail, and maglev. A number of service routes have also been proposed, including use of the existing rail line that is owned and operated by UPRR.

The privately-sponsored DesertXpress project, now known as XpressWest, has recently completed a Final EIS, and has a Record of Decision issued by the FRA in July 2011 for the portion of the corridor between Las Vegas and Victorville, California. Records of Decision have also been issued by the Bureau of Land Management and the California and Nevada Divisions of the Federal Highway Administration (FHWA). The Surface Transportation Board has also issued a Certificate of Public Convenience and Necessity authorizing the construction and operation of the interstate railroad.

The XpressWest project has been proposed by a private consortium, DesertXpress Enterprises, LLC, which will operate and maintain the service.[130] This entirely new line would be a double-tracked system running primarily along the I-15 freeway corridor with no at-grade crossings. The top operating speed will be 150 mph. Plans were developed in cooperation with multiple federal and state agencies. The project is supported by the California cities of Victorville, Palmdale, Lancaster, Adelanto, and the town of Apple Valley, acting through the High Desert Corridor Joint Powers Authority. In addition, Caltrans, the California State Business Transportation & Housing Agency, and the LACMTA have all taken actions in support of the project.

The Record of Decision identifies the six selected routing segments shown in Table 8.14.

The Final EIS identified temporary and permanent environmental effects, such as the potential for increased air pollutants and ground disturbance that would likely result in adverse impacts to adjacent biological, cultural, and/or hydrological resources.

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[128] *Forbes*, *The $100 Million 'X Train' Will Be A Party From L.A. To Vegas*, December 6, 2012, http://www.forbes.com/sites/rachelhennessey/2012/12/06/the-100-million-x-train-will-be-a-party-from-l-a-to-vegas/.

[129] VRE, *Las Vegas Railway Express, Inc. – "X" Train Acquires Additional Passenger Train Cars*, October 12, 2012, http://www.marketwire.com/press-release/Las-Vegas-Railway-Express-Inc-X-Train-Acquires-Additional-Passenger-Train-Cars-OTCQB-XTRN-1712930.htm.

[130] XpressWest website, accessed August 2012, http://www.xpresswest.com/.

Table 8.14: XpressWest Proposed Route Segments

Segment		Proposed Location of Selected Alternative
1	Victorville to Lenwood	Along the west side of I-15
2	Lenwood to Yermo	Side and median options; Runs about 1 mile north of I-15 from Old Hwy 58 to Yermo
3	Yermo to Mountain Pass	West side of I-15; modification at Halloran Springs Road
4	Mountain Pass to Primm	I-15 corridor; 1.5 mile diversion via Mojave National Preserve
5	Primm to Sloan Road	East side of I-15
6	Sloan Road to Las Vegas	West side of I-15

Source: FRA, DesertXpress High-Speed Passenger Train, accessed August 2012 at: http://www.fra.dot.gov/rpd/downloads/ROD_FINAL.pdf.

The preliminary service plan presented in the EIS assumes that trains will operate between approximately 6:00 a.m. and 10:00 p.m. Trains operating 20 to 30 minutes apart are proposed during peak weekend hours, with hourly headways proposed at other times. Daily peak service will range from 12 to 16 round trips in the first full year of operation, with service increasing through year 2040. Initial rolling stock investment of 16 consists (comprised of fully electric multiple unit trains) is expected, with a need for 25 trainsets by 2040.[131] The total project costs are estimated to be $6.9 billion (up to $34 million per route mile).

The key purpose of this passenger rail line would be to connect the large population of Los Angeles County with the visitor destinations of Las Vegas. In 2011, Las Vegas attracted 43.8 million annual visitors, and of this number, 62 percent of the visitors have origins in the western U.S. – with a majority traveling from southern California. While there is a demonstrated travel market between Los Angeles and Las Vegas, the end-to-end ridership projections for the proposed XpressWest service have not been finalized. Ridership estimates included in the Final EIS projected a range of 4.4 to 6.9 million annual passengers by 2020 with 24,700 to 26,500 average daily passengers on Fridays (the busiest corridor travel day).

In December 2011, XpressWest executed a lease agreement with the U.S. Bureau of Land Management for the federally-owned railroad ROW comprising a majority of the 180-mile route. XpressWest has applied to the FRA's RRIF program for a loan to start and complete project construction. In addition to the RRIF loan, private debt and equity will be included in the project financing. Project administrators are currently arranging agreements and land purchases necessary for the project.

In a planning effort which is complimentary to the proposed XpressWest service, southern California transportation planning and governmental agencies including LACMTA, the High Desert Corridor JPA, SCAG and SANBAG have expressed support for an HSR connection between Victorville and Palmdale within the proposed High Desert Corridor. This would allow XpressWest passengers to transfer to the existing Metrolink Antelope Valley Line to complete the trip from Palmdale to Los Angeles, or connect with the future California HSR system at the Palmdale Station to reach LAUS and northern California. Though this second phase was not included in the Record of Decision issued July 2011 nor in the FRA loan application, LACMTA has initiated the High Desert Corridor environmental study in cooperation with

[131] Federal Railroad Administration, Final Environmental Impact Statement and Final Section 4(f) Evaluation for the Proposed DesertXpress High-Speed Passenger Train, accessed August 2012 at http://www.fra.dot.gov/rpd/freight/1703.shtml.

Caltrans. The approximately 50-mile link between Palmdale and Victorville is included as an alternative in this environmental study.[132] The environmental process will be completed during 2014.

Palmdale to LAUS is served by Metrolink Antelope Valley commuter rail service with increasing ridership needs calling for more frequent Metrolink service. The initiation of the HSR IOS will significantly increase future capacity requirements between LAUS and the San Fernando Valley. SCRRA and LACMTA are currently evaluating options for providing additional capacity and shorter travel times.

Next Steps

There is a strong ridership potential in reconnecting Los Angeles and Las Vegas and intermediate cities in this corridor with higher speed rail service on a passenger rail-only alignment with a possible interface with the California HSR system. Operations and plans in the two sections of the corridor are in different stages of development:

- Palmdale-Victorville. An HSR connection was recently included in the environmental work for the multi-modal High Desert Corridor sponsored by LACMTA in cooperation with Caltrans, with completion anticipated during 2014.
- Victorville-Las Vegas. With the recent completion of a Final EIS by XpressWest and issuance of Records of Decision by the lead and cooperating federal agencies, funding for this segment is being secured.

8.5.3 Santa Cruz Branch Line Service

The Santa Cruz and Monterey Bay Railway (SCMB) is planning to operate passenger rail service on the Santa Cruz Branch Line between Santa Cruz and Pajaro, working in partnership with the Santa Cruz County Regional Transportation Commission, UPRR, Amtrak, and other stakeholders. SCMB began excursion passenger service on the Santa Cruz Branch Rail Line with a “Train to Christmas Town” in November 2012 and plans to initiate dinner train service in 2014. The excursion services are intended to be a precursor to scheduled passenger service and generate revenue for track upgrades.

The 32 mile branch line was purchased by Santa Cruz County Regional Transportation Commission in October 2012. To provide regular passenger service, it will be necessary to upgrade the Santa Cruz Branch Rail Line track at least to FRA Class I and preferably to Class II. Over five miles of the line have been upgraded to Class I track to date. The preliminary cost to upgrade the rest of the line is anticipated at about $4 million, with the additional cost to upgrade the track to FRA Class II at about $12 million. Passenger trains on the Santa Cruz Branch Line could be operated as a through service in conjunction with existing services, potentially reaching San Jose and beyond. The type and scope of operations remain to be defined through a “Unified Corridor Analysis” currently being initiated.

8.6 Proposed Commuter Rail Service

Commuter rail, which serves local and regional transportation needs and provides connections to statewide intercity services, is planned and administered by local and regional transportation agencies. Chapter 5 provides descriptions of existing commuter rail service. This section discusses expansion plans for commuter rail systems in California. This includes existing Caltrain, ACE, Metrolink, and COASTER service, as well as the proposed Sonoma-Marin Area Rail Transit (SMART), Kern Council of Governments commuter rail, Santa Barbara-Ventura commuter rail, Monterey Bay commuter rail and Dumbarton Rail Corridor Project services.

[132] Southern California Association of Governments, 2012-2035 Regional Transportation Plan Passenger Rail Appendix, accessed August 2012 at: http://rtpscs.scag.ca.gov/Pages/2012-2035-RTP-SCS.aspx.

8.6.1 Caltrain

Caltrain provides commuter rail service along the San Francisco Peninsula from downtown San Francisco to San Jose and Gilroy. Caltrain has completed several recent initiatives, including the California Avenue Station completion, improvements to the Palo Alto and Burlingame stations, addition of the Baby Bullet express service, and transition to the Clipper Card transit pass. These have resulted in some of the highest ridership counts in its history. Caltrain is currently in the process of implementing PTC technology to improve safety and operational efficiencies.

Caltrain, the Authority, and other parties developed a vision of blended service involving both Caltrain and HSR utilizing the existing Caltrain corridor. This vision was developed at the same time that the Authority was developing the 2012 Business Plan for the California HSR system that could utilize blended service in the Caltrain corridor.

Caltrain and the Authority are committed to advancing the Blended System. This local vision was developed with stakeholders interested in the Caltrain corridor. The Blended System will remain substantially within the existing Caltrain ROW and accommodate future HSR and modernized Caltrain service along the Peninsula corridor by primarily utilizing the existing track configuration on the Peninsula. The Blended System will be primarily a two-track system shared by Caltrain, HSR, and existing passenger and freight rail tenants.

Based on the Blended System vision, this corridor is the recipient of an initial investment of HSR Proposition 1A bond funds to implement improvements that would benefit Caltrain and HSR in the long run. Caltrain, the Authority, and seven other San Francisco Bay Area agencies have approved an MOU[133] to pursue shared use of the corridor between San Jose and San Francisco to provide blended service of both Caltrain commuter rail service and HSR intercity service. The MOU included agency and funding commitments to making an incremental investment of $1.5 billion ($600 in Proposition 1A funds) in the corridor for an advanced signal system, electrification, and electrified rolling stock. The MOU also conceptually outlines potential additive improvements needed beyond the first incremental investment of $1.5 billion to receive future HSR service in the corridor.

Caltrain, the Authority, and the MOU partners have agreed on shared use of the Caltrain corridor for use of up to six Caltrain trains per peak hour per direction and up to four HSR trains per peak hour per direction. The operational feasibility of blended service has been studied, but this project is presently only at the conceptual planning phase. The potential addition of HSR service to this corridor will be subject of a separate environmental process that will be subsequent to the environmental process for the Corridor Electrification Project. Based on the Authority's 2012 Business Plan, blended service along the Corridor is scheduled to commence sometime in 2026.

Table 8.15 lists planned capital investments by timeframe. At the present time, the Caltrain corridor does not have any joint use segments:

In the future the corridor is planned to be shared with other services:

- San Francisco to Santa Clara. Shared with future HSR service and proposed *Coast Daylight* service.
- San Jose to Gilroy. Shared with the proposed *Coast Daylight* service and *Capitol Corridor* extension to Salinas.

133 http://www.caltrain.com/Assets/Caltrain+Modernization+Program/Documents/Bay+Area+HSR+Early+Investment+MOU-+JPB+Board+Resolution+2012.pdf.

Table 8.15: Caltrain Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015)					
Downtown Extension from Fourth & King to Transbay Transit Center (Phase 1)[b]	Extension/ new route	$1,589.00[a]	Allocated (HSIPR)	San Francisco	HSIPR (ARRA) MTC RTP (financially-constrained)
Downtown Extension from Fourth & King to Transbay Transit Center (Phase 2), including construction[b]	Extension/ new route	$2,596.00[a]	n/a	San Francisco	MTC RTP (financially-constrained)
Caltrain Modernization Program: Service frequency improvements, electrification, and CBOSS + PTC	Track & Signal	$1,718.00[a]	Programmed (1A) Allocated (1B PTMISEA) Allocated (1B SLPPA)	n/a	Proposition 1A Proposition 1B (PTMISEA) Proposition 1B (State-Local Partnership Program Account) MTC RTP (financially-constrained)
Transit operating and capital improvement program: Includes replacement, rehabilitation, and minor enhancements for rolling stock, equipment, fixed facilities and other capital assets; platforms and other station improvements[c]	n/a	$7,666.90[a]	n/a	n/a	MTC RTP (financially-constrained)
Caltrain system-wide station access improvements: Includes parking, bus, shuttle and bicycle and pedestrian access improvements	Station	$30.20[a]	n/a	n/a	MTC RTP (financially-constrained)
Subtotal (Near Term)	–	**$13,608.74**	–	–	–
Mid Term (2016-2020)					
New Oakdale Station (San Francisco)[b]	Station	$45.00	n/a	San Francisco	MTC RTP (financially-constrained) Bayview-Oakdale Caltrain Station Study: Design Feasibility Assessment and Station Concepts (Final Report) (February 2005)
Grade separations in San Mateo County (two to three high-priority Measure A candidate locations)	Grade separation	$355.40[a]	n/a	San Mateo	STIP Proposition 1B (Highway-Railroad Crossing Safety Account) MTC RTP (financially-constrained)

Table 8.15: Caltrain Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Palo Alto Caltrain Station and Transit Center expansion[b]	Station	$74.70[a]	n/a	Santa Clara	MTC RTP (financially-constrained)
Rengstorff Avenue grade separation[b]	Grade separation	$73.30[a]	n/a	Santa Clara	MTC RTP (financially-constrained)
South County track improvements: Second main track and crossing improvements (Coyote to Gilroy)[b]	Track & Signal	$61.00[a]	n/a	Santa Clara	MTC RTP (financially-constrained) Commuter Rail Program: Caltrain South County (June 2012)
Caltrain TOD station improvements: Includes parking, bus, shuttle and bicycle and pedestrian access improvements	Station	$219.80[a]	n/a	n/a	MTC RTP (financially-constrained)
At-grade crossing improvements	Grade crossing	$6.00[a]	n/a	n/a	MTC RTP (financially-constrained)
Subtotal (Mid Term)	–	**$835.20**	–	–	–
Long Term					
Hollister commuter rail service[b]	Extension/ new route	$146.00[a]	n/a	San Benito	MTC RTP (financially-constrained)
Subtotal (Long Term)	–	**$146.00**	–	–	–
TOTAL – Entire Corridor	–	**$14,589.94**	–	–	–

[a] Original project cost from source document is a YOE cost estimate, and may include contingency or other assumptions. As a result, no cost escalation or other adjustments were made for YOE costs.

[b] Caltrain is not an agency sponsor for this project.

[c] This project and its associated costs include elements spanning near-term, mid-term, and long-term timeframes.

For the purposes of the capital investments tables, the segment between Santa Clara and San Jose has been defined as a joint use segment of the *Capitol Corridor*, and several projects sponsored by the JPA are listed in Table 8.15.

8.6.2 Altamont Corridor Express

ACE offers regional rail service of four weekday round trips from Stockton to San Jose via Livermore and Fremont which operate inbound towards the Bay Area in the morning and return towards the San Joaquin Valley in the afternoon. ACE investments are overseen by the SJRRC. ACE has near-term and mid-term plans to improve existing service, as well as a long-term plan to expand and enhance service. These are described separately below.

Improvements to Existing Service

Near-term and mid-term infrastructure investments for ACE will support existing operations and service expansion to 6 daily round trips. Track and other infrastructure improvements to the existing line will reduce delays, increase schedule reliability, and improve average speeds for trips made along the existing route. SJRRC is planning for eventual expansion to 10 round trips on the existing alignment, and the UPRR has agreed to consider up to a total of 10 round trips. The near-term/mid-term expansion of ACE is part of the NCURS planning effort. SJRRC is also planning to extend ACE service to new markets to become a regional rail service. SJRRC is planning to extend ACE to Modesto and on to Merced to connect with the HSR IOS.

These infrastructure investments are listed in Table 8.16. The projects are grouped into near-term (2013-2015) and mid-term/long-term (2016-2040) timeframes. Project cost estimates are reported in 2012 dollars. The table uses the same definitions and categories as those presented above in Section 8.0.

Longer-Term Expansion Plan

SJRRC is pursuing the proposed *Altamont Corridor Project* which is intended to evolve and expand the service over the long term into an enhanced passenger rail service operating on dedicated passenger tracks at significantly higher maximum and average speed. The improved corridor would transform ACE by making it possible to operate intercity trains on regular headways all day long in both directions. The future ACE could ultimately be electrified and capable of hosting high-speed trains. ACE intercity train service could extend beyond the existing Altamont route to serve other Central Valley destinations, including Modesto, Merced, and Sacramento.

The goals of the project include:[134]

- Develop a regional passenger rail service in the Altamont corridor linking the northern San Joaquin Valley with the Bay Area that provides dedicated trackage separate from existing lines shared with Class 1 freight operations, where feasible.
- Transform the ACE service into a “world-class” intraregional and commuter service with frequent trains operating in both directions throughout the day.
- Develop passenger train station locations that serve existing and planned population and employment centers in the South Bay, East Bay, Tri-Valley, and northern San Joaquin Valley.

[134] SJRRC, Altamont Corridor Rail Project Preliminary Alternatives Analysis Report, February 2011.

Table 8.16: ACE Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015)					
New ACE maintenance facility in Stockton	Maintenance facilities	$76.78	Allocated (1B PTMISEA)	San Joaquin	Proposition 1B (PTMISEA) SJCOG RTP (financially-constrained) *ACE 2011-2012 Work Program & Budget* (June 3, 2011)
Stockton (ACE) Station platform and track extension (to maintenance facility) for *San Joaquin* service to San Jose via Altamont Pass	Station	$24.90	Programmed (1A) Allocated (STIP Interregional)	San Joaquin	STIP Proposition 1A SJCOG RTP (financially-constrained) *ACE 2011-2012 Work Program & Budget* (June 3, 2011)
Platform extensions at Alameda County and San Joaquin County stations	Station	$8.00[a]	Allocated (1B PTMISEA)	n/a	Proposition 1B (PTMISEA) MTC RTP (financially-constrained)
Subtotal (Near Term)	–	**$109.68**	–	–	–
Mid Term (2016-2020)					
San Jose-Stockton corridor capital investments for capacity, reliability, connectivity and time savings	Track & Signal	$77.00	n/a		SJRRC
Modesto service extension	Extension or new route	$161.20	n/a		SJRRC
Station improvements (rail station expansion, access): Stockton Station, Lathrop Station, and second station in Tracy	Station	$28.25[a]	n/a	San Joaquin	SJCOG RTP (financially-constrained)
Stockton track extension and Lathrop second main track[c]	Track & Signal	$4.00[a]	n/a	San Joaquin	SJCOG RTP (financially-constrained)
Northwest track connection at Stockton Interlocking (BNSF/UPRR)	Track & Signal	$7.50[a]	n/a	San Joaquin	SJCOG RTP (financially-constrained)
Shuttle services in San Joaquin County stations	Station	$1.12[a]	n/a	San Joaquin	SJCOG RTP (financially-constrained)
Connection from UPRR Fresno Sub to UPRR Oakland Sub in Lathrop	Track & Signal	$6.56[b]	n/a	San Joaquin	Northern California Rail Partners Working Group

Table 8.16: ACE Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Lathrop transfer station (ACE and Central Valley commuter rail)	Station	$5.50[a]	n/a	San Joaquin	SJCOG RTP (financially-constrained)
Lathrop to Niles Junction signal upgrades	Track/signal	$4.33[a]	Programmed (STIP Interregional)	San Joaquin, Alameda	STIP SJCOG RTP (financially-constrained)
Acquisition of ACE corridor between Lathrop and Niles Junction		$45.00[a]	n/a	San Joaquin, Alameda	SJCOG RTP (financially-constrained)
Extension of Wyche siding	Track & Signal	$9.83[b]	n/a	San Joaquin	Northern California Rail Partners Working Group
Extension of Midway siding	Track & Signal	$9.83[b]	n/a	San Joaquin, Alameda	Northern California Rail Partners Working Group
Extension of Altamont siding	Track & Signal	$9.83[b]	n/a	Alameda	Northern California Rail Partners Working Group
Track realignment UPRR Oakland Sub MP 55.5 to MP 54.0	Track & Signal	$10.93[b]	n/a	Alameda	SJCOG RTP (financially-constrained) Northern California Rail Partners Working Group
Pleasanton area regional station improvements	Station	$32.78[b]	n/a	Alameda	Northern California Rail Partners Working Group
Service extensions (intercity rail enhancements, integration of ACE and state routes)	Extension or new route	$8.56[a]	n/a	n/a	SJCOG RTP (financially-constrained)
Central Valley commuter rail (Merced – Stockton – Sacramento)	Extension or new route	n/a	n/a	n/a	SJCOG RTP (financially-constrained)
Merced service extension	Extension or new route	$350.00	n/a	n/a	SJRRC
Positive Train Control	Track & Signal	$14.54	Allocated (1B PTMISEA)	n/a	Proposition 1B (PTMISEA)
Subtotal (Mid Term)	–	**$205.56**	–	–	–

Table 8.16: ACE Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Long Term (2021-2040)					
Stockton to Lathrop to Tracy track improvements (track alignment, siding extension, and curve realignment)	Track & Signal	$14.54	n/a	San Joaquin	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Altamont Pass track improvements and extension of Midway siding	Track & Signal	$35.00	n/a	San Joaquin	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Livermore to Pleasanton second main track and siding upgrades	Track & Signal	$11.00	n/a	Alameda	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Alameda County ACE/BART direct connection (Valley Avenue/Stanley Boulevard in Pleasanton or Greenville Road in Livermore)	n/a	$31.00	n/a	Alameda	SJCOG RTP (financially-unconstrained)
Capital improvements (rolling stock, track improvements, station improvements)	n/a	$20.00[a]	n/a	n/a	SJCOG RTP (financially-unconstrained)
Altamont service improvements (rolling stock, track improvements, station improvements)	n/a	$32.00[a]	n/a	n/a	SJCOG RTP (financially-unconstrained)
Altamont Corridor speed and safety upgrades (track realignment and ATS, maximum speed 90 mph)	Track & Signal	$52.00[a]	n/a	n/a	SJCOG RTP (financially-unconstrained)
Subtotal (Long-Term)	–	**$195.54**	–	–	–
TOTAL – Entire Corridor	–	**$510.78**	–	–	–

[a] Original project cost from source document is a YOE cost estimate, and may include contingency or other assumptions. As a result, no cost escalation or other adjustments were made for YOE costs.

[b] Original project cost from source of document assumes 2013 dollars. Cost escalation between 2012 and 2013 is assumed to be negligible, and no adjustments were made for costs provided in 2013 dollars.

[c] Some elements of the project scope may be duplicated by other projects listed here.

8.6.3 Metrolink

Metrolink, operated by the SCRRA, offers a large network of commuter rail services between Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties. Metrolink's planned investments are highly integrated with other transit services throughout southern California. Long-range planning efforts have established the following principal objectives over the mid-term timeframe:

- Improve customer service reliability, accessibility, and service options.
- Improve integration with other transit services.
- Address deferred maintenance of rail lines and infrastructure, and sustaining ongoing rehabilitation needs.
- Coordinate with the Authority and member agencies on key projects (Palmdale to Los Angeles segment, Los Angeles to Anaheim segment, and LAUS).
- Improve safety and capacity at Burbank Junction and Empire Avenue.
- Support local efforts in the Los Angeles-San Diego-San Luis Obispo corridor.

The *LOSSAN Corridorwide Strategic Implementation Plan* (April 2012) identifies the operation of additional Metrolink service by 2014 in its "Preferred Service Plan". This includes new through Metrolink-COASTER trains between Los Angeles and San Diego making all stops, additional mid-day Metrolink and COASTER service with timed connections in Oceanside, and additional Orange County intracounty service between Laguna Niguel and Fullerton. The 2030 "Preferred Service Plan" identifies further increases in service levels, including additional through commuter service between Los Angeles and San Diego.

Future train volumes are planned at 10 daily round trips on the Ventura County Line in 2014 and 18 daily round trips in 2030. On the Orange County Line, train volumes are planned at 10 and 14 daily round trips in 2014 and 2030, respectively. Future service levels are also planned to increase on the Metrolink lines that operate on shorter segments of the LOSSAN corridor. On the Antelope Valley Line, train volumes are planned at 15 daily round trips in 2014 and 23 daily round trips in 2030. Service on the Inland Empire-Orange County Line is planned at 8 round trips in 2014 and 14 round trips in 2030, while 6 and 16 round trips are planned for the 91 Line in 2014 and 2030, respectively. In addition, 7 and 7 Intra-County round trips in Orange County are planned in 2014 and 2030, respectively.

The *Strategic Implementation Plan* identifies station capacity in Los Angeles, multiple track capacity between Los Angeles and Fullerton, coordination with *Pacific Surfliner* and COASTER services, and integration of HSR as key issues for Metrolink as future service levels are implemented.

LAUS is expected to be a key intermodal link as the HSR Phase 1 Blended System is developed. While details of service plans are evolving, the HSR IOS will likely see Metrolink and *Pacific Surfliner* trains passing through LAUS and providing connecting service transfers at the interim terminus in the San Fernando Valley. Existing passenger service on the Antelope Valley line (15 daily round trips) will need to be nearly doubled to provide hourly and one-half hourly connections with the HSR line. The Southern California Regional Interconnector Project, which will provide "run-through" tracks at LAUS, will allow a mix of northbound *Pacific Surfliner* and Metrolink trains to be routed through to the San Fernando Valley. By 2029 HSR dedicated tracks and service will be extended to LAUS, which will be the main intermodal hub for southern California intercity, regional, and local rail services.

Metrolink capital improvements, with estimated costs, are presented in Table 8.17. Metrolink shares the *Pacific Surfliner* corridor from East Ventura to Oceanside, and projects in this segment that would benefit both services are listed in Table 8.8. Projects on the *Pacific Surfliner* corridor that only benefit Metrolink are listed in Table 8.17. The projects are grouped into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes. Project cost estimates are reported in 2012 dollars. The table uses the same definitions and categories as those presented above in Section 8.0. The Metrolink investments include several major projects and key investment categories, including:

- PTC. This project was initiated by SCRRA in late 2008 and is expected to be completed in 2013, well in advance of the federal deadline.
- Systemwide Rail Line Rehabilitation/Renovation Projects. These projects include track, signal and bridge work, tunnels, stations, drainage, facilities, rolling stock overhaul and rehabilitation, and passenger information throughout the system.
- Sealed Corridor Program. This program will provide a comprehensive strategy to enhance the safety of trains, passengers, motorists, pedestrians, and neighboring land uses within and along Metrolink's railroad corridors. Under the program, appropriate safety measures will reduce the opportunity for accidents at grade crossings or elsewhere within the corridor. The first phase of this project in Orange County is largely complete with improvements to 52 crossings at a cost of approximately $85 million. Subsequent phases will study and implement safety improvements along the Antelope Valley and Ventura County lines, and will include improvements such as quad gates, median islands, longer gate arms, grade crossing closure, and gates to limit access to the rail ROW. In addition, a Los Angeles County wide grade crossing and safety program will be initiated in 2013.
- Eastern Maintenance Facility (EMF) Phase III. The EMF project was constructed to provide additional storage and maintenance capability for Metrolink rolling stock in the Inland Empire area. EMF Phase III will improve capacity and utility of the EMF by constructing additional storage tracks in the EMF yard and add heavy-duty shop equipment such as a wheel true machine.
- Antelope Valley Line Improvements. LACMTA has conducted a study to improve speed, capacity, reliability, and safety on the Antelope Valley Line between Lancaster and Los Angeles. The study created a strategy to prioritize projects, and identify costs, benefits, and funding sources. Projects will be coordinated between LACMTA and Metrolink.
- San Gabriel Line Improvements. LACMTA will be conducting a future study to improve speed, capacity, reliability, and safety on the San Gabriel Line in Los Angeles County. The study created a strategy to prioritize projects, and identify costs, benefits, and funding sources. Projects will be coordinated between LACMTA and Metrolink.
- Train Control and Operations Support Facility. In 2007 and 2008, studies were conducted that determined that additional facilities were required to support Metrolink maintenance and operations support functions.
- Perris Valley Line. RCTC will use FTA Small Starts funds, along with significant local match funds, to extend the Metrolink 91 Line to South Perris in Riverside County. The extension will add approximately 21.3 miles to the route along the congested I-215 highway and serve additional areas of Riverside, Moreno Valley, and Perris. The entire length of the line was purchased in 1993. Commuter rail service in this corridor is projected to begin in late 2014.

