5 Freight Rail Investment Strategy

Since its initial development in the 19th century, California's rail network has evolved in response to the changing needs of what is now the United States' largest state economy. The freight rail network, responsible for the movement of goods that generate that economic competitiveness, operates on privately owned infrastructure that has integrated freight and passenger service on the same tracks. To date, private capital has been the principal source of funding for upkeep and improvement of the freight network.

By improving rail infrastructure to attract additional long-distance freight movement (otherwise concentrated on highways), extra capacity is created on highways for passengers and short-distance freight travel. Improvements to the rail network allow for the shift of goods movement from automobile and air to rail, thereby creating capacity on those existing infrastructures by reducing demand. Rail, therefore, is an effective mechanism for congestion relief on highways, and for the movement of people and goods, while simultaneously improving and complementing parallel trade corridors.

Because freight rail is owned and operated by private industry and is therefore market-driven, patterns of goods movement are determined by the reliability and availability of the transportation network. It is imperative that California's infrastructure—especially the long-distance, transcontinental routes—remain robust and competitive as a means for further generating economic activity at ports throughout the state and throughout the country. There are still areas where public and private interests intersect; in such situations, public participation is beneficial, or even necessary, to support and enhance the entire statewide, multimodal transportation system.

This chapter presents freight capacity analysis, corridor-based planning, and investment strategies that address the needs of California's freight rail system and help ensure its long-term utility and viability. Rather than identifying a comprehensive list of projects, the chapter describes categories of investments that will advance the State's vision for a rail network; describes how they can impact California's economy, environment, and communities; and identifies opportunities where investments will be mutually beneficial for both passenger travel and goods movement. This chapter also articulates the State's strategy for improving the rail network through the context of transportation objectives defined in the CTP 2040 and the Governor's Sustainable Freight Action Plan, while laying the foundation for the next update of the California Freight Mobility Plan.

5.1 Freight-Capacity Analysis

Freight-capacity analysis takes into account the freight and passenger vision for 2040 and the current freight train volumes, where 30 to 50 daily trains per track represents the range between moderate and dense freight volumes. Denser freight volumes require increased signaling, sidings, grade crossings, and track capacity to safely accommodate higher numbers of trains. The LOS of the rail corridors, as defined by the association of American railroad, is calculated by dividing the expected train volume by the available capacity.

The 2013 freight volumes and commodity information was based on 2013 STB Confidential Carload Waybill Samples . The forecast analysis used the FAF version 3.5 (FAF3) database with 2007 as a base year, and used a combination of actual data and modeled behavior. The FAF forecast was adjusted based on Moody's Economic data of industry sector output for third quarter in 2015. The process involved linking FAF3- derived commodity flow growth rates to 2013 Carload Waybill samples of rail traffic volumes.

Table 5.1: Corridor Screening Framework for Freight Capacity Analysis

		Passenger Train Traffic		
		No Traffic	**Moderate Traffic > 10 daily trains per direction**	**Dense Traffic > 10 daily trains per direction**
Freight Train Traffic	**No traffic**	No analysis	No analysis	No analysis
	Moderate traffic > 30 daily trains per track	No analysis	No analysis	High-level analysis, potentially detailed
	Dense traffic > 30 daily trains per track	High-level analysis	High-level analysis, potentially detailed	Detailed analysis

The forecasts for California rail activity suggests substantial growth, from 161 million tons in 2013 to 319 million tons in 2040, with rail carrying 15.2 million units. In 2013, 58 percent of tonnage originated in United States, and exported tonnage and imported tonnage each accounted for 21 percent. By 2040, exported tonnage is expected to decline slightly, to 20 percent from 21 percent, but despite the shift in commodity origin, the directional distribution is not expected to change. The commodities shipped by rail in California are projected to achieve a compound annual growth rate (CAGR) of 2.6 percent between 2013 and 2040. Outbound goods are projected to have the highest CAGR, 3.3 percent; inbound goods are projected to have a CAGR of 2.3 percent. The projected growth in train volumes will affect the performance of the system, its capital needs, and potential shifts in mode share between rail and other competing modes. It is important to take into account the overall LOS of the train network as the corridors are being developed for passenger, shared, or freight-only routes.

