

METROPOLITAN TRANSPORTATION COMMISSION

GOODS MOVEMENT PLAN *Task 4a – Strategy Development*

DRAFT Technical Report

prepared for

Metropolitan Transportation Commission

prepared by

Cambridge Systematics, Inc.

technical report

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Cambridge Systematics, Inc.
555 12th Street, Suite 1600
Oakland, CA 94607

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1.0 INTRODUCTION

The purpose of this report is to identify candidate strategies for addressing the regional goods movement needs, issues and opportunities for the San Francisco Bay Area that were identified in the report, *Needs, Issues and Opportunities*.

The term “strategy” as used in this report refers to individual projects, programs, or policies that could address an identified need or opportunity. Projects refer to identified infrastructure improvements where the location and the specific elements of the project are fairly well defined. Projects include, but are not limited to, construction of infrastructure and installation of technology. Programs typically provide funding for specific types of projects that address a specific goal, such as signal synchronization, without necessarily identifying the precise location. Programs may also involve activities that will be implemented by other agencies or include guidance documents. Lastly, a policy is a statement that guides the actions of MTC, such as how funding will be allocated, how funding decisions will be made, or the agency’s legislative platform. Policies may also be related to regulations, which are often implemented by outside agencies, such as cities, Caltrans, the Bay Area Air Quality Management District and the California Air Resources Board (CARB). Some examples include truck prohibitions and delivery restrictions.

It should be noted that while strategies will be identified in this stage of the Plan, they will not be evaluated until the next stage of Plan development. Just because a strategy is listed in this report does not mean that it will be given a high priority after subsequent evaluation and only high-priority projects will be included in the MTC Goods Movement Plan. Therefore, at this stage in plan development we are trying to list as many different strategies as possible that might address a particular need. During strategy evaluation, complementary projects may also be grouped together so that a more manageable number of projects are evaluated. The *San Francisco Bay Area Freight Mobility Study*¹ and the ACTC *Strategy Development* report developed as part of this study were used as guides in determining strategies for each corridor, as well as cross-cutting strategies.

It is also important to note that after all of the strategies have been evaluated in the next stage of plan development, the highest priority strategies (that achieve the highest evaluation ratings) will be assembled into a “balanced portfolio” of strategies that comprise the final plan, to ensure that all of the goals of the plan are met. That means that if a project scores highly on a number of critical performance measures but creates impacts that need to be addressed, the portfolio will need to include other projects that minimize or eliminate these impacts. At this stage in the plan development process, the list of potential strategies to evaluate should include strategies that

¹ San Francisco Bay Area Freight Mobility Study, Caltrans, 2014.

are designed to address impacts that might be created by other strategies (e.g., emission reduction strategies that can be applied to address impacts of growth in goods movement that is associated with economic benefits). More information about the evaluation process and how the final portfolio of projects will be developed is provided in the report, *Multimodal Performance Measures*.

1.1 Report Organization

The rest of the report is organized into the following sections:

- **Section 2.0 Linking Goods Movement Needs to Strategies.** This section presents a summary of the strategies considered to address all goods movement system needs, including strategies that could be applied to specific corridors, global gateways, local streets and roads, and strategies that cut across all of these areas, i.e., cross-cutting strategies
- **Section 3.0 Corridor Strategies.** This section presents more detailed strategies for each corridor critical to the Bay Area's goods movement system. These corridors were first described in the report, *Infrastructure, Services, and Demographics/Freight Flow Trends*. Within each corridor, strategies related to highway, rail, global gateway, and those that are cross-cutting are discussed, where applicable.
- **Section 4.0 Global Gateway Strategies.** This section discusses in more detail the strategies associated with the seaports and airports in the region.
- **Section 5.0 Local Streets and Roads Strategies.** Though local street and roadways is not a focus on the regional goods movement needs assessment, it is important to understand the key strategies that are related to local streets and roads. This section presents a summary of the local streets and roadway strategies.
- **Section 6.0 Strategies to Capitalize on Opportunities.** After considering all of the needs and issues in the Bay Area, and their associated strategies, this section provides a summary of the best opportunities to consolidate individual strategies and make a positive impact on the regions' goods movement system. Strategies in this section will be made up of programs and policies.