Table 8.17: Metrolink Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015)					
Systemwide or Multiple Lines					
Eastern Maintenance Facility (EMF) expansion	Maintenance facilities	$13.00[a]	n/a	n/a	Metrolink News: EMF Expansion Project groundbreaking held (October 5, 2012) (press release)
San Jacinto Branch Line upgrades (Perris Valley Line)	Extension or new route	$246.83[a]	Programmed (1B PTMISEA) Allocated (STIP)	Riverside	STIP FTA (Small Starts) SCAG RTP (FTIP)
New Station at Bob Hope Airport, adjacent to or co-terminus with HSR station (Hollywood Way)	Station	$18.00[a]	n/a	Los Angeles	LACMTA Board Meeting, July 26, 2012
Subtotal (Near Term)	–	**$277.83**	–	–	–
Mid Term (2016-2020)					
Systemwide or Multiple Lines					
Riverside County Transportation Commission systematic commuter rail improvements [b]	n/a	$10.00[a]	n/a	Riverside	SCAG RTP (FTIP)
Los Angeles Metrolink station parking improvements	Station	$0.31[a]	n/a	Los Angeles	SCAG RTP (FTIP)
Norwalk/Santa Fe Springs Station improvements (transit facility, equipment maintenance facility, operations/dispatch offices, fuel island, bus wash and drainage, parking, and pedestrian plaza)	Station	$0.65[a]	n/a	Los Angeles	SCAG RTP (FTIP)
Norwalk/Santa Fe Springs Station improvements, Phase 2 (parking)	Station	$2.82[a]	n/a	Los Angeles	SCAG RTP (FTIP)
San Bernardino Station additional parking structure	Station	$11.06[a]	n/a	San Bernardino	SCAG RTP (FTIP)
Antelope Valley Line					
North Buena Vista Street SCRRA crossing improvements (Burbank)[e]	Grade crossing	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects

Table 8.17: Metrolink Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Brighton siding speed increase	Track & Signal	n/a	n/a	Los Angeles	California Passenger Rail System: 20-Year Improvement Plan Technical Report
CP Brighton to CP Roxford second main track	Track & Signal	$108.60[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Arvilla Avenue/San Fernando Road SCRRA crossing closure (Los Angeles)	Grade crossing	$2.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Sunland Boulevard/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Penrose Street/San Fernando Road SCRRA crossing closure (Los Angeles)	Grade crossing	$4.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Sheldon Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$40.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Branford Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Osborne Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Pierce Street/San Fernando Road SCRRA crossing closure (Los Angeles)	Grade crossing	$2.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Van Nuys Boulevard/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$40.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Paxton Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Jessie Street/1st Street/Wolfskill Street/ Truman Street SCRRA crossing grade separation (San Fernando)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Brand Boulevard/Truman Street/1st Street SCRRA crossing grade separation (San Fernando)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Maclay Avenue/Truman Street/1st Street SCRRA crossing grade separation (San Fernando)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects

Table 8.17: Metrolink Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Hubbard Avenue/San Fernando Road SCRRA crossing grade separation (North Valley)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Polk Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$45.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Bledsoe Street/San Fernando Road SCRRA crossing closure (Los Angeles)	Grade crossing	$2.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Roxford Street/San Fernando Road SCRRA crossing grade separation (Los Angeles)	Grade separation	$40.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Newhall to Santa Clarita second main track	Track & Signal	$40.20[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Newhall Station parking expansion (final phase)	Station	$1.20[a]	n/a	Los Angeles	SCAG RTP (FTIP)
Santa Clarita and Soledad Canyon track realignment[b]	Track & Signal	n/a	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Santa Clarita to Via Princessa second main track	Track & Signal	$12.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Santa Clarita curve realignments[b]	Track & Signal	$3.69[a]	n/a	Los Angeles	SCAG RTP (financially-constrained)
Via Princessa to Vincent Grade/Acton second main track	Track & Signal	$5.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Extension of Vincent siding	Track & Signal	$11.20[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Avenue S/Sierra Highway SCRRA crossing grade separation (Palmdale)	Grade separation	$56.80[a]	n/a	Los Angeles	SCAG RTP (FTIP)
New Palmdale siding	Track & Signal	$7.00[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Palmdale Station platform extension	Station	$1.01[a]	n/a	Los Angeles	SCAG RTP (FTIP)
Rancho Vista Boulevard/Sierra Highway SCRRA crossing grade separation (Palmdale)	Grade separation	$64.17[a]	Partially programmed	Los Angeles	SCAG RTP (FTIP)
Inland Empire–Orange County Line					
New Olive Subdivision siding	Track & Signal	$5.00[a]	n/a	Orange	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*

Table 8.17: Metrolink Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
Anaheim Canyon Station improvements and second track	Track & Signal	$29.00	Allocated (STIP)	Orange	STIP SCAG RTP (FTIP) *LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
CP Rana to CP San Bernardino shortway second track	Track & Signal	$22.75[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
91 Line					
New Placentia Station	Station	$23.42[a]	n/a	Orange	SCAG RTP (FTIP)
Orange County Line					
New Orange Station parking structure	Station	$23.70[a]	n/a	Orange	SCAG RTP in the FTIP
Laguna Niguel/Mission Viejo Station pedestrian improvements, amenities, and parking	Station	$63.00[a]	Programmed (1B SLPPA)	Orange	Proposition 1B (State-Local Partnership Program Account) SCAG RTP in the FTIP
San Bernardino Line					
CP Amar to CP Irwin second main track	Track/signal	$91.65[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
Baldwin Park Station pedestrian overcrossing	Station	$1.81[a]	n/a	Los Angeles	SCAG RTP (financially-constrained)
Baldwin Park Station transportation center and parking structure	Station	$8.05[a]	n/a	Los Angeles	SCAG RTP (FTIP)
Covina Station pedestrian bridge	Station	$0.47[a]	n/a	Los Angeles	SCAG RTP (FTIP)
CP Barranca to CP White second main track	Track & Signal	$110.30[a]	n/a	Los Angeles	Southern California Potential Early Investment Projects
CP Central to CP Archibald second main track	Track & Signal	$104.00[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
Upland Station additional parking	Station	$5.81[a]	n/a	San Bernardino	SCAG RTP (FTIP)
CP Rochester to CP Nolan second main track	Track & Signal	$22.75[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
Etiwanda Avenue/Whittram Avenue SCRRA crossing grade separation (Rancho Cucamonga)	Grade separation	$54.05[a]	n/a	San Bernardino	SCAG RTP (FTIP)

Table 8.17: Metrolink Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020), continued					
CP Beech to CP Locust second main track	Track & Signal	$46.80[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
CP Lilac to CP Rancho second main track	Track & Signal	$31.85[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
Rialto Station parking expansion	Station	$3.36[a]	n/a	San Bernardino	SCAG RTP (financially-constrained)
Second fly-over structure, CP Rancho to CP San Bernardino	Track & Signal	$31.85[a]	n/a	San Bernardino	Southern California Potential Early Investment Projects
Downtown San Bernardino Passenger Rail Project	Extension or new route	n/a	n/a	San Bernardino	n/a
Redlands Passenger Rail Project	Extension or new route	n/a	n/a	San Bernardino	n/a
Ventura County Line					
Commuter rail service expansion in Ventura County	Extension or new route	$32.67[a]	n/a	Ventura	SCAG RTP (financially-constrained)
East Ventura Station improvements (station modifications or relocation to support overnight layover)	Station	$5.00	n/a	Ventura	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Subtotal (Mid Term)	–	**$1,738.43**	–	–	–

Table 8.17: Metrolink Proposed Capital Investments (continued)

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Long Term (2021-2040)					
Antelope Valley Line					
New Station at Bob Hope Airport, adjacent to or co-terminus with HSR station (Hollywood Way)	Station	$15.00[a]	n/a	Los Angeles	SCAG RTP (financially-unconstrained) Southern California Potential Early Investment Projects
Barrel Springs Road/Sierra Highway SCRRA crossing grade separation (Palmdale)	Grade separation	n/a	n/a	Los Angeles	SCAG RTP (financially-unconstrained)
San Bernardino Line					
Central Avenue/East Arrow Highway/Richton Street SCRRA crossing grade separation (Upland/Montclair)	Grade separation	n/a	n/a	San Bernardino	SCAG RTP (financially-unconstrained)
Archibald Avenue/East 8th Street SCRRA crossing grade separation (Rancho Cucamonga)	Grade separation	n/a	n/a	San Bernardino	SCAG RTP (financially-unconstrained)
Extension of El Monte siding by 1,200 feet	Track & Signal	n/a	n/a	Los Angeles	*California Passenger Rail System: 20-Year Improvement Plan Technical Report*
Ventura County Line					
Santa Paula Branch commuter rail	Extension or new route	n/a	n/a	Ventura	SCAG RTP (financially-unconstrained)
Subtotal (Long Term)	–	**$75.00**	–	–	–
TOTAL	–	**$2,284.16**	–	–	–

[a] Source document does not specify cost year. A review of available information concerning project scope concluded that no cost escalation or other adjustments are necessary.

[b] Some elements of the project scope may be duplicated by other projects listed here.

- Redlands Passenger Rail Project. This project will provide commuter rail service from the new San Bernardino Transit Center in downtown San Bernardino to the University of Redlands. The project will replace all track and bridges, most at-grade crossings. It will also add a mid-system passing siding, railroad signaling and PTC, and four station platforms. The Redlands Passenger Rail Project is currently in the environmental/preliminary engineering phase, which should be complete by late 2013. Construction is expected to start in 2017.
- Santa Paula Branch Line. Ventura County Transportation Commission (VCTC) acquired the Santa Paula Branch Line from the Southern Pacific Railroad in 1995. The UPRR provides limited freight rail service on this corridor. Passenger rail operations remain unfunded at this time. Fillmore and Western Railway operates tourist and charter trains between Fillmore and Santa Paula on a regular basis.
- Metrolink Service Enhancement Program. The Orange County Transportation Authority (OCTA) supports the increase of Metrolink service frequencies between Fullerton and Laguna Niguel/Mission Viejo, with some trips extending to Oceanside. Initial service started in July 2011 with 6 trips each weekday, and increased to 10 trips each weekday in 2012. This service is integrated with existing Metrolink service operating between Oceanside and Los Angeles, and between Oceanside and San Bernardino.

8.6.4 COASTER

COASTER is operated by the NCTD and provides commuter train service to eight stations between Oceanside and downtown San Diego. The goals and objectives of the COASTER service include:

- Service to customers first.
- Ensure the safety and security of employees and customers.
- Deliver high-quality transit services.
- Develop and maintaining facilities that sustain and promote current and future transportation services.
- Secure adequate revenue, protecting our assets, and getting the maximum return on the public investment.
- Work in partnership with our communities and other stakeholders.
- Encourage innovation, creativity, and leadership.

The *LOSSAN Corridorwide Strategic Implementation Plan* (April 2012) identifies the operation of additional COASTER service by 2014 in its “Preferred Service Plan.” This includes new through Metrolink-COASTER trains between Los Angeles and San Diego making all stops, and additional mid-day COASTER and Metrolink service with timed connections in Oceanside. The 2030 “Preferred Service Plan” includes additional through commuter service between Los Angeles and San Diego and express COASTER service. Planned future service levels are 14 daily round trips in 2014 and 20 daily round trips in 2030.

The San Diego region expects to see more than $2 billion in LOSSAN rail corridor improvements over the next 40 years, including double-tracking the rail corridor from Orange County to downtown San Diego. About one-half of the double-tracking has been completed. In addition to double-tracking, other near-term investments include bridge replacements, new platforms, pedestrian under-crossings, and other safety and operational enhancements. In particular, the Carlsbad double-track project and Del Mar Bluffs

Stabilization Projects were completed recently to enhance the safety and efficiency of passenger rail service.

As previously noted, the capacity projects shown in Table 8.8 benefit intercity, freight, and COASTER services. Table 8.18 presents the proposed improvements in the *Pacific Surfliner* Corridor that will only benefit COASTER service, with the exception of the Camp Pendleton Station. Additional long-term improvements in the fiscally-constrained regional transportation plan include 20-minute peak and 60-minute off-peak frequencies for COASTER service, and a new seasonal station at the Del Mar Fairgrounds. The projects are grouped into near-term (2013-2015), mid-term (2016-2020), and long-term (2021-2040) timeframes, with project cost estimates reported in year 2012 dollars. The table uses the same definitions and categories as those presented above in Section 8.0.

8.6.5 Sonoma-Marin Area Rail Transit

The SMART passenger rail service is a commuter rail route under construction along a 70-mile existing rail corridor extending from Cloverdale in Sonoma County, California, to a location near the Larkspur Ferry Terminal in Marin County. The project includes construction of a bicycle/pedestrian pathway adjacent to the railway, some segments of which have been completed and are open to public use (such as the Cal Park Tunnel pathway segment between Larkspur and San Rafael). Revenue passenger rail services on the corridor are anticipated to start in late 2015 or early 2016.

The rail corridor is formerly known as the Northwestern Pacific Railroad (NWP), and parallels Highway 101. The 54-mile segment between Healdsburg and Corte Madera is publicly owned by the SMART District. North of Healdsburg, the NWP is publicly owned by the North Coast Railroad Authority (NCRA), which contracts with a short-haul freight operator on the corridor. The SMART District intends to exercise rights it holds to operate rail service on this 17-mile segment. NCRA has the right to provide freight service over SMART tracks north of Novato, a right which it currently exercises through a contract with a private carrier. The SMART District controls the dispatching of all lines it owns and all lines it will operate and has been dispatching freight operations within its ROW since freight service was reinstated by the FRA in July 2011. Dispatch control is currently exercised through contract with RailAmerica (Genessee and Wyoming), but in the future the SMART District will maintain the railroad, operate its own trains, and dispatch all passenger and freight operations with its own crews.

Improvements for the SMART service include a full range of commuter rail components such as track and bridge replacements, railroad crossing upgrades, to station construction and vehicle procurement. The rail investments – nearly 40-miles of which are currently under construction – include:

- Rehabilitation of tracks to FRA Class IV standards (up to 80 mph for passenger services) and operation of commuter rail service on weekdays (30 one way/15 round trip trains per day) and weekends (four round trips per day) along the existing 70-mile SMART corridor.

  Fourteen constructed or planned rail stations (nine in Sonoma County and five in Marin County), with one additional potential station in Sonoma County at Airport Boulevard. Constructed or planned stations are: Cloverdale, Healdsburg, Windsor, Santa Rosa North – Guerneville Road/Coddingtown, Santa Rosa Railroad Square, Rohnert Park, Cotati, Petaluma North, Downtown Petaluma, Novato North, Novato South, Marin Civic Center, Downtown San Rafael, and Larkspur.
- Park-and-ride lots at some station locations.
- Rail operations and maintenance facility at Airport Boulevard in Sonoma County.
- Train passing sidings, timber trestle and other bridge replacements, and drainage improvements.

Table 8.18: COASTER Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Mid Term (2016-2020)					
Camp Pendleton Station	Station	$20.00	n/a	San Diego	n/a
Carlsbad Village Station parking structure	Station	$20.50	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Carlsbad Poinsettia Station parking structure	Station	$20.30	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
Encinitas Station parking structure	Station	$21.00	n/a	San Diego	*San Diego-LOSSAN Corridor Project Prioritization Analysis (Final Project Report)*
San Diego Convention Center Station	Station	$8.00	n/a	San Diego	*LOSSAN Corridorwide Strategic Implementation Plan (Final Report)*
Subtotal (Mid Term)	–	**$20.00**	–	–	–
TOTAL	–	**$60.80**	–	–	–

- Bicycle/pedestrian pathway generally within or adjacent to the rail corridor and connecting the rail stations along the 70-mile corridor.
- Use of FRA-compliant and Tier 4 emissions-compliant diesel multiple unit (DMU) rail cars that are currently being manufactured.

Next Steps

In 2008, the SMART project was the subject of a voter approved one-quarter cent sales tax to help fund construction and operations of the SMART project. The SMART Board has currently divided the project into two phases, with the majority of Phase 1 under construction between the Downtown San Rafael and Santa Rosa North stations as of 2012. Some elements of the project have been completed as far south as Larkspur (Cal Park Tunnel project) and as far north as Airport Boulevard (track and maintenance facility), Healdsburg (pathway), and Cloverdale (rail crossings reconstruction). All other elements of the project have been classified by the SMART Board as Phase 2. The SMART project is included in the financially-constrained element of the MTC's Draft 2040 RTP. The SMART projects listed in MTC's plan are shown in Table 8.19.

8.6.6 Kern Council of Governments Commuter Rail

The Kern Council of Governments (COG) completed a Commuter Rail Feasibility Study in 2012 that examined commuter rail service corridors within the Bakersfield metropolitan area and portions of Kern County.[135] The results identified key markets for commuter rail service and presented near-term, mid-term, and long-term recommendations to advance its development. The study presented technical findings for rail service extending from Bakersfield along northwest and southwest corridors. These corridors would be serviced by 4 daily peak period round trips. The study also included analysis of a Metrolink Antelope Valley line extension. Kern COG has initiated discussions with Metrolink to explore the possibility of extending commuter rail service an additional 14 miles north on the existing UPRR line from Lancaster station to Rosemond/Edwards Air Force Base with a population service area of over 100,000.

Next Steps

This service is in the initial concept phase, and will require substantial coordination with the UPRR and Metrolink's member agencies.

8.6.7 Ventura – Santa Barbara Commuter Rail Service

In 2008, SCAG initiated the Ventura/Santa Barbara Rail Study in response to interest in improved rail service from the VCTC and Santa Barbara County Association of Governments (SBCAG). The study examined the need for commuter-friendly passenger rail service between western Ventura County and southern Santa Barbara County. New commuter service between Ventura and Santa Barbara counties would provide one northbound morning peak period train and one southbound peak period train by 2020, with future service expanding to eight daily peak period trains by 2040. Highway 101, which parallels the

[135] Draft Commuter Rail Feasibility Study, Kern Council of Governments, July 2012, accessed January 2013 at http://www.kerncog.org/images/docs/studies/KernCOG_ Commuter_Rail_Draft_Report_20120720.pdf.

Table 8.19: SMART Proposed Capital Investments

Project	Project Type	Cost (Millions)	Funding Status	County	Source(s)
Near Term (2013-2015)					
SMART Phase 1 Santa Rosa North to San Rafael Downtown (IOS)	Extension or new route	$360.00[a]	**Programmed (local), Allocated (SLPP, P116, TCRP and federal)**	Marin, Sonoma	Proposition 1B (State-Local Partnership Program Account(SLPP)) Proposition 116 TCRP MTC RTP (financially-constrained) Federal sources
Windsor River Road/Windsor Road NWPRR crossing improvements (Windsor)[b]	Grade crossing	$9.00[a]	n/a	Sonoma	MTC RTP (financially-constrained)
Subtotal (Near Term)	–	**$369.00**	–	–	–
Mid Term (2016-2020)					
SMART Phase 2: Extensions to Larkspur and Cloverdale, Sonoma County capacity improvements, and completion of multi-use path	Extension or new route	$209.00[a]	n/a	Marin, Sonoma	MTC RTP (financially-constrained)
Subtotal (Mid Term)	–	**$209.00**	–	–	–
Long Term (2021-2040)					
SMART Phase 3: Extension to Cloverdale	Extension or new route	n/a	n/a	Sonoma	MTC RTP (financially-constrained)
Subtotal (Long Term)	–	–	–	–	–
TOTAL	–	**$578.00**	–	–	–

[a] Original project cost from source document is a YOE cost estimate, and may include contingency or other assumptions. As a result, no cost escalation or other adjustments were made for YOE costs.

[b] Town of Windsor project.

In 2008, Santa Barbara County voters approved $25 million in funding to operate a pilot service as part of the Measure A (Road Repair, Congestion Relief and Transportation Safety Program), and SCAG and VCTC have been in discussions with the host railroad to obtain track-sharing agreements to operate the service. It is expected that the service would be provided under contract with Metrolink.

The *LOSSAN Corridorwide Strategic Implementation Plan* (April 2012) includes the introduction of commuter service between Ventura and Santa Barbara by 2014 in its “Preferred Service Plan,” which will require trackage rights, capital improvements, and funding agreements.

Next Steps

SBCAG and VCTC are working together to coordinate on minor capital improvements at East Ventura, secure track rights with UPRR, develop an operating plan with Metrolink, and procure operating subsidies, possibly from highway mitigation funding. Service initiation is contingent upon agreements between SBCAG, VCTC, SCRRA, UPRR, and Caltrans regarding trackage rights, capital improvements and funding. Future funding of $32.67 million has been identified by and is documented in the SBCAG and SCAG RTPs for this commuter rail service expansion. Identification of supporting infrastructure needs for the future service, including provision of appropriate layover facilities in the East Ventura and Goleta station areas, would be identified based on future studies and agreements.

8.6.8 Monterey Bay Commuter Rail Service

TAMC is planning commuter rail service on an existing rail corridor extending from Monterey to Marina, with a later extension to Castroville. The rail corridor, commonly, known as the Monterey Branch Line, parallels Highway 1. Planned improvements include infrastructure, stations, and DMU vehicles. TAMC is concurrently working with the CCJPA to extend intercity rail service to Salinas from its current terminus in San Jose. The extension of *Capitol Corridor* service to Monterey County would serve new stations in Pajaro and Castroville, and the existing station in Salinas. TAMC is working to ensure that the local DMU commuter service on the Monterey Branch Line would connect with the *Capitol Corridor* service via cross-platform transfers in Castroville.

In 2005, TAMC initiated an alternatives analysis of various rail and bus improvements that were based on recommendations from prior systems planning studies and extensive public and local agency input. The Monterey Peninsula Fixed-Guideway Alternatives Analysis identified a preferred transit investment that includes phased LRT along the abandoned Monterey Branch Rail Line paralleling SR 1. As part of the phased approach, LRT would first connect Monterey, Sand City, Seaside and Marina and subsequently extend to Castroville as the corridor develops. The Branch Line is owned by TAMC and the cities of Seaside and Monterey.

The preferred transit alternative also includes improved bus connections to Castroville, the Fort Ord Redevelopment Area and Salinas, expanding the mobility benefits of the project. Transportation problems in the study corridor include significant congestion and deteriorating roadways, a lack of competitive alternatives to the private automobile, physical constraints on existing transit operating speeds and capacity, need for general improvement in providing efficient mobility for low-income residents, and need for transportation infrastructure to serve areas of growth and development through a TOD process.

The proposed rail service is in the *2010 Monterey County RTP* (adopted on May 26, 2010) and the 2010 AMBAG Metropolitan Transportation Plan (called the "*Monterey Bay Area Mobility 2035 MTP*"). The project is also listed in the RTIP/FTIP.

Next Steps

TAMC is now coordinating with the FTA on the NEPA document. TAMC plans to circulate a joint CEQA/NEPA document.

8.6.9 Dumbarton Rail Corridor Project

The Dumbarton Rail Corridor Project would improve 20.5 miles of existing rail infrastructure in the Dumbarton Rail Corridor between Redwood City and Newark and establish new cross-bay passenger rail service connecting the East Bay with San Francisco, the Peninsula, and the South Bay (San Jose). In particular, the project would include the following improvements:[136]

- Rehabilitation and reconstruction of tracks (including the Dumbarton Rail Bridge).
- Construction of new stations in Newark (Willow Street) and Menlo Park (Willow Road) and upgrades to existing stations at Redwood City (Caltrain), Fremont (Fremont–Centerville ACE), and Union City (proposed *Capitol Corridor* station).
- Improvements to signal and grade-crossing warning systems.
- Replacement and retrofit of structures.

Environmental work began in 2006 and an administrative draft of the EIS for the project was completed in 2009, but concerns over the project's cost effectiveness (including an increase in the estimated cost and a reduction in expected benefits), together with recent developments regarding improvements to the Bay Area's rail network (including the HSR project and BART's extensions to San Jose and Livermore), initiated a reevaluation of the project.

As a result of this effort, the San Mateo County Transportation Authority published the *Dumbarton Rail Corridor Alternatives Study* in March 2011, which evaluated a series of revised rail and bus alternatives for providing transit service in the Dumbarton Corridor. A subsequent alternatives screening process based on ridership, total costs, cost effectiveness, TOD potential, and operational feasibility narrowed down the potential options to a set of four alternatives recommended to be carried over for further study into a new EIR/EIS for the project:

- Weekday hourly peak-direction rail service between Union City and San Francisco (three morning and three evening trains) and between Union City and San Jose (three morning and three evening trains) with no off-peak service.
- Weekday bi-directional peak-period service between Union City and Redwood City with 15-minute headways. No off-peak service.
- Weekday hourly peak-direction rail service between Union City and San Francisco (three morning and three evening trains) and between Union City and San Jose (three morning and three evening trains), supplemented by weekday bi-directional peak-period service between Union City and Redwood City with 30-minute headways. No off-peak service.
- Union City – Stanford Research Park and Fremont – Stanford University bus routes, combined with a bi-directional bus service between Union City and Redwood City. Bus preferential treatments include transit-only lanes and allowing shoulder operations.

Next Steps

Public meetings for the project were held in November 2011. Environmental work is currently underway, and a new Draft EIS/EIR for the project was originally scheduled to be released for public comment in late spring 2012, but has been delayed.

[136] San Mateo County Transportation Authority, *Public Meeting Presentation,* December 2011, http://www.smcta.com/Assets/Dumbarton+Rail+Corridor/Public-Info-Meetings/DRC_Public_Meeting_Presentation-November_2011.pdf.

8.7 Connectivity Plans

Travelers' first interaction with passenger rail occurs at rail stations throughout the State. Intercity passenger rail stations serve as connection points between statewide passenger rail services and regional transportation systems, including rapid rail, light rail, buses, roadways, and bicycle and pedestrian facilities. The rail portion of a passenger's journey should be part of a coordinated trip that begins at their origin location and ends at their destination. Connections between modes should be seamless: simple, comfortable and fast. Stations and connecting transit service are key components of a seamless passenger rail trip.

Transit system investments are growing throughout California. The *California Interregional Blueprint* (CIB) *Interim Report* indicated that Metropolitan Planning Organizations (MPO) are focusing limited discretionary funding on investments in transit capacity, frequency, and in transit connections. As an example, SANDAG, SCAG, and SACOG dedicated the second largest portion of their RTP funding to investment in transit capital and operations. MPOs also are including major transit capacity and frequency expansions in their RTP/SCS plans. Orange County's Go Local Program proposes a number of local transit connections, including both rubber-tire and fixed-guideway systems connecting the Anaheim and Santa Ana stations with local employment and activity centers.

Planned investments in high-capacity transit at the regional level will have a more substantial influence on statewide travel patterns as conventional and HSR systems are developed and expanded. While rail station planning and construction have traditionally been led at the local and regional level, the State has an interest in assuring that these facilities provide amenities that attract rail travelers. The State also wants to ensure that rail stations are located in areas that leverage regional transit investments and TOD. For example, the Authority's decisions to locate stations within developed urban centers (rather than in suburban locations) were partly guided by a desire to integrate a statewide passenger rail system with strong local transit systems that provide access to interregional transportation hubs.

This section addresses station planning and regional transit connections from a standpoint of how best to serve each Californian's door-to-door travel needs. While prior sections have presented specific capital investments for track, signal, and rolling stock, this connectivity discussion presents two approaches for enhancing local, regional, and statewide connections through intercity passenger rail stations. First, a station typology is presented as a tool for identifying potential improvement opportunities. Second, connectivity considerations with respect to emerging HSR service including the Blended System concept are discussed.

8.7.1 Station Typology

The station typology includes five station categories based on the size of the city where the station is located and the location within the city. Each station category shares similar station features. The features are grouped into two categories: connectivity and amenities. Connectivity features include automobile accessibility (as indicated by parking cost) and intermodal access (as represented by connecting rail and public transportation services). Passenger amenities include features such as baggage checking or staffed ticket booths. These five station categories capture the wide range of land use contexts and connectivity functions of rail stations, which can provide a readily-applied tool for assessing station needs and opportunities:

- Major Metropolitan Downtown. These stations have statewide significance and are located in the high-density, mixed-use primary downtowns of the State's major metropolitan areas (Sacramento, Oakland, San Jose, Los Angeles, and San Diego). Auto access, while important, is not dominant and parking costs are high due to high land values. All types of connecting passenger services are typically represented at these stations. Long-distance and corridor services stop at these stations, and a broad range of regional and local transit services are typically represented. Trains serve the station throughout the day, often at regular intervals. The number of daily passengers and trains warrants a broad spectrum of amenities, including staffed ticketing offices, restrooms, phones, and vendors.

- Developed Urban Area. These stations have regional significance and are located in the downtowns of cities outside of the major metropolitan areas, or in areas of middle-density within major metropolitan areas. The areas around these stations feature middle- to low-density development, with moderate to low parking costs. Along with corridor trains, stations within the major metropolitan areas may have long-distance, commuter rail or other regional transit options. A broad range of regional and local transit services are typically available. Several trains may serve these stations throughout the day, but not necessarily at regular intervals. These stations may feature amenities, such as staffed ticketing offices, restrooms, phones, and vendors.
- Minor Downtown or Activity Center. These stations have regional significance and are located in the downtowns of secondary cities outside of the major metropolitan areas or in low-density suburban areas. The areas around these stations feature middle- to low-density development, with moderate to low parking costs. Along with corridor trains, stations within the major metropolitan areas may have commuter rail service. The station may be served by long-distance trains, particularly if the surrounding area is rural. A broad range of regional and local transit services are typically available. Several trains may serve these stations throughout the day, but not necessarily at regular intervals. These stations may feature amenities, such as staffed ticketing offices, restrooms, phones, and vendors.
- Outlying Area with Moderate Transit Connectivity. These stations have local significance and are in outlying or suburban areas, with a dominant focus on auto access and low cost or free parking. Long-distance trains typically do not serve these stations, although some may have intercity connections. Connectivity at the stations is provided by Amtrak Thruway buses or commuter rail, as well as local transit service. Trains are limited to only a few services in each direction throughout the day. Amenities are typically limited at these stations, and most are unstaffed.
- Outlying Area with Limited Transit Connectivity. These stations have local significance and are in outlying areas, with a dominant focus on auto access and low cost or free parking. Long-distance trains typically do not serve these stations, only corridor trains. Scheduled connecting services typically include limited local bus service. Trains service is typically available only a few times in each direction throughout the day. These stations are typically not staffed.

Table 8.20 summarizes typical connectivity features and amenities associated with the station categories, and Table 8.21 summarizes the typologies of the stations served by the state-supported routes. “Major Metropolitan Downtown” stations exhibit high-quality connectivity and amenities. Some “Developed Urban Area” stations and “Minor Downtown or Activity Center” stations exhibit a similar array of features, but they may be fewer or of lesser quality. “Outlying Area” stations provide a minimum of station features and may be of lower quality.

Table 8.21 classifies all of the state-supported rail stations in one of the five station categories, placing each within a group of peers that handle similar volumes and types of rail passengers, and operate within similar contexts. Opportunities and deficiencies emerge by comparing how connectivity is accommodated or what station amenities are provided among peer stations.

Table 8.20: Station Typology Features

Feature				Station Category				
							Outlying or Suburban Area	
				Major Metropolitan Downtown	Developed Urban Area	Minor Downtown or Activity Center	Moderate Transit Connectivity	Limited Transit Connectivity
Connectivity	Rail/ Transit	Intercity		●	○	○	○	
		Local/ Regional	Urban rail	●	○			
			Commuter rail	●	○	○	○	
			Bus or other	●	●	○	○	○
	Auto	Parking facility		●	●	●	●	○
		Pick-up/drop-off zone		●	●	●	●	○
		Taxi zone		●	●	●	○	○
		Rental car facility/Car sharing		○	○	○		
	Bicycle	Nearby bicycle routes		●	●	●	○	○
		Bike storage		●	●	●		
		Bike sharing programs		●	○	○		
	Station configurations supporting connectivity (e.g., full grade separation, cross-platform transfers)			●	○			
	Pedestrian			●	●	○	○	○
	Pedestrian-oriented land use/urban design			●	●	○		
Amenities	Enclosed waiting area			●	●	●	●	○
	Station staffing			●	●	○	○	
	Ticket machines/office			●	●	○	○	
	Baggage check			●	●	○	○	
	Restrooms			●	●	●	●	○
	Payphone			●	●	○	○	○
	ATM			●	●	○	○	
	Vendors			●	●	○	○	

● Good quality and/or common among stations of indicated typology.

○ Low or moderate quality and/or only found in some stations of indicated typology.

Source: AECOM and Cambridge Systematics, Inc., 2013.

Table 8.21: State-Supported Route Station Typology

Station	Intercity and Commuter Services	Station Category				
					Outlying or Suburban Area	
		Major Metropolitan Downtown	Developed Urban Area	Minor Downtown or Activity Center	Moderate Transit Connectivity	Limited Transit Connectivity
Anaheim	*Pacific Surfliner*, Metrolink*;* Thruway Bus Route 1			●		
Antioch	*San Joaquin*					●
Auburn	*Capitol Corridor*; Thruway Bus Routes 3, 20				●	
Bakersfield	*San Joaquin*; Thruway Bus Routes 1a, 1, 9, 10, 12, 19		●			
Berkeley	*Capitol Corridor*			●		
Burbank-Bob Hope Airport	*Coast Starlight*, *Pacific Surfliner*; Metrolink; Thruway Bus Routes 1,4		●			
Camarillo	*Pacific Surfliner*, Metrolink*;* Thruway Bus Route 4					●
Carpinteria	*Pacific Surfliner*; Thruway Bus Routes 4, 10					●
Chatsworth	*Pacific Surfliner*, Metrolink, Thruway Bus Routes 1, 4			●		
Corcoran	*San Joaquin*					●
Davis	*California Zephyr*, *Capitol Corridor*, *Coast Starlight*; Thruway Bus Route 3			●		
Emeryville	*California Zephyr*, *Capitol Corridor*, *Coast Starlight*, *San Joaquin*; Thruway Bus Routes 34, 99		●			
Fremont/ Centerville	*Capitol Corridor;* Thruway Bus Route 6			●		
Fresno	*San Joaquin;* Thruway Bus Route 1		●			
Fullerton	*Pacific Surfliner*, *Southwest Chief*, Metrolink; Thruway Bus Routes 1, 39		●			
Glendale	*Pacific Surfliner*, Metrolink; Thruway Bus Routes 1, 4			●		
Goleta	*Pacific Surfliner;* Thruway Bus Route 4					●
Grover Beach	*Pacific Surfliner*; Thruway Bus Routes 17, 18a, 21				●	
Guadalupe	*Pacific Surfliner;* Thruway Bus Route 1, 17				●	
Hanford	*San Joaquin*; Thruway Bus Routes 18a, 18b				●	
Hayward	*Capitol Corridor*			●		
Irvine	*Pacific Surfliner*, Metrolink			●		

Table 8.21: State-Supported Route Station Typology (continued)

Station	Services	Station Category: Major Metropolitan Downtown	Station Category: Developed Urban Area	Station Category: Minor Downtown or Activity Center	Station Category: Outlying or Suburban Area: Moderate Transit Connectivity	Station Category: Outlying or Suburban Area: Limited Transit Connectivity
Laguna Niguel – Mission Viejo	*Pacific Surfliner*, Metrolink					●
Lodi	*San Joaquin;* Thruway Bus Routes 3, 6, 34				●	
LAUS	*Coast Starlight*, *Pacific Surfliner*, *Southwest Chief*, *Sunset Limited*, *Texas Eagle*, Metrolink; Thruway Bus Routes 1, 4	●				
Madera	*San Joaquin;* Thruway Bus Route 4				●	
Martinez	*California Zephyr, Capitol Corridor, Coast Starlight, San Joaquin*; Thruway Bus Route 7			●		
Merced	*San Joaquin;* Thruway Bus Route 15			●		
Modesto	*San Joaquin*					●
Moorpark	*Pacific Surfliner*, Metrolink*;* Thruway Bus Route 4				●	
Oakland – Coliseum	*Capitol Corridor*			●		
Oakland – Jack London	*Capitol Corridor, Coast Starlight, San Joaquin*; Thruway Bus Routes 17, 34, 99	●				
Oceanside	*Pacific Surfliner*, COASTER, Metrolink; Thruway Bus Route 1			●		
Orange	*Pacific Surfliner*, Metrolink		●			
Oxnard	*Coast Starlight, Pacific Surfliner*, Metrolink; Thruway Bus Routes 4, 10			●		
Paso Robles	*Coast Starlight;* Thruway Bus Routes 17, 18, 21				●	
Richmond	*Capitol Corridor, Coast Starlight, San Joaquin*		●			
Rocklin	*Capitol Corridor*; Thruway Bus Routes 3, 20				●	
Roseville	*California Zephyr, Capitol Corridor*; Thruway Bus Routes 3, 20			●		
Sacramento	*California Zephyr, Capitol Corridor, Coast Starlight, San Joaquin*; Thruway Bus Routes 3, 20	●				
Salinas	*Coast Starlight*; Thruway Bus Routes 17, 21, 68				●	
San Clemente	*Pacific Surfliner*					●

Table 8.21: State-Supported Route Station Typology (continued)

Station	Services	Station Category: Major Metropolitan Downtown	Developed Urban Area	Minor Downtown or Activity Center	Outlying or Suburban Area: With Moderate Transit Connectivity	With Limited Transit Connectivity
San Diego	*Pacific Surfliner*, COASTER; Thruway Bus Route 1	●				
San Diego – Old Town	*Pacific Surfliner*, COASTER		●			
San Jose	*Capitol Corridor, Coast Starlight*, ACE, Caltrain; Thruway Bus Routes 6, 17, 21, 35, 55	●				
San Juan Capistrano	*Pacific Surfliner*, Metrolink; Thruway Bus Route 1				●	
San Luis Obispo	*Coast Starlight; Pacific Surfliner*; Thruway Bus Routes 17, 18a, 21			●		
Santa Ana	*Pacific Surfliner*, Metrolink; Thruway Bus Route 1		●			
Santa Barbara	*Coast Starlight, Pacific Surfliner*; Thruway Bus Routes 4, 10, 17, 21		●			
Santa Clara – Great America	*Capitol Corridor*, ACE; Thruway Bus Route 6			●		
Simi Valley	*Coast Starlight, Pacific Surfliner*, Metrolink; Thruway Bus Routes 1, 4					●
Solana Beach	*Pacific Surfliner*, COASTER; Thruway Bus Route 1				●	
Stockton – ACE	*San Joaquin*, ACE; Thruway Bus Routes 3, 6, 34		●			
Stockton – Amtrak	*San Joaquin*; Thruway Bus Routes 3, 6, 34			●		
Suisun City	*Capitol Corridor*					●
Surf/Lompoc	*Pacific Surfliner*					●
Turlock/Denair	*San Joaquin*					●
Van Nuys	*Coast Starlight, Pacific Surfliner*, Metrolink; Thruway Bus Routes 1, 4				●	
Ventura	*Pacific Surfliner*; Thruway Bus Routes 4, 10				●	
Wasco	*San Joaquin*					●

Source: AECOM analysis of station information from Amtrak California website. http://www.amtrakcalifornia.com/index.cfm/stations/.