Table 5.2: Corridor Screening Framework for Freight Capacity Analysis

LOS	Description of Operating Characteristics	Volume-to-Capacity Ratio
A	Free-flow conditions with unimpeded fluidity.	0% to 60.0%
B	Reasonably unimpeded operations and fluidity, with slight restrictions at pinch points.	60.1% to 70.0%
C	Stable operations and fluidity, with some on-time performance issues.	70.1 %to 80.0%
D	Approaching unstable operations with moderate fluidity. Added trains will increase delays and decrease on-time performance.	80.1% to 90.0%
E	Unstable operations, low average speeds, impeded fluidity, and poor on-time performance.	90.1% to 99.0%
F	Adverse signal progression, causing high delay, very low average speeds, extremely poor on-time performance, and no fluidity across line.	100%

5.2 Corridor-Based Approach

Freight growth along the transcontinental corridors is projected to double in the next 20 years, representing a more significant increase than population growth (and its corresponding demands of the transportation network). Accordingly, the State's interest in freight rail planning concerns not just accommodating passenger rail on existing rail infrastructure, but also ensuring efficient management of the entire rail network, to promote goods movement and maintain and expand the economic gains that California has achieved in the past few decades. Future growth projections show that rail in California has the potential to continue to serve as a national hub and distribution center for economic activity in the United States, if the infrastructure can keep up with the growth demands.

One key to efficiently managing the transportation system is corridor planning. As has been explained throughout this Rail Plan, long-term planning for freight improvements can be difficult because the State does not own the infrastructure, and the freight rail industry is sensitive to releasing information on their long-term projects, for profit and proprietary reasons. However, there are opportunities to work with the freight railroads, and there are opportunities to maximize State money by investing in projects that benefit an entire corridor rather than individual projects. A corridor-based approached to freight rail planning helps to identify the best projects that will intensify the use of existing infrastructure, and invest in projects that can improve parallel and complementary routes or projects in a corridor. As elaborated in Exhibit 5.1, there are multiple transcontinental freight routes and many sea ports along the east coast, west coast, and the Gulf of Mexico that are constantly competing for business. If one region fails to meet the growing demand of the market, another might step up to fill the gap, shifting business away from the region. It is paramount for California to invest in its transportation network to maintain its economic edge.

The Rail Plan's freight strategy draws from a number of existing plans and policies that attempt to identify and define corridors and subsequent investment priorities. In the 2013 Rail Plan, funding priorities were guided by the amount of gross tonnage carried on the existing freight rail system. The priorities based on that metric were defined in Caltrans' 2014 Freight Mobility Plan, in consultation with the CFAC.

The development of criteria for defining, selecting, and prioritizing corridors is an integral part of corridor-based planning. Volumes of tonnage, as identified in previous freight and state rail plans, can serve as one of the selection criteria. Other selection categories might include:

- critical connections to transcontinental routes;
- railroad classification;
- location, with respect to land and sea ports; and
- available alternatives for port traffic.

Defining corridors allows better collaboration among transportation agencies at the local, regional, and state levels as they identify multimodal approaches to solving problems and prioritizing funding. It can make it easier to examine trade-offs, trade corridor impacts, and joint passenger and freight rail effects. Often, the state, regional, and local agencies have similar overarching objectives, but different plans for reaching them; and corridor-based planning allows for a more open and cross-jurisdictional process that weighs corridor-wide, and therefore network-wide impacts. This can include transportation decisions and nontransportation decisions—such as land use planning, zoning, and environmental regulations—to help decision makers invest more strategically for the greatest benefit and efficiency.

For example, a proposed grade separation on a lightly used line that is projected to serve an intermodal terminal may not be justifiable, absent construction of the terminal. In that case, corridor-level planning allows a broader look at the overall gains for the entire corridor, and bundles the projects together, from the standpoint of funding, sequencing of construction, and impact. This type of corridor-level project delivery will result in more timely overarching and coordinated improvements for the specific corridor, which will improve system-wide mobility and efficiency.