2.0 LINKING GOODS MOVEMENT NEEDS TO STRATEGIES

This section presents a summary of the strategies that address the highest priority needs of the Bay Area. The high priority needs are based on the needs assessment report's evaluation of the system performance relative to the Plan's goals. Table 2.1 provides a summary of the needs and the strategies (projects, programs, and policies) that should be considered for addressing the needs. For each type, the needs are broken down further by the functions of the goods movement system – global gateways (seaports and airports), interregional rail corridors, interregional and intraregional highway corridors, local streets and roads, and cross-cutting needs and strategies, where applicable. In some instances, examples of the specific locations where needs are greatest and where specific strategies might be applied are also included to provide clarity, though the purpose of the table is to provide an overview that gives a sense of what the most critical strategies for the region might be. Appendix A provides a listing of all strategies considered.

Table 2.1 Summary of Needs and Strategies of the Bay Area Regional Goods Movement System

Types of Needs Identified	Description of Need	Key Potential Strategies to Address Need
Safety		
Highway	Highest crash locations on I-880, I-580, I-80	Interchange improvements, mainline, auxiliary lanes, truck interchange bypasses, and geometric improvements
	Crash rates highest near high volume interchanges	ITS technology and traveler information, truck safety programs, improved signage for truck movements
Rail	Potential hazards from increased movement of crude oil by rail to regional refineries and potential of crude by rail traversing region to Central Coast refineries	<p>Monitor and advocate in federal regulatory proceedings and state and federal legislation for increased rail tank car safety standards, hazardous materials transport operations safety procedures, and information to local first responders on hazardous materials transport through cities</p> <p>Consider policies to support the recommendations of the California Interagency Working Group that studied the crude by rail issue</p> <p>Coordinate regional efforts to work with railroads to ensure training and information exchange between railroads and first responders regarding hazardous spill emergency response</p>
Local streets and roads	Analysis from Alameda County suggests high levels of truck-involved crashes on local roads at freeway access locations.	Signalize freeway access and ensure signal timing considers acceleration/deceleration characteristics of trucks

Types of Needs Identified	Description of Need	Key Potential Strategies to Address Need
	Potential safety hazards on high speed rural commuter routes that also provide access to areas of goods movement activity (e.g., wineries and agricultural producers)	Turn lanes with adequate storage for trucks at freeway ramp access points
Infrastructure Condition		
Highway	Selective highway pavement and bridge conditions needs along north U.S. 101, east SR 4	Targeted bridge or pavement improvements Identify/establish programs to maintain roadways in a state of good repair
Congestion, Mobility and Travel-Time Delay		
Global Gateways	Gate queues at Port of Oakland Truck delays at grade crossings at Port of Oakland Rail delays accessing Port of SF Limited bulk terminal capacity for growing demand (all ports) Congestion at OAK access roads	FRATIS and ITS at Port of Oakland and access roads around OAK Projects to reduce queuing and crossing delays at Port of Oakland Expansion of bulk and cold storage terminal improvements (all ports) Rail lead (spur) improvements at Ports of Oakland and SF Longer-term expansion of intermodal terminal capacity
Highway	Significant delay and reliability issues on many truck corridors (I-880, I-80, US 101, SR4, I-580, I-680) Critical freight bottlenecks (I-80/I-680/SR12)	Interchange improvements, mainline, auxiliary lanes, truck interchange bypasses, and geometric improvements. Improved signage for truck movements ITS based solutions that are coordinated with arterial systems. Long-term development of alternate modes (e.g., short-haul rail)
Rail	Growth in international intermodal traffic and bulk movements (along with potential growth in crude oil by rail shipments) straining Martinez, Oakland, Coast, Niles and Stockton Subdivisions Impacts on capacity on Martinez Subdivision created by switching of trains on the mainline. Future needs to expand domestic intermodal terminal capacity in Oakland to reduce truck traffic from Central Valley intermodal terminals.	Capacity improvements on Martinez Subdivision (sidings and increased track in selected locations) Expanded capacity and coordinated strategy for Niles and Oakland Subdivisions to make better use as southern route to Port of Oakland Future expansion of intermodal terminals at Port of Oakland (OHIT Phase 2 expansion). Industrial rail spur program to improve industrial access (also promotes economic development in locations such as Contra Costa Northern Waterfront, North Bay agriculture production areas, industrial areas near Ports of San Francisco and Redwood City).
Local Streets and Roads	Poor LOS on certain major and minor arterial truck routes	Selective widening projects