For example, pedestrian crossings of tracks are not found at most of the “Major Metropolitan Downtown” stations, with platform access facilitated by concourses below the tracks. San Diego and Oakland-Jack London Square are exceptions; this suggests that an underground or elevated concourse may merit consideration as improvements to these stations are planned.

Similarly, in comparing the “Developed Urban Area” station, San Diego-Old Town stands out as a platform-only station, while all of its peers offer some form of shelter. This suggests that an enclosed waiting space and other amenities may benefit passengers at this station.

A complete cross-examination of the connectivity provisions and needs of stations within each category is the subject of future work; however, the typology offers a starting point to assess projects and policies considered to improve station access and connectivity.

8.7.2 Blended Service Hubs

Since publication of the previous CSRP, the proposed phased implementation of the HSR program has introduced the concept of a blended system to bring early benefits of enhanced passenger rail service connecting the State’s major metropolitan areas before the HSR system is complete. The concept refers to trips that would be facilitated by a blended system and blended operations. HSR will be integrated with existing intercity and regional/commuter rail systems via coordinated infrastructure (the system) and scheduling, ticketing, and other means (the operations).[137] Thus, the blended service plan takes into account both physical and operational characteristics.

In order to facilitate seamless trips between different passenger rail systems, the Blended System depends on a high level of coordination between HSR operations and conventional trains operated as Amtrak corridor services or commuter rail services, and between the corridor/commuter services themselves. The stations where these services will meet are classified as blended service hubs and include the following stations:

- Bay Area. San Francisco (Transbay Transit Center), San Jose, Martinez.
- Central Valley. Sacramento, Stockton, Merced, and Bakersfield.
- Southern California. Palmdale, San Fernando Valley Station, LAUS, Anaheim, and San Diego.

To facilitate connections between trains at these stations, cross-platform transfers, direct vertical connections, or convenient concourse connections will need to be implemented to achieve the level of service called for in 2012 Business Plan. Coordinated schedules, as well as integrated ticketing, will be necessary to realize the vision of seamless rail travel with improved travel times, in advance of full implementation of HSR.

In particular, the Southern California Regional Interconnector Project will extend four of the LAUS existing stub tracks south, reconnecting them to the mainline to reduce trip times for both *Pacific Surfliner* and Metrolink commuter trains serving Orange County and points south. The project will also increase the overall capacity of the station by 40 to 50 percent. Similarly, funded station and track improvements in the *Capitol Corridor* will increase capacity at Emeryville station, allowing for greater operational flexibility by permitting parallel train moves. While they may not necessarily be implemented directly as part of blended service, these improvements will facilitate the ability of these blended service hubs to support the integration of HSR, existing intercity, and regional/commuter rail services.

[137] California High-Speed Rail Authority’s High Speed Rail Program, *Revised 2012 Business Plan*.

8.7.3 Smart Land Use and Station Area Planning

Policies adopted in recent years have brought new focus on stations as activity centers and anchors for development. AB 32, the Global Warming Solutions Act of 2006, aims to reduce GHG emissions from all sources throughout the State. AB 32 was followed by SB 375 (Steinberg 2008), the Sustainable Communities and Climate Protection Act of 2008, built upon the former legislation to require MPOs to develop "Sustainable Communities Strategies" (SCS) that integrate transportation, land use, and housing policies. SCS include specific measures regions will undertake to meet GHG reduction targets.

The Authority envisions HSR stations and station areas that are desirable destinations and great places. The Authority adopted general principles for station area planning that promote TOD principles, support infill development, and minimize urban sprawl. Station areas as envisioned advance the objectives of SB 375 and SB 391 (Liu 2009). The planning process enables the Authority, station cities, and stakeholders to work together to ensure that the station, surrounding area, and transportation systems are planned to work together to maximize the economic, mobility, environmental, and other benefits of the HSR stations.

Planning to encourage a greater mix of uses and increased development density around rail stations (such as TOD) has the potential to shift trips from auto to rail, as it makes a greater number of destinations directly accessible by rail. TOD also increases the potential for auto trips to shift to transit, bicycle or pedestrian trips, as greater numbers of these trips become attractive within a compact station area with a mix of uses. As emission-intensive auto trips are replaced by less-polluting rail, transit, walk or bike modes, the objectives of AB 32, SB 375, and SB 391 can be met.

By encouraging a greater variety of transportation modes in station areas, TOD turns street design and operation from an auto-only focus to a multi-modal approach that accommodates pedestrians, bicycles, and transit vehicles. This shift to "complete streets" was embraced in a 2008 Caltrans directive, which instituted a policy to "include bicycle, pedestrian, and transit modes in statewide strategies for safety and mobility and in system performance measures." The policy also calls for partnerships with local, regional, and state agencies, coordinating with adopted bicycle, pedestrian, and transit plans.[138]

The role of intercity passenger rail stations is thus evolving into multi-modal transportation hubs that anchor compact development and activity centers. Through support of intercity rail service, Caltrans makes a significant contribution to the goals of climate protection and sustainable communities. Caltrans is also supporting these goals through the preparation of the CIB, which will articulate the State's vision for a multi-modal interregional transportation system that integrates statewide modal plans and statewide programs, as well as complements regional transportation plans and land use visions.[139] These efforts depend on, as well as support, the efforts of local jurisdictions to maintain and redevelop their station-area districts, implement "complete streets," and increase housing and employment opportunities for their residents.

San Francisco's Fourth and King Station provides an example of smart land use and station area planning in a major metropolitan downtown. A renovation of the station's interior was completed in 1998, concurrently with multiple land use changes taking place in the South Beach neighborhood surrounding the station. Vacant and underutilized land, including parking lots and deteriorating buildings, has been redeveloped with new mid-rise residential buildings and ground-floor retail uses. In addition, AT&T Park, home of the San Francisco Giants Major League Baseball franchise, was opened within the station area in 2000, creating a new hub of urban activity along San Francisco's waterfront.

In the immediate vicinity and stretching well to the south of the station is the Mission Bay neighborhood, where an ambitious redevelopment plan has been converting the former Southern Pacific (SP) railyards

[138] California Department of Transportation, *Complete Streets – Integrating the Transportation System*, Deputy Directive DD-64-R1, October 2008.

[139] California Department of Transportation *California Interregional Blueprint Overview Fact Sheet*, March 2012.

into a new mixed-use neighborhood in recent years. The rezoning efforts include provisions for 6,000 residential units, 4.4 million square feet of office/life sciences/biotechnology commercial space, and a new 2.65-million square-foot University of California, San Francisco research campus and a new hospital complex. The efforts also call for new neighborhood amenities including 500,000 square feet of community-serving retail, 41 acres of public open space, a 500-student public school, a new library, and new police and fire stations, and other community facilities.[140]

Opened in 2007, the T-Third Street light-rail line connects the station with Mission Bay and Bayview. The line is being extended as the Central Subway, connecting to downtown San Francisco, the Moscone Convention Center, Union Square, and Chinatown. The area around the Fourth and King Station also has a comprehensive network of pedestrian and bikeway facilities to facilitate nonmotorized transportation. The extensive transit service and future improvements, combined with the ongoing land use and urban design transformations in the area, encourage a substantial share of residents and visitors to forego private automobiles. Residents and visitors will instead be encouraged to use transit and nonmotorized modes of transportation, helping to meet the sustainability and emissions objectives of AB 32, SB 375, and SB 391.

Other examples of smart land use and station area planning in major downtowns include the Sacramento Railyards, an infill project to redevelop 244 acres on the former SP railyard immediately to the north of Sacramento station and downtown Sacramento; and the Diridon Station Area Plan, calling for higher-intensity land use and TOD within a one-half-mile radius of San Jose (Diridon) Station. Moreover, the Master Plan covering 40 acres surrounding LAUS, with plans for up to six million square feet of development, and the Centre City Redevelopment Project, encompassing the area immediately surrounding San Diego Station and most of downtown San Diego, are further examples. As in the case of San Francisco's Fourth and King Station, these station area planning efforts focus new development and urban activity around existing rail and transit hubs, following a sustainable growth pattern that encourages use of alternative modes of transportation and reduces overall GHG emissions.

Fullerton also provides an example of smart land use and station area planning in a developed urban area outside of a major downtown. In late 2010, the Fullerton Transportation Center Specific Plan was adopted, rezoning 39 acres around the rail station for mixed-use development, increasing residential and commercial densities, and introducing new transportation modes. The plan has been commended by the California Department of Housing and Community Development (HCD) in its Catalyst Projects for California Sustainable Strategies Pilot Program. HCD's program embodies the goals of SB 375 and identifies cities committed to building sustainable communities and testing and evaluating innovative strategies. In addition, the City of Fullerton is evaluating the feasibility of an improved transit connection between the rail station and California State University, Fullerton, an urban commuter school with the largest enrollment in the California State University system.

The "Vision California" research project undertaken by the State of California found significant economic, fiscal, health, water and environmental co-benefits from the State, regions, and localities choosing to grow through TOD and infill near existing and future local and intercity rail service. Households could save over $7,250 per year in auto costs and utility bills. Local governments could save more than $47 billion in infrastructure costs (water pipes, sewers, roads, and utility lines) while gaining over $120 billion in new revenue. Reduced health incidences would save approximately $1.9 billion a year by 2035. By 2050 water saving would total 19 million acre-feet. Over 3,700 square miles less farmland, open space, and recreation areas would be lost to development, and 75 million metric tons of carbon dioxide (or its equivalent) less pollution would be created by 2050.

[140] "Mission Bay Redevelopment Summary," December 2010.

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9.0 Freight Rail Improvements

Chapter 9 assesses and summarizes California's freight rail improvement needs. This chapter's structure and details differ from the specific passenger rail improvements presented in Chapter 8, for several reasons:

- Strategic planning information, such as a list of planned freight rail projects, is proprietary and difficult to obtain from privately owned freight railroads.
- The Class I railroads do not plan long-term capacity improvements in the same way the public sector does. Most of the known short- and long-term improvements to the Class I system are being planned jointly by the railroads and the passenger rail service providers.
- Typically short lines are underfunded and have limited ability to produce a list of improvement projects with funding commitments.
- A permanent ongoing public investment program does not exist for freight rail.

In recent years, the California Department of Transportation (Caltrans) has partnered with freight railroads to make improvements primarily through the Trade Corridor Improvement Fund (TCIF) program. These program funds have been largely committed. The federal government provided funding through the Transportation Improvements Generating Economic Recovery (TIGER) grant program as part of the economic stimulus program. The new federal Moving Ahead for Progress in the 21st Century (MAP-21) legislation does not include dedicated funding for freight rail capacity improvements.

Some of California's Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Agencies (RTPA) have examined regional freight rail needs. These organizations incorporated recommended freight rail improvements in the financially constrained and unconstrained elements of their Regional Transportation Plans (RTP).

The first part of Chapter 9 identifies freight rail project proposals that either improve California's primary trade corridors or address local and short line railroad needs. Based on the freight rail system's needs described in Chapter 6, Chapter 9 then describes general improvement where specific projects have not been identified yet.

In both sections, four improvement categories are referenced:

- Trade Corridor. Trade corridor improvements help California maintain its position as the premier gateway for Pacific Rim trade.
- Local Rail. Local Rail improvements focus on short line railroads, Class I branch lines, and other low density lines that support economic activity throughout the State.
- Community Impact Mitigation. These improvements include grade crossings and programs for freight and passenger railroad emission reductions to lessen the impacts of rail service on local communities.
- Economic Development. These improvements maintain or improve business access to freight rail services. They may also take advantage of synergies with other logistics-related economic development opportunities.

The chapter concludes with an overview of new program and policy needs, and a review of national best practices that could serve as a model moving forward.

9.1 Freight Rail Improvement Projects

California's economic growth, competiveness, and social vitality depend on reliable freight rail transportation connections. Freight rail projects help the State meet future freight demand, ensure safety, improve mobility, expand connectivity, and reduce highway congestion. This section lists planned freight rail projects. Some projects have committed public and/or private sector funding, while others are currently unfunded.[141]

9.1.1 Trade Corridor Projects

Trade corridor projects directly address issues along major freight rail corridors serving overseas and North American trade. These projects strengthen California's position as a gateway for international trade. Existing and planned trade corridor projects include mainline capacity expansion, access/operation improvements, intermodal terminal improvements, and port-related expansion (on-dock rail and rail access). Table 9.1 shows all major planned and programmed projects that improve rail infrastructure and operations along major trade corridors. Project construction start dates are provided if they were available in the original source documents. These projects were gathered from a review of all relevant documents and sources, including:

- TCIF. These are large scale grant projects supported by a State of California bond issue. Project costs, construction schedules, and details are updated based on latest information.
- Federal TIGER Grants. These include projects funded by TIGER I, II, III, and IV over the last four years.
- Southern California Association of Governments' (SCAG) *2012-2035 Regional Transportation Plan/Sustainable Communities Strategy* and *Comprehensive Regional Goods Movement Plan and Implementation Strategy*.
- Sacramento Area Council of Governments' (SACOG) *Metropolitan Transportation Plan/Sustainable Communities Strategy 2035*.
- San Diego Association of Governments (SANDAG) *2050 Regional Transportation Plan*.
- Metropolitan Transportation Commission's (MTC) *Transportation 2035 Plan.*
- *San Joaquin Valley Interregional Goods Movement Study* (in progress). This study includes projects for San Joaquin, Stanislaus, Merced, Madera, Kings, Tulare, Fresno, and Kern counties. The study builds from projects included in each MPO RTP, regional rail studies, and interviews with short line railroads and rail stakeholders throughout the San Joaquin Valley.
- Port of Los Angeles (POLA) Port of Long Beach (POLB) projects lists.

Planned and programmed projects in this category total nearly $8.4 billion[142] (not counting projects lacking cost information). Of these investments, $3.3 billion are directed toward mainline capacity improvements, and nearly $3 billion will fund port-related rail investments. These figures indicate that mainline corridors connecting to international trade gateways are a significant investment priority in California.

[141] The projects listed in this chapter do not include all of the investments planned by private railroads (Class I and shortlines) as this information is proprietary. The project lists focus primarily on projects that either have public contributions or are contemplated as potential public private partnerships.

[142] All costs presented in this section are in Year of Expenditure (YOE) dollars.

Table 9.1: Planned and Programmed Trade Corridor Projects

Location	Project Name	Project Description	Type	Project Cost[a] (in Millions)	Grant/Bond/ Committed Funding (in Millions)	Construction Status	Project Source
Alameda County	Outer Harbor Intermodal Terminals (OHIT)	Building a new intermodal rail terminal complex that will provide additional capacity. Works includes rail access improvements and manifest yard as part of an integrated five-segment project: • Environmental Remediation • Rail Access Improvements and Manifest Yard • City Site Prep Work and Backbone Infrastructure • Recycling Facilities • City Trade and Logistics Facilities	Ports related	$385	$242	Projected start 06/2013	TCIF/TIGER IV
Contra Costa County	Richmond Rail Connector, to allow BNSF Railway (BNSF) trains access to the Union Pacific Railroad (UPRR) Martinez subdivision.	Construct at-grade connector to allow BNSF Railway (BNSF) trains access to the Union Pacific Railroad (UPRR) Martinez subdivision, improving goods movement and minimizing community impacts.	Access	$22	$11	Projected start 09/2012	TCIF
Kern County	Capacity expansion of Bakersfield yard	Accommodate new unit grain carload business on the sunset subdivision.	Intermodal/ yards			Unk.	SJV IRGMS Project 94
Kern County	Tehachapi Trade Corridor Rail Improvement Project	Double-track 15 miles of the corridor along with other improvements to add capacity and improve connectivity.	Mainline capacity	$113	$54	Projected start 09/2013	TCIF
Los Angeles County	Intermodal Container Transfer Facility (ICTF) Modernization	Electrify cranes and 6 new tracks totaling 50,000 ft to expand the ICTF's current capacity.	Intermodal/ yards	$500		Complete by 2016[b]	SCAG RTP
	Southern California International Gateway (SCIG) Construction	Create a new near-dock facility for BNSF with direct access to the Alameda Corridor with a capacity of 1,500,000 lifts.	Intermodal/ yards	$500		Complete by 2016[b]	SCAG RTP
	Terminal Island Rail & Seaside (Evergreen Terminal On-Dock Railyard) • West Basin ICTF Rail Yard Expansion (Phase 1) – TraPac On-Dock Rail Project	These projects include terminal rehabilitation, expansion, reconfiguration and track improvements.	Ports related	$998.1		Short term[c]	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
	On-Dock Rail Access Improvements: • Port Truck Traffic Reduction Program – West Basin Railyard. Intermodal railyard connecting Port of Los Angeles with Alameda Corridor to accommodate increased loading of trains at the port, reducing truck trips to off-dock railyards. • Pier 400 Second Lead Track • Pier B Street Realignment – Pier B Street Intermodal Railyard Expansion • Pier F Support Yard • Track Realignment at Ocean Boulevard • Terminal Island Wye Track Realignment • Reconfiguration of Control Point (CP) Mole Navy Mole Road Storage Yard • Pier B Rail Yard (Phase II – 9th Street Alternative) expansion of Pier B Street intermodal railyard • Pier B Rail Yard (Phase III – 10th/12th Street Alternative) expansion of Pier B Street intermodal railyard	These projects will improve terminal access through track realignment, railyard construction, and reconfiguration.	Ports related	$1,538		Short term	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
Los Angeles and San Bernardino Counties	Colton Crossing to Redondo Junction – UPRR Alhambra Subdivision	Double-track key segments to increase capacity.	Mainline capacity	$1,189		Unk.	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*

Table 9.1: Planned and Programmed Trade Corridor Projects (continued)

Location	Project Name	Project Description	Type	Project Cost[a] (in Millions)	Grant/Bond/ Committed Funding (in Millions)	Construction Status	Project Source
Los Angeles and San Bernardino Counties	West Colton to City of Industry – UPRR Los Angeles Subdivision	Double-track some segments.	Mainline capacity	$376		Unk.	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
San Bernardino County	Barstow to Keenbrook – BNSF Cajon Subdivision	Add 3rd and 4th main tracks on some segments.	Mainline capacity	$762		Unk.	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
San Bernardino County	Devore Road to West Colton (includes flying junction) – UPRR Mojave Subdivision	Double-track to increase capacity and construct flying junction at Rancho.	Mainline capacity	$522		Unk.	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
San Bernardino County	Southern California Logistics Airport (SCLA)	Provide rail service from Air Expressway, approximately 5 miles north of Colusa Road between Phantom East and the Mojave River, to a new line from BNSF to SCLA, and connect with new intermodal SCLA facility.	Intermodal/ yards	$250		Near term	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
San Diego County	South Line Rail Improvements/San Ysidro Yard – Yard Expansion	Improve capacity on the South Line supporting movement from Baja California.	Intermodal/ yards	$42.2	$42.2	01/2013	TCIF
San Diego County	National City Rail Yard	Expand capacity to handle port-related business and staging for South Line traffic.	Intermodal/ yards	$7		Unk.	SANDAG RTP
San Diego County	South Line Rail Improvements/San Ysidro Yard – Mainline Improvements	Improve South Line mainline rail to increase freight capacity to serve Mexican traffic.	Mainline capacity	$107	$98	12/2013	TCIF
San Joaquin County	New connection at Stockton Tower between UPRR and BNSF	Create a new connection from the UPRR Fresno subdivision southbound and then westbound to the BNSF Stockton subdivision for direct movement to the port.	Ports related			Long term	SJV IRGMS Project 102
San Joaquin County	UPRR and BNSF new trackage at Port of Stockton East Complex (CCT)	Add 19,000 feet of trackage to Port of Stockton East to accommodate 4 additional unit trains per week of ore or coal.	Ports related			Short term	SJV IRGMS Project 101
San Joaquin County	UPRR and BNSF Port of Stockton West Complex Trackage (CCT)	Add 8,000-12,000 feet of new track on Port of Stockton West to unload coal and ore unit trains and agricultural products for marine transload to improve efficiency.	Ports related			Short term	SJV IRGMS Project 35
SCAG Region		Track and Intermodal Yard Improvements (Phases 1 through 4)	Intermodal/ yards	$673		Long term	*SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy*
Stanislaus County	Crows Landing Intermodal Rail Facility	Rail improvements along an alignment from Port of Oakland to the Crows Landing Airfield in Stanislaus County to improve accessibility.	Intermodal/ yards	$52		Unk.	GMAP 2007
Yolo County	CEMEX Rail Safety improvement	Construct rail line from Port of West Sacramento to CEMEX to improve operations and safety	Ports related	$1		Complete by 2020	SACOG RTP

[a] Costs are presented in Year of Expenditure dollars.

[b] Project start date not provided in the SCAG RTP.

[c] Projects in Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties that are listed in the SCAG RTP and Comprehensive Regional Goods Movement Plan and Implementation Strategy may have construction dates listed as Short term, Medium term, or Long term. Short term projects have start dates from 2012-2019, Medium term projects have start dates from 2020-2027, and Long term projects have start dates from 2028-2035+.

9.1.2 Short Line Railroad Projects

As short line railroads have been historically underfunded, they face the challenge of expanding capacity to meet growing local demand and maintaining tracks and facilities in a financially constrained environment.

Table 9.2 provides details on short line railroad projects. Though none of the projects have committed funding, the majority of these projects are for track maintenance and upgrade or connectivity improvements. Many of the projects are located in the San Joaquin Valley and improve or preserve rail access for rail-served industries. These projects will help maintain rail service viability for local industries, while also facilitating customer base expansion for the short line railroads.

Table 9.2: Short Line Railroad Projects

Location	Project Name/ Description	Project Benefits	Type	Construction Status	Project Source
Kern County	Mojave Airport Rail Access Improvements	Improvements to allow current logistics hub to accommodate heavier rail loads from 75- to 112-lb rail. Total cost: $1.5 Million.	Rehabilitation	Likely short term	SJV IRGMS Project 56
Kern County	Upgrade and Replace Rail on the SJVR	Upgrade and replace rail on the SJVR to increase speed and maximum allowable gross weight (to 286,000 lb) This upgrade will help attract rail service and increase economic development	Expansion	Short term	SJV IRGMS Project 89
Marin/Sonoma County	Sonoma-Marin Area Rail Transit	Renovate and Upgrade track, bridges, systems and signals benefits short-haul NWPCo.	Expansion	Short term	SMART District Phase 1
Sacramento/ San Joaquin/ Sacramento, Stockton	Central California Traction Company (CCT) Short Line Rail Upgrade for New Aggregate Business	Rehabilitate 29 miles of track on the CCT in San Joaquin and Sacramento counties with 136-lb rail and rebuild bridges. This serves a potential rock quarry and therefore, has economic benefits.	Rehabilitation	Short term	SJV IRGMS Project 34
San Joaquin County	CCT Lodi Branch Upgrade	Repair a 1,200-foot bridge trestle in Lodi and rehabilitate track to 286K lb carloads, and upgrade 2.5 miles of track to accommodate same. The upgrade will accommodate carload shipments by wineries, taking long-haul trucks off the highways.	Rehabilitation	Short term	SJV IRGMS Project 37
San Joaquin County	San Joaquin Valley Railroad (SJVR) – Short Line – Rail Improvements	SJVR-Arvin Short Haul rail improvements.	Expansion	Long term	SJV IRGMS Project 89

Table 9.2: Short Line Railroad Projects (continued)

Location	Project Name/ Description	Project Benefits	Type	Construction Status	Project Source
Tulare County	Construct Eastside Short-Haul Rail System	This project will extend existing track to the BNSF mainline to support economic development.	Expansion	Long term	SJV IRGMS Project 93
Tulare County	Upgrade and Replace Rail on the SJVR	Upgrade and replace rail on the SJVR to increase speed and maximum allowable gross weight (to 286,000 lb) to accommodate grain trains and increased hazardous materials volumes. This upgrade will help attract rail service and increase economic development.	Expansion	Short term	SJV IRGMS Project 96
Tulare County	West Isle Line Track Upgrade	Renovate and repair six miles of trackage (replace ballast and ties) on the West Isle Line. This upgrade will enable the line to operate better to retain rail service and potentially divert trucks off highways.	Expansion	Short term	SJV IRGMS Project 95

9.1.3 Community Impact Mitigation Projects

Some communities located near rail facilities and railroad crossings face challenges related to public safety, auto vehicle delay, and vehicle emissions. While growth in rail traffic brings significant economic benefits to California through growth in international trade-related activities and domestic trade of California's manufactured and agricultural products, mitigating the impacts on communities is an important part of the public sector's role in rail investment. Highway/rail grade separation projects can help to address many of these challenges. Appendix H provides a complete list of planned or programmed grade separation projects on freight lines. Many of these grade separation projects are on busy Class I mainlines that are projected to carry increasing volumes of intermodal traffic from the Ports of Long Beach, Los Angeles, and Oakland. For example, in the SCAG region delays at grade crossing are expected to reach 8,721 vehicle-hours per by 2035 – an increase of 269 percent as compared to 2010 levels. Chapter 8 presents grade separation projects where freight and intercity passenger services share tracks.

Highway-rail grade separation projects were gathered from several sources, including:

- The Highway-Rail Grade Crossing Safety Account.
- Projects from the SCAG *2012-2035 Regional Transportation Plan* (2012) and *Comprehensive Regional Goods Movement Plan and Implementation Strategy* (2012). The SCAG RTP and *Comprehensive Regional Goods Movement Plan and Implementation Strategy* include 71 grade separation projects in Los Angeles, Riverside, San Bernardino, Orange, and Ventura counties.[143] The majority of these projects are in Los Angeles County (Alameda Corridor East), Riverside, Orange, and San Bernardino counties.
- Projects from the constrained projects list in the Kern County RTP (2011).
- Tier I and Tier II projects listed in the San Joaquin County RTP (2011).
- SACOG Sustainable Communities Strategies Projects List.
- Documents and sources noted in Chapter 8.

The total cost of the highway-rail grade separation projects is $7.35 billion[144]. These projects will eliminate conflicts at grade crossings to improve safety, facilitate goods movement, reduce emissions (less idling) and enhance passenger efficiency by eliminating grade crossing conflicts. A majority of grade crossing projects are located in southern California. The SCAG region accounts for about for $4.8[145] billion (66 percent) of project costs, most of which is for projects in Los Angeles and Riverside counties (such as the Alameda Corridor–East). The San Diego area follows with about 22 percent of project costs. The San Joaquin Valley accounts for about 7 percent of total project costs, and the Bay Area approximately 5 percent.

9.2 New Types of Investment Needs

The $16 billion in proposed projects presented in Section 9.1 indicate the need for rail freight infrastructure improvements. California is committed to improving freight rail systems and goods movement. In addition, other types of freight rail investments have been identified to address specific freight rail needs. These investments will support long-range goals that will guide freight rail planning in California, including:

- Maintain the leadership position of California's ports as North America's gateway to Pacific Trade.
- Maintain viable rail service for California's industries and consumers.
- Retain or improve the balance among the primary freight modes.
- Minimize community and environmental impacts, such as reduced emissions of criteria pollutants $PM_{2.5}$ and NO_x, as well as GHGs.

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[143] The list of grade separations in Appendix H does not include all of the grade separation projects that are included in the SCAG *Comprehensive Regional Goods Movement Plan and Implementation Strategy*. Several projects have been completed since the completion of the SCAG plan and several are included in the Chapter 8 list of projects on shared passenger-freight lines.

[144] Costs are presented in Year of Expenditure (YOE) dollars.

[145] The SCAG Comprehensive Regional Goods Movement Plan and Goods Movement Study includes projects with a total cost of over $5.6 billion. Several of these projects have been completed or are included in the list of projects on shared passenger-freight corridors presented in Chapter 8.

While project types are known, specific projects have not been identified because the State's existing freight rail programs have not typically supported these types of investments. Caltrans will work with the newly formed Freight Advisory Committee (FAC) to identify how the State and its public and private partners can cooperatively address these needs. The following sections discuss these needs by category: trade corridor needs and local rail service needs.

9.2.1 Trade Corridor Needs

Double-stack container service allows rail carriers to achieve economies of scale by stacking one container on top of another. This technology reduces shipping costs through the highly efficient use of railroad equipment, crews, and line capacity. These efficiencies are critical to the railroad's ability to offer highway competitive intermodal service. The prerequisite for double-stack service is sufficient vertical clearance, typically 19 feet for international boxes and 20 feet 6 inches for domestic boxes. While most of California's primary network has sufficient vertical clearances for domestic double-stack service, some restrictions remain.

Eliminating these clearance constraints would improve efficiency, reduce costs, and enhance the environment. The network should be reviewed for clearance restrictions both in the context of existing as well as potential new intermodal services, and a process should be developed to rank and prioritize the elimination of these restrictions. Caltrans and the FAC will collaborate to determine appropriate public agency roles for assisting freight railroads in eliminating priority corridor height restrictions.

9.2.2 Local Railroad Needs

A number of issues were identified for nonmainline traffic, including short line and switching railroad connections, and carload business that is associated with line-side industry that utilizes local trains for distribution and collection purposes. Increasing train volumes without a commensurate improvement in infrastructure often leads to reduced service quality and increasing costs on these lines, which makes the traffic less attractive to the railroads. These issues should be taken into consideration to ensure that California's freight-oriented industries have access to high-quality, efficient transportation options. The project needs mentioned in this section help address these concerns.