Legend

US Ports

Rail Freight Volume in Kilotons	Truck Freight Volume in Kilotons
0 - 50	0 - 500
51 - 100	501 - 1,000
101 - 500	1,001 - 5,000
501 - 1,000	5,001 - 10,000
1,001 - 5,000	10,001 - 25,000

Exhibit 5.1: Transcontinental Freight Routes [169]

169 Kim, Jaehoon. International Journal of Traffic and Transportation Engineering. Multimodal Freight Distribution and Economic Development due to International Capacity Expansion, (2015).

5.1.1 Identifying Freight Corridors

Planning for freight rail and goods movement through the corridor-based approach is important for maximizing investments, but it is key to first understand the options for securing capacity and identifying corridors. Ensuring the appropriate capacity for passenger and freight rail operations can happen in a few different ways. First, there can be shared track infrastructure used by both freight and passenger trains. Second, there can be largely dedicated track for passenger and freight in a shared right-of-way that retains the ability to share track under certain conditions. Finally, capacity can be ensured by the development of completely separate freight and passenger infrastructure. Rail freight corridors are characterized as follows:

- **Primary Trade Corridors**, requiring investment in dedicated freight capacity;
- **Shared Corridors**, where state investment in expanding the passenger rail network will provide capacity benefits for freight rail; and
- **Interregional Investment Corridors**,[170] defined in the ITSP as corridors where the State has an interest in investing in rail as a strategy to ensure capacity for goods movement, and to address projected trucking volumes on parallel interregional highway segments.

The nature of corridor development may change over time, as more passenger service is phased in. Limits on passenger train growth in a corridor during the early phases of network development will place a premium on using available passenger train slots for the highest-ridership services, and lengthening train consists where necessary, while supplementing the service with integrated express bus during off-peak or lower-demand times of day. Additional growth would be achieved through significant investments in physical infrastructure, in partnership with the freight railroads. For more passenger trains to gain access to freight railroads' lines, the freight railroads may require up-front capital project investments and ongoing access fee agreements, enabling capital investments to be made by the railroad corridor owner over time. The partners may conclude that future growth needs may require investing in dedicated or mostly dedicated passenger rail infrastructure for all or a portion of the corridor.

Although the Rail Plan reflects a general understanding of the type of investment appropriate to each corridor, specific decisions will be made through detailed implementation planning and negotiations with host railroads. The established goals and objectives of the freight rail planning process that should guide future implementation planning and negotiations are:

- improving trade corridors;
- developing economic opportunities;
- improving the safety and efficiency of the rail network;
- advancing climate and environmental goals;
- eliminating adverse impacts from rail (i.e., noise, congestion, and safety) on communities; and
- improving the overall quality of life.

The most effective projects and efficient investments will be those that satisfy one or more of the overall goals and objectives, and address national trade route demands, while serving economic needs at the local and regional levels. These corridor-level planning and investment decisions play a major role in shaping the economy and trade growth along every corridor within regions and across the entire state. A corridor-based approach for planning has system-wide effects—each investment decision aimed at improving a portion of the network has cascading impacts on the performance and reliability of rail and goods movement statewide, thereby impacting the future growth and overall demand for rail services.

5.1.2 Freight Rail Corridor Investment Strategy

Freight rail plays an integral mobility role in trade corridors, and with innovative techniques, alternatives analysis, corridor evaluation, and cost-benefit analyses, the available funding can be targeted to identify investment programs and system-management strategies.

Establishing a network of identified corridors, and conducting targeted studies to identify the needs of the entire system, can help clarify which projects

170 Caltrans. *ITSP,* (2015).

support corridor-wide improvements. In this way, system-wide efficiencies can be increased, creating a multi-tiered strategy for prioritizing funding. Corridor plans can provide an effective link between statewide modal plans and local and regional needs that can simultaneously enhance statewide and urban mobility and statewide and transcontinental goods movement. The identification of the needs, priorities, and funding availability help identify the investment level required to achieve the performance expectations from the network.