Types of Needs Identified	Description of Need	Key Potential Strategies to Address Need
		SMART corridors including arterials Signal timing and prioritization projects on truck routes
Passenger System		
Global Gateways	Potential truck conflicts with autos on Caesar Chavez accessing Port of SF Potential conflicts with bike and pedestrian trails on truck routes on access to marine terminals at Port of Oakland and Port of Richmond At-grade rail crossing delays for autos near Port of Richmond	Improved access planning for autos in South Waterfront area of Port of SF Physical separations for bike and ped routes at Port of Oakland At-grade crossing safety and grade separation program
Highway	Truck traffic conflicts with passenger traffic	Projects and programs to allow selective use of passenger only facilities.
Rail	Expansion of Caltrain, ACE, and Capitol Corridor services will strain capacity on several lines Expansion of SMART commuter service limits growth of NWP shortline services.	Expanded track and sidings to allow for freight and passenger separation wherever possible. Potential ROW acquisition or trenching through Emeryville on Martinez Subdivision Coordinated strategy to separate freight and passenger services on Oakland, Niles, and Coast Subdivisions Revisit operating window restrictions for freight on Caltrain Corridor in light of new FRA rulings
Local Streets and Roads	Arterial truck routes are often on high frequency bus routes Bike and pedestrian routes on certain truck routes	Time of day managements to reduce conflicts Bike and pedestrian physical separations where feasible Multiple use delivery pullouts
Multimodal Connectivity		
Global Gateways	Grade crossing improvements North rail access to intermodal terminals Local circulation improvements	Port of Oakland 7 th St Grade separation project Local circulation improvements at Port of Oakland and OAK Port of Oakland rail access improvements
Highway	Limited E-W connections to Central Valley and interior U.S.	Projects to improve key corridors that provide alternatives to I-580, such as SR 12/SR37, SR4, and SR 152
Local Streets and Roads	Locations with poor connectivity between freeways and major freight hubs	Advocate for state and federal programs to improve first/last-mile connectors Provide guidance for truck route planning New truck route designations with time of day regulation (where routes must pass through residential areas)

Types of Needs Identified	Description of Need	Key Potential Strategies to Address Need
		Selective upgrading of routes for trucks where better connectivity between major local truck routes is needed
Rail	Industrial rail access needs for industrial shippers on Northern Contra Costa Waterfront, North Bay, San Mateo County	Industrial Rail Access Program, Short haul rail project
Air Quality, Environment, and Community Impacts (Equity)		
	PM _{2.5} emissions from freight have been declining but reductions may plateau in the 2020 – 2025 time frame	<p>Incentives for engine retrofits to low and zero emission technology</p> <p>ZEV technology demonstrations for trucks.</p> <p>Low emission rail terminal operations including incentives for conversion to low emission switcher locomotives</p>
	Localized health effects of diesel emissions and rail noise/emissions in major truck and rail corridors (e.g., I-880, I-80, SR-4, US101)	<p>Programs to target low/zero emission strategies (see above) to corridors with Communities of Concern</p> <p>Improvements to rail at-grade crossings (including selective separations), quiet zones.</p> <p>Coordination of truck route planning in industrial areas with restrictions and enforcement in adjacent residential areas.</p>
	Vulnerability to sea level rise on major truck, rail, airport, and seaport infrastructure along Bay and other waterfront areas.	Adaptation strategies and improvements to diking systems to reduce potential flooding
Land Use		
	<p>Modal and Land Use Conflicts and Coordination with Passenger Systems (e.g., residential and commercial development in converting industrial corridors can encroach on active rail and truck corridors)</p> <p>Lack of truck parking and truck services in industrial corridors</p>	<p>Land use guidance program</p> <p>Incentives to preserve buffers around freight corridors incorporated in project plans</p> <p>Identify sites for overnight and short term truck parking and work with private sector providers to implement truck services in development of these sites</p> <p>Complete Streets guidance and incorporation in One Bay Area Grants for programs such as delivery windows, curb pullouts)</p> <p>Night delivery pilot programs</p>
Jobs Programs		
	<p>Near-term truck driver shortages</p> <p>Near-term lack of logistics professionals</p>	<p>Training and workforce development programs coordinated through community colleges</p> <p>Continued local hiring goals for communities close to freight hubs</p>