Upgrade Lines to Efficiently Handle 286,000 Pound Railcars

In the mid-1990s, the standard accepted weight for rail cars was increased from 263,000 to 286,000 pounds. Therefore, broad accommodation of 286,000 pound railcars is now a necessity for all railroads. A rail line's ability to handle this weight is a function of track conditions, rail weight, and weight bearing structures such as bridges.

California's Class I network is generally able to handle 286,000-pound railcars. In fact, about 87 percent of the Class I network can carry 315,000-pound railcars. An additional 283 miles of track (8.4 percent) are rated to 286,000 pounds, and only a small percentage (39 miles or 1.2 percent of total miles) are rated at less than 286,000 pounds.

Short line railroads have a broader range of maximum weight ratings. For the short lines reporting this information, roughly 284 miles (27 percent of total reported short line rail miles) are rated at 286,000 pounds or higher, while 400 miles (40 percent of the total) have a reported capacity of less than 286,000 pounds, and the remaining miles are not reported. Therefore, upgrading short line rail to the higher weight limit is important for competitiveness of short line rail service. As such, projects to advance upgrades of tracks and bridges on short lines to safely accommodate 286,000-pound railcars are needed by railroads as well as their current and potential future customers.

Maintain Federal Railroad Administration Track Class II or Better

Track conditions generally should be Federal Railroad Administration (FRA) Track Class II or better, which would allow operating speeds of 25 miles per hour (mph) or higher. At speeds less than 25 mph, competitive service becomes much more of a challenge for a railroad, while at the same time increasing operating costs due to the long travel time over a line. Moving freight at 25 mph will keep travel times and operating costs, which will make rail a more viable alternative to shippers. While only about 1 percent of Class I rail lines do not meet this threshold, nearly 45 percent of short line railroad miles fail to meet this threshold.

Positive Train Control Implementation Assistance

The Rail Safety Improvement Act (RSIA) of 2008 and associated FRA regulations require passenger and major freight railroads to implement Positive Train Control (PTC) on most major lines by December 31, 2015. Fewer than 100 of the approximately 550 operating short lines in the U.S. will require the PTC installation. However, even short lines that are not required to install PTC may incur PTC-related costs if their locomotives operate over Class I lines with PTC installed. Installation costs of on-board hardware are expected to be at least $50,000 per locomotive (for a retrofit of existing locomotives) and considerably more for the older units that lack microprocessor control systems. Many short lines still operate these older units. Several California short lines could or will be impacted by this requirement. Potential projects and programs can be explored with the newly established FAC to determine potential support to short lines with PTC implementation requirements.

Grade Crossing Projects for Lower Density Rail Lines

The recent focus on high volume and shared use corridors has resulted in few resources for crossing improvements on lower volume rail lines. California's freight rail accident rate is above the national average in several categories, and grade crossings account for the highest numbers of fatalities over the last three years. Replacing obsolete grade crossing equipment is a growing concern for lower-volume rail lines, because the carriers must absorb the cost to maintain these systems. A large portion of grade crossing equipment on lower volume lines is approaching or has surpassed its 25-year design life. Once equipment such as warning devices reaches its design life, the electronics are obsolete and parts are often difficult to obtain. These factors pose potential safety hazards and impose substantial costs on the railroads responsible for maintaining them.

Targeting grade crossings on lower-density lines would fill a gap in the State's efforts to reduce crossing-related incidents. A multi-year strategy with dedicated funding would allow for orderly improvements to these systems. In some instances, adoption of other strategies such as crossing closures might be considered.

9.3 Policy Issues and Best Practices

In addition to the project needs suggested in Section 9.2, a number of policy issues to improve freight operations in California are identified. Addressing these economic development and institutional policy issues will further enable Caltrans to achieve its goods movement goals. Whenever possible, best practices and solutions used by other states to address these issues are also presented. Caltrans will examine the applicability of these best practices as part of the *California Freight Mobility Plan* update and in consultation with the newly established FAC. This examination will help inform whether such policy options should be recommended in future updates to the *California State Rail Plan* (CSRP).

9.3.1 General Issues

Performance Measures and Measurement Framework

Performance measures utilize data to provide insights about the use, condition, and impacts on the transportation system. These measures illustrate progress towards established targets. A good performance measurement system can help promote transparency in public spending by better linking investments to outcomes. Currently, Caltrans does not systematically maintain measures of rail freight system performance, nor does it have a formal freight performance measurement framework. Stakeholders reported that the focus of existing measures appears limited to international trade and ports, and there is a need to monitor freight activity across all modes and regions of the State.

A robust performance measurement framework will be important with the passage of MAP-21, which features a new federal emphasis on performance measurement. Under MAP-21, the U.S. Department of Transportation (U.S. DOT) will establish performance measures, and state Departments of Transportation (DOT) will develop performance targets in consultation with MPOs and others. Within a year of the final rulemaking on performance measures, states must set targets for measures identified by U.S. DOT, along with other requirements. Several surrounding states, including Oregon and Idaho, are currently actively involved in establishing freight- and rail-specific measures to address their goods movement planning goal areas. These include freight demand, mobility, safety, accessibility, systems conditions, environment, and economic goal areas, where robust measures are developed based on data availability and other factors.

Interagency Coordination

Improved interagency coordination in the freight industry is necessary. Stakeholders perceive a lack of coordination across state government agencies and boards. Complex agency relationships make dealings time-consuming and sometimes contradictory.

As seen in Chapter 6, certain aspects of the freight rail industry are regulated at both the federal and state levels. At least five agencies that regulate railroads at the federal level, and four more regulate railroads at the state level in California.[146,147] In addition, regional rail authorities may have some regulatory influence. There are various mandates and statutes overseen by one or more of these agencies, creating challenges for private sector railroads navigating requirements.

Administration of safety regulations, which fall under the purview of both federal and state agencies, was perceived as being in conflict, particularly by some of the smaller railroads. Such perceived or actual conflicts can complicate operations and increase the cost of business for California's railroads. The FAC will provide a forum for discussing potential policy changes that may be needed to address this issue.

Stakeholder Communication and Collaboration

Different stakeholders could collaborate to better link economic development and transportation policies, programs, and investments to ensure that the State and its regions can compete more effectively in national and global markets. In recent years, California has seen several very contentious rail projects including intermodal terminal expansions and grade crossing improvements fail to make progress, because stakeholders could not resolve disagreements. In some cases these disagreements have lead to costly litigation and regulatory proceedings. This problem is not unique to freight railroad projects;

[146] Federal agencies with some regulatory responsibility for railroads include the Federal Railroad Administration (FRA), the Surface Transportation Board (STB), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Department of Homeland Security (DHS), and the Environmental Protection Agency (EPA).

[147] State agencies and commissions with some oversight and planning responsibility for rail programs include the Caltrans, the California Transportation Commission (CTC), the California Public Utilities Commission (PUC), and the California Environmental Protection Agency (EPA).

however, given the size and complexity of these projects and the scope of the potential benefits they offer to the State and national economy, the process by which stakeholders interact on these projects may require special attention. A process that brings all of the key stakeholders together early in the planning process with continued consultation throughout project delivery could help to ensure that local concerns are more effectively balanced with the national, state, and regional economic benefits of an efficient rail sector. Participants in this process may include private railroads, rail shippers, state and local transportation agencies, and state and federal resource agencies.

The CSRP took a step toward engaging public- and private-sector freight stakeholders through interviews. Caltrans will establish initiatives to continue a program of stakeholder outreach through the FAC. In addition, Caltrans will continue to participate in the Southern California National Freight Gateway Collaboration, an agreement signed by federal, state, regional, and local agencies in southern California designed to facilitate greater collaboration on issues related to international trade movement.

9.3.2 Local/Small Railroads Issues

Railroads will have to replace and renovate rolling stock to meet emissions regulations and replace obsolete freight equipment. Locomotives are currently powered exclusively by diesel engines, which, while comprising a small part of California's overall emissions, are nevertheless significant sources of certain toxic pollutants, such as nitrogen oxides (NO_x) and particulate matter (PM).

As emissions regulations tighten, the cost of compliance is increasing substantially. The upcoming Tier IV emissions regulations adopted by the U.S. Environmental Protection Agency (EPA), which will take effect in 2015, are of particular concern. Short line locomotive fleets are typically 30 years of age or older, and thus are exempt from these regulations. However, eventually they will wear out and must be replaced at a cost that will be far higher than what short lines typically can afford. The California Air Resources Board's (ARB) Carl Moyer Program has been a welcome source of funding for fleet improvements, but there have been some concerns about its continued funding levels. The federal Diesel Emissions Reduction Act (DERA) Program has also been a welcoming source of funding from the federal government. However, although DERA is authorized at $100 million annually, in recent years appropriations have declined from approximately $60 million to $30 million in the past few years.

Freight rail equipment needs are also becoming more important as the average fleet age increases. According to a report by Railinc Corporation, the average age of the railroad-owned railcar fleet is 19.2 years, a figure that has increased in the past few years as the economy has worsened. Ages vary greatly by car type, with box cars being among the oldest, averaging in excess of 27 years. However, about 7 percent of the boxcar fleet is expected to be retired in the next four years.[148] While Class I carriers rely less and less on box cars, they continue to be a mainstay for many California short lines. Thus, the continued erosion of the box car fleet is a concern.

9.3.3 Economic Development Issues

Preserving Rail Accessible Industrial Sites

Rail-served industrial sites are a limited and precious resource and should be preserved for continued use by rail freight generating or rail freight receiving businesses. When a rail-served industry closes its doors, many local governments look to redevelop the sites as retail centers or truck-oriented industrial parks, essentially eliminating the opportunity for new rail-served industries to move in at a later date. But, in order for rail to increase its mode share, shippers must have access to the rail network.

[148] Humphrey, David, Railinc: Fleet remains young, Railway Age, May 31, 2011, http://www.railwayage.com/index.php/operations/railinc-fleet-remains-young.html.

Some states address this issue through Industrial Rail Access Programs. These programs provide various forms of financial assistance to industries/shippers to construct and improve rail connections and facilities. For instance, the North Carolina DOT began an industrial rail access program to provide an incentive to locate or expand industrial facilities in the State. The program uses state funds to assist in constructing or refurbishing tracks required by industries to encourage economic development.[149] Virginia and Maine have similar programs, and several other states are currently implementing such a program.

In California, this type of program could:

- Provide grants and/or loans for build-out of track and related infrastructure to rail-served industries.
- Facilitate development of transload and intermodal terminals to provide access to rail service for shippers that do not have direct service.

Such a program would not only help existing businesses by providing rail transport options, but could also help attract new businesses and stimulate economic and employment growth through expanded rail service. Prior to establishing such a program, a detailed examination of needs and a review of experience by other states should be carried out, and program components then designed to reflect objectives specific to California.

The need for rail-served inland ports and transload facilities in California and the question whether or not these facilities would be viable is a related issue. Transload facilities are needed throughout California to provide freight rail access to shippers that currently do not have direct rail service. Over the last decade, there has been considerable interest in developing inland ports, particularly in the San Joaquin Valley, that could provide short-haul rail links to the Port of Oakland, POLA, and POLB. But, most prior studies have found that these services would not compete effectively with conventional truck drayage options given current intermodal lift and drayage costs. Some of the proposed projects look toward other business models, such as truck-to rail-transload facilities. Future costs and travel times associated with truck connections between the seaports and inland customers in California may make these rail-served inland ports more feasible.

Three specific projects have been studied most extensively, and at least two have applied for TCIF funding. These projects are:

1. Shafter Inland Port.
2. Altamont Pass Rail Corridor [also known as the California Interregional Intermodal Shuttle].
3. Crows Landing Intermodal Facility.

While the CSRP does not recommend any specific inland port project at this time, Caltrans will continue to monitor developments in the marketplace and look for opportunities for these types of projects to develop over the long term.

There may also be economic development opportunities that could be enhanced through development of new shortline connections and/or rehabilitation of existing track. An example would be the development of a new rail route connecting the deepwater port at Humboldt Bay with the national rail network in the Sacramento Valley. An existing line (Northwest Pacific) through the Eel River Canyon has been shut down after flooding but a variety of government agencies and local business interests are examining the

[149] North Carolina Department of Transportation, Industrial Access*,* http://www.bytrain.org/industrial.

feasibility of another connection. If this feasibility study shows potential markets, this project could be worthy of state support if new programs for improvement of short rail lines are implemented in the future.

Minimizing Delays for New Facility Development

When private freight railroads construct improvements that are entirely on their own property, in most circumstances they are exempt from National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) review requirements. However, both Class I railroads and short lines are increasingly involved in public-private partnership projects and/or building projects on public land. This is most prevalent when the projects involve access improvements to public ports, new terminals in areas where private land is difficult to acquire, and the creation of logistics parks aimed at encouraging economic development. The environmental review process can be long and arduous for these types of projects, especially because they often involve environmental justice issues due to project location.

Since this issue has surfaced in a number of cases involving projects in and around POLA and POLB, the Southern California National Freight Gateway Collaboration has been reviewing potential adjustments to environmental review procedures that would protect the integrity of the environmental review process and also streamline the process through interagency coordination and early consultation. Caltrans will continue to participate in these collaborative discussions with California EPA, the ARB, and federal resource agencies to develop streamlined procedures that will continue to protect public health and safety, but also meet the State's mobility and economic development objectives.

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10.0 Rail Benefits and Next Steps

This chapter provides the passenger rail service assumptions used for ridership and revenue forecasting; the intercity passenger rail ridership and revenue forecast results; information on public and private benefits associated with rail projects, including transportation, economic, and environmental benefits; information on programs for managing rail abandonments and preserving rail corridors; an overview of current and proposed rail funding and financing programs; and next steps for updating and implementing the *California State Rail Plan* (CSRP) elements.

10.1 Public and Private Effects

10.1.1 Illustrative Network and Service Assumptions for Ridership Forecasting

The service plan assumptions outlined in this section were developed for planning purposes to enable ridership and revenue forecasting. Service planning continues in many corridors, and specific operating plans and timetables have not been finalized at this time. Service plan implementation will require funding and agreements that are yet to be established. As such, the service plan assumptions described below are illustrative and do not reflect a commitment to provide the indicated services.

Table 10.1 summarizes illustrative rail service assumptions for a 2013 “baseline” plus 2020, 2025, and 2040 improvement scenarios. These planned future services and their interconnections are depicted in Exhibits 10.1, 10.2 and, 10.3 for northern California, and Exhibits 10.4, 10.5 and 10.6 for southern California.

The illustrative service plan assumptions reflect phased implementation of the California High-Speed Rail (HSR) system and blended operations with conventional intercity and commuter rail routes to deliver integrated statewide passenger rail service. The assumptions are consistent with the *California High-Speed Rail Program Revised 2012 Business Plan* (2012 Business Plan) and planned near-term expansion of the California intercity and commuter rail network. They were also developed with input from northern and southern California working groups comprised of rail operators of existing intercity and commuter rail services (Northern and Southern California Rail Partners Working Groups-NCRPWG and SCRPWG). Finally, the assumptions include increased passenger service on those corridors shared with freight traffic that freight rail operators have agreed to evaluate or are currently evaluating.

Key aspects of the illustrative service plans are as follows:

- Unified Statewide Service Planning. California’s passenger rail system is evolving toward integrated statewide operations, scheduling, and ticketing for all rail passenger services (commuter, intercity, and HSR). This evolution reflects a shifting focus to addressing the door-to-door needs of intercity travelers. Accordingly, the illustrative service plans include future assumptions for all of California’s in-state passenger rail routes plus regional and local transit connections.

  Table 10.1 and Exhibits 10.1 through 10.6 show future service improvement assumptions for the passenger rail routes that serve intercity trips. Assumptions are included for the following passenger rail services: the three state-supported routes, HSR, Altamont Corridor Express (ACE), and the Metrolink and COASTER routes on the LOSSAN corridor. Although not detailed in Table 10.1, the ridership and revenue forecasts and benefits analysis includes increased service level assumptions for California’s commuter rail, rapid transit, light rail, and fixed-route bus systems. The future year commuter rail service level assumptions were provided by the rail operators, while other transit service levels are consistent with financially-constrained regional transportation plans.

Table 10.1: Train Frequency Assumptions for Ridership and Revenue Forecasting

Route and Segment	Train Frequencies (Daily Round Trips) Baseline 2013	Improved 2020	Improved 2025	Improved 2040
Bay Area & Northern San Joaquin Valley (Unified Service Operating Plan)				
Capitol Corridor Route:[a]				
Auburn – Oakland	1	2	2	2
Sacramento – Oakland[b]	7	3[c]	3[c]	3[c]
Sacramento – San Jose	7	11[d]	11[d]	11[d]
San Joaquin Route:				
Sacramento – Bakersfield via *San Joaquin* Route	2	0	tbd[e]	tbd[e]
Sacramento – Bakersfield via HSR first construction section of the Initial Operating Section (IOS)[f]	0	2-5	0	0
Sacramento – Merced connection to HSR via *San Joaquin* Route[g, h]	0	0	10[i]	10[i]
Oakland – Bakersfield via *San Joaquin* Route	4	1	tbd[e]	tbd[e]
Oakland – Bakersfield via HSR first construction section of the IOS[j]	0	5-9	0	0
Oakland – Merced connection to HSR via *San Joaquin* Route	0	0	10[i]	10[i]
Stockton – Merced connection to HSR via *San Joaquin* Route	0	0	1[k]	1[k]
Madera – Bakersfield via *San Joaquin* Route	0	2-5	0	0
Merced – Bakersfield via *San Joaquin* Route[k]	0	0	3-6	3-6
Madera – Bakersfield via HSR first construction section of the IOS	0	1	0	0
ACE Route:				
San Jose – Stockton via ACE Route	4	6	4	4
San Jose – Merced connection to HSR via ACE & Union Pacific Railroad (UPRR) Route[l]	0	0	2	2
San Jose – Merced connection to HSR via ACE & BNSF Railway (BNSF) Route[m]	0	0	4	4
High-Speed Rail Service				
Merced – San Fernando Valley	0	0	34[n]	0
Merced – Los Angeles Union Station (LAUS)	0	0	0	22
San Jose – LAUS	0	0	0	12
San Francisco – LAUS	0	0	0	64
Southern California Connecting Services				
Coast Daylight & Pacific Surfliner[o]*:*				
San Francisco – Los Angeles	0	1	1	2
San Luis Obispo – Los Angeles	2	1	2	2
Goleta – Los Angeles	3	4	3	3
Los Angeles – San Diego	11	12	18	18

Table 10.1: Train Frequency Assumptions for Ridership and Revenue Forecasting (continued)

Route and Segment	Train Frequencies (Daily Round Trips)			
	Baseline 2013	Improved 2020	Improved 2025	Improved 2040
Southern California Connecting Services (continued)				
Metrolink (Ventura & Orange County Lines) & COASTER:[a]				
East Ventura[p] – Los Angeles	10	10	10	10
Los Angeles – Irvine/Laguna Niguel	4.5	4.5	4.5	6.5
Los Angeles – Oceanside	5	4	1	2
Los Angeles – San Diego (Metrolink-COASTER "through" commuter service)	0	2	5	5
Riverside – San Diego (Metrolink-COASTER "through" commuter service)	0	0	0	2
Oceanside – San Diego	11	13	22	20
San Fernando Valley HSR – Los Angeles[q] (via extended *Pacific Surfliner* & Metrolink routes)	0	0	34	0

Notes:

[a] Weekend service levels may vary.

[b] The total number of trains operating between Sacramento and Oakland includes Auburn – Oakland and Sacramento – San Jose trains. Fifteen total round trips are assumed for 2020, and 16 total round trips are assumed for 2025 and 2040.

[c] One train terminates in Martinez with timed transfer to a *San Joaquin* train.

[d] Three trains originate/terminate in Roseville in 2020; eight trains originate/terminate in Roseville in 2025/2040.

[e] *San Joaquin* service will be provided along the existing route to Bakersfield. Year 2025 and 2040 service will be determined (tbd) through ongoing planning activities.

[f] Trains operate on the first construction section of the IOS between Madera and north of Bakersfield.

[g] Assumes six trains on existing *San Joaquin* route and four trains on UPRR Fresno Subdivision south of Lathrop.

[h] Assumes track connection between BNSF and Merced HSR station with transfer platform.

[i] The illustrative service plan assumes that *San Joaquin* trains will be turned back at the Merced HSR station. These trains would meet HSR trains, which will provide continuing service to Bakersfield and points south.

[j] In 2020 up to four trains originate/terminate in Richmond and use BNSF between Richmond and Stockton.

[k] Shuttle train added to connect with HSR.

[l] Uses UPRR Fresno Subdivision between Lathrop and Merced.

[m] Uses BNSF Stockton Subdivision between Stockton and Merced.

[n] Assumes four trains per hour during peak hours and one train per hour during off-peak hours.

[o] The *Pacific Surfliner* trains include a mix of through trains and trains that terminate at LAUS. The ridership and revenue forecasting included a mix of through and terminating trains consistent with the LOSSAN Strategic Implementation Plan.

[p] Some Metrolink trains terminate/originate at Moorpark and Chatsworth in the near term; and at Moorpark in the long term (post 2030).

[q] The ridership and revenue forecasts assume cross platform transfer for all HSR trains. Some transfers are with Metrolink Antelope Valley Line trains, and some *Pacific Surfliner*, Metrolink Orange County Line, and Metrolink 91 Line trains are extended from LAUS to San Fernando Valley Station with cross platform transfers.

Exhibit 10.1: Illustrative Northern California Service Assumptions, 2020

Source: Cambridge Systematics, Inc., 2013.

Exhibit 10.2: Illustrative Northern California Service Assumptions, 2025

Source: Cambridge Systematics, Inc., 2013.

Exhibit 10.3: Illustrative Northern California Service Assumptions, 2040

Source: Cambridge Systematics, Inc., 2013.

Exhibit 10.4: Illustrative Southern California Service Assumptions, 2020

Source: Cambridge Systematics, Inc., 2013.

Exhibit 10.5: Illustrative Southern California Service Assumptions, 2025

Source: Cambridge Systematics, Inc., 2013.

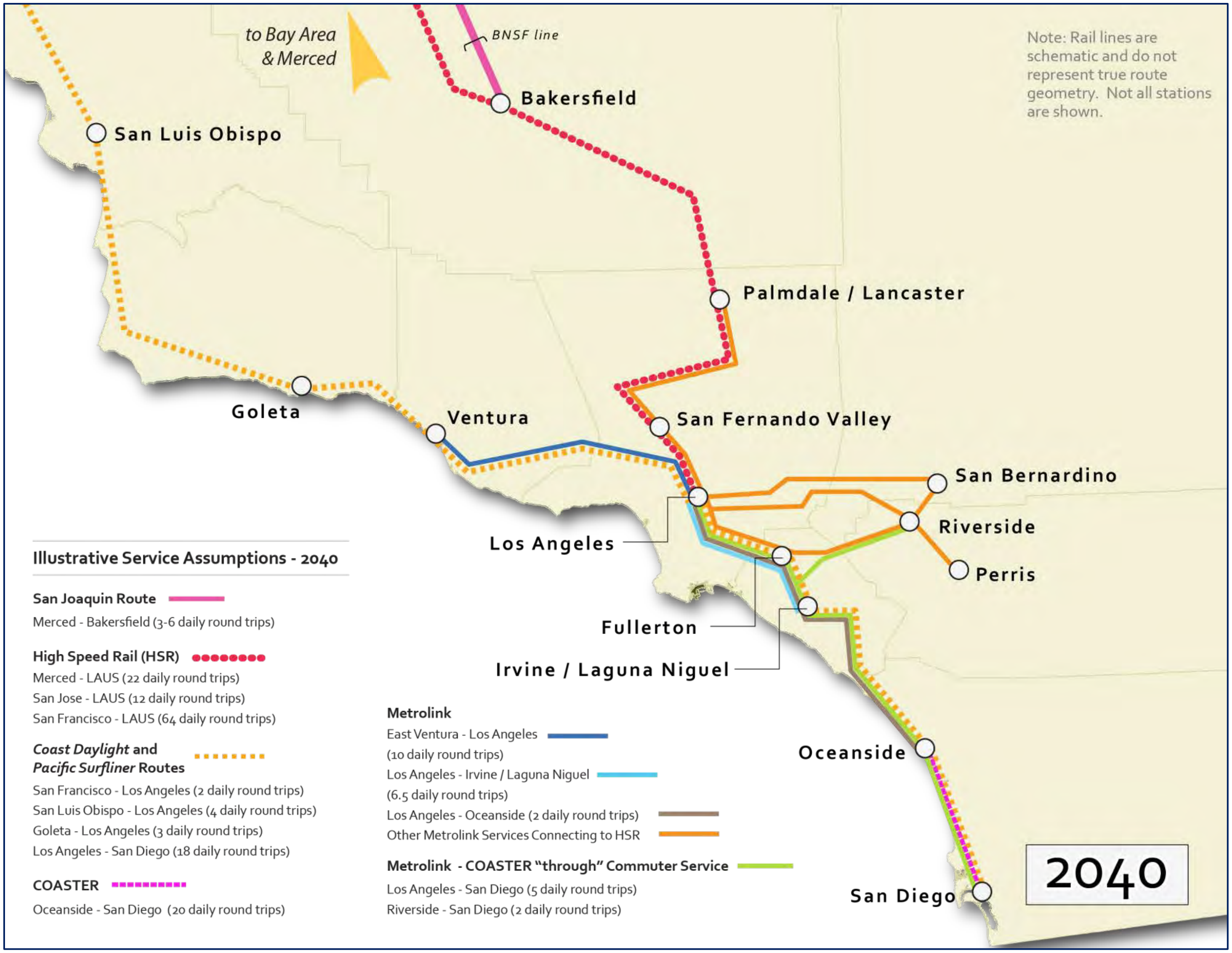

Exhibit 10.6: Illustrative Southern California Service Assumptions, 2040

Source: Cambridge Systematics, Inc., 2013.

- *San Joaquin* Route. The *San Joaquin* service to the Bay Area and Sacramento includes various route and terminal station options. In the near term (2020), some *San Joaquin* trains are planned to operate over the first construction section of the HSR IOS between Madera and north of Bakersfield. After initiation of electrified high-speed service in the San Joaquin Valley, *San Joaquin* trains will operate along conventional rail lines to Bakersfield with provision for a connection to the HSR system near Merced.

  Conventional passenger rail service levels beyond the 2020 analysis year have not been identified at this time. Accordingly, Table 10.1 indicates that year 2025 and 2040 service levels between Oakland/Sacramento and Bakersfield will be determined ("tbd") through developing a longer-range Service Development Plan (SDP) for the *San Joaquin* route and other northern California connecting services.

- HSR Service Initiation. The 2012 Business Plan indicates that HSR service could commence as early as 2022. The 2025 and 2040 ridership and revenue results reflect operation of the high-speed system. Specifically, the 2025 forecast reflects electrified high-speed service operation between Merced and San Fernando Valley, while the 2040 forecast reflects Phase 1 Blended System operation.

- Connecting Services. The illustrative service plans assume that each HSR train will be met by a conventional passenger rail train or connecting motorcoach at the HSR termini. This arrangement minimizes transfer wait times. These connecting services are assumed to provide frequent, fast connections to key destinations such as Oakland, San Jose, and Sacramento in northern California, and San Fernando Valley, LAUS, Orange County and San Diego in southern California.

- Year 2040 Service Levels. The year 2040 illustrative service plan reflects agency service goals and information from recent reports. For example, Metrolink and *Pacific Surfliner* frequencies were assembled from Southern California Regional Rail Authority (SCRRA) input and the LOSSAN Strategic Implementation Plan. On the other hand, *San Joaquin* frequency assumptions were guided by statewide connectivity goals between HSR and conventional passenger rail. Since HSR service levels at Merced do not increase between 2025 and 2040, *San Joaquin* service assumptions were unchanged between 2025 and 2040 for purposes of the ridership, revenue, and benefits analysis. Importantly, these initial 2040 scenario assumptions will be discussed and refined over time.

- *Coast Daylight* Service Initiation. The illustrative service plans assume initiation of one round trip on the proposed *Coast Daylight* route between San Francisco and Los Angeles in the 2020 scenario and a second, overnight *Coast Daylight* train in the 2040 scenario.

The service plan assumptions shown in Table 10.1 are organized first into northern California, HSR, and southern California groups. Train frequency assumptions are then shown for each route and route segment. The frequencies for each segment pertain to all train trips traveling only between those specific endpoints. If the endpoints of a particular frequency are extended, then that frequency is shown under the longer segment. (For example, four of the existing seven Sacramento-Oakland *Capitol Corridor* trains are extended to San Jose by 2020. Accordingly, the Sacramento-Oakland segment is reduced by four trains in 2020 and the Sacramento – San Jose segment is increased by four trains.)

Segments on the *San Joaquin* route are of three types:

1. Entirely on the existing *San Joaquin* route (i.e., Oakland – Bakersfield via *San Joaquin* route).
2. Use of both the first construction section of the IOS and the existing *San Joaquin* route (i.e., Oakland – Bakersfield via HSR first construction section of the IOS). These segments are only in

operation between 2020 and 2025 before the entire IOS is completed. Conventional intercity passenger rail trains will travel on the first construction segment of the IOS at higher speeds and then continue their trip on the existing *San Joaquin* route.

3. Use of the existing *San Joaquin* route to connect to HSR at Merced (i.e., Oakland – Merced HSR via *San Joaquin* route) in 2025 and 2040.

10.1.2 Ridership and Revenue

This section describes the travel demand modeling methods, inputs, and assumptions, and the forecasted ridership and revenue for intercity passenger rail trips.

The ridership and revenue forecasting process captured all intercity travel by passenger rail, airplanes, and personal vehicles, then divided the travelers into the three modes. The forecast results reflect only the intercity rail ridership for the illustrative service plans for all of California's in-state passenger rail routes. Table 10.1 depicts the service plan assumptions for the line-haul intercity passenger rail services.[150]

Although not detailed in Table 10.1, the ridership and revenue forecasts for 2025 and 2040, once the HSR system is in place, reflect increased service level assumptions for California's commuter rail, rapid transit, light rail, and fixed-route bus systems. These local and regional systems provide access to line-haul intercity passenger rail routes and are a critical element for door-to-door intercity travel. The future year commuter rail service level assumptions were provided by the rail operators, while other transit service levels are consistent with financially-constrained regional transportation plans.

Methodology and Approach

Two existing travel demand models were employed to prepare ridership and revenue forecasts:

- The Amtrak/California Intercity Passenger Rail Forecasting Model (Amtrak/Caltrans Model), a forecasting model developed by AECOM for California Department of Transportation (Caltrans) Division of Rail and Amtrak to provide consistent ridership and ticket revenue forecasts in support of short- and long-term rail passenger service planning in California. The model is based on extensive market and traveler behavior research throughout California (and nationwide), historical rail ridership and revenue data and trends, and demographic data.
- The High-Speed Rail Ridership and Revenue Model (HSR R&R Model), a model developed by Cambridge Systematics, Inc. under contract to the Metropolitan Transportation Commission (MTC) with the California High-Speed Rail Authority (Authority) as an active partner throughout the project. This project, which was a companion to MTC's Regional Rail Study, produced a state-of-the-art transportation model designed to portray what future conditions might look like in California with and without HSR.

Ridership and revenue forecasts were first prepared for 2020, 2025, and 2040 baseline–or "no action" scenarios. These no action scenarios include**:**

- Growth based on socioeconomic forecasts for the respective years.[151]

[150] For Section 10.1 "intercity passenger rail trips" is intended to reflect a traveler's perspective of a longer distance trip that is made somewhat infrequently. This type of "intercity" trip might occur between metropolitan areas or between non-adjacent counties in rural areas or within one metropolitan area. This definition is different than the usage of "intercity passenger rail" in other chapters that relates to administrative and/or funding distinction between passenger rail operators.

[151] Future growth estimates are based on socioeconomic data and forecasts developed by Moody's Economy.com. Key measures include forecasts of population, employment, and income.

- 2013 service levels for the ACE, *Pacific Surfliner*, *San Joaquin,* and *Capitol Corridor* routes.
- Projected future year service levels for California's commuter rail, rapid transit, light rail, and fixed-route bus systems. Future year commuter rail service level assumptions were provided by the rail operators, while other transit service levels are consistent with financially-constrained regional transportation plans.