For example, California's Trade Corridor Investment Fund, which was specifically established to ensure the continued competitiveness of California's trade-related infrastructure, can fund freight rail projects that benefit the economy of the state, and create capacity on freeways. The newly established Trade Corridor Enhancement Program (TCEP) indicates that investments in goods movement are a state priority, and can provide additional opportunities to address strategic investments in highway and rail trade corridors. Funds designated for grade crossing improvements can be invested efficiently to minimize interaction of rail and roadways. Additionally, many passenger rail improvements benefit freight, and the co-investment in these corridors result in co-benefits to freight rail. The improvements are often inextricably tied, and state investments intend to maximize the co-benefits to passenger and freight rail where possible.

Freight rail can also benefit from freight-specific federal and state funding. For example, the FAST Act of 2015 contains freight-related provisions that offer the prospect of modest funding for freight rail. Other funding sources include local ballot initiatives, some of which direct money to freight rail or goods movement more broadly. Flexibility in the use of public funds (federal, state, and local) can provide the means to accelerate some of the freight railroads' investments, either for the direct benefit of goods movement, or for shared benefits achieved while addressing passenger rail needs.

Phased Investment Strategy

Similar to the passenger rail investment strategy, phasing freight rail investments allows for the most efficient use of money to intensify uses, and avoids duplicated or stranded investments while building toward the long-term goals.

The Rail Plan freight investment strategy envisions an evolving partnership between the State and freight railroads to:

- eliminate bottlenecks and use existing corridors more intensively, enhancing the capabilities of both freight and passenger trains in the short term;
- use significant new federal and state funding programs, such as FASTLANE and TCEA, to implement corridor investment programs for freight improvements;
- make shared investments that improve the performance and utility of freight and passenger operations through strategic identification of infrastructure projects that provide benefits to all operators; and
- implement quiet zones and grade separations, and foster the use of cleaner and quieter locomotives that will make railroads better neighbors.

In the short-term (2022) horizon, addressing existing trade corridor bottlenecks is the top priority. These improvements will greatly increase the reliability and efficiency of the entire statewide rail network, and can be implemented in this time frame. Building on the short-term improvements, the mid-term (2027) horizon year prioritizes investing in shared corridors and dedicated trade corridor capacity. Again, these investments will need to be identified through strategic implementation planning with freight and passenger rail providers, but improving shared corridors will improve the functionality of the entire system for passenger mobility and economic growth. Finally, the long-term vision (2040) will expand on all the short- and mid term improvements, and will represent the integration of all services possible.

Recognizing the potential impact of proposed improvements is important in prioritizing the needs of the system. Through this process, the most important issues can be identified and addressed first through appropriate policy and funding strategies.

5.2 Categories of Investment

Chapter 3 of the Rail Plan presents a vision for the state's rail system, and sets forth the context for rail-related investments by developing a premier, customer-focused, integrated system that successfully moves people and products, while enhancing economic growth and quality of life for all Californians. As described in the previous section, with a corridor-based planning approach, the investments can be more effective, and create system-wide improvements. In this context, six major areas of need and opportunity (also referred to as categories of investment) were identified for freight rail in California:

- trade corridor improvements;
- economic development and short lines;
- grade-crossing improvement needs throughout the state ;
- additional terminal and yard capacity;
- short-haul rail improvements; and
- advancement of zero- and near-zero-emissions technologies.

These categories of improvement are expected to improve the freight rail system in accordance with the State's vision for freight rail. Through the framework of these investment categories, the remainder of this chapter defines and articulates the freight rail investment strategy with example projects, and identifies their potential impacts. The project examples will also identify where freight improvements will have passenger rail co-benefits.

5.2.1 Freight Rail Vision

A premier system requires improved trade corridors, yards, and terminals; clean, advanced technology equipment; upgraded track conditions for short lines; and innovative service concepts that have efficiency and safety benefits for all users. A customer-focused system will lead to improved access to the rail network (Class I and Short Lines), with competitive cost and service (improved speeds and service options), enhancing options for the state's shippers. An integrated system requires improved intermodal terminal and transload connections to smooth transfers between modes. The Rail Plan is focused on supporting development of a rail network that moves both people and products; it will address strategies and improvements for coordinating passenger and freight service, and preserving freight capacity as passenger services grow. Economic growth will be achieved through trade corridor improvements and the availability of competitive modal options for California's industries. Finally, the freight component of the state rail vision will support improvements in California's quality of life through modal energy/emissions benefits associated with the adoption of zero- and low-emissions technologies, and the movement of freight by rail and mode-shift to rail where feasible. The Rail Plan will also address grade-crossing impacts.