Types of Needs Identified	Description of Need	Key Potential Strategies to Address Need
	Continued lack of job opportunities in communities close to freight hubs	

3.0 CORRIDOR STRATEGIES

This section provides a more focused look at strategies for each of the major goods movement corridors in the region. Since each of the corridors feature different types of goods movement infrastructure, serve different goods movement functions, and face different needs (as identified in the *Needs Assessment Report*) this section highlights strategies that will help each corridor play its role in the regional goods movement system more effectively. It reports the strategies by corridor, as shown in Table 3.1. The primary focus of the strategy discussion is on the interregional/intraregional highway and rail strategies. Interregional corridors include road and rail infrastructure whereas intraregional corridors are primarily highway corridors. As described in the Baseline Assessment report, many of the defined corridors for this plan overlap and include both interregional and intraregional elements. Strategies to address Global Gateway needs are mentioned briefly as they relate to each specific corridor. However, because several of the Global Gateways overlap multiple corridors, a more complete discussion of these strategies is presented for each Global Gateway individually in Section 3.0. A similar approach is taken to addressing cross-cutting strategies. Since some of these strategies are aimed at multiple corridors, the corridor strategy description mentions the cross-cutting strategies that are most relevant to each corridor, referring to a more complete description of the cross-cutting strategies that was presented in Section 2.

The projects, programs and policies discussed in this section address needs and issues in five main system performance areas: safety; infrastructure condition; congestion, mobility and travel-time reliability; passenger system compatibility; and multi-modal connectivity/redundancy. These concepts are briefly described following Table 2.1 and should be referenced while reviewing this section. In the case of Global Gateways the projects, programs and policies also address general capacity needs, which while often related to congestion usually reflects insufficient capacity to take advantage of a market opportunity that in the absence of the capacity would result in diversion to another Gateway. Projects, programs, and policies that are related to cross-cutting issues address needs and issues in the performance areas of emissions/air quality/public health, equity, land use compatibility, and climate change/sea-level rise. Specific projects, programs and policies are listed in detail in Appendix A.

Table 3.1 Goods Movement Corridors in the Bay Area

Counties in Bay Area	Corridor	Other Corridor Elements	Corridor Functions	Corridor Description
Alameda, Santa Clara	I-880	UP Rail Lines (Niles, Coast Subdivisions), Port of Oakland, UP Railport, BNSF Oakland Intermodal Gateway (OIG), Oakland International Airport, Mineta San Jose International Airport	Global Gateway, Interregional, Intraregional	Major North-South truck corridor supporting East Bay. One of the region's primary international gateway corridors and intermodal rail terminals. Major industrial corridor with much of the region's historic industrial core.

Counties in Bay Area	Corridor	Other Corridor Elements	Corridor Functions	Corridor Description
San Francisco, Alameda, Contra Costa, Solano, Napa	I-80 (Central Corridor)	UP Martinez Subdivision, Port of Benicia, Travis Air Force Base, Cordelia Truck Scales, Major interchange at I 80/I 680/SR 12	Global Gateway, Interregional, Intraregional	Primary corridor connecting Bay Area to Sacramento and northern tier states across the U.S. Also connects Bay Area counties.
Contra Costa, Alameda	I-580/SR 238 (Altamont Corridor)	UP Oakland Subdivision, M580 Marine Highway (currently operating only on an as-needed basis), Port of Richmond	Global Gateway, Interregional	Primary truck corridor connecting the Bay Area to the rest of the U.S. to the continental U.S. Secondary freight rail line that is expected to grow increasingly important with expansion of rail terminal at the Oakland Army Base and capacity constraints on the Martinez Subdivision.
Santa Clara, San Mateo, San Francisco, Marin, Sonoma	U.S. 101	UP Coast, Caltrain Peninsula, SFO, Port of San Francisco, Port of Redwood City, SMART rail on NWP line	Global Gateway, Interregional, Intraregional	Major goods movement corridor serving the Peninsula in the Bay Area. Also connects agriculture/wine shippers in North Bay (Sonoma), Central Coast, and North Coast with markets in Bay Area. Also primary access to SFO.
Santa Clara, Alameda, Contra Costa	I-680	Port of Benicia, Valero Oil Refinery	Intraregional	Serves trucks moving from South Bay and Fremont and connecting to and from the warehouses in the San Joaquin Valley via connections with I-580.
Sonoma, Napa, Solano	SR 12/SR 37	Northwestern Pacific rail line	Interregional, Intraregional	Helps connect North Bay to the Port of Oakland, San Joaquin Valley, and rest of the region.
Santa Clara	SR 152		Interregional, Intraregional	Important connection providing link that connects the San Joaquin Valley to the coast. Recently selected as a Caltrans Focus Route.
Contra Costa	SR 4	BNSF and UP Lines from Stege/Port Chicago to Stockton, UP Tracy Line (Martinez to Lathrop)	Intraregional, interregional	Serves refineries and chemical manufacturers in CCC, provides connections to Central Valley