Ridership and revenue forecasts were then prepared for the 2020, 2025, and 2040 illustrative service plan assumptions shown in Table 10.1. These forecast scenarios used the same socioeconomic forecasts and commuter rail, rapid transit, light rail, and fixed-route bus service assumptions from the "no action" scenarios.

This CSRP analysis represents the first joint application of these two travel forecasting models. Both models were applied with similar socioeconomic, travel time, travel cost, service frequency, and other assumptions. Model results were thoroughly reviewed and compared to assure reasonableness. The values shown below represent the consensus forecasts from the two modeling approaches, relying upon the HSR R&R Model for the longer-distance, high-speed trips and the Amtrak/Caltrans Model) for regional-intercity trips (including the commuter rail lines that were modeled) broken out by line.

Amtrak/Caltrans Model Structure

The Amtrak/Caltrans Model is based on extensive travel survey data collected in 2005-2008 from existing automobile and rail users at key locations within California. It uses a two-stage model system. The first stage forecasts the growth in the total number of person trips in each market and the second stage predicts the market share captured by each available mode in each market. Both stages are dependent on the service characteristics of each mode and the characteristics of the corridor population. The key market segments addressed in the forecasting model system are defined and evaluated by origin-destination market pair and trip purpose (commute, business, recreation, and other).

The first stage of the model addresses the growth in the total intercity person travel volumes and includes "natural" growth and "induced" demand. The second stage of the model is the mode share component, which estimates the percentage of the total person travel by the following three different modes of intercity travel: auto, intercity rail, and air. The key variables in the mode share model include:

- Line-haul travel time for all modes.
- Access/egress time for intercity rail and air.
- Frequency of service (departures per day).
- Travel cost or fare.

HSR R&R Model Structure

The HSR R&R Model consists of integrated components for forecasting long-distance interregional travel and intraregional travel within urban areas. For purposes of the model, California was divided into 14 regions that roughly correspond to Metropolitan Planning Organization (MPO) and/or Regional Transportation Planning Agency (RTPA) boundaries. The model defines an interregional trip as any trip that begins in 1 of the 14 regions and ends in a different region. Similarly, an intraregional trip terminates in the same region that it began.

Interregional travel is forecast using models derived from survey data collected for the project combined with other relevant survey data sources. The model forecasts all interregional trips by purpose and length (trip frequency), identifies which region the interregional trips will be going to (destination choice), and then estimates which access, egress, and line-haul mode the interregional trip will use (mode choice).

Intraregional models travel forecasts are based on trip tables generated from the existing MPO models. For the intraregional trips for the Bay Area and Los Angeles metropolitan regions, the existing MPO mode choice models were modified to reflect local urban area highway and transit systems, and options for HSR within the region.

Ridership Forecast Results

Table 10.2 summarizes passenger rail ridership forecasts by route and analysis year. Forecasts are shown for HSR service, intercity passenger rail routes, and some commuter rail routes that serve large numbers of intercity trips.[152]

Table 10.2: Annual Ridership Forecasts for Intercity Travel

Passenger Rail Route	Baseline Service 2013	Improved Service		
		2020	2025	2040
ACE[a]	0.91	1.41	1.85	1.90
Capitol Corridor[b]	1.79	2.40	2.73	3.46
San Joaquin Valley – Conventional Rail[c]	1.17	2.64	2.51	2.34
High-Speed Rail[d]	n/a	n/a	8.81	26.38
Pacific Surfliner[e]	2.70	3.26	3.91	5.04
Metrolink & COASTER[f]	4.95	6.27	9.38	12.09
Coast Daylight	–	0.12	0.14	0.27
TOTAL	**11.52**	**16.10**	**29.33**	**51.48**

Notes:

Values are millions of annual trips.

[a] This row reports ACE train trips that do not connect to any other intercity passenger rail route. The row includes ACE trips entirely within the San Joaquin Valley or Bay Area, plus trips between the two regions.

[b] This row includes Martinez connecting ridership associated with 16th weekday frequency.

[c] "San Joaquin Valley – Conventional Rail" includes trips that use only conventional passenger rail between the boarding and alighting stations. These values include trips that connect to ACE or use a Thruway Bus. *San Joaquin* trips that connect to HSR (beginning in 2025) are reported in the "HSR" row.

[d] "High-Speed Rail" includes trips made between HSR stations and trips that connect to other northern and southern California intercity and commuter rail systems.

[e] This row includes trips that use only a *Pacific Surfliner* train between the boarding and alighting stations. It also includes trips that link to a Metrolink or COASTER trip. *Pacific Surfliner* trips that connect to HSR (beginning in 2025) are reported in the "High-Speed Rail" row.

[f] This row includes trips within the *Pacific Surfliner* corridor that use only a Metrolink or COASTER train between the boarding and alighting stations. Trips that link to *Pacific Surfliner* are reported in the *Pacific Surfliner* row. Trips that connect to HSR (beginning in 2025) are reported in the "HSR" row.

Sources: AECOM and Cambridge Systematics, Inc., 2013.

[152] Individual operators may have more detailed analyses of ridership and revenues which are more robust than these overall results presented in the CSRP.

Table 10.2 reports each door-to-door passenger rail trip once even if a traveler uses two or more trains. This type of reporting is known as "linked trips," and it avoids double counting of individual trips. For reporting in Table 10.2, an individual trip is generally assigned to the train route on which the majority of the trip occurs. Some reporting examples are as follows:

- A passenger that uses Metrolink from Fullerton to LAUS and then connects to a *Pacific Surfliner* train to Santa Barbara is reported as a *Pacific Surfliner* trip in Table 10.2.
- A passenger that uses a *San Joaquin* train from Fresno to Stockton then connects to ACE train to Livermore is reported as a *San Joaquin* trip in Table 10.2
- A passenger that uses HSR for any portion of their trip is reported as an HSR trip in Table 10.2.
- A passenger that travels on only one train route is reported in that row in Table 10.2.

Relative to the baseline, the forecasts reflect market growth in response to organic growth in population and employment throughout California. The market is expected to grow by almost two percent per year, with some variation among markets. These future forecasts also reflect the influence of additional passenger rail frequency, speed increases for routing along the HSR IOS, and improved statewide connectivity among all conventional intercity passenger rail, regional commuter rail, and statewide HSR.

When compared to the baseline, the largest forecasted ridership increases are related to the significant service improvements including added train frequencies and improved running times associated with HSR implementation. For example, in 2025, the combined San Joaquin Valley and HSR ridership is an order of magnitude higher than the 2013 baseline. The forecasts also show ridership growth for ACE (reflecting the new daily round trips in the future scenarios), *Capitol Corridor* (reflecting additional service to San Jose), *Pacific Surfliner*, and the new *Coast Daylight* service to/from San Francisco.

Revenue Forecast Results

Revenue includes ticket revenue associated with fares paid by train riders. Revenue forecasts are the product of the ridership forecasts and the average fares by station pair market.[153] Table 10.3 summarizes the ticket revenue forecasts by passenger rail route and analysis year. All revenue forecasts are expressed in 2012 dollars and are consistent with the latest near-term forecasts developed by Amtrak and Caltrans for current state-supported intercity passenger rail services within California, and by the Authority for the 2012 Business Plan.

10.1.3 Transportation System Effects

The ridership and revenue forecasting process also provides a tool for calculating the change in vehicle miles traveled (VMT) and vehicle hours traveled (VHT), and travel mode changes as passenger rail service is expanded. This section reports the associated analysis steps and results.

Travel Mode Changes

The increased passenger rail ridership noted in the prior section results from travelers diverting from air or personal vehicle travel or from taking an entirely new trip ("induced travel"). The ridership forecasting tools project that, in 2020, the illustrative service assumptions shown in Table 10.1 will reduce statewide personal vehicle travel by about 1.22 million annual trips and air travel by about 0.15 million annual trips.

[153] The average HSR fares are projected fare assumptions from the 2012 Business Plan. Fares for all other passenger rail services are average fare yield based on historical data.

Table 10.3: Annual Ticket Revenue Forecasts for Intercity Travel

Passenger Rail Route	Baseline Service 2013	Improved Service		
		2020	2025	2040
ACE[a]	$5.02	$7.77	$11.24	$12.4
Capitol Corridor[b]	$28.91	$39.10	$44.32	$65.9
San Joaquin Valley – Conventional Rail[c]	$39.74	$97.70	$103.04	$93.7
High-Speed Rail[d]	n/a	n/a	$712.87	$1,840.7
Pacific Surfliner[e]	$59.50	$75.17	$94.68	$121.9
Metrolink & COASTER[f]	$28.75	$37.99	$58.09	$75.0
Coast Daylight	n/a	$6.20	$7.00	$14.4
Total	**$161.92**	**$263.94**	**$871.24**	**$2,224.1**

Notes: Values are millions, in 2012 dollars

[a] This row reports ACE train trips that do not connect to any other intercity passenger rail route. The row includes ACE trips entirely within the San Joaquin Valley or Bay Area, plus trips between the two regions.

[b] This row includes Martinez connecting ridership associated with 16th weekday frequency.

[c] "San Joaquin Valley – Conventional Rail" includes trips that use only conventional passenger rail between the boarding and alighting stations. These values include trips that connect to ACE or use a Thruway Bus. *San Joaquin* trips that connect to HSR (beginning in 2025) are reported in the "High-Speed Rail" row.

[d] "High-Speed Rail" includes trips made between HSR stations and trips that connect to other northern and southern California intercity and commuter rail systems.

[e] This row includes trips that use only a Pacific Surfliner train between the boarding and alighting stations. It also includes trips that link to a Metrolink to COASTER trip. *Pacific Surfliner* trips that connect to HSR (beginning in 2025) are reported in the "High-Speed Rail" row.

[f] This row includes trips within the *Pacific Surfliner* corridor that use only a Metrolink or COASTER train between the boarding and alighting stations. Trips that link to *Pacific Surfliner* are reported in the *Pacific Surfliner* row. Trips that connect to HSR (beginning in 2025) are reported in the "High-Speed Rail" row.

Sources: AECOM and Cambridge Systematics, Inc., 2013.

As the Blended System is initiated and expanded, rail ridership is forecast to increase rapidly resulting in much larger air and personal vehicle trip reductions. By 2025, about 7.9 million annual personal vehicle trips and 0.8 million annual air trips are projected to divert to conventional or high-speed intercity passenger rail. By 2040, the annual diversions are projected to be about 20.7 million personal vehicle trips and 5.0 million air trips.

Personal Vehicle Travel

The ridership forecasting tools also provide VMT and VHT forecasts for all modeled scenarios. For VMT and VHT, ridership and revenue forecasts were first prepared for 2020, 2025, and 2040 baseline–or "no action" scenarios. These no action scenarios include**:**

- Growth based on socioeconomic forecasts for the respective years.
- 2013 service levels for the ACE, *Pacific Surfliner*, *San Joaquin,* and *Capitol Corridor* routes.
- Projected future year service levels for California's commuter rail, rapid transit, light rail, and fixed-route bus systems. Future year commuter rail service level assumptions were provided by

the rail operators, while other transit service levels are consistent with financially-constrained regional transportation plans.

Ridership and revenue forecasts were then prepared for the 2020, 2025, and 2040 illustrative service plan assumptions shown in Table 10.1. These forecast scenarios used the same socioeconomic forecasts and commuter rail, rapid transit, light rail, and fixed-route bus service assumptions from the “no action” scenarios.

Therefore, the VMT changes that result from auto to rail diversion are primarily the result of assumed service increases for intercity passenger rail and HSR. Since service assumptions for commuter rail, rapid transit, light rail, and fixed-route bus systems did not change from the baseline scenarios, these regional and local services did not directly affect the VMT changes.

Table 10.4 summarizes the expected changes in VMT from the “no action” or baseline service by region and service option, while Table 10.5 shows similar detail for VHT. Appendix I provides regional VMT and VHT totals for the “no action” or baseline service levels.

The forecast shows a daily VMT reduction in most regions. At the statewide level, daily VMT is projected to decrease by about 218,000 miles in 2020, which represents a 0.02 percent reduction. In 2025, daily VMT is projected to decrease by about 3.35 million miles (0.34 percent reduction). By 2040, statewide daily VMT is projected to decrease by just over 12 million miles (1.09 percent reduction). The large change between 2025 and 2040 is associated with inclusion of the HSR Phase 1 Blended scenario in year 2040. This scenario offers a single seat rail trip between downtown Los Angeles and downtown San Francisco, and many points in between. This single seat service is projected to reduce personal vehicle travel between the San Francisco Bay Area and southern California, which will reduce VMT and VHT through intermediate regions such as the Central Coast (U.S. 101) and San Joaquin Valley (Interstate 5 and State Route 99).

Table 10.4: Daily Vehicle Miles Traveled Changes

	2020		2025		2040	
Region	**Change**	**Percent Change**	**Change**	**Percent Change**	**Change**	**Percent Change**
Sacramento	(11,000)	-0.01%	(117,000)	-0.32%	(805,000)	-1.92%
Bay Area	(32,000)	-0.02%	(93,000)	-0.06%	(3,182,000)	-1.74%
San Joaquin Valley	(79,000)	-0.09%	(1,467,000)	-1.69%	(2,338,000)	-2.38%
Central Coast	(26,000)	-0.08%	~0	~0.00%	(393,000)	-1.07%
Los Angeles	(45,000)	-0.01%	(1,472,000)	-0.32%	(4,731,000)	-0.92%
San Diego	(24,000)	-0.02%	(74,000)	-0.05%	(377,000)	-0.24%
Rest of California	(2,000)	~0.00	(132,000)	-0.19%	(237,000)	-0.31%
Statewide Total	**(218,000)**	**-0.02%**	**(3,351,000)**	**-0.34%**	**(12,063,000)**	**-1.09%**

Note: Each year’s changes are calculated from the “no action” or baseline service in that year. Negative values indicate a personal VMT reduction for the assumed passenger rail service levels shown in Table 10.1.

Sources: AECOM and Cambridge Systematics, Inc., 2013.

Table 10.5: Daily Vehicle Hours Traveled Changes

Region	2020		2025		2040	
	Change	Percent Change	Change	Percent Change	Change	Percent Change
Sacramento	(300)	-0.01%	(2,500)	-0.32%	(16,500)	-1.92%
Bay Area	(700)	-0.01%	(5,900)	-0.06%	(68,700)	-1.74%
San Joaquin Valley	(1,700)	-0.07%	(32,800)	-1.69%	(53,200)	-2.38%
Central Coast	(700)	-0.09%	(500)	~0.00%	(9,300)	-1.07%
Los Angeles	(1,200)	-0.01%	(35,300)	-0.32%	(103,300)	-0.92%
San Diego	(800)	-0.02%	(3,800)	-0.05%	(9,900)	-0.24%
Rest of California	~0	~0.00%	(2,700)	-0.19%	(5,000)	-0.31%
State Total	**(5,500)**	**-0.02%**	**(83,400)**	**-0.34%**	**(265,900)**	**-1.09%**

Note: Each year's changes are calculated from the "no action" or baseline service in that year. Negative values indicate a personal VHT reduction for the assumed passenger rail service levels shown in Table 10.1.

Sources: AECOM and Cambridge Systematics, Inc., 2013.

Overall, the San Joaquin Valley is projected to account for about 45 percent of the total 2025 VMT decrease and 20 percent of the 2040 VMT decrease. This large share is a function of the large amount of interregional vehicle travel through the Valley.

The forecast shows a slight reduction in daily VHT (or hours spent driving) in most regions of the State in all years. At the state level, daily VHT is projected to decrease by about 5,000 hours in 2020, which represents a 0.02 percent. In 2025, daily VHT is projected to decrease about 83,400 hours, while a daily decrease of nearly 266,000 hours is projected for 2040. As with VMT, the San Joaquin Valley is projected to exhibit the largest VHT reduction.

Air Travel

In addition to the modal diversion numbers, diversion of air trips to conventional and high-speed intercity passenger rail may lead to reduced aircraft operations for intra-California air travel. The most recent analysis, which was conducted for the 2008 *Bay Area to Central Valley High-Speed Train Program Environmental Impact Report/Environmental Impact Statement* estimated that the full statewide HSR system (Phases I and II) could result in approximately 280,000 fewer annual commercial aircraft operations at California airports (a 5 percent reduction). This magnitude of aircraft operation reduction was projected to reduce air travel delay each year by about 13.9 million passenger hours.

Impacts of VMT Reduction in Central Coastal Areas

The HSR system and the revived *Coast Daylight* will provide important nonautomotive transportation alternatives for travel between northern and southern California. These new rail services will protect the capacity of Interstate 5, State Route 99, and the coastal highways – State Route 1 and U.S. Route 101 – for economic mobility and recreational travel. Enhanced multimodal capacity infers less need for future highway widening. This redundancy could provide unique benefits to coastal areas by reducing potential effects on critical wetland habitats and beach areas. Thus the planned implementation of HSR and the revived *Coast Daylight* service between San Francisco and Los Angeles will help to carry out Coastal Act policies that protect these areas.

10.1.4 Economic Effects

California's passenger and freight rail improvements will benefit the State in a number of ways, and many of these benefits are quantifiable. For example, improved passenger rail service directly benefits travelers who shift from autos to trains for travel in the State. As more people use rail, those who remain on California's highways enjoy the benefits of reduced congestion levels, saving themselves time on their trips. Finally, more rail trips will also translate to accident reductions and lower pollution emissions. All of these benefits are measurable by monetizing values generated from the ridership and revenue forecasting tools described in Section 10.1.2.

This analysis does not account for all potential benefits. For example, increased rail use will lead to reduced highway maintenance and capital costs and fewer delays for travelers who continue to use California's airports. HSR also yields potential economic development benefits by more effectively connecting markets and encouraging business interactions that further stimulate growth, strengthening the competitiveness of California's industries, major metropolitan areas, and intermediate cities.

The benefits quantified in this analysis divide into two categories: "user benefits" and "non-user benefits." User benefits accrue to individuals as they shift from air or personal vehicle to passenger rail. These travelers place a monetary value on riding comfortable, reliable, and safe trains. Passengers also value the dependability provided by rail in almost all weather conditions, allowing travel even as flights are canceled and driving is hampered by weather. The user benefits for HSR passengers are a reflection of these advantages.

Non-user benefits include highway delay reductions, safety improvements, and lower pollution emissions that result from a less intensive use of motor vehicles on California's roadways. The economic effects analysis includes monetized values for both the user benefits and non-user benefits that result from improvements to California's passenger rail system. Appendix J provides additional detail on the economic benefits forecasting methodology.

Tables 10.6 and 10.7 summarize the economic benefits based upon the ridership and revenue forecasts presented in Section 10.1.2. Table 10.6 shows the estimated economic effect based on the type of benefit – user and non-user. Table 10.7 shows the distribution of these same benefits by corridor. In a corridor both rail users and auto users (i.e., auto users) will benefit as described above. Annual user and non-user benefits are projected to total $150 million in 2020, $2.7 billion in 2025, and just over $7.1 billion by 2040. The large benefit growth over time reflects inclusion of the HSR IOS in the 2025 service plan assumptions and the HSR Phase 1 Blended in the 2040 service plan assumptions. Increased passenger rail ridership and relatively lower congestion levels result in substantial increases in total benefits shown in both tables.

Table 10.6: User and Non-User Benefits

Region	Annual Benefits (in millions in 2012 dollars)		
	2020	**2025**	**2040**
Passenger Rail User Benefits	$47	$537	$1,640
Non-User Benefits			
Accident Reduction	$12	$179	$647
Pollution Reduction	$2	$26	$92
Highway Delay Reduction	$89	$1,962	$4,752
Statewide Total	***$150***	***$2,704***	***$7,157***

Sources: AECOM and Cambridge Systematics, Inc., 2013.

Table 10.7: User and Non-User Benefits by Corridor

Region	Annual Benefits (in millions in 2012 dollars)		
	2020	2025	2040
Pacific Surfliner, South of Los Angeles	$26	$162	$429
Pacific Surfliner, North of Los Angeles	$14	$81	$215
Coast Daylight	$14	$81	$215
HSR & Northern/Southern California Connecting Services	$96	$2,380	$6,298
Statewide Total	***$150***	***$2,704***	***$7,157***

Note: HSR, *Capitol Corridor*, and *San Joaquin* are planned to have fully coordinated operating plans in the three analysis scenarios. These intercity passenger rail services are also planned to fully coordinate with regional rail services such as ACE, Caltrain, COASTER, and Metrolink. Given these highly coordinated operations, benefits are most reliably forecast on an aggregate basis for all coordinated services. Contributions of individual routes or services require further detailed analysis.

Sources: AECOM and Cambridge Systematics, Inc., 2013.

10.1.5 Environmental Effects

Freight and passenger rail implementation can bring tremendous positive environmental and economic benefits to the State. They can also, impact communities and the natural environment. The most common effects include contribution to air pollution and greenhouse gas (GHG) emissions and physical impacts such as noise and light pollution.

Air Pollution and Greenhouse Gas Emissions

U.S. Environmental Protection Agency Criteria Pollutants

According to the United States Environmental Protection Agency (EPA), there are six criteria pollutants that can affect human health, the environment, and property: volatile organic compounds (VOC), particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and lead (PB).[154]

Freight and passenger rail operations emit CO, NO_x, VOC, and PM.

Increased presence of these criteria pollutants have been linked to a variety of poor health conditions. These conditions may include:

- Reduced lung function.
- Asthma and other respiratory illnesses.
- Increased cancer risk.
- Premature death (especially in vulnerable groups such as children and the elderly).

[154] U.S. EPA, http://www.epa.gov/air/urbanair.

Emissions from rail activities also lead to ozone formation. Ozone is formed when emissions of NO_x chemically react with VOCs under conditions of heat and sunlight. Ozone is linked to public health impacts including chest pain, coughing, throat irritation, and congestion. Long-term exposure can worsen existing afflictions like asthma or bronchitis, or even lead to permanently scarred lung tissue.[155]

PM is divided into two subcategories: PM_{10} (particles between 2.5 and 10 microns in diameter) and $PM_{2.5}$ (particles less than 2.5 microns in diameter). Numerous studies have linked PM exposure to public health issues including irregular heartbeat, asthma, decreased lung function, and increased respiratory ailments that can lead to premature death.[156]

Greenhouse Gas Emissions

Freight emissions comprise close to one-third of U.S. transportation GHG emissions. These emissions have grown by more than 50 percent since 1990.[157] According to the U.S. EPA, there are six key transportation-related GHG emissions that affect public health and welfare:

1. Carbon dioxide (CO_2).
2. Methane (CH_4).
3. Nitrous oxide (N_2O).
4. Hydrofluorocarbons (HFC).
5. Perfluorocarbons (PFC).
6. Sulfur hexafluoride (SF_6).

GHG emissions contribute to climate change. They are linked to regional and atmospheric changes that can exacerbate acid rain, ozone depletion, and damage to crops, plants, and property.

Emissions Analysis

The prior Transportation System Effects section illustrates that improved rail services and HSR would reduce automobile and truck VMT throughout California. VMT reductions lead directly to reduced emissions of CO_2 and key mobile source pollutants.[158] Air quality emissions were forecast for years 2020, 2025, and 2040 using the California Air Resources Board (ARB) Emissions Factor (EMFAC) model[159] coupled with the VMT forecasts.

Table 10.8 summarizes statewide air quality emissions by analysis year and passenger rail corridor. The column titled “No Action Emissions” shows total statewide on-road mobile source emissions by pollutant and analysis year. “No Action” assumes continuation (but no expansion) of current passenger rail routes and service levels. The remaining four columns indicate mobile source emission reduction within each passenger rail corridor arising from the modeled planning scenarios. Each row shows emission reductions for the indicated year; the values are not cumulative between years.

155 U.S. EPA, http://www.epa.gov/air/ozonepollution/health.html.

156 U.S. EPA, http://www.epa.gov/pm/health.html.

157 Federal Highway Administration. *Freight and Air Quality Handbook*, May 2010.

158 The CSRP analysis included reactive organic gases (ROG), oxides of nitrogen (NO_x), carbon monoxide (CO), large particles (PM_{10}), and small particles ($PM_{2.5}$).

159 The CSRP analysis used the EMFAC 2011 model.

Table 10.8: Annual Statewide Emission Reduction

Year	No Action Emissions (Tons per Year)	Emission Reduction for California State Rail Plan (tons per year from "No Action")			
		Pacific Surfliner (South of Los Angeles)	*Coast Daylight* & *Pacific Surfliner* (North of Los Angeles)	HSR & Northern/Southern California Connecting Services	Total Reduction From "No Action" Emissions
Carbon Dioxide (CO_2)					
2020	176,064,000	6,120	7,500	23,840	37,460
2025	179,082,000	34,620	10,820	527,659	573,103
2040	206,056,000	43,340	16,870	1,818,830	1,879,040
Reactive Organic Gases (ROG)					
2020	91,000	<10	<10	10	20
2025	80,000	20	<10	210	230
2040	76,000	20	<10	670	700
Oxides of Nitrogen (NO_x)					
2020	212,000	<10	<10	30	50
2025	159,000	30	10	500	540
2040	155,000	30	10	1,380	1,420
Carbon Monoxide (CO)					
2020	777,000	30	40	100	170
2025	640,000	130	40	1,710	1,880
2040	604,000	130	50	5,320	5,500
Large Particles (PM-10)					
2020	26,000	<10	<10	<10	<10
2025	27,000	<10	<10	80	80
2040	32,000	<10	<10	280	290
Small Particles (PM-2.5)					
2020	12,000	<10	<10	<10	<10
2025	12,000	<10	<10	40	40
2040	15,000	<10	<10	130	130

Note: HSR, *Capitol Corridor*, and *San Joaquin* are planned to have fully coordinated operating plans in the three analysis scenarios. These intercity passenger rail services are also planned to fully coordinate with regional rail services such as ACE, Caltrain, COASTER, and Metrolink. Given these highly coordinated operations, emissions are most reliably forecast on an aggregate basis for all coordinated services. Contributions of individual routes or services require further detailed analysis.

Sources: Cambridge Systematics, Inc. and AECOM, 2013.

The illustrative service plan assumptions shown in Table 10.1 are projected to reduce statewide emissions, but at a magnitude of less than one percent of projected statewide mobile source emissions. Reductions are largest in the regions directly served by the improvements to the rail system and for corridors served by HSR. Appendix I provides emission reduction details by state subregion.

This emissions analysis reflects vehicle travel reduction due to mode shifts from personal vehicles to passenger rail and residual congestion reduction from this mode shift. Additional emission reduction might arise from: 1) improved rail system efficiency through reduced locomotive idling and improved locomotive fuel economy; 2) reduced aircraft operations from air to rail modal shifts; 3) reduced vehicle acceleration and deceleration from highway bottleneck elimination; and 4) shifting of freight from trucks to rail. Emission increases might arise from: 1) additional locomotive operation due to expanded service levels, and 2) passenger travel to/from intercity passenger rail stations.

Freight Rail Effects and Opportunities

Freight rail provides potential environmental benefits through higher levels of energy efficiency and reduced emissions per ton-mile of goods moved as compared to trucking. This has been one of the justifications for public investment in short line preservation programs and new short haul rail projects that would either prevent diversion of freight from short line railroads to trucking or encourage diversion of truck traffic to rail when economically feasible. Nonetheless, locomotives are still a significant source of diesel emissions, and these emissions are projected to increase in the near future. For example, ARB's 2010 emissions inventory estimates that diesel locomotives in California emitted 116 tons per day of NO_x, this figure represented 4.6 percent of all mobile source NO_x emissions in the State. This figure is projected to increase to 138 tons per day by 2020, which will represent 8.2 percent of all mobile source NO_x emissions in the State.[160] As such, the public and private sectors are involved in several efforts to reduce future locomotive emissions.

This section highlights current and future locomotive emission regulations, explains the institutional relationships among regulatory agencies, and presents technology and policy initiatives to further reduce emissions from freight rail operations.

Locomotive Regulations[161]

Authority for regulating emissions from locomotives lies with the U.S. EPA. At the state level, the California ARB has negotiated various agreements with the railroad industry to help accelerate adoption of clean locomotive technology to improve environmental performance of railyards and to support adoption of new clean rail technologies. Likewise, air quality management districts and air pollution control districts have also occasionally adopted control measures that encourage development of new rail emission control technologies. This section provides a summary of adopted regulations for rail air quality.

In 1998, the U.S. EPA created several tier standards for locomotive engines, which were amended in 2008. The standards apply to all newly manufactured and remanufactured locomotives used in line-haul, passenger, and switcher service within the United States. An exception applies to locomotives originally manufactured before 1973, which are not subject to emissions standards. For new locomotives, the Tier 2 standards took effect beginning in 2005. Tier 3 and Tier 4 standards take effect beginning in 2012 and 2015, respectively. Achieving Tier 4 emission standards will likely necessitate the use of after-treatment technologies (e.g., diesel particulate filters, exhaust gas recirculation, and selective catalytic reduction) by locomotive manufacturers. Tier 3 locomotives are now available; Tier 4 locomotives are not likely to be available before 2015. Exhibit 10.7 illustrates the emission standards for line-haul locomotives and shows the extent of reductions that are achieved as each tier standard is adopted.

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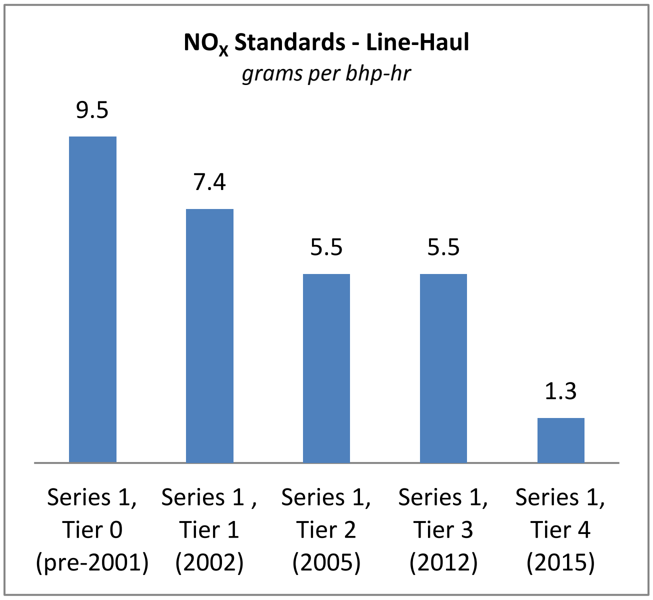
[160] Source: California Air Resources Board, "Emission Projections by Summary Category, Base Year: 2008", April, 2013.

[161] Much of the information in this section is taken from the chapter on Environmental and Quality of Life Concerns in *On the Move: Southern California Delivers the Goods: Comprehensive Regional Goods Movement Plan and Implementation Strategy*, prepared by ICF International and Cambridge Systematics for the Southern California Association of Governments (SCAG), February 2013.



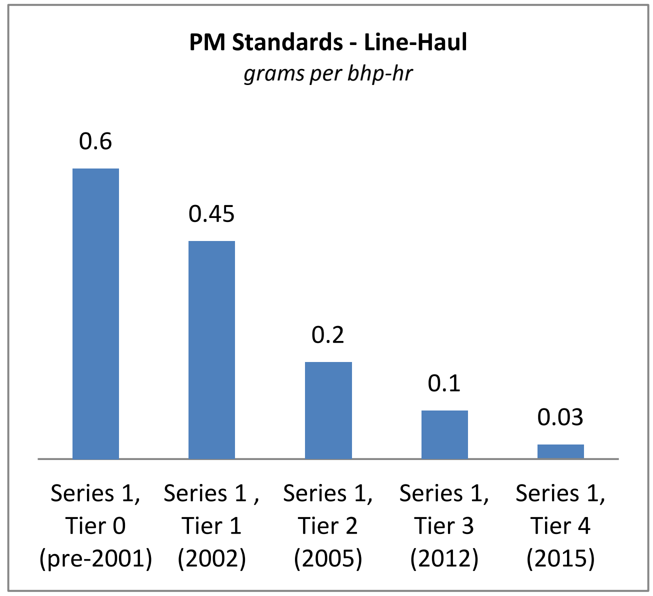


Exhibit 10.7: Emission Standards for Line-Haul Locomotives

Note: Brake horsepower-hour = bhp-hr.