Zero-Emission Technologies

Electrification eliminates mobile sources of GHGs and other pollutants. However, GHGs at the source of electrical generation can still pose a threat to air quality, human health, and climate. Approximately 57 percent of California's electricity is still produced by burning natural gas or other fossil fuels such as oil, bio-mass, or coal. The remaining balance (43 percent) of electricity produced in California is from a combination of sources including nuclear, hydro, solar, geothermal, and wind. Providing zero-emission GHG trains is a laudable goal.

Germany recently acquired 14 passenger trainsets for regional services in Saxony, based on a DMU design using hydrogen fuel-cell technologies for propulsion power. The trains commenced service between Buxtehude–Bremervörde–Bremerhaven–Cuxhaven in December 2017. The route, branded as Coradia iLint, is the first train to be produced in large quantities, travel long distances (375 to 500 miles on a tankful of hydrogen), and be powered by a hydrogen fuel-cell. In addition to being a zero-emission train, the propulsion system is almost noise-free, according to news reports from Germany.

The hydrogen fuel cell produces the electric energy needed to power the train. The by-product of the chemical process converting hydrogen into electrical energy is water vapor. Flexible energy storage is provided by lithium-ion batteries that accumulate the energy and supply it when needed, with the help of an intelligent energy management system. Alstom, the supplier of the trainsets, promises to provide the necessary hydrogen supply infrastructure on the route. The hydrogen is acquired from chemical plants where hydrogen is produced as a waste product.

China is currently operating a fuel-cell tram (streetcar) in Tangshan city. Service commenced in October 2017. The fuel-cell powered tram was developed by Tangshan Railway Vehicle Co. Ltd., under the guidance of Chinese rail manufacturer China Railway Rolling Stock Corporation. Railroads in the United States are developing fuel-cell locomotives for yard switching duties. India is developing hybrid-hydrogen electric locomotive for mainline use. Toronto Metrolinx has begun a study of hydrogen fuel-cell locomotives and trainsets for its regional rail network.

Ultra-low emissions switching locomotive (Source: flickr, Roy Luck, https://commons.wikimedia.org/wiki/File:Union_Pacific_Genset_switcher,_Eureka_Yard.jpg)

California will continue to evaluate hydrogen fuel-cell technologies for propulsion power for freight railyard switchers and light-density passenger rail lines now using DMU.

5.2.2 Trade Corridor Improvements

Trade corridor improvements focus on core system capacity, efficiency, reliability, and economic development. System capacity improvements (e.g., adding additional track or sidings) can help address current and future bottlenecks, allowing for additional traffic, decreased travel times, and improved reliability. Improved reliability and faster travel times impact the entire network, just as slowdowns at bottlenecks have a cascading effect on the rest of the system. A reduction in bottlenecks will make the system more efficient and reliable, fostering economic development and competitiveness. Current and future bottlenecks can also be tackled through various operational strategies, such as directional running or segregating by train type where parallel lines are available. This type of network rationalization could reduce conflicts between freight and passenger service, while also increasing overall capacity.

If bottlenecks are reduced, thereby decreasing travel times, overall emissions could also be reduced through more efficient rail operations. Additionally, the potential diversion of freight from highways will create more capacity on the roadways, further reducing emissions. Signalization improvements offer increased capacity and speeds, greater reliability, and safety benefits. Improvements to bridges and tunnels are primarily associated with keeping the structures in a state of good repair, and with ensuring that these structures can handle modern freight equipment.

Examples of trade corridor improvements and how they would contribute to California's overall rail vision, including potential co-benefits for both freight and passenger rail, are summarized in Table 5.3.