3.1 The I-880 Corridor

The I-880 corridor is the core north-south intraregional freight corridor that supports a variety of manufacturing, logistics and value-added industries in the east bay from San Jose to Oakland. This corridor includes both the I-880 highway and multiple UP rail facilities along its length, two international airports (OAK and SJC), and the container terminal at the Port of Oakland. UP and BNSF both operate intermodal facilities adjacent to the Port of Oakland. I-880 also provides access to the interregional network of I-580/I-238, and for industrial areas along the I-880 corridor, as well

as serving as the East Bay entry point for the three Transbay bridges: the Bay Bridge, the San Mateo Bridge, and the Dumbarton Bridge.

Strategies for this corridor are designed to address the following critical needs:

- **Congestion, mobility and reliability (highway)** – I-880 has the highest volumes of trucks in the region and some of the highest levels of truck delay in the region. With expansion and successful continued development of the corridor’s Global Gateways, truck traffic is expected to experience high growth. This is also one of the most congested corridors in the region. The corridor has poor reliability weighted for truck delay from the Hayward-Union City area up to the Port of Oakland. Access to OAK is also an issue because of congestion on the freeway and on primary local access roads. This is a particular problem with growing demands of third party logistics providers who serve e-commerce.
- **Congestion, mobility, and reliability (rail)** – The UP rail corridors in the corridor are not heavily used for freight transportation at present but they are experiencing growth. Commuter rail in the corridor is significant and expected to grow. An overall investment plan linked to rail improvements in the Oakland Subdivision through Niles Canyon is important for future growth at the Port.
- **Safety** – I-880 has the highest levels of truck-involved crashes. This is often related to older interchanges that were not designed for heavy truck traffic and conditions such as short merge and weave sections, close interchange spacing, ramp geometries that are not sufficient for heavy trucks, and the high volumes of trucks in the outside lanes through which autos must weave to access and leave the facility. The truck safety issues are a primary cause of the poor reliability in the corridor.
- **Capacity issues and congestion at the Port of Oakland** - Growth potential at the Port will put strains on bulk terminal capacity. Current operational issues and circulation problems on local streets around marine and rail terminals result in queuing at gates and the inability for cargo to move efficiently into and out of the port. In the long run, lack of intermodal rail terminal capacity could impact port growth.
- **Land Use Compatibility** – As one of the region’s principal industrial corridors, the I-880 corridor is likely to see continued growth in demand from emerging industries and industrial land supply needs to be monitored. Expanding residential and commercial development along existing goods movement corridors (rail and truck routes) may threaten their viability.
- **Environment, Public Health and Equity** - A number of the region’s Communities of Concern are along this corridor and experience high levels of public health risk due in part to exposure to goods movement emissions. Inadequate truck parking and truck services in industrial areas impacts adjacent neighborhoods. Growth in residential and commercial development along rail corridors slated for additional freight growth creates noise and

impacts at crossings. With its location along the bay, most of the critical goods movement infrastructure in the corridor is vulnerable to sea-level rise.

Strategies that will be evaluated for this corridor address these needs in order for the corridor to continue to serve the international trade and domestic trade opportunities moving through the Global Gateways and Interregional Corridors. These strategies will also allow the corridor to serve the needs of emerging industries critical to the economic diversity of the region including a role as a West Coast hub for e-commerce and global logistics. The corridor strategy also seeks to realize these opportunities while reducing impacts on adjacent communities.