In 1998, ARB developed a Memorandum of Understanding (MOU) with the two Class I railroads that operate in California, UPRR and BNSF. The MOU includes provisions for early introduction of clean locomotives, with requirements for a locomotive fleet average in the South Coast Air Basin equivalent to EPA's Tier 2 locomotive standard by 2010. The railroads have complied with this requirement.

ARB also signed a 2005 agreement with UPRR and BNSF that requires the railroads to significantly reduce diesel emissions in and around rail yards in California. Among the most important elements of the agreement include: 1) a statewide idling-reduction program; 2) health risk assessments for all major rail yards; 3) community and air district involvement in the preparation of risk assessments, enforcement of agreement provisions, and the evaluation and development of measures to further reduce impacts on local communities.

In 2010, ARB proposed further binding voluntary commitments to reduce diesel PM emissions at four rail yards: BNSF San Bernardino, BNSF Hobart, UPRR Commerce, and UPRR ICTF/Dolores. The agreement would set a maximum level of emissions starting in 2011 that could not be exceeded, regardless of the level of growth that occurs at the rail yards. Compared to the 2005 baseline, this agreement would require a 65-75 percent reduction in diesel PM emissions by 2015 and an 85 percent reduction by 2020. ARB is considering revising the 2010 commitments to establish enforceable emission caps and other requirements, tracking mechanisms, and deadlines to further reduce harmful diesel PM through 2020. The revisions would not change the diesel PM emission caps for each rail yard.

Low Emission Technologies for Locomotives

New locomotive technologies include cleaner-burning locomotive engines, locomotives powered by multiple smaller engines (GenSets), and locomotive and infrastructure upgraded to new fuels, notably natural gas or electrification. Benefits can be derived by replacing older units with cleaner units or remanufacturing older units to the standards of new locomotives. Technologies include:

Tier 4 Line-Haul Locomotives

Beginning in 2015, new locomotives will be required to meet Tier 4 emissions standards, which reduce NO_x emissions by 76 percent and PM emissions by 70 percent compared to current Tier 3 standards. These locomotives, which rely on exhaust after treatment technologies and engine improvements to achieve the more stringent standards, are under development but not yet deployed. The U.S. EPA projects that by 2023, 34 percent of the nationwide Class I line-haul fleet will be Tier 4.

The South Coast Air Quality Management District (SCAQMD) has recently proposed an emission control measure that calls on the ARB to pursue enforceable mechanisms within its authority to achieve 95 percent or greater introduction of Tier 4 freight locomotives in the South Coast Air Basin by 2023.[162] This could potentially be achieved through a similar MOU to the one signed by the ARB and freight railroads in 1998 that lead to early introduction of Tier 2 and Tier 3 locomotives. A similar commitment has been offered by SCRRA for early introduction of Tier 4 locomotives in passenger service.

Electrified Line-Haul Locomotives and Infrastructure

Railroad electrification would enable freight trains to be moved using electric rather than diesel locomotives, resulting in potentially large reductions in locomotive emissions. There are several technology options for electrification, including straight-electric locomotives with overhead catenary, dual-mode locomotives with overhead catenary (i.e., locomotives that can switch from an all-electric mode to a nonelectric primary energy source), and a linear synchronous motor system. Electrification would reduce locomotive emissions in two ways: first, by changing the power source to a cleaner-burning fuel, that is, switching from diesel fuel for a conventional locomotive to natural gas electrical generation; second, by shifting the location of the emissions to the power plant, which may or may not be located within California.

Electrified rail is a proven technology used throughout the world for both passenger and freight rail purposes. However, several issues make rail electrification in California a challenging proposition for the railroads and the public sector. These issues include high upfront capital costs, impacts on operations, and long-term energy cost and availability.

There are currently no major electrified freight rail systems in North America. Freight operations in the U.S. would differ from operations in other countries, because U.S. freight rail carriers have adopted higher power and traction requirements. The electric locomotives available today have not been designed to meet these requirements, and no prototypes have been developed or operated by the U.S. railroad industry. While there is interest in dual mode locomotives, none have been developed and demonstrated where the diesel engine is designed to meet the latest, Tier 4 locomotive emission standards. This factor could create technical challenges for the design of the locomotive platform.

The U.S. freight rail network is a vast interconnected system and partially electrifying this system creates new operational requirements that would need to be ironed out over time to ensure that the overall performance of the system is not degraded during changeover between electric and nonelectric operations. These issues are not necessarily insurmountable obstacles to a long-term zero emission strategy, but there technology development and demonstration is needed so that these technologies can be applied.

The Southern California Association of Governments (SCAG), in its 2012 Regional Transportation Plan,[163] included the outline of a program to work with regional, state, federal, and private sector partners to develop and eventually deploy promising zero and near-zero emission freight locomotive technologies. Supporting this plan, the SCAQMD has also adopted an advanced technology control measure in the

[162] Final 2012 Air Quality Management Plan, South Coast Air Quality Management District, December 2012.

[163] 2012-2035 RTP/SCS, SCAG, April 2012.

2012 AQMP that also calls for the development and deployment of zero and near-zero emission locomotive technologies. These strategies were also evaluated in the *Vision for Clean Air* described later in this section and will be further developed in the ARB's Sustainable Freight Initiative.

Natural Gas Locomotives

Several Class I railroads and locomotive manufacturers are experimenting with natural gas locomotive technology, which has the potential to reduce NO_x and PM, and to achieve small reductions in GHG as compared to diesel locomotives. Canadian National (CN) has retrofitted two of its existing diesel locomotives to run on natural gas and is testing the locomotives between Edmonton and Fort McMurray. In the longer-term, CN is working with locomotive manufacturer Electro-Motive Diesel, Westport Innovations, Inc., and Quebec gas distributor Gaz Metro to develop and test a new generation of natural gas-powered locomotives. In the U.S., BNSF recently announced that it will begin testing liquefied natural gas (LNG) locomotives later this year. The former Burlington Northern used natural gas locomotives in the 1980s and 1990s and BNSF tested LNG switch locomotives in Los Angeles until they reached the end of their useful life a few years ago. The abundance of new natural gas supplies and relatively low fuel cost is, in part, driving interest in this clean fuel option.

Tier 4 Locomotive Switchers

Switcher locomotives are often Tier 0 and pre-Tier 0 units that have been retired from line-haul operation. Rail yard emissions can be reduced by replacing these high-emission locomotives with Tier 4 switcher locomotives that rely on clean engines and exhaust after treatment to meet the most stringent EPA standards. Tier 4 switchers are scheduled to be introduced between 2015 and 2017. The costs of Tier 4 switcher locomotives have not been clearly established. The U.S. EPA estimates the cost of Tier 4 line-haul locomotives at $3 million each. While switcher locomotives have smaller engines and less power than line-hauls, the costs of each loco type are assumed to be comparable.

GenSet Switchers

UPRR and BNSF currently operate 84 GenSet switchers within the South Coast Air Basin.[164] GenSets are powered by a bank of three nonroad engines typically found in off-road heavy-duty equipment such as construction, mining, and cargo handling equipment. The U.S. EPA regulates nonroad engine emissions using a Tier structure more stringent than locomotive engine standards. Further, GenSets can achieve efficient operation at low loads by idling one or more engines, while single-engine locomotives are much less efficient at low loads.

Battery-Electric Locomotives

New technologies are being explored that would incorporate batteries into the design of a diesel-electric locomotive or use a battery "tender car" that would be connected to the locomotives to provide power to their electric motors. Batteries could be charged from electricity produced by the on-board diesel engines, or through regenerative braking. While these technologies are not commercially available today, they appear to have good potential for technological feasibility.

ARB's Sustainable Freight Transport Initiative

ARB is undertaking a "Sustainable Freight Transport Initiative" to outline a path to transform California's freight transport system to one that is more efficient and sustainable. According to ARB, the goals of the initiative are to:

- Move goods more efficiently with zero/near-zero emissions.

[164] This figure includes 13 "Green Goats" operated by UPRR. The "Green Goat" is a low-emission, diesel hybrid switcher locomotive manufactured by Railpower Technologies Corporation. It is powered by a single, low-emission diesel engine that powers a bank of batteries delivering motive power. By running the diesel engine at constant load and driving the locomotive off the battery power, lower idle emissions can be achieved.

- Transition to cleaner renewable transportation energy sources.
- Provide reliable velocity and expanded system capacity.
- Integrate with the national and international freight transportation system.
- Support healthy, livable communities.

The effort builds upon recent modeling and analysis work conducted by ARB in cooperation with the SCAQMD and the San Joaquin Valley Air Pollution Control District in *Vision for Clean Air: A Framework for Air Quality and Climate Planning*. The *Vision for Clean Air* includes examination of the potential opportunities for rail electrification and other options for moving to zero and near-zero emission technologies for freight rail. These will be further explored in the Sustainable ARB initiative over the next several years.

Climate Change Assessment

In 2008, through the Governor's Executive Order S-13-08, Caltrans was charged with preparing a preliminary assessment of the state transportation system vulnerability to sea-level rise.[165] Caltrans also developed a guidance on incorporating sea-level rise in Project Initiation Documents in May 2011.[166] In 2012, the National Research Council confirmed that tide gages show that global sea levels have risen about 7 inches during the 20th century, and recent satellite data show that the rate of sea-level rise is accelerating.[167] Scientists have continued to narrow predictions of climate change and scenarios that include sea-level rise, temperature rise, and precipitation variability. Both passenger and freight rail systems in California are susceptible to the impacts of a changing climate. This section outlines the potential effects that changes in storm activity, sea levels, temperature, and precipitation patterns could have on the rail network. California is climatically diverse, with bioregions that span the coastal marine to the Sonoran desert. Rail infrastructure resides in this variety of environments, and adaptation strategies may take on a very local approach, depending on the climatic environs and nature of the impact.

Projected Statewide Consequences of Climate Change and Possible Rail System Effects

Future projections of climate change for California have been synthesized by the 2009 California Climate Change Scenarios Assessment and the 2012 Reports on the Third Assessment from the California Climate Change Center, which examined changes in average temperatures, precipitation patterns, sea-level rise, and extreme events.[168] In California, the physical impacts on railroads from these changes include inundation, landslides, flooding, high winds, intense waves, storm surge, accelerated coastal

[165] Caltrans, *Vulnerability of Transportation Systems to Sea Level Rise: Preliminary Assessment*, submitted by Business, Transportation, and Housing Agency, February 2009.

[166] Caltrans, *Guidance on Incorporating Sea Level Rise for Use in the Planning and Development of Project Initiation Documents*, May 16, 2011.

[167] National Research Council. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. National Academies Press, 2012.

[168] Cayan, D., M. Tyree, M. Dettinger, H. Hidalgo, T. Das, E. Maurer, P. Peter Bromirski, N. Graham, and R. Flick, *Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment*, PIER Research Report, CEC-500-2009-014, Sacramento, California: California Energy Commission. 2009 and Reports on the Third Assessment from the California Climate Change Center, http://www.climatechange.ca.gov/adaptation/third_assessment/.

erosion, and change in construction material durability.[169] The following sections provide a summary of the potential consequences of climate change and the affiliated impacts to the state rail system.

Temperature

Current emissions model scenarios all project hotter conditions by the end of the century, with the business as usual scenario projecting a 1°C increase by 2100. Temperature levels are expected to rise more quickly and be higher by the end of the century under higher emissions scenarios.

Rail tracks are laid on top of and within a range of land surfaces, including cleared pavement right-of-way (ROW), solid earth, and a network of bridges and tunnels. Expected increases in temperature and temperature extremes may produce a range of new effects, including the following:

- More freeze-thaw conditions may occur, creating frost heaves and potholes on road and bridge surfaces and compromising rail beds.
- Longer periods of extreme heat can cause deformation of rail lines and derailments, or at a minimum, speed restrictions.[170] Buckled rails and heat kinks result from overheated rails that expand and cannot be contained by the material supporting the track.
- Higher heat can increase the cost to cool equipment, and equipment may even have to be redesigned if inadequate for increased temperature. Many urban rail systems are controlled by a system of complex electrical train control and communications systems that are sensitive to overheating with substations, signal rooms, and electrical boxes designed with ventilation and air conditioning.[171]
- Increased extreme heat can also strain overhead catenary wires, cause overheating of vehicles, and lead to failed air conditioning systems within the vehicle itself.[172]

An overall extension of extreme heat days can cause challenges for customer service and worker safety; passengers waiting on platforms in hot weather, or construction and maintenance crews working in cramped spaces in indoor vehicle maintenance facilities.[173]

Precipitation

Projected changes in precipitation are less clear-cut than for temperature. The seasonal pattern of cool, wet winters and hot, dry summers, typical of a Mediterranean climate, is likely to continue. However, the amount of precipitation is likely to change; and, where and how much rain and snow fall differs with emission scenarios.

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[169] Kahrl, F., and D. Roland-Holst, *Climate Change in California: Risk and Response*, University of California Press, 2012.

[170] National Research Council of the National Academies (NRC), *Potential Impacts of Climate Change on U.S. Transportation*, Transportation Research Board Special Report 290, Washington, D.C., 2008.

[171] Federal Transit Administration (FTA) Office of Budget and Policy, *Flooded Bus Barns and Buckled Rails: Public Transportation and Climate Change Adaptation*, FTA Report No. 0001, August 2011.

[172] Ibid.

[173] Ibid.

Expected changes in precipitation, both for averages and extremes, may produce a range of effects, including:

- The frequency, intensity, and duration of intense precipitation events contribute to design specifications for transportation infrastructure; and projected changes may necessitate design specification updates for rail beds and storm water drainage around rail tracks.[174]
- More intense precipitation may cause flooding of coastal rail lines. Low-lying bridge and tunnel entrances for rail and rail transit will be more susceptible to flooding, and thousands of culverts could be undersized for storm water flows.[175] In urban rail systems, during heavy rain storms, the volume of water can exceed the capacity of street storm water drains and systems, leaving no capacity to accommodate water pumped out of subway tunnels.[176]
- Changing precipitation may result in erosion and subsidence of rail beds, causing interruption or disruption of rail traffic. As a result, commuter and freight trains could experience extensive delays due to damaged or inundated tracks.[177]
- The changing precipitation (for instance, changes from frozen to liquid precipitation) may change runoff patterns, increasing the risk of floods, landslides, slope failures, and consequent damage to rail beds, especially rural rail beds in the winter and spring months.[178]

Sea-Level Rise

Sea levels have risen by about seven inches on the California coast in the past century.[179] Present sea-level rise projections suggest that global sea levels in the 21st century can be expected to be much higher. These projections are summarized in the State of California Sea-Level Rise Interim Guidance Document[180,181] and shown in Table 10.9.

[174] National Research Council of the National Academies (NRC), *Potential Impacts of Climate Change on U.S. Transportation*, Transportation Research Board Special Report 290, Washington, D.C., 2008.

[175] Ibid.

[176] FTA Office of Budget and Policy, Flooded Bus Barns and Buckled Rails: Public Transportation and Climate Change Adaptation, FTA Report No. 0001, August 2011.

[177] National Research Council of the National Academies (NRC), *Potential Impacts of Climate Change on U.S. Transportation*, Transportation Research Board Special Report 290, Washington, D.C., 2008.

[178] Ibid.

[179] National Research Council. Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future. National Academies Press, 2012.

[180] Ocean Protection Council (OPC), *State of California Sea-Level Rise Interim Guidance Document*, Ocean Protection Council. 2011.

[181] The recent sea-level rise publication from the NRC *titled Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (NRC 2012) revises some of the projections included in the OPC report and Caltrans guidance. Caltrans is working with other state agencies to determine specific sea-level rise values to incorporate into future planning and design documents. As new state guidance becomes available it will be important to incorporate that information into future planning assessments and update Caltrans guidance, as appropriate.

Table 10.9: Sea-Level Rise Projections

Mean Sea-Level Rise (Meters)	Year to Reach Projected Sea-Level Rise in High (A2) Scenario	Year to Reach Projected Sea-Level Rise in Low (B1) Scenario
0.0	2000	2000
0.5	2054	2057
1.0	2083	2098
1.4	2100	2125

Note: The State has agreed on two emissions scenarios (A2 and B1) from the Special Report on Emissions Scenarios from the Intergovernmental Panel on Climate Change (IPCC) representing a range of possible futures.[182]

Source: OPC, 2011.

Higher water levels may also increase coastal bluff erosion rates; change environmental characteristics that affect material durability (e.g., pH and chloride concentrations); lead to increased groundwater levels; and change sediment movement both along the shore and at estuaries and river mouths. These issues for existing and planned rail ROWs at the planning and project level will need to be addressed. Caltrans recently developed a project screening process to plan for the impact of different potential sea levels based on a facility's importance for statewide travel, community safety, and other factors.[183]

Extreme Events

Gradual changes in average temperature, precipitation, and sea level have been described. However, it is likely that the State will face a growing number of additional climate change-related extreme events, such as heat waves, wildfires, droughts, and floods.[184]

Region-Specific Impacts to the California State Rail Network

The following sections describe the potential effects to the state rail network for different regions of the State.

Northern California

This region, which includes Lassen, Modoc, Shasta, Siskiyou, and Trinity counties, is a sparsely settled inland region with both rugged mountains and thick forests.[185] Based on future projections, climate change impacts are likely to affect the rail system in this region by increased wildfire, reduced snowpack,

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[182] These are both scenarios evaluated by California for statewide climate assessments. Each scenario leads to a projection of possible emissions levels based on population growth rate, economic development, and other factors. Ultimately, the effect on climate change depends on the amount and the rate of accumulation of heat-trapping gases in the atmosphere that these scenarios suggest. Of the two options provided, the A2 scenario is the more realistic choice for decision-makers to use for climate adaptation planning. Generally, the B1 scenario might be most appropriately viewed as a version of a "best case" or "policy" scenario for emissions, while A2 is more of a status quo scenario incorporating incremental improvements. These two scenarios are represented above.

[183] California Department of Transportation, Climate Change Working Group, Guidance on Incorporating Sea Level Rise, May 19, 2011.

[184] Mastrandrea, M. D., C. Tebaldi, C. P. Snyder, S. H. Schneider, *Current and Future Impacts of Extreme Events in California*, PIER Research Report, CEC-500-2009-026-D, Sacramento, California: California Energy Commission, 2009.

[185] California Emergency Management Agency and California Natural Resources Agency, *California Climate Change Draft Adaptation Policy Guide*, April 2012.

and potential flooding. Wildfire risk is projected to increase by 6 to 14 times by the end of the century, and March snowpack is projected to disappear by the end of the century for most of the region.[186] Major rail routes in this region include the *Coast Starlight* (on the UPRR ROW), the Lake County Railroad (on the Modoc Northern Railroad), the Central Oregon and Pacific Railroad, and Yreka Western Railroad (on Kyle Railways).

In the case of wildfires, rail service must be rerouted or suspended; the main intercity routes in the north region do not have alternative routes and face significant disruption. In these cases, evacuation routes must include a multimodal strategy. In the case of reduced snowpack, increased saturation in soils can lead to landslides and rockslides for rail beds, posing potential damage and disruption to rail lines. Finally, intense precipitation could give rise to flooding events, which cause temporary inundation. Low-lying bridge and tunnel entrances for rail and rail transit could also be susceptible to flooding.

In addition, the areas along the coast including Sonoma, Mendocino, and Humboldt counties will also be impacted by extreme weather events and sea level rise with much of the rail infrastructure abutting the coastal areas. Although rail lines along the coast are not currently operational, the right-of-way and potential for future use still remains; and the infrastructure would be affected.

The Sacramento-San Joaquin Delta

The Sacramento-San Joaquin Delta region (Delta), once marshland, is the largest estuary in California, is the State's most important water supply and is very sensitive to climate forces. Climate changes are projected to more than double the risk of Delta flooding events by the middle of the century and cause an eight-fold increase of flooding by the end of the century.[187] A complex system of levees controls flooding and protects the region from periodic inundation, leaving it one of the most vulnerable areas when considering climate change. In fact, nearly 300,000 acres of the Delta are below sea level, and the railway networks rest on continuously subsiding land and soft peat soils, protected only by the aging levee system.[188]

Major rail lines such as the BNSF traverse the Delta, with segments below sea level which are protected by levees.[189] The ACE, *San Joaquin*, and *Capitol Corridor* routes are major commuter and intercity rail systems running through the Delta. Rising sea level and higher winter water flows are likely to pose adverse impacts to these railroads in the long term.

The San Francisco Bay Area

Sea-level rise is the biggest potential climate impact in the San Francisco Bay Area region (Bay Area). In fact, sea levels are projected to rise up to 55 inches by 2100 in this area, posing threat to both coastal and low-lying areas adjacent to the Bay. The number of acres vulnerable to flooding is expected to increase from 20 to 40 percent in some areas.[190]

In the Bay Area, there are railroads used by both passenger and freight trains (UPRR Coast Subdivision). There are also a number of major rail station facilities outfitted with platforms and amenities, such as the Emeryville and Jack London Square rail stations. There are also some major railyards and depots that

[186] Ibid.

[187] USGCRP, 2009, *Global Climate Change Impacts in the United States*, Karl, T. R., J. M. Melillo, and T. C. Peterson (eds.), United States Global Change Research Program. Cambridge University Press, New York, New York.

[188] Roos, M., Sea Level Rise: What is the Water Engineer to Do with all Those Projections? Sacramento, California: Department of Water Resources, Draft 7, October 2008.

[189] California Emergency Management Agency and California Natural Resources Agency, "California Climate Change Draft Adaptation Policy Guide, April 2012.

[190] Ibid.

provide storage, operations and maintenance (O&M), and control facilities for rail operations, such as the Amtrak Caltrans Oakland maintenance facility.

In the 2011 Adapting to Rising Tides study, the Oakland Jack London Square station was listed as an example of a rail asset potentially affected by sea-level rise. Other rail facilities affected by projected sea-level rise include the tracks leading to the UPRR Niles subdivision railroad pumps, the Amtrak Caltrans Oakland maintenance facility, BNSF International Gateway Intermodal Yard, and the Bay Area Rapid Transit line (Transbay Tube and Oakland Wye).[191]

Portions of the shoreline system currently protect these rail assets, but have the medium likelihood to be overtopped in a mid-century 2050 scenario,[192] and high likelihood to be overtopped at a 2100 scenario,[193] with an average overtopping depth of 2.6 feet and more than 20,000 feet of the shoreline overtopped.[194]

The Central Valley

The Central Valley is California's inland region defined by its status as one of the most productive agricultural regions in the country. In the north, it is defined partially by the Delta (see San Joaquin-Sacramento Delta). On the east it is bordered by the Sierra Nevada Mountains and on the west by the Coast Range. These two mountain ranges meet to form the southern border of the region. In this region, rail assets are vulnerable to climate impacts, such as temperature increases, reduced precipitation, and flooding.[195]

Key rail corridors connecting northern and southern California straddle the Central Valley. These include the UPRR and BNSF and the *San Joaquin* route, which uses both UPRR and BNSF tracks. Because of its proximity to the Delta, the flooding events have the potential to impact the northern section of the *San Joaquin* route. Temperature increases, in terms of both average temperatures and extremes, is another important consideration. In extreme heat conditions, rails can deteriorate, warp, and buckle, slowing vehicles at a minimum and requiring faster replacement.

Central and South Coast

The Central and South Coast will be susceptible to changes in temperature and precipitation, but the biggest threat will be sea-level rise on the coastal railways, including the *Pacific Surfliner* and *Coast Starlight*. Other local and regional rail lines, such as Metrolink, COASTER, and Sprinter route also span segments of the coastal areas at risk. In additional, rail systems serving the ports of San Diego, Long Beach, Los Angeles, and Hueneme could be affected by potential sea-level rise.

The South Coast is a particularly dense and urbanized region, and the rail system there is a critical asset for both passenger and goods movement. Sea-level rise and storm surges, along with weather-related landslides, could disrupt parallel, roadway transportation infrastructure, such as U.S. 101 and the Pacific Coast Highway, leaving railroads as the best potential alternative transportation mode in the area. Railroads also supported the tourism industry in the Central and South Coast by bringing tourists to coastal attractions. With passenger rail lines contributing to the high-value tourist industry for the State, the economic effects are substantial.[196]

[191] MTC, Caltrans and BCDC, Adapting to Rising Tides: Transportation Vulnerability and Risk Assessment Pilot Project Technical Report, November 2011.

[192] 16 inch+ 100-year Stillwater Elevation (SWEL) scenario.

[193] 55 inch+ 100-year Stillwater Elevation (SWEL) scenario.

[194] Ibid.

[195] California Emergency Management Agency and California Natural Resources Agency, *California Climate Change Draft Adaptation Policy Guide*, April 2012.

[196] Ibid.

Potential Adaptation Options for the California State Rail Network

Of the various climate stressors, sea-level rise and inland flooding pose the biggest climate impact to the California statewide rail network. Adaptation strategies should be coordinated with a wide range of stakeholders, including other state agencies (e.g., California Emergency Management Agency, California Natural Resources Agency); federal agencies such as the U.S. Army Corps of Engineers, and regional and local partners (MPOs, counties, and cities). Potential climate change adaptation strategies may include:

- Improving the drainage around rail stations and rail facilities, and increasing the capacity for storm water drainage.
- Retrofitting entrances to stations to minimize volume of floodwater that might inundate the station, and placing water-sensitive elements above a flood elevation.
- Elevating railroad tracks, rail beds, and/or station sites, but still maintaining adequate clearances.
- Conducting partial or temporary closures in extreme events, and providing alternative routes for goods movement.
- Constructing a permanent or temporary floodwall/barrier to manage tidal flows.
- Building levees and strengthening coastal armoring around key high-risk locations.
- Providing supportive hazard mitigation and emergency evacuation plans.
- In the most extreme cases, abandoning the asset or finding alternate routes for the coastal rail lines and at-risk stations under consideration.

Land Use and Community Effects

Intercity passenger rail, commuter rail, and freight rail services are important components of California's transportation system, providing benefits to the State that extend beyond the mobility of people and goods. Many land use and community effects are indirect and cumulative. For example, passenger rail ridership increases may generate demand for compact, mixed-use development near intercity passenger rail stations. Safe and efficient passenger rail services that are well-integrated with local transportation options may also contribute to community and greening benefits such as improved community livability, land use, safety, and public health. At the same time, increased rail operations can affect neighborhoods near rail lines, yards, and passenger stations.

The planned capital and operational improvements to California's intercity rail system can be grouped into the following categories:

- Rail line improvements improve the speed, capacity, reliability, and safety of a railroad corridor. Rail line improvements may include double-tracking, siding improvements, curve realignments, and panelized turnouts to increase capacity and improve safety and travel times. Community and greening benefits resulting from rail line improvements include reduced braking and acceleration noise, reduced idling on sidings, and enhanced safety.
- Grade separations, which typically may be considered a subset of rail line improvements, but in this case these improvements are so prevalent and such an important part of the rail improvement plan that they are noted separately. Grade separations improve the safety, speed, and reliability of rail service by eliminating dangerous at-grade crossings of rail and highway systems. More specifically, greening and community benefits of grade separation improvements include reduced braking and acceleration noise, less traffic disruption, reduced idling at crossing, enhanced safety, and removal of barriers and walls dividing the community.

- Bridges are planned along some corridors. Existing bridges require widening to accommodate expected passenger rail and freight rail activity, and new bridge construction is planned to accommodate proposed track extensions. Community and greening benefits resulting from these improvements include providing enhanced wildlife corridors/crossings, providing agriculture access, and may reduce barriers dividing communities.
- Building new rail corridors and constructing extensions to existing lines can provide services to new areas that were formerly only reachable by automobile. Examples include the Coachella Valley and proposed XpressWest corridors. Community and greening benefits resulting from rail line extensions include reduced emissions, encouraging nonmotorized transportation modes, and land use benefits supporting vibrant transit-oriented development (TOD).
- Signal and train control improvements provide integrated command, control, communications, and information systems for controlling train movements with safety, security, precision, and efficiency. Community and greening benefits resulting from these improvements include reduced braking and acceleration noise, reduced idling on sidings, enhanced safety, and less traffic disruption.
- Rolling stock improvements include purchasing new railcars/locomotives, and upgrading existing railcars/locomotives. In addition to improving the passenger experience (e.g., amenities, ride comfort), new rolling stock can offer tangible travel time benefits – for example trains with tilting capabilities can reduce or eliminate the need for trains to reduce speed on low-radius curves, allowing trains to maintain higher average speeds. Community and greening benefits resulting from these improvements include reduced braking and acceleration noise, expanded system capacity, and emission reductions from cleaner locomotives.
- Electrification converts a railroad corridor to be fully powered by electricity. Community and greening benefits resulting from electrification include reduced pollution and noise, which may have the further effect of encouraging TOD along the rail line.
- Station and station access improvements may include providing new or improved station platforms; enhanced pedestrian and bike facilities; and customer amenities, such as additional parking, shuttle service to enhance access to the station, electronic signage with real-time arrival and departure information, and enhanced lighting. Community and greening benefits resulting from station improvements include enhanced safety, mitigation of issues related to noise and emissions from locomotives, land use benefits supporting vibrant TOD communities, and promotion of multimodal transportation options such as bicycling or pedestrian activity. These improvements may also provide public health benefits and improve broader measures of health throughout the community.
- Freight terminal improvements include new and expanded freight rail yards and intermodal facilities. Greening benefits of these projects potentially include noise and air pollution mitigation, diversion of trucks from the highway system, and improved efficiency and safety.

The way these benefits accrue to users and non-users of the rail system differs somewhat by rail service type. Following an initial discussion of potential negative effects, potential benefits are described in more detail for passenger rail (both intercity and commuter) and the freight rail system.

Community Impacts from Rail Operations

Rail system operations and maintenance facilities can negatively affect the communities in which they operate. For example, freight facilities such as intermodal centers, rail yards, maintenance facilities, and rail tracks can impact communities by exposing nearby residents to air toxics, hazardous materials, light and noise pollution, eyesores, and other unpleasant or potentially harmful side effects. Some of these impacts include:

- Noise pollution, which is described by the U.S. EPA as "unwanted or disturbing sound." Noise pollution can contribute to significant public health impacts, including annoyance, sleep disturbance, reduced productivity, hearing loss and tinnitus, cardiovascular disease, and effects on the immune system, among others.[197] Noise-Induced Hearing Loss (NIHL) is the most common health impact,[198] though research has shown that there are numerous other negative impacts on public health. Noise pollution associated with railroad activities can occur at a single source (i.e., rail yard or intermodal center) or from the use of train whistles, horns, and train movement along rail tracks.
- Light pollution, which causes such adverse health outcomes as headaches, sleep deprivation and associated health effects, decreased mental capacity, a compromised immune system, depression, hypertension, and weight gain.[199] Light pollution also can have environmental consequences, such as disrupting delicate ecosystems by confusing animal navigation or changing predator-prey relationships.[200] It also can waste energy if not being used for an active and necessary purpose. Light pollution associated with railroad activities can include station area or crossing lighting and the lights from the moving locomotives themselves.

Communities surrounding passenger and freight rail infrastructure can be disproportionately impacted by poor air quality and pollutant emissions. In fact, idling, switching, and slow moving trains within rail yards can contribute to elevated levels of CO, NO_x, VOC, and PM. Over time, elevated air pollution levels have been shown to contribute to increased risk of asthma and other respiratory diseases, cancers, and other ailments.[201]

Intercity and Commuter Passenger Rail Benefits

Passenger rail includes a complex system of intercity and commuter rail to connect cities across the State. Intercity passenger rail in California serves metropolitan and rural areas, and provides service between regions in the State. Commuter rail service is a key component of the State's integrated rail system serving local travel and providing regional connections to and from intercity passenger rail service. Safe and efficient intercity and commuter passenger rail services that are well-integrated with local transportation options can contribute to community and greening benefits to users and non-users of the system in regards to community livability, land use, safety, and public health.

Community and green benefits for intercity passenger rail users and non-users from the various capital and operational improvement types, along with project examples, are summarized in Table 10.10.

As with the intercity passenger rail system, community and greening benefits of commuter rail service improvements may be valued differently for users and non-users of the system. Benefits resulting from commuter rail system improvements also extend beyond better transportation service provided to users of the system.

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[197] http://www.epa.gov/air/noise.html.

[198] http://www.epa.gov/air/noise.html.