Table 5.3: Project Examples of Trade Corridor Improvements with Co-Benefits

Investment	Freight	Passenger
Trade Corridor		
Capacity improvements – UPRR Martinez Subdivision	✓	✓
Siding and access improvements – Benicia	✓	
Track additions – Bakersfield to Mojave	✓	
Capacity improvements – southern route to/from Oakland – UPRR Niles, Coast, Oakland Subs	✓	✓
New connections to facilitate Northern California route alternatives – Stockton Wye	✓	✓
Merced to Stockton improvements – BNSF Stockton Sub	✓	✓
Joint-use facilities on the Altamont Pass rail corridor and an intermodal rail shuttle between Port of Oakland and the northern part of the Central Valley	✓	✓
Double-tracking and signal improvements in San Diego County	✓	✓
Complete UPRR Alhambra Subdivision double track	✓	
BNSF – Los Angeles to Barstow Corridor	✓	✓

5.2.3 Economic Development and Short Lines

California's short lines handle approximately one-tenth of the state's carload freight tonnage, and are a critical link between many of the state's freight-intensive industries, ports, and principal trade corridors. Therefore, it is important to maintain a modern and efficient short-line rail system in California that operates seamlessly with its Class I connections.

The principal challenge that must be addressed is that some of the state's short-line trackage cannot handle freight cars weighing 286,000 pounds, a standard that the Class I railroads adopted in 1994. Where a line is not 286K-capable, the common practice is to either load a railcar to less than its maximum capacity, or to transfer the load to trucks for transport to a location where the railroad can handle the heavier load. Both practices unnecessarily increase costs through the inefficient use of assets, the additional steps required, and the increased travel time.

Addressing the 286K issue on a line typically requires undertaking one or more improvements, including replacing rail, ensuring that there are an adequate number of performing ties, and strengthening or replacing bridges. Concurrently, except for short lengths of line, it is greatly beneficial to bring track conditions up to FRA Track Class II, which allows speeds of up to 25 mph for freight trains. Higher speeds greatly improve the operational efficiency of railroads, reduce their costs, and have the potential to improve the marketability of rail service, particularly for potential new rail shippers. Industrial spurs provide direct access to the rail network and reduce truck movement, and often are a necessity for some industries that wish to use rail.

Some examples of short-line-focused improvements and how they would contribute to California's overall rail vision, including potential co-benefits for both freight and passenger rail, are summarized in Table 5.4.

Table 5.4: Project Examples of Economic Development and Short Lines with Co-Benefits

Investment	Freight	Passenger
Economic Development and Short Lines		
Freight spurs/sidings SMART/Northwestern Pacific Railroad – increase rail opportunities for North Bay shippers	✓	✓
Evaluate rail-served industrial development infrastructure for Northern Contra Costa Waterfront	✓	
Track and yard expansion	✓	
Reload yard and multiple rail upgrades for CTC	✓	
Sidings, track upgrades, industrial spurs, and loaders for rail-served customers	✓	
State of good repair and infrastructure upgrades to maintain and expand service	✓	✓
Track and yard expansion (Santa Maria Valley Railroad)	✓	✓
Grade separation at SCRRA tracks on San Canyon Road	✓	

5.2.4 Grade Crossing Improvement Needs throughout the State

The most common freight-related projects at the regional level have been rail grade-crossing improvements; primarily, grade separation projects. Grade separations are expensive, but there are other cost-efficient ways of making a grade-crossing safe using funding allocations from federal and state programs for other types of crossing improvements. Although the comparative safety risks and delays at rural crossings are much lower than in the state's high-volume corridors, particularly in urban areas, the equipment at many rural crossings does not meet current standards for safety and operational efficiency, and is expensive to maintain. By conglomerating upgrade projects and prioritizing them based on corridor-level planning, the reliability and safety improvements become more enhanced throughout the region.

By incorporating current best practices, technology, and equipment, improving these crossings enhances safety, and reduces vehicular and pedestrian delays. Ongoing maintenance costs are also reduced, creating savings that accrue to the railroads and the state and local agencies—which together share the financial burden.

Some examples of grade-crossing improvements and how they would contribute to California's overall rail vision, including potential co-benefits for both freight and passenger rail, are summarized in Table 5.5.