3.1.1 Highway

In light of the congestion, reliability, and safety needs identified for this corridor, strategies are designed to increase effective capacity and improve operations. There is limited right-of-way available for significant lane additions and there are numerous interchange issues. Thus, a primary focus of strategies for the corridor are to improve deficient interchanges, add auxiliary lanes, widen ramps, and improve interchange geometry. There are a number of projects that will be evaluated throughout the corridor. Collectively, these projects could have significant impacts on truck operations.

While not a specific project recommendation at this time, another highway strategy for the I-880 corridor is to examine the potential to make better use of existing and proposed HOV/HOT lanes to incorporate truck access, especially in off-peak periods, as a method of separating trucks and autos to achieve greater truck safety. Truck-only lanes could include interchange bypasses that will be evaluated in some locations and also could include demonstrations of zero-emission truck technology.

Another major strategy for the highway system in the I-880 corridor are proposed projects to expand the ITS technology applications in the corridor as part of an overall plan for Integrated Corridor Management (ICM) that is already planned for the corridor. This could be linked to new applications of Freight Advanced Travel Information Systems (FRATIS), a technology program being developed by the Federal government to help ports and airports more effectively manage their gate operations through truck travel information, information about availability of cargo, advanced appointment systems and other techniques to reduce gate queues.

3.1.2 Rail

UP's two rail subdivisions, the Niles and the Coast, each have capacity needs due to the high volume of freight rail traffic carried, as well as the shared passenger rail operations. Currently, rail capacity is worst on the Coast subdivision from San Jose to Niles. In the future, capacity on this line will worsen. In addition, the Oakland subdivision from Niles to Oakland will also face significant capacity constraints in the future. Potential projects that will address capacity needs and reduce congestion, delay, and reliability are presented below for each of the major subdivisions in the rail system. The

overall strategy is to rationalize the use of the three parallel subdivisions considering the different freight and passenger operations and potentially separate passenger and freight traffic, increase overall capacity as needed to accommodate increased freight access to Oakland from the south (a route that is likely to be used increasingly for growing bulk export and manifest traffic), and to create better connections with the Oakland Subdivision in the I-580 Corridor.

- **Coast Subdivision:** The Coast Subdivision south of Newark carries a large number of freight trains as well as Capitol Corridor, ACE, and Amtrak trains on what is primarily a single-track railroad. There are two major projects that have been proposed to expand capacity and address delay and congestion in this corridor – the Newark-Albrae Siding Connection and the Alviso Wetlands Double-Track project. The latter has significant environmental sensitivities which would need to be resolved in order for this to be feasible.

North of Newark, there is also likely to be increasing congestion on the Coast Subdivision if train volumes grow as projected accessing the Port of Oakland via the southern route. This could be further exacerbated if there is no resolution to congestion on the Martinez Subdivision and UP diverts traffic to the Oakland Subdivision through Niles Canyon. There are no projects currently identified to address congestion and capacity needs on the northern portion of the Coast Subdivision; however, there are possible opportunities for future project and strategy development. The first involves creating a connection between the Oakland Subdivision and the Niles Subdivision to allow freight traffic to/from the Port of Oakland to use this line (along with associated capacity improvements on the Niles Subdivision). The second option would involve changing alignments for the Capitol Corridor to free up capacity on the Niles Subdivision for freight movements. While this would also require the connectivity improvement between the Oakland Subdivision and the Niles Subdivision mentioned previously, some of the capacity upgrades to the Niles Subdivision would not be required.

- **Niles Subdivision:** At present, the Niles Subdivision from Niles Junction to Elmhurst is not a heavily used freight line and most of the capacity needs are driven by growth in the Capitol Corridor Oakland to San Jose service. However, north of Elmhurst where Coast Subdivision trains join the Niles up to Oakland, this is the primary southern access route to the Port of Oakland and there are significant capacity improvements needed. There are two projects that would add a third main track from Oakland through Jack London Square to Elmhurst. There have also been proposed projects to double track from Elmhurst to Industrial Parkway that would be needed to support freight growth if freights move to the Niles Subdivision as the preferred route to Oakland. If this connection is not made, there might still be a need for these projects south of Elmhurst but this would be to support passenger growth.