[199] *Atlanta Regional Freight Mobility Plan: Community & Environmental Impact Scan and Assessment:*http://www.atlantaregional.com/transportation/freight/Freight-Mobility_Plan.

[200] Ibid.

[201] http://www.arb.ca.gov/railyard/railyard.htm.

Generally, the capital and operation improvements to the State's commuter rail systems have the potential to impact local road congestion; alternate transportation options (nonmotorized transportation, transit, etc.); land use patterns; community livability; the environment; and public health. Specific benefits that may be enjoyed by commuter rail users and non-users are summarized in Table 10.11.

For users, improved passenger rail service that operates more safely, comfortably, and efficiently will enhance personal mobility and offer travelers greater diversity of transportation options. Capital and operational improvements, such as grade separation projects, double-track projects, station improvements, and service frequency improvements, are examples of projects that will improve the attractiveness and viability of rail travel as the preferred mode for many intercity and commuter trips. Rail station improvements that enhance pedestrian and bike facilities and amenities and increase TOD around station areas will be important factors encouraging users to use active transportation modes to access stations. Users of passenger rail may enjoy economic benefits associated with a reduced travel cost compared to automobile ownership/travel. Providing more varied and affordable travel modes also mitigates transportation equity and environmental justice issues for users of the passenger rail system.

Passenger rail improvements may bring about community and green benefits for non-users in several ways. Shifting the rail system to a cleaner energy source through projects like electrification will reduce GHG emissions and diesel-generated criteria air pollutants from system operations. Increasing the appeal of rail travel through grade separation projects, double-track projects, station improvements, and service frequency improvements will encourage people to shift from driving single-occupancy vehicles to comparatively cleaner and safer rail travel. Non-users will also enjoy reduced congestion on roadways as drivers shift to train travel. That mode shift will translate to congestion relief for the non-users along parallel highway corridors. TODs supported by the commuter rail services facilitate concentrations of homes, shops, and jobs nearby rail stations. Thus, users and non-users may enjoy access to vibrant TOD communities with diverse and accessible recreational and employment opportunities. Benefits may also be enjoyed by non-users as more compact development presents more opportunities to integrate walking and biking for mobility purposes.

Improved passenger rail service also supports development of livable communities. The *Vision California* scenario modeling project[202] undertaken by the State of California found significant economic, fiscal, health, water and environmental co-benefits from the State, regions, and localities choosing to grow through TOD and infill near existing and future local and intercity rail service. Households could save over $7,250 per year in auto costs and utility bills. Local governments could save more than $47 billion in infrastructure costs (water pipes, sewers, roads, and utility lines) while gaining over $120 billion in new revenue. Reduced health incidences would save approximately $1.9 billion a year by 2035. By 2050 water saving would total 19 million acre-feet. Over 3,700 square miles less farmland, open space, and recreation areas would be lost to development, and 75 million metric tons of less GHG would be created by 2050. These indirect benefits from smarter growth and development choices would be above and beyond the direct user and non-user benefits discussed in section 10.2.1.

[202] Authority and Strategic Growth Council funded project. http://www.visioncalifornia.org.

Table 10.10: Community and Greening Benefits from Intercity Passenger Rail Improvements

Improvements by Type	Example	Greening Benefits for Rail System Users	Greening Benefits for Non-Users
Rail Line	Add double-track and siding improvements from Sacramento to Oakland (*Capitol Corridor*)	Improves safety by reducing conflicts between trains. Reduces noise by expediting train flows. Reduces idling by allowing trains to pass one another.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces emissions through reduced vehicle idling and smoother operations.
Grade Separation	Los Angeles Avenue Grade Separation in Ventura-Burbank (*Pacific Surfliner*)	Improves safety by reducing conflicts between trains and other vehicles.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces traffic congestion and improves local traffic flow by reducing vehicular delays at crossings. Reduces emissions through reduced vehicle idling at crossings. Enhances viable multimodal/active transportation options by enhancing community connectivity and the safety of crossings.
Bridge	New bridge construction associated with double-tracking segments of the *Pacific Surfliner* route	Improves safety by facilitating double-tracking and system connectivity that reduces conflicts between trains. Reduces noise through development of modern trestles and track improvements. Reduces idling and improves train speed.	Improves safety by facilitating double-tracking and system connectivity that reduces conflicts between trains. Reduces noise, idling, and emissions through system efficiency gains. Reduces traffic disruption by providing more grade separations. Provides wildlife corridors and agricultural access beneath the rail line.

Table 10.10: Community and Greening Benefits from Intercity Passenger Rail Improvements (continued)

Improvements by Type	Example	Greening Benefits for Rail System Users	Greening Benefits for Non-Users
New Rail Corridor Construction	Coachella Valley and Xpress West routes California HSR	Enhances connectivity by providing additional transportation options to more destinations. Increases transportation options available to rail system users with development of new stations.	Supports TOD around new stations with diverse transportation options. Reduces emissions and automobile congestion as car trips are replaced by rail trips. Enhances livability as communities develop around new rail stations with diverse transportation options. Enhances multimodal/active transportation options in dense developments surrounding the new rail station.
Signal and Train Control	Bakersfield – Port Chicago Positive Train Control for San Joaquin Valley (*San Joaquin* route)	Improves safety by reducing conflicts between trains. Reduces noise by smoothing train flows.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by smoothing train flows through communities.
Rolling Stock	Purchase modern tilting intercity rolling stock (*Coast Daylight*)	Reduces noise and improves passenger experience through improved railcar design.	Reduces noise affecting neighboring communities through improved railcar design.
Station and Station Access	Construct new stations in Pajaro, Castroville, Soledad, and King City; and upgrade station in Salinas (*Coast Daylight* and *Capitol Corridor Extension* to Salinas)	Improves safety through improved lighting and platform design. Enhances viable multimodal/active transportation options available to rail system users as more destinations are accessible near new rail stations.	Reduces noise impacts to neighboring communities from passing trains. Supports TOD and vibrant communities near new rail stations. Reduces emissions and automobile congestion as car trips are replaced by rail trips. Enhances community connectivity. Enhances livability as dense, vibrant communities develop around new rail stations with additional transportation options.

Source: AECOM and Cambridge Systematics, Inc., 2013.

Table 10.11: Community and Greening Benefits Commuter Rail Service Improvements

Improvements by Type	Example	Greening Benefits for Rail System Users	Greening Benefits for Non-Users
Rail Line	Metrolink, COASTER, Caltrain	Improves safety by reducing conflicts between trains. Reduces noise by expediting train flows. Reduces idling by allowing trains to pass one another.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces emissions through reduced vehicle idling and smoother operations.
Grade Separation	Del Mar Tunnel	Improves safety by reducing conflicts between trains and other vehicles. Reduces noise by expediting train flows.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces traffic congestion and improves local traffic flow by reducing vehicular delays at crossings. Reduces emissions through reduced vehicle idling at crossings. Enhances community connectivity by removing at-grade tracks that can divide the community. Enhances viable multimodal/active transportation options by enhancing community connectivity and the safety of crossings.
New Rail Corridor Construction and Extensions	Perris Valley Line Extension (Metrolink)	Enhances connectivity by providing additional transportation options to more destinations. Increases transportation options available to rail system users with development of new stations.	Supports TOD around new stations with diverse transportation options. Reduces emissions and automobile congestion as car trips to more destinations are replaced by rail trips. Enhances livability as dense, vibrant communities develop around new rail stations with diverse transportation options. Enhances viable multimodal/active transportation options in dense developments surrounding the new rail station.

Table 10.11: Community and Greening Benefits Commuter Rail Service Improvements (continued)

Improvements by Type	Example	Greening Benefits for Rail System Users	Greening Benefits for Non-Users
Signal and Train Control	Positive Train Control and Train Control and Operations Support Facility (Metrolink)	Improves safety by reducing conflicts between trains. Reduces noise from braking and acceleration by expediting train flows.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces idling on sidings.
Rolling Stock	Purchase modern tilting intercity rolling stock (*Coast Daylight*) Rebuild up to 30 locomotives and improve up to 55 rail cars (Metrolink)	Improves safety for passengers in the event of an incident through improved railcar design. Reduces noise and improves passenger experience through improved railcar design.	Reduces noise affecting neighboring communities through improved railcar design.
Electrification	Caltrain	Reduces noise, which improves passenger experience, by expediting train flows with quieter technology.	Reduces noise by expediting train flows through communities with quieter technology. Reduces emissions through the use of a cleaner fuel source. Encourages TOD near rail stations in areas more attractive to households and businesses due to reduced noise and emissions.
Station and Station Access	Construct new stations in Pajaro, Castroville, Soledad, and King City, and upgrade station in Salinas (*Coast Daylight* and *Capitol Corridor* Extension to Salinas); upgrade Bayshore Station (Caltrain);and construct San Diego Convention Center Station and San Diego Airport Intermodal Transportation Center (COASTER)	Improves safety in the areas of personal safety through improved lighting and pedestrian safety enhancements on platforms. Increases transportation options available to rail system users with development of new stations. Enhances viable multimodal/active transportation options available to rail system users as more destinations are accessible near new rail stations.	Reduces noise impacts to neighboring communities from passing trains. Supports TOD and vibrant communities near new rail stations. Reduces emissions and automobile congestion as car trips are replaced by rail trips. Enhances livability as communities develop around new rail stations with additional transportation options. Reduces emissions and automobile congestion as car trips are replaced by rail trips. Enhances multimodal/active transportation options with more diverse transportation options available to TOD communities located nearby the rail station.

Source: AECOM and Cambridge Systematics, Inc., 2013.

Freight Rail Benefits

Freight rail operations in California help link the State to both domestic and international markets. The freight railroad system in California consists of an expansive network of Class I railroads, short line railroads, and switching yards/terminals stretching more than 5,000 miles across the State. Safe and efficient freight rail services that are well-integrated with the State's transportation system can contribute to community and greening benefits to users and non-users of the system in the areas of safety, job creation, noise reduction, the environment, and public health.

For planning analysis, benefits to users and non-users of the freight rail system will depend on the varying perspectives and freight knowledge of stakeholders and whether they are more focused on the impacts on track, the rolling stock, or the freight facilities, for example. Community and green benefits for users and non-users from the different types of projects, along with examples of the various project types, are summarized in Table 10.12.

For users of the freight rail system (i.e., shippers), service and infrastructure improvements that allow the system to operate more safely and efficiently will reduce freight transportation costs. Rail grade separation projects, double-track projects, and freight facility improvements are examples of projects that will improve the reliability and economic competitiveness of freight rail travel as a preferred mode for freight trips.

Freight rail improvements may also bring about community and green benefits for non-users in several ways. For example, the GenSet technology (short for "Generator Set" or sets of engines turning a generator) replaces the large diesel engine and generator found in almost all existing freight locomotives with two or three much smaller diesel engines and generators providing fuel consumption reduction and improved air quality benefits. Shifting the rail system to a cleaner energy source through projects that expand the use of GenSet Locomotives at switching yards, implement idling limit devices, and facilitate eventually electrification will reduce GHG emissions and benefit public health in communities located near rail lines terminals. However, for the electrification of passenger and freight rail to occur, enough electricity must be available in California's power grid. Enhancing freight rail movement through grade separation projects will improve safety and reduce congestion and the associated emissions from vehicle idling, reduce conflicts between trains traffic within neighboring communities, and improve community connectivity by removing divisive at-grade tracks. Rail line improvements may reduce noise along freight corridors, and new freight intermodal terminals will create jobs.

Table 10.12: Community and Greening Benefits Freight Rail Service Improvements

Improvements by Type	Example	Greening Benefits for Rail System Users	Greening Benefits for Non-Users
Rail line	Richmond Rail Connector to allow BNSF trains access to UPRR Martinez Sub Tehachapi Trade Corridor Rail Improvement Project	Improves safety by reducing conflicts between trains. Allows freight trains to avoid travel through the City of Richmond. Reduces time in transit by expediting train flows and reducing idling.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces emissions through reduced vehicle idling and smoother operations.
Grade Separation	Improvements for port access in southern California 7th Street Grade Crossing in Alameda County	Improves safety by reducing conflicts between trains and other vehicles.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise by expediting train flows through communities. Reduces traffic congestion and improves local traffic flow by reducing vehicular delays at crossings. Reduces emissions result from reduced vehicle idling at crossings. Enhances community connectivity by removing at-grade tracks that can divide the community.
Signal and Train Control	Ongoing signal improvement projects on Class I rail lines	Improves safety and reliability by reducing conflicts between trains. Reduces fuel cost by smoothing train flows.	Improves safety by reducing conflicts between trains and neighboring communities. Reduces noise and emissions by expediting train flows through communities.
Rolling stock	Genset switchers, modernized reefers, expanded use of well cars for intermodal shipments	Improves reliability and efficiency by modernizing rail cars.	Reduces noise affecting neighboring communities through improved railcar design.
Intermodal Terminals	SCIG and ICTF expansion	Improves safety through improved design. Improves efficiency and saves fuel by using more efficient yard equipment and reducing the time and movements required to build trains.	Reduces emissions by implementing low emission yard equipment (including electric cranes) and reducing truck VMT traveling from ports to off-dock yards.

Source: AECOM and Cambridge Systematics, Inc., 2013.

10.2 Rail Funding and Financing

This section describes potential funding sources for conventional and high-speed intercity passenger rail and freight rail.

10.2.1 Intercity Passenger Rail Funding

Intercity passenger rail funding is primarily provided by state and federal sources, but also includes local and private funding sources. The following sections provide further information on these funding sources; however, the amount of funding available for intercity passenger rail from each of the sources is uncertain. Given the total amount of funding available from each source, its availability for use on intercity passenger rail projects, and historic uses, they can be roughly categorized based on their potential to provide revenue for intercity passenger rail projects (see Table 10.13). Several of the funding sources are temporary programs, including the Federal High-Speed Intercity Passenger Rail Program, Federal TIGER Grants, State Proposition 1A, and State Proposition 1B.

An important recent development was the enactment of California State Senate Bill (SB) 1029 (Committee 2012), which appropriated $4.73 billion of Proposition 1A funds and $3.29 billion of Federal High-Speed Intercity Passenger Rail (HSIPR) Program funds towards IOS construction plus several intercity and commuter rail projects statewide. Further details on the funding breakout are described in the following sections on Proposition 1A and the High-Speed Intercity Passenger Rail Program.

Table 10.13: Potential Intercity Passenger Rail Project Funding Sources

High Potential Funding Capacity (potentially on the order of $100 million per year or more)
Federal High-Speed Intercity Passenger Rail Program
State Public Transportation Account
State Proposition 1A
Federal Amtrak Funds
Modest Potential Funding Capacity (potentially on the order of tens of millions of dollars per year)
State Highway Account
State Section 190 Grade Separation Program
Federal TIGER Grants
Federal MAP-21
Local Funds
Private Funds
Funding Capacity Unknown or Highly Variable
State Cap-and-Trade Program Funds
State General Funds
State Traffic Congestion Relief Fund
Other Federal Railroad Administration (FRA) Grants
Funding Capacity Mostly Exhausted
State Proposition 1B
State Proposition 108
State Proposition 116

Source: Cambridge Systematics, Inc., 2013.

State Funding Sources

Public Transportation Account

The Public Transportation Account (PTA) is a significant source of intercity passenger rail operating and capital funds. Proposition 116 designated the PTA as a trust fund to be used "only for transportation planning and mass transportation purposes" (Public Utilities Code Section 99310.5). PTA is the only state funding source for intercity passenger rail operations.

Historically, PTA revenues were derived primarily from varying formulas on sales tax on diesel and gasoline and state excise tax on gasoline. Following passage of Assembly Bill (AB) 6 (Evans 2010) SB 70 (Committee 2010), and AB 105 (Committee 2011), collectively known as the Fuel Tax Swap of 2010, the only remaining source of revenue for the PTA is the sales tax on diesel fuel. The passage of AB 105 also implemented a new sales tax on diesel of 2.17 percent, in addition to the 4.75 percent sales tax for state fiscal year (SFY) 2012-13.

The January 2012 Governor's proposed budget for SFY 2012-13 estimated available PTA resources to be $1,235,924,000 (see Table 10.14), including $643,393,000 in expected revenue from the diesel sales tax; $196,101,000 in reserves; $370,641,000 from the Federal Trust Fund; and deposits from several other accounts. The federal funds include $34,988,000 for state operations; $192,805,000 for local assistance; and $142,848,000 for capital outlays.

PTA funds are apportioned between state and local programs in accordance with Proposition 22, passed by voters in 2010. At the state level, these funds help support intercity passenger rail operations, and also help fund the State Transportation Improvement Program (STIP). Locally, funding goes toward improvements in county and city mass transit capital purchases, and operation and maintenance (Public Utilities Code Sections 99312-99315).

Proposition 22 also prohibits PTA revenues from being permanently or temporarily loaned to the state General Fund or any other state fund, including for cash-flow purposes.

State Highway Account

The bulk of State Highway Account (SHA) funding supports the state highway system, but a portion of the account also supports rail projects by way of the STIP. The SHA receives its funds from state gasoline and diesel fuel taxes, state vehicle weight fees, and reimbursements from the Federal Trust Fund for Federal-Aid projects.

Table 10.14: Estimated Fiscal Year 2012/2013 Public Transportation Account Resources

Resources	Amount
Diesel Sales Tax	$643,393,000
Investment Income	$713,000
Reserves	$196,101,000
State Highway Account	$25,046,000
Aeronautics Account	$30,000
Federal Trust Fund	$370,641,000
Total	$1,235,924,000

Source: 2012-2013 California Transportation Financing Package, Chart D, Caltrans, April 16, 2012.

Use of the state-generated portion of the SHA is governed by Article XIX of the State Constitution that allows the funds to be used for research, planning, construction, improvement, maintenance, and operation of public streets and highways. Additionally, the SHA can be used for the research, planning, construction, and improvement of public mass transit guide ways (which includes intercity, commuter and urban rail, and electric trolley bus services) and their fixed facilities. The SHA cannot be used for mass transit vehicle acquisition or maintenance, or mass transit operating costs.

The STIP consists of two broad programs: 1) the Regional Transportation Improvement Program (RTIP), funded from 75 percent of new STIP funding; and 2) the Interregional Transportation Improvement Program (ITIP), funded from 25 percent of new STIP funding. The RTIP is further subdivided by formula into County Shares. County shares are available solely for projects nominated by regions in their RTIPs. The Caltrans ITIP will nominate only projects for the interregional program. Under restricted circumstances, an RTIP may also recommend a project for funding from the interregional share.

The STIP programming cycle begins with the release of a proposed fund estimate in July of odd-numbered years, followed by California Transportation Commission (CTC) adoption of the fund estimate in August (odd years). The fund estimate serves to identify the amount of new funds available for the programming of transportation projects. Once the fund estimate is adopted, Caltrans and the regional planning agencies prepare transportation improvement plans for submittal by December 15th (odd years). Caltrans prepares the Interregional Transportation Improvement Plan (ITIP) and regional agencies prepare Regional Transportation Improvement Plans (RTIPs). The STIP is adopted by the CTC by April (even years).

The 1989 Blueprint Legislation allowed intercity passenger rail projects to compete for SHA funds in the STIP. SB 45 (Kopp 1997) reserved a minimum of nine percent of the ITIP for intercity passenger rail and grade separation projects. SB 45 also allowed intercity passenger rail projects to be programmed in the RTIP.

The latest STIP was adopted on March 28, 2012. It covers SFY 2012-13 through 2016/17. The 2012 STIP adds two new years of programming, SFY 2015-16 and SFY 2016-17, with $1.483 billion in new STIP funding capacity. Added to the base of programming in the prior STIP, the new STIP will program about $3.54 billion. However, the 2012 STIP Fund Estimate indicates a negative program capacity (-$542 million) for the PTA over the Fund Estimate period, starting in SFY 2012-13. Due to the loss of PTA funding, the STIP is over programmed in SFY 2012-13 by about $170 million. Current projects have been delayed, and the transit projects programmed in the STIP will have to be delivered with other funds or unprogrammed. The total STIP program of $3.54 billion consists of $761 million for SFY 2012-13, $633 million for SFY 2013-14, $683 million for SFY 2014-15, $733 million for SFY 2015-16, and $733 million for SFY 2016-17.

Transportation Investment Fund

Proposition 42, which was passed by voters in March 2002 and added Article XIXB to the California Constitution, made permanent the transfer of sales tax on gasoline to the Transportation Investment Fund (TIF). However, with the elimination of sales tax on gasoline due to the Fuel Tax Swap of 2010, the revenue stream for the TIF was eliminated.

Proposition 108 – The Passenger Rail and Clean Air Bond Act of 1990

The 1989 Blueprint Legislation authorized three $1 billion rail bond measures to be placed on the ballot in 1990, 1992, and 1994. In 1990, voters approved the first $1 billion rail bond measure, The Passenger Rail and Clean Air Bond Act of 1990, but did not approve the subsequent two bond measures in 1992 and 1994. To date, almost all bond proceeds have been used to fund new rail projects and improvements to existing systems, including $225 million for intercity passenger rail capital projects.

Proposition 116 – Clean Air and Transportation Improvement Act of 1990

Proposition 116 provided a $1.99 billion one-time source of funding for rail and transit projects. Proposition 116 contained about $382 million for intercity passenger rail capital projects, $1.37 billion for urban and commuter rail projects, and $235 million for other transit and transit-related projects. Only a small portion (approximately $4 million) of the overall amount remains to be allocated.

Proposition 1A – Safe, Reliable, High-Speed, Passenger Train Bond Act for the 21st Century

Proposition 1A, approved by voters in November 2008, authorized the issuance of $9.95 billion in general obligation bonds to fund HSR construction. Of the $9.95 billion in proceeds, $9.00 billion will fund HSR planning, engineering, ROW acquisition, and construction. Proposition 1A funds are not allowed to be used on rail maintenance or operating costs.

The remaining $950 million will be allocated by the CTC through the High-Speed Passenger Train Bond (HSPTB) Program to eligible recipients for capital improvements to intercity and commuter rail lines, and urban rail systems that provide direct connectivity to the HSR system and its facilities, or that are part of HSR construction (Section 2704.095 of the Streets and Highways Code).

The HSPTB Program consists of a $760 million Commuter and Urban Rail Program and a $190 million Intercity Rail Program. The Commuter and Urban Rail Program funds are divided by formula among Alameda Corridor Express (ACE), Los Angeles County Metropolitan Transportation Authority, North County Transit District (NCTD), Caltrain, Sacramento Regional Transit, San Diego Trolley, Bay Area Rapid Transit District (BART), San Francisco MUNI, Santa Clara Valley Transportation Authority, and SCRRA.

The CTC has adopted a Prop 1A program totaling $931 million, including $744.8 million of Commuter and Urban Rail Program projects, and $186.2 million of Intercity Rail Program projects.

SB 1029 appropriated $4.73 billion of Proposition 1A funds (from the High-Speed Passenger Train Fund) towards constructing the first construction section of the IOS plus several intercity and commuter rail projects statewide. This funding is divided as follows:

- $2.61 billion to construct the first construction section of the IOS.
- $124 million to acquire HSR ROW.
- $80 million for HSR design work.
- $819 million to implement “capital improvement projects to intercity and commuter rail lines and urban rail systems that provide direct connectivity to the HSR system and its facilities.”
- $1.1 billion to implement “early improvement projects in the Phase 1 Blended System consistent with the Metropolitan Transportation Commission Memorandum of Understanding (approved by the Authority on April 12, 2012 in Resolution 12-11) and the Southern California Memorandum of Understanding (approved by the Authority on April 12, 2012 in Resolution 12-10).” These two funding sources are available for encumbrance or liquidation until June 30, 2018.

Example projects in northern California being funded by these last two sources include the San Francisco MUNI Central Subway, Caltrain electrification, Caltrain advanced signal system, BART Millbrae station track improvements, BART car purchase, and *Capitol Corridor* track improvement. Example projects in southern California include the Los Angeles Metro Regional Connector Transit Corridor, SCRRA new or improved locomotives and cars, San Diego Trolley Blue Line improvements, and NCTD Positive Train Control.

Proposition 1B – Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006

Proposition 1B, or the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act, was approved by the voters in November 2006 and authorized the issuance of $19.9 billion in the state general obligation bonds for specified transportation purposes, including transit and passenger rail improvements, highway-railroad grade separation, and crossing improvement projects. Proposition 1B included $3.6 billion for local transit services and $400 million for intercity passenger rail improvements.

Several sections of Proposition 1B directly impact the intercity rail program. They include:

- The Public Transportation Modernization, Improvement, and Service Enhancement Account. This is the only fund under Proposition 1B specifically reserved for intercity passenger rail projects. Of the $400 million available for intercity passenger rail improvements, $125 million is reserved for intercity passenger rail equipment. Through March 2013, a total of $188.7 million has been allocated by the CTC, including $42 million for equipment.
- Highway-Railroad Crossing Safety Account (HRCSA). Proposition 1B includes $250 million for high-priority grade separation and railroad crossing safety improvements pursuant to Chapter 10 (Sections 2450 through 2461) of Division 3 of the Streets and Highways Code through March 2013. The CTC has allocated $213.5 million to supplement the Section 190 Grade Separation Program, but with an additional requirement that a dollar for dollar match of nonstate funds be provided for each project receiving HRCSA funding. The CTC allocated $100 million of HRCSA funds to high-priority railroad crossing improvements (including grade separation projects) that are not part of the Section 190 process. The allocation of these funds is made in consultation with the Authority.

State Section 190 Grade Separation Program

The Section 190 Grade Separation Program is a state-funded safety program that provides for the elimination of existing at-grade railroad crossings. Most projects funded under this program are grade separations. However, consolidations or track removal projects that eliminate grade crossings can also be considered. Eligible projects are identified on the basis of the priority list established by the California Public Utilities Commission (PUC). This list is developed every two years and becomes effective in July of even numbered years. Local agencies, railroad companies, or Caltrans can nominate projects. Nominated projects are prioritized on the basis of a formula that incorporates such factors as traffic volumes (both roadway and railroad), projected state contribution, accident history, and physical conditions at the crossing to be eliminated.

Once the PUC list has been established, Caltrans administers the program. Section 190 of the California Streets and Highways Code requires the State's annual budget to include $15 million for funding these projects. The maximum funding per project is $5 million annually. In general, the state contribution for any one project is limited to 80 percent or $5 million, whichever is less.

Cap-and-Trade Program Funds

State legislation, AB 32 (Nunez 2006) mandates a reduction of statewide GHG emissions to 1990 levels by 2020. In accordance with that law, California has implemented a market-based, cap-and-trade program. Funds from the program can be used to further the purposes of AB 32, including development and construction of the California HSR system.

To create a framework for spending the revenue, on September 30, 2012, the Governor signed AB 1532 (Perez) and SB 535 (de Leon).

AB 1532 creates the Greenhouse Gas Reduction Account within the Air Pollution Control Fund, requires fees collected from polluters through the cap-and-trade program be deposited in this account, and requires the money to be granted to programs and activities that achieve feasible, cost-effective GHG emission reductions in the State through investments that also maximize economic, environmental, and public health benefits. AB 1532 establishes a public process and framework for allocating monies in the Greenhouse Gas Reduction Account, and requires the Department of Finance to provide three-year investment plans for program revenues, beginning with the SFY 2013-14 May Budget Revision.

SB 535 requires that at least 10 percent of program revenues be used for projects located within disadvantaged communities, and at least 25 percent be spent on projects that benefit disadvantaged areas disproportionately affected by pollution. These communities are to be identified by the California Environmental Protection Agency.

The Governor's SFY 2013-14 Budget Summary recommends that because transportation is the single largest contributor to GHG emissions in California, cap-and-trade funds should make reducing transportation emissions a top priority, including mass transit, HSR, electrification of heavy duty and light duty vehicles, sustainable communities, and electrification and energy projects that complement HSR.

Federal Funding Sources

High-Speed Intercity Passenger Rail Program

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established the framework for the High-Speed Intercity Passenger Rail Program (HSIPR). In February 2009, President Obama signed the American Recovery and Reinvestment Act of 2009 (ARRA) into law. ARRA appropriated $8 billion of funding for HSIPR. Since then, an additional $2.1 billion of funding has been provided through annual appropriations, bringing total HSIPR program funding to $10.1 billion. The HSIPR is administered by the FRA.

California has been a major recipient of HSIPR funds, receiving a total of $4.24 billion, or 42 percent of total program funding. Of the $4.24 billion, $3.90 billion have been awarded to the Authority for its HSR system. The remaining $350 million have been awarded to Caltrans for various projects, including the following:

- $68 million awarded to purchase 15 passenger rail cars and four locomotives for use on the *Pacific Surfliner*, *San Joaquin*, and *Capitol Corridor* routes.
- $100 million for new rolling stock for the *Pacific Surfliner* and *San Joaquin* routes.
- $38.3 million to add a third main track on a portion of the *Pacific Surfliner* route.
- $24.9 million and $13.5 million to implement Positive Train Control on the *Pacific Surfliner* route between San Diego and Moorpark.
- $18 million for improvements to San Jose Diridon Station.
- $13.2 million to overhaul eight locomotives.

SB 1029, passed by the California State Legislature and signed by the Governor in July 2012, appropriated $3.29 billion of federal HSIPR funds (from the Federal Trust Fund) for the high-speed train system. The funding was divided as follows:

- $3.24 billion to construct the first construction section of the IOS.
- $28 million to acquire HSR ROW.
- $20 million for HSR design work.

Transportation Investment Generating Economic Recovery (TIGER) Grants

The Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant program provides funds for road, rail, transit, and port projects. The grants are awarded on a competitive basis for projects that have a significant impact on the country as a whole, a metropolitan area, or a region. There have been four rounds of TIGER grants. Table 10.15 shows the amount of funding for each round and the number of projects funded under each round, nationwide. The original TIGER I program was authorized and implemented as part of ARRA. In subsequent fiscal years, Congress appropriated new funding for TIGER II, TIGER 2011, and TIGER III.

While the majority of TIGER funding has been for roadway, bridge, urban transit, freight rail, and port projects, some funding has benefited intercity passenger rail. These include $83 million in TIGER I to upgrade Penn Station in New York City; $15 million in TIGER II to improve Dilworth Plaza in downtown Philadelphia, which improves access to Amtrak; and $21 million in TIGER III to improve tracks, signals, and platform in Raleigh, North Carolina. In California, $15 million was awarded as part of TIGER III to upgrade the Sacramento Valley rail station, which is used by state-supported intercity passenger rail and Amtrak long-distance trains.

Moving Ahead for Progress in the 21st Century (MAP-21)

On July 6, 2012, President Obama signed a new transportation funding act, Moving Ahead for Progress in the 21st Century (MAP-21), authorizing federal transportation programs through September 30, 2014. As with previous transportation authorization acts, the primary source of funding for MAP-21 programs is the Federal Highway Trust Fund (HTF). In addition, MAP-21 transfers $18.8 billion from the general fund and $2.4 billion from the Leaking Underground Storage Tank Trust Fund to the HTF.

As in the past, a portion of HTF funds flowing to California will be used to fund the STIP (see State Highway Account, previous discussion).

HTF money from various specific programs has been used in the past for intercity passenger rail projects. In particular, funding has been provided for station projects from the FTA Section 5307 (Urban Transit Formula Assistance) and Section 5309 (Fixed Guideway Capital Investment Grants) programs. However, in general, federal flexible transportation funds, such as are provided through the Surface Transportation Program, are generally not available for intercity passenger rail projects.

Table 10.15: TIGER Grant Program

Round	Fiscal Year	Total Funding (in Millions of Dollars)	Projects Funded
TIGER I	2009	$1,500	51
TIGER II	2010	$600	42
TIGER 2011	2011	$527	46
TIGER III	2012	$500	47

Source: http://ops.fhwa.dot.gov/freight/infrastructure/tiger/index.htm#tg2; TIGER Grants, U.S. DOT, February 17, 2010; TIGER 2010 Awards, U.S. DOT; TIGER 2011 Awards, U.S. DOT; and TIGER 2012 Awards, U.S. DOT.