Table 5.5: Project Examples of Grade-Crossing Improvements with Co-Benefits

Investment	Freight	Passenger
Grade Crossings Improvements		
Address community impacts through corridor-based improvement plan as rail traffic grows/shifts	✓	✓
Bridge and crossing improvements	✓	✓
Address rural grade crossing needs, including along short lines	✓	
Develop corridor improvement program along major highways	✓	✓
City of Colfax grade separation	✓	
Improvements along BNSF and UPRR main lines in Fresno	✓	
Develop corridor improvement program along major highways	✓	✓

5.2.5 Additional Terminal and Yard Capacity

Terminals and yards are instrumental in the handling of goods at the beginning of their trip by rail, at the end of their trip by rail, or at intermediate locations along the way. These facilities help maintain the efficient flow of intermodal and carload traffic across the network. Intermodal rail terminals are established to facilitate transfer of containers and trailers between modes (ship to rail, truck to rail, and vice-versa).[171] Future growth studies show that the demand at the ports and at terminals will increase at a much faster pace than the population growth of California—indicating that freight and goods movement for the economy of the state and rest of the country will rely on the transcontinental routes originating in California. Improvements to terminals help ensure that capacity is sufficient to meet demand for goods movement, and help maintain—and perhaps improve—rail's competitive position.

Additional terminal capacity might also improve travel times and reliability, and potentially serve markets that are currently not being served due to capacity constraints. The State also has an interest in supporting regional economic development and investment in ports—proposals for economic development in the North Coast region and improvements to the Port of Humboldt Bay being two examples. The Rail Plan Vision for freight supports the expansion of new freight rail facilities at ports if the benefits and feasibility of those projects can be documented to justify State investment, which can leverage regional funding support and private investment to deliver improvements.

Some examples of terminal and yard capacity improvements and how they would contribute to California's overall rail vision are summarized in Table 5.6.

Table 5.6: Examples of Adding Terminal and Yard Capacity and Co-Benefits

Investment	Freight	Passenger
Terminal and Yards		
Ensure capacity and connectivity at Port of Oakland – 7th Street Grade Separation	✓	
Potential battery assist switcher demonstrations	✓	
Planned intermodal expansions	✓	
Improvements and expansion of rail facilities at ports	✓	
Intermodal terminal expansion to address growth – terminal access improvements for on-dock rail	✓	
Reduce yard and terminal emissions through implementation of zero-emissions technologies – cargo handling and switching	✓	
Realize truck/rail emission tradeoffs – on-dock and near-dock terminals	✓	
Port of San Diego yard capacity improvements	✓	

171 The majority of intermodal traffic in California is associated with the Port of Oakland, POLA, and POLB; a sizeable but smaller volume is related to traffic associated with the United States, Canada, and Mexico. For a more detailed description and list of intermodal facilities in California, please refer to Chapter 2.

5.2.6 Short-Haul Rail Improvements

Short-haul rail shuttles connecting ports with inland regions that host substantial international trade-related distribution activity offer the opportunity to improve the velocity of the flow of goods into and out of the densely populated regions of Southern California and San Francisco Bay Area. With sufficiently high volumes, short-haul rail shuttles transfer the volume of freight truck traffic away from the already congested highways, particularly in and around the major ports. The capital investment in short-haul rail shuttle improvement can be made using funds from the Traffic Congestion Relief Program, given a clear analysis of how the rail shuttle can help relieve congestion on roadways. The feasibility of short-haul rail shuttles is highly sensitive to the differential in costs between rail and highway transportation, and efficient operation would be required to maximize their viability and capture a better rate of return on the investment of public funds.

The ways that short-haul rail improvements would contribute to California's overall rail vision are summarized in Table 5.7.

Table 5.7: Project Examples of Short-Haul Rail Improvements

Investment	Freight	Passenger
Short Haul		
Reassess short-haul link between Oakland and Central Valley	✓	
Connectivity to Bay Area ports	✓	
Connectivity to Southern California ports	✓	
Potential Shafter terminal expansion	✓	
Reexamine inland port concepts	✓	