There are also projects included to expand rail terminal capacity at the Port of Oakland and the Oakland Army Base. Expanded bulk and manifest yard projects at the Oakland Army Base are already underway and will allow the region to take greater advantage of bulk export opportunities.

In the future, there may be a need to build the next phase of the Outer Harbor Intermodal Terminal (OHIT) project to expand intermodal terminal capacity at the port.

3.1.3 Global Gateway

Global Gateway strategies for the I-880 corridor include the rail terminal strategies discussed previously as well some of the following projects:

- **Access Improvements to Port of Oakland** – The most critical of these improvements in the I-880 corridor is the 7th Street grade separation project, which will grade separate a rail grade crossing reducing delays to trucks accessing the marine terminals and improve rail terminal access. Other improvements are planned to address local street circulation issues.
- **ITS** – A project is proposed to develop a FRATIS project for the Port of Oakland to improve gate operations and an airport access ITS project for OAK

3.1.4 Cross-Cutting

As noted previously, the I-880 corridor has the highest concentration of goods movement activity in the region as it is home to a major truck corridor, the southern rail route into the Port of Oakland, and both the Port of Oakland and Oakland International Airport. It is also a major industrial corridor with logistics facilities and manufacturing businesses in Oakland, San Leandro, Hayward, Union City, and Fremont. This activity creates a variety of impacts on communities along the corridor and many of these are Communities of Concern, raising equity concerns. These needs cut across goods movement functions and modes and thus are addressed through cross-cutting strategies. The cross-cutting strategies that are applicable to the I-880 corridor are presented here to show how they need to be integrated with other corridor strategies. Many of these are programmatic strategies and are listed in the appendix in the cross-cutting strategies section of the table.

- **Land Use Strategies** – As demand for central locations for affordable housing and new commercial space has intensified all over the Bay Area, this pressure has become especially acute in the I-880 corridor. This means that industrial land uses and goods movement infrastructure is often in the path of new commercial and residential development creating potential conflicts. Land use regulation is under local authority so the strategies suggested to address this issue are programmatic and focus on guidelines that cities can use to minimize land use conflicts along goods movement corridors. These will be particularly relevant in the I-880 corridor and should be integrated in specific corridor plans and or projects that involve expansion of goods movement infrastructure (such as some of the proposed rail projects and projects around the Port of Oakland).
- **Air Quality/Public Health/Equity** – A number of existing rules and programs (such as the Port of Oakland’s Maritime Air Quality Improvement Program and the BAAQMD’s programs to provide assistance to trucking companies to retrofit to cleaner engines) and new rules at the state and

federal level have been successful in significantly reducing NOx and PM emissions in the Bay Area. Nonetheless, there are still significant health risks experienced by residents within the corridor. At some point in the future (mostly likely in the 2020 -2025 timeframe), emissions reductions from these programs will begin to plateau and there will be a need for new programs. Strategies to demonstrate and develop zero-emission and near zero-emission technologies for truck drayage, line haul, and urban delivery vehicles could have an important role in the corridor. Strategies will be evaluated as part of MTC's Freight Emission Reduction study to determine how best to target these strategies to the appropriate corridors and the I-880 corridor is a likely corridor. In addition, further discussions with the Class I railroads and switching operators at the Port of Oakland should focus on how best to incorporate adoption of zero and near-zero emission yard technologies and the cleanest locomotive as part of any efforts to expand rail terminal and mainline capacity in the corridor. The FRATIS project described under Global Gateway strategies could also reduce drayage truck VMT and idle emissions by improving efficiency of operations. Since the corridor is expected to see significant growth in rail operations there are also specific projects and programs for developing new projects that would address at-grade crossings and the need for quiet zones.

- **Truck Parking Services** – As a condition of the approval of the Oakland Army Base redevelopment, provisions have been made to address truck parking and truck services to reduce neighborhood impacts. There is a strategy to continue monitoring the effectiveness of these programs and to determine if additional parking is needed. There is also a strategy to more generally review truck parking needs in the corridor, to determine if sites identified in the Alameda County truck parking study of 2008 are still suitable, and to identify specific sites that could be designated for truck services and truck parking, addressing needs in the industrial parks and industrial areas in the Hayward, Union City, and Fremont areas as well as the needs at the Port of Oakland.

3.2 The I-80 Corridor

The I-80 Corridor is a major interregional freight corridor connecting the Bay