While MAP-21 does not include a specific rail improvement program, several MAP-21 provisions affect intercity passenger rail funding. These provisions include:

- Continues dedicated funding for the Railway-Highway Crossings program (formerly known as "Section 130"). This program allocates money to the states specifically for eliminating hazards at public highway-railroad grade crossings. MAP-21 authorizes $220 million per year in 2012, 2013, and 2014 for this program.
- Eliminates the Railway-Highway Crossing Hazard Elimination in the High-Speed Rail Corridors program.
- Continues to make operating intercity passenger rail service an eligible use of Congestion Management and Air Quality (CMAQ) funding. The CMAQ program funds projects that reduce highway traffic congestion and help meet Federal Clean Air Act requirements. CMAQ funding may be used for rail projects that accomplish CMAQ goals.
- Continues the Projects of National and Regional Significance program. MAP-21 authorizes $500 million in funding (subject to appropriation) in federal fiscal year (FFY) 2013 only to fund critical high-cost surface transportation capital projects that will accomplish national goals, such as generating national/regional economic benefits and improving safety, and that are difficult to complete with existing federal, state, local, and private funds.
- Fixed Guideway Capital Investment (Section 5309) funds will no longer be available for fixed-guideway modernization projects.
- A new formula-based State of Good Repair (Section 5337) program will be available to repair and upgrade rail transit systems. Capital projects to maintain transit systems in a state of good repair are eligible for funding, including projects to replace and rehabilitate rolling stock; track; line equipment and structures; signals and communications; power equipment and substations; passenger stations and terminals; security equipment and systems; maintenance facilities and equipment; and operational support equipment, including computer hardware and software.

Other Federal Railroad Administration Programs

PRIIA authorized three new federal intercity passenger rail capital programs to be administered by the FRA: 1) Intercity Passenger Rail Service Corridor Capital Assistance, 2) High-Speed Rail Corridor Development, and 3) Congestion Relief. These programs are in the process of being established.

Amtrak Funds

PRIIA authorized funding for Amtrak to cover operating costs, capital investments, and repayment of long-term debt and capital leases for FFY 2009 through 2013. Annual operating and capital funding appropriations are requested by the Administration through the U.S. DOT budget request, and directly by Amtrak through its Federal Grant and Legislative Request to Congress.

On the operating side, Amtrak has supported 30 percent of the *Pacific Surfliner* route, as this portion is considered to be part of their basic system, and not as a state-supported service. Section 209 of PRIIA required recalculation of state costs for intrastate passenger rail routes, and on November 1, 2013, California will be responsible for all state operating costs for the *Pacific Surfliner*.

On the capital side, Amtrak develops and funds some California intercity passenger rail capital projects.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The Transportation Infrastructure Finance and Innovation Act (TIFIA) Program is a federal program providing credit assistance to eligible surface transportation projects, including intercity passenger rail and some types of freight rail. While TIFIA does not provide funding for projects, TIFIA can be used as a financing mechanism to bring funds in out years forward into earlier years.

The TIFIA credit program may provide three types of financial assistance:

- *Secured loans* are direct federal loans to project sponsors offering flexible repayment terms and providing combined construction and permanent financing of capital costs.
- *Loan guarantees* provide full-faith-and-credit guarantees by the federal government to institutional investors, such as pension funds, that make loans for projects.
- *Lines of credit* are contingent sources of funding in the form of federal loans that may be drawn upon to supplement project revenues, if needed, during the first 10 years of project operations.

TIFIA credit assistance may cover the following portions of the total cost of a project:

- TIFIA line of credit: up to 33%.
- *TIFIA loan*: up to 49%.
- TIFIA loan and TIFIA line of credit, combined: up to 49%.
- Total federal assistance (grants and loans): up to 80%.

Under MAP-21, Congress authorized $1.75 billion in budget authority for the TIFIA program ($750 million in FFY 2013, and $1 billion in FFY 2014). Since each dollar of budget authority can leverage approximately $10 in lending capacity, TIFIA should be able to offer an estimated $17 billion in TIFIA credit assistance based on the MAP-21 authorized funding level.

Railroad Rehabilitation and Improvement Financing (RRIF)

The Railroad Rehabilitation and Improvement Financing (RRIF) program is a federal credit assistance program for railroad infrastructure development. While RRIF does not provide funding for projects, it can be used as a financing mechanism to bring funds in out years forward into earlier years. The RRIF program was established by the Transportation Equity Act for the 21st Century (TEA-21) and amended by the Safe Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Under this program, the FRA Administrator is authorized to provide direct loans and loan guarantees up to $35.0 billion to finance development of railroad infrastructure. Up to $7.0 billion is reserved for projects benefiting freight railroads other than Class I carriers.

The funding may be used to:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings, and shops.
- Refinance outstanding debt incurred for the purposes listed above.
- Develop or establish new intermodal or railroad facilities.

Direct loans can fund up to 100% of a railroad project with repayment periods of up to 35 years and interest rates equal to the cost of borrowing to the government.

Local Funding Sources

Article XIIIB of the California State Constitution allows for local sales tax measures subject to voter approval. Table 10.16 lists the 19 California counties that have to date passed local tax measures (typically around 0.5 percent) dedicated to transportation funding, including fixed guideway enhancements. Note that the total sales tax revenues shown on Table 10.16 are used on a wide range of transportation projects (highway, street, transit, etc.) and a fairly small portion of the funding is actually eligible to rail projects. Nevertheless, the total revenue from these local sales tax measures is significant – they are estimated to generate $3.6 billion in 2010.

In addition, four transit districts have established permanent one-half-percent sales taxes: 1) San Mateo; 2) Santa Clara; 3) Santa Cruz; and 4) BART (covering San Francisco, Alameda, and Contra Costa counties).

Although the majority of funds from county sales tax measures are used to fund urban transit improvements, a substantial portion have been invested to fund commuter rail development (which has included joint-use improvements on the *Pacific Surfliner* route). Also, intercity passenger rail stations are often owned by cities or local transit agencies and funded with local revenue in addition to STIP funding.

Table 10.16: County Transportation Sales Tax Measures

County	Duration	Estimated 2010 Revenue (in Millions of Dollars)
Alameda	2002-2022	$122
Contra Costa	1989-2034	$65
Fresno	1987-2027	$57
Imperial	1990-2050	$10
Los Angeles (1% Tax)	Permanent	$1,333
Los Angeles (Measure R)	2009-2039	$667
Madera	1990-2027	$7
Marin	2005-2025	$21
Orange	1991-2041	$266
Riverside	1989-2039	$133
Sacramento	1989-2039	$95
San Bernardino	1990-2040	$142
San Diego	1988-2048	$223
San Francisco	1990-2034	$78
San Joaquin	1991-2041	$43
San Mateo	1989-2033	$64
Santa Barbara	1990-2040	$29
Santa Clara	1996-2036	$167
Santa Clara (BART Ext 0.125%)	2013-2043 (Est.)	$42
Sonoma (0.25% Tax)	2005-2025	$18
Sonoma-Marin (SMART 0.25%)	2009-2029	$29
Tulare	2007-2037	$23
Total		$3,634

Note: Unless otherwise noted, these county sales taxes are imposed at a rate of 0.5 percent. Also, the total sales tax revenues shown are used on a wide range of transportation projects (highway, street, transit, etc.) and a fairly small portion of the funding is actually eligible to rail projects.

Source: *Transportation Funding in California*, California Department of Transportation, 2011.

Private Funding Sources

Private railroads own the rights-of-way (ROW) on tracks used for intercity passenger routes. In some instances, the cost of track and signal improvement projects on these tracks is shared by the railroads and the State.

The California HSR and the proposed XpressWest are both considering public private partnership (P3) to address funding, financing, and project delivery needs. P3 are contractual agreements formed between a public agency and a private sector entity (could also be public-public) that allows for greater private sector participation in delivery and finance of projects.

10.2.2 Freight Rail Funding

Being private entities, freight railroads normally finance infrastructure improvements and equipment purchases through their own resources and private investment. However, there are a number of state and federal funding sources that provide funding.

State Funding Sources

State Highway Account

Currently, Article 19 of the California Constitution identifies authorized uses of the State's motor fuel tax revenues. However, it restricts the State's ability to use SHA funds for purposes other than highway, roadway, and some passenger mass transit guideway purposes. Rail freight projects, are not fundable from the SHA. This program is more fully discussed in Section 10.2.1.

State Section 190 Grade Separation Program

The Section 190 Grade Separation Program is a state-funded safety program that provides for the elimination of existing at-grade railroad crossings. This program is more fully discussed in Section 10.2.1.

Proposition 1B – Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006

Proposition 1B, or the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act, was approved by the voters in November 2006 and authorized the issuance of $19.9 billion in the State general obligation bonds for specified transportation purposes, including transit and passenger rail improvements, highway-railroad grade separation, and crossing improvement projects.

Several sections of Proposition 1B are relevant to the funding of freight rail projects. They include:

- Trade Corridors Improvement Fund (TCIF). Proposition 1B includes $2 billion, available to the CTC upon appropriation by the California State Legislature, for infrastructure improvements along Federally designated Trade Corridors of National Significance in California, or along other corridors within California with a high volume of freight movement. Currently about $1.12 billion has been allocated to projects. While the program had originally been intended to fund mostly freight rail infrastructure projects, a significant portion has been allocated to grade separations. Of the total amount allocated some $717 million is allocated to 15 grade separation projects. Class I railroads are typically required to provide 5% of the cost of these grade separations. The rest of this allocated amount will fund several much needed freight rail improvements such as the Colton Crossing, Richmond Rail Connector, and Tehachapi Trade Corridor improvements. Other similar projects may be funded with the remaining unallocated amount. In shared corridors, TCIF funds also benefit intercity passenger rail services (e.g., Sorrento to Miramar Phase 1 double-track on San Diego Sub).

- Highway-Railroad Crossing Safety Account (HRCSA). Proposition 1B includes $250 million for high priority grade separation and railroad crossing safety improvements. This program is more fully discussed in Section 10.2.1.

Federal Funding Sources

Transportation Investment Generating Economic Recovery (TIGER) Grants

TIGER grants have helped fund several freight rail projects across the country. Projects in California include $33.8 million in TIGER I funds to eliminate the mainline at-grade rail crossing of the UPRR and BNSF at Colton in San Bernardino County; $16 million in TIGER II for the West Basin Railyard project to construct an intermodal railyard, including staging and storage tracks connecting on-dock railyards with the Alameda Corridor; $17 million in TIGER 2011 to improve the lead tracks to two rail yards, and relieve a chokepoint at the Ocean Boulevard overcrossing near the entrance to the Port of Long Beach; and $15 million in TIGER III for the Port of Oakland to build a new arrival track and high-speed turnout from UPRR's mainline, two track leads into the Port's new Joint Intermodal Terminal, and a new manifest yard (Knight Yard) to replace the former Oakland Army Base Yard. This program is more fully discussed in Section 10.2.1.

Moving Ahead for Progress in the 21st Century

Provisions in MAP-21 provisions that affect freight rail project funding include the following:

- Continues dedicated funding for the Railway-Highway Crossings program. Removes the Railway-Highway Crossing Hazard Elimination in High-Speed Rail Corridors program.
- Continues funding of the Congestion Management and Air Quality (CMAQ) program. CMAQ funding may be used for rail projects that accomplish CMAQ goals.
- Continues the Projects of National and Regional Significance program.

MAP-21 is more fully discussed in Section 10.2.1.

Federal Railroad Administration Grant Funds

The FRA has several competitive grant programs that can provide funds for freight rail projects. At the current time, none of these are accepting new applications.

- Railroad Safety Technology Grant Program. This program was authorized by Section 105 of the Rail Safety Improvement Act of 2008. The program's purpose is to facilitate the deployment of train control technologies, train control component technologies, processor-based technologies, electronically controlled pneumatic brakes, rail integrity inspection systems, rail integrity warning systems, switch position indicators and monitors, remote control power switch technologies, track integrity circuit technologies, and other new or novel railroad safety technology. The legislation provides $1.6 billion for rail safety for FFY 2009 through FFY 2013.
- Rail Line Relocation and Improvement Capital Grant Program. To assist in mitigating the adverse effects created by the presence of rail infrastructure, Congress authorized this program in 2005. The program funds construction projects that improve the route or structure of a rail line and 1) are carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development; or 2) involve a lateral or vertical relocation of any portion of the rail line. Since FFY 2008, Congress has appropriated a total of $90,104,200 for the program. Congress did not appropriate any funding for the program in FFY 2012, and all available funding has been awarded.

- Disaster Assistance. The Consolidate Security, Disaster Assistance, and Continuing Appropriations Act, 2009, provides $20,000,000 to make grants to repair and rehabilitate Class II and Class III railroad infrastructure damaged by hurricanes, floods, and other natural disasters in areas for which the President declared a major disaster.

Short Line Railroad Tax Credit

Section 45G of the Federal Internal Revenue Code created an incentive for short line railroads to invest in track rehabilitation by providing a tax credit of 50 cents for every dollar the railroad spends on track improvements up to $3,500 per mile. The credit was capped based on a mileage formula. Section 45G has been extended through 2013.

Railroad Rehabilitation and Improvement Financing (RRIF)

The RRIF program is a federal credit assistance program for railroad infrastructure development. The program is described in more detail in Section 10.2.1.

User Fees

Enacting user fees is a possible mechanism for funding freight rail projects. An example user fee is the Infrastructure Cargo Fee planned at the Ports of Los Angeles and Long Beach. The fee would be assessed on every loaded twenty-foot equivalent unit (TEU) cargo container entering or leaving any terminal by truck or train. The fee amount would fluctuate based on project funding needs. The expected charge is around $15 per loaded TEU for seven years. The fee is expected to generate $1.4 billion for transportation projects to improve traffic flow and air quality in the harbor area. The fee was originally planned to start on January 1, 2009, but has been delayed until January 1, 2014. Another example is the Alameda Corridor fees. Revenues from user fees paid by the railroads are used to retire nearly $2 billion in bond debt.

Private Funding Sources

Because freight railroads are privately owned, freight rail projects are funded in large part with private funds. For some projects, private funds are leveraged using a public private partnership (P3). P3 are contractual agreements, formed between a public agency and a private sector entity (could also be public-public) that allows for greater private sector participation in delivery and finance of projects. There are many different P3 structures, and the degree to which the private sector assumes responsibility, including funding risks, differs from one application to another. Partnerships allow private and public entities to pool resources together to make key infrastructure investments possible. For example, financing through public entities may allow for low interest loans that the private sector would otherwise not be able to access. The Alameda Corridor rail expressway connecting the Ports of Los Angeles and Long Beach to rail yards near Los Angeles is an example of a project built as a P3.

10.3 Rail Corridor Preservation

As highlighted in Chapter 6, rail corridor abandonments have become more prevalent in California since the 1980s, in particular for smaller lines in rural locations. Many of these were triggered by the Staggers Act of 1980, a U.S. federal law that deregulated the American Railroad industry and allowed it to consolidate and close underperforming rail lines.[203] Recent trends suggest that rail abandonment (in particular short line rail abandonment) is ongoing, and shows no sign of slowdown. In general, the abandonment of a rail line only occurs because it is underperforming economically; an act that is understandable when one considers that most railroads are privately owned, for-profit industries. However, the issue at times becomes a public issue, because rail lines, once abandoned, are generally

[203] http://www.fra.dot.gov/downloads/policy/staggers_rail_act_impact.pdf.

pulled up and sold for scrap metal. This is particularly true when steel prices spike as they did in 2008 when steel quadrupled in price. This essentially removes a once-valuable resource and can leave important gaps in freight rail service. This loss not only could have detrimental impact on economic development, it also affects future transportation needs. With issues of redundancy, transportation modal options, and efficient use of public funds foremost in everyone's mind, the issue of potentially preserving existing rail infrastructure is becoming an attractive consideration.

Local planners and governments should be aware of rail salvage firms taking an interest in underutilized or inactive rail lines in their regions. Such firms act swiftly and have become adept at securing abandonments through the Surface Transportation Board abandonment process, and their subsidiaries for the purpose of salvaging ties, ballast, and rail for resale. While this is certainly an economically legal practice, it is often not in the public interest, as all exemptions are lost and restoration of rail service must now go through the lengthy environmental review and public hearing process.

This section outlines strategies and priorities for preserving existing rail corridors in California by first discussing considerations for rail line preservation. The section then discusses the different types of rail preservation methods that have been used in other states, and concludes with a summary of California's progress in rail preservation. It is useful to note that this section draws heavily on results from a recent research conducted by Caltrans Division of Research and Innovation on *Rail Preservation Programs: A Survey of National Guidance and State Practice, 2011.*

10.3.1 Considerations for Rail Line Preservation

Before determining what strategies should be used to preserve rail lines, an important question to ask is whether a rail line should be preserved in the first place. Preservation of rail lines can be costly, and the costs are often borne by the public sector.

On the other hand, the continuous linear right-of-way associated with a rail line is a unique asset and the cost of reassembling a linear right-of-way and processing the associated environmental approvals can be substantially more costly than would be indicated by the cost of land based on market real estate values on a pure square footage basis. At the time when decisions are being made about the future status of a secondary or surplus line, neither continued use for freight service (potentially as a short line operation) nor a publicly-supported passenger rail service may be foreseeable or practicable. Conversion to a trail, while clearly providing a public benefit, may not ultimately be the highest and best use for the right-of-way. Best practice would be to consider a full range of measures appropriate for railroad corridor preservation, which could include:

- Rail and Trail Project. Which would allow both uses to be accommodated even if developed on different timeframes.
- Preservation for Recreational/Tourist Rail. As an example the Napa Valley Wine train initiative was able to acquire and institute service after the Southern Pacific decided to abandon the former Napa Valley Railroad.
- Innovative Rail-Related Recreational Use. Private railcar such as "speeder" hobbyist rallies.
- Physical Preservation of the Railbed. Even if paved over for use by pedestrians and rubber-tired vehicles, retention of the existing track can be accomplished to maintain the presence of rail use.
- Temporal Separation. Rail use could be limited to specified hours potentially allowing other uses to more effectively share the right-of-way.

In summary, preservation of any rail line must be driven by demonstrated public economic benefit, and the ability to make the link between business retention, growth, and the presence of the rail line.

Some of the key factors that must be weighed objectively to determine the short-term viability of the rail lines include:

- Reasons for abandonment. Most rail lines are abandoned because they are no longer profitable, either because the industry they serve is declining (or has disappeared) or because there is the presence of other transportation modes that have economic or time advantages. If the industry has declined, it should be determined whether it is likely that the industry will return in the near future, or that other industries are likely to create demand for rail service in the same location in the future. The presence of competitive modes (generally truck) should be evaluated, and whether the restoration of the rail service likely to offer advantages to shippers. Finally, one should ask if there is any potential for converting the rail for transit service as well. Essentially, it should be determined if a business case exists to preserve the rail line, then a decision can (and should) be made.
- Supporting industries and infrastructure. The logistics and supply chain network to move goods include not only the shippers and the carriers (i.e., short line rail), but also the receivers, the warehouses, and distribution centers. When a rail line is abandoned because of a loss of industry, it is likely that the surrounding warehouses and distribution centers are also abandoned or are functionally obsolete. Therefore, the cost of resurrecting these supporting industry sectors – or the potential to attract new industry clusters – should also be considered.
- Land use issues. One of the most important issues to consider is the changing land use around the rail lines. Over time, land around an abandoned line may convert to uses that are incompatible with freight. There may be encroachment of incompatible land uses that makes rail operation difficult in the future (such as residential land uses directly adjacent to the rail facility). Rail line abandonments often occur in urban areas where industries and land uses are in competition for competing land, and the pace of development is rapid. Questions such as “will the land uses around the rail line remain intact in the future,” and “are there foreseeable zoning changes in the future” should be asked.

10.3.2 Types of Rail Corridor Preservation

Once it has been determined that rail service is a desirable modal choice, then there are several potential types of preservation strategies that may be employed. Preserving a rail line may be a desirable strategy because establishing a new line (and securing the necessary ROW for it) is much more difficult than sustaining the activity on an existing line. In general, corridor preservation strategies can be divided into two types of strategies: direct acquisition strategies, or financial support strategies. Examples of both include:

- The Federal Rail Banking Program. Rail banking is a method by which corridors that would otherwise be abandoned can be preserved for future rail use through interim conversion to a trail. This program was established in 1983 as an amendment to the National Trails Systems Act. This Act allows the federal government to regulate lines threatened for abandonment, preserving them for future reactivation. Permanent rail structures should be kept intact for possible future reactivation. The abandoning railroad can decide to donate, lease, or sell their property to the trail manager. According to the National Cooperative Highway Research Program (NCHRP) 374, a research report on Rail Preservation, successful preservation initiatives were nearly without exception the product of a formal state corridor policy or involved alignments that had previously been identified as essential and stated as such in state or regional transportation plans. Up until 2007, out of the 103 preserved properties, 57 are active for freight service.[204]

[204] It should be noted, however, that it may in practice be very difficult to regain the use of a rail corridor that has been converted to a trail. Trails often are a very popular public amenity, and considerable opposition may arise if and when the rail corridor is proposed to convert back into an active freight rail corridor.

- Local and Regional Level Rail Acquisition Programs. Another way to preserve rail is to vest the power in a state or local agency to acquire rail lines that are either threatened for abandonment or filed for abandonment. North Carolina, Ohio, Oregon, South Carolina, Texas, Washington, and Wisconsin currently have statutory provisions that grant authority for state rail acquisition. Georgia and Florida also have at times purchased rail lines to avoid abandonment. It is important to note that having this authority alone is not enough, as there must be a funding structure established to purchase the abandoned lines.[205] In addition to purchasing rail lines, rail cars can also be purchased so as to keep the short lines in business. For instance, Washington purchased 29 grain cars to ensure that certain short line railroads continued to exist. These short line railroads provide a valuable service to the agricultural community in the eastern part of the State by allowing them to export produce through the Puget Sound Area maritime ports.

10.3.3 Best Practices from Other States

Financial assistance for at-risk railroads can also be offered in the form of loans or grants supported through a stable long-term funding structure. These financial programs exist to help railroads maintain or improve their infrastructure to bring it up to sufficient standards to operate and service industries. Currently, about 10 states have formal railroad assistance programs, providing different levels and types of funding to mainly short line railroads. These programs are summarized in Table 10.17. Further detail is provided in Appendix K.

10.3.4 Rail Preservation in California

Currently in California, there is no statewide program to provide dedicated financial assistance specifically targeted at rail preservation. However, there is one regional effort in place. Specifically, this regional effort is brought about through SB 325 (Rubio 2011),[206] which called to enact the Central California Railroad Authority Act that will, in turn, create the Central California Railroad Authority. This Authority will have the power to acquire and manage railroad properties at its discretion. It will also have the ability to issue revenue bonds to operate railroads, including those outside its boundaries, in order to connect its lines along with several other powers. It applies to the counties of Kern, Kings, Tulare, Fresno, and Merced; optionally the counties of Madera, Stanislaus, and San Joaquin can also join. Currently, the bill has been passed and the first draft of the joint powers agreement is being reviewed. Though questions remain as to how this Authority will be funded, it is nevertheless a regional step being taken towards creating a rail preservation program in the San Joaquin Valley. This Authority is not unlike railroad authorities in the other states that have similar responsibilities, and is a model that has proven to be fairly successful. It is also California's first regional rail authority with a freight rail focus.

10.4 Next Steps

This CSRP has outlined the many changes that are occurring in the structure of passenger and freight planning and delivery in California. Planning for passenger rail, in particular has undergone dramatic changes in 2012 with the release of the Authority's 2012 Business Plan, which calls for an HSR system that is blended with conventional rail services to make a statewide integrated network.

[205] Source: http://www.dot.ca.gov/newtech/researchreports/preliminary_investigations/docs/rail_preservation_preliminary_investigation_6-21-11.pdf.

[206] http://legiscan.com/gaits/view/270892.

Table 10.17: Funding Programs to Encourage Rail Preservation

State	Program(s)	Description
Iowa	Railroad Revolving Loan and Grant Program	Grants up to 50 percent of project costs, loans up to 80 percent of project costs for job creation projects. Only rail network improvement projects are eligible for loans.
Indiana	Industrial Rail Service Fund, 1997	Grants and low-interest loans to Class II and Class III railroads.
Kansas	State Rail Service Improvement Fund, 1999	Low-interest, 10-year revolving loans to short line railroads; loans cover 70 percent of project costs.
North Carolina	Rail Industrial Access Program, 1994	Funds of up to 50 percent of project costs may be used to construct or rehabilitate tracks; provides an incentive to businesses to locate or expand facilities in North Carolina.
Ohio	Rail Line Acquisition Program	Assistance for the acquisition of rail lines to prevent cessation of service or to enhance the line’s viability.
Oregon	Connect Oregon (2005)	A lottery-bond-based initiative that began in 2005 to provide financing for rail and other types of transportation projects.
Pennsylvania	Rail Freight Assistance Program, 1984 Rail Transportation Assistance Program Pennsylvania Infrastructure Bank, 1998	All programs provide financial assistance for investment in rail infrastructure. Funding for up to 70 percent of the total project up to $700,000. Applicants are required to have a line item authorized in the current Capital Budget Act. Low-interest loans with terms up to 10 years.
Virginia	Rail Enhancement Fund, 2005 Rail Preservation Grants, 1991 Rail Industrial Access Grants, 1986	Fund established in 2005 as the first dedicated source of rail funding in state history; applicants must provide a minimum of 30 percent cash or in-kind contribution. Grants to support and preserve short line railways, with an annual allocation of $3 million. Grants to support projects that provide rail access to businesses in Virginia; funding expected to average $1.5 million in future years.
Washington	Freight Rail Investment Bank Program Freight Rail Assistance Program	Grant program that assists with smaller capital projects with funds up to $250,000 that must be matched by at least 20 percent of funds from other sources. Grant program directed toward larger projects.
Wisconsin	Freight Railroad Preservation Program, 1992 Freight Railroad Infrastructure Improvement Program, 1992	Grant funding of up to 80 percent of the cost to purchase abandoned rail lines or facilitate connectivity to a different transportation corridor; the program pays 100 percent of real estate acquisition costs. Low-interest loans of up to 100 percent for rail projects that connect an industry to the national rail system, make corridor improvements, rehabilitate lines, or develop the economy.

Sources: *Rail Preservation Programs: A Survey of National Guidance and State Practice*, Caltrans, 2011.

This section outlines subsequent steps in implementing many of the projects and programs outlined in this CSRP. These next steps fall into three general categories: institutional changes, planning activities, and project execution:

- **Institutional Changes**. Relationships among organizations engaged in passenger rail planning and service delivery could change in the near future. To deliver the HSR Blended System, new institutional structures may evolve.
  - Effective July 1, 2013, a new State Transportation Agency will be created in California state government that will have jurisdiction over the Authority, Caltrans, and other transportation related state departments. The proposed State Fiscal Year (SFY) 2013-14 Governor's Budget states: "The Transportation Agency develops and coordinates the policies and programs of the State's transportation entities to achieve the State's mobility, safety, and air quality objectives from its transportation system." This agency's actions may have a major impact on rail planning and delivery.
  - In 2012, the California State Legislature authorized the creation of two new JPAs to administer the *Pacific Surfliner* and *San Joaquin* routes (described in more detail in Section 5.3.1 in Chapter 5). JPAs have been created and can enter into interagency transfer agreements with Caltrans between June 30, 2014 and June 30, 2015. The legislation specifies several requirements that must be reached before the interagency transfer agreements can be executed. Under the terms of the legislation, Caltrans would continue to administer the two routes through SFY 2013-14. The process of establishing JPAs which would administer the routes has started. This process provides a forum for reexamination of the appropriate institutional structures to administer intercity rail in California.
  - With the release of the 2012 Business Plan, the Authority, Caltrans, Capitol Corridor JPA, commuter rail agencies, and other regional transportation and urban transit agencies realized new cooperative structures would need to be formed to plan and deliver the HSR Blended System. As discussed in Section 2.1.3 of Chapter 2, the Northern and Southern California Rail Partners Working Groups were formed to assist in planning and delivering the HSR Blended System. These planning and delivery structures are still evolving, as are decisions on the necessary planning documents and projects to deliver the Blended System.
  - The Authority expects to enter into partnerships with private firms and/or consortia for funding, construction, and/or operations of HSR services.
  - Congressional deliberations on reauthorization of PRIIA and of the Moving Ahead for Progress in the 21st Century Act (MAP-21) may expand or alter federal programs for passenger and freight rail programs. Any program changes could alter federal and state agency responsibilities.
- **Planning Activities**. Entities engaged in rail planning and delivery will continue to plan a wide range of passenger and freight rail projects and services in California. These activities include developing plans for the HSR Blended System, planning for existing system expansion, and planning and delivering new rail systems. As noted above, the institutional structure to plan and operate the HSR Blended System is evolving, and it has not been fully determined which entities will be involved in the following planning activities:

- Plans for integrating HSR and conventional passenger rail into the Blended System will need to be developed. Necessary actions include:
    - Prioritize capital projects for the 2018 and 2022 Blended System.
    - Administer and fund operations and maintenance, including revenue and cost sharing.
    - Deliver, utilize, and maintain fleet.
    - Develop schedule and fare integration policies and systems.
    - Plan transit and other transportation connectivity.
    - Develop integrated marketing and branding.
- Detailed capital and service planning is necessary for some specific locations where the existing rail systems will need to be expanded to meet the needs of the statewide Blended System. Examples of these locations include Stockton, the HSR IOS Merced terminus, the HSR IOS San Fernando Valley terminus, and Los Angeles Union Station.
- Railroads will be conducting ongoing and new rail operations simulation modeling to determine the effects of planned HSR, intercity, and commuter passenger rail operations in freight and publicly-owned rail corridors, and the necessary capital projects to allow delivery of the planned service.
- Environmental clearance for HSR projects and for necessary intercity and commuter rail projects on existing routes and the planned HSR Blended System will continue through the completion of program and project environmental documents.
- Service development plans, which are the rail corridor-level companion documents to environmental documents, will be completed and possibly updated, particularly in relation to planning the HSR Blended System.
- Station area planning activities for stations on the HSR and conventional rail network will be conducted to improve connectivity.
- Detailed plans, including engineering and environmental, will be prepared for passenger and freight rail projects listed in Chapters 8 and 9.
- The CSRP and the Authority's 2012 Business Plan will be updated in accordance with state law. These updates will include the latest information on future passenger rail operations and ongoing planning activities.
- New passenger rail services or extensions of services described in Chapter 8 will require operational modeling and operational agreements with the applicable freight railroads.
- Planning for freight rail projects in the upcoming *California Freight Mobility Plan* will proceed.

- **Project Execution**. Even as public agencies complete detailed passenger and freight rail plans, many funded freight and passenger rail projects will move into procurement, construction, and/or manufacturing. These steps include the following:
    - Passenger rail locomotives and coaches for intercity service meeting new national equipment specifications will be manufactured domestically and will be tested and put into operating service.

- New mainline track, sidings, switches and turnouts, and train signal and control systems will be constructed on rail lines throughout the State for freight rail operations and for passenger rail services.
- New maintenance and layover facilities will be constructed to accommodate blended HSR service.

10.5 Conclusions

The CSRP provides a thorough description of how California's planned rail investments will continue to support the nation's largest population and economy by moving people and goods across a sustainable system. The CSRP provides an analysis for long-range passenger and freight rail investment to meet projected passenger travel and domestic and international freight demand. These investments are also informed by the following vision for the future: *California has a premier, customer-focused rail system that successfully moves people and products while enhancing economic growth and quality of life.*

This CSRP has been developed through an extensive stakeholder and public outreach process. It meets federal rail plan requirements to ensure California's eligibility for future federal high-speed and intercity passenger rail funding. The CSRP integrates into a broader set of plans that will lead to the 2040 CTP, which will meet the state statutory requirements for identifying an integrated, statewide multimodal transportation system that supports the State's GHG emission reduction goals.

The CSRP integrates the plans of many institutions, agencies, and companies from across California, reflecting the State's unique culture of shared transportation planning and operations and its ongoing commitment to expanding freight and passenger rail services. The CSRP incorporates the Authority's HSR implementation plans, including network integration and infrastructure improvements for intercity and commuter passenger rail corridors and systems. Since these plans are evolving due to the dynamic nature of HSR network integration planning, the CSRP captures the plans existing at the time of CSRP release.

The CSRP includes a comprehensive listing of proposed and planned rail improvements within the context of the current freight and passenger rail system inventory and planning environment. Future CSRP iterations will build upon this plan to capture and reflect the updates and plans for the California integrated passenger and freight rail environment.

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