5.2.7 Advancement of Zero- and Near-Zero-Emissions Technologies

Priority should be given to rail projects that support the deployment of technologies that produce zero or near-zero air emissions, as defined in Health and Safety Code Section 44258. An element of the California Sustainable Freight Action Plan is that zero-emissions equipment should be deployed, where feasible, to reliably and efficiently transport freight; near-zero-emission equipment powered by clean, low-carbon renewable fuels should be used everywhere else.[172] The use of less polluting equipment reduces GHGs and other toxic emissions, and ultimately improves air quality. CARB's petition to the U.S. EPA, which requests adoption of more stringent national locomotive emissions standards, would support the move toward a cleaner freight rail transport system and protect the health and environment near freight facilities. The freight railroads are private companies that operate in national and transcontinental markets, and therefore may be more reluctant to invest in zero- and near-zero-emissions technologies to meet California-specific standards. However, the State's role in advancing the adoption of this technology is central, from both a regulatory and financial perspective, because it can help advance development of the prerequisite technology; and by providing financial incentives, support its commercialization.

172 CARB's November 2016 Technology Assessment: Freight Locomotives (Assessment) considers potential advanced locomotive technologies that could operate on the existing freight rail network with emissions well below the current national Tier 4 emission levels. In particular, the Assessment states that the most technologically feasible and cost-effective advanced technology for near-term deployment is the installation of a compact after-treatment system onto new and remanufactured diesel-electric freight interstate line haul locomotives. As a further step, after-treatment-equipped freight locomotives could be augmented with on-board batteries to provide an additional 10 to 25 percent reduction in diesel fuel consumption and GHG emissions.

5.3 Rail Projects with Freight Elements

Paralleling the proposed passenger rail improvements presented in Chapter 4, a set of projects that contain a freight rail element can be found in Appendix A. These projects present the existing need on the freight rail network. Consideration of these projects also helps identify potential gaps where specific initiatives may be needed to advance the State's vision and goals for freight rail.

The projects on the current list, extracted from the 2014 CFMP, subsequent RTPs, and stakeholder input, represent the potential costs of freight improvements by 2040. Based on projects from these existing lists, the total improvements will cost between $20 and $40 billion. Only projects that include a freight rail element are included; nevertheless, in some regions, most or all projects address joint-use passenger and freight facility needs, along with grade separations and other crossing improvements. Grade separations benefit freight reliability and speed, as well as highway users and abutters and the overall safety of the transportation system.

5.3.1 Freight Rail Projects and the Freight Investment Strategy

The freight investment strategy identifies projects under each of the investment categories guiding the freight rail strategy. Unlike passenger-rail projects, specific regional service goals and investments tied to specific horizon years cannot be identified, due to the differing nature of the private-public relationships required for delivery.

As previously discussed, for the most part, private freight railroad investment plans are not included. Therefore, unlike passenger rail projects, the freight rail strategy does not identify specific service goals tied to time horizons. Rather, the freight investment strategy helps prioritize projects in the short term as a means to intensify services and reduce redundancies in the long term, with the understanding that private freight companies respond to market demands, and change plans accordingly. Most investments are associated with maintaining the infrastructure in a state of good repair, and therefore are usually exempt from any kind of reporting requirement. However, information about projects that require extended planning cycles and environmental review—such as those involving new or reconfigured terminals and major civil engineering efforts—may be publicly available. Appendix A includes a list of funded projects identified in the CFMP 2014.

The appendices provide prospective lists of current and planned investments drawn from the CFMP, RTPs, and stakeholder feedback, and are neither exhaustive, nor meant to necessarily reflect the State's priorities for funding freight rail. They do not recommend specific projects for adoption in the Rail Plan; rather, they highlight improvements that various stakeholders have identified as important. Freight projects will be proposed based on the investment strategy listed in this chapter.

The freight rail needs, as identified throughout this chapter, suggest that trade corridor improvements and at-grade crossings are the two biggest categories of need as we prepare to invest in a more reliable rail network. Congestion relief, efficient transportation, better air quality, and safety are all goals that are met by investing in these projects. Yard capacity improvements are location-based, and despite the fact that they impact the whole network, come as a secondary priority for the investment of public funds. Because the railroad industry is predominantly privately owned and operates nationwide, the short-line industry needs more organization to enter into better public-private partnerships for maintenance and providing connectivity to the larger network. Together, these identified improvements, based on strategic and phased investment from public and private coordination, will increase the efficiency, reliability, and safety of goods movement in California and the United States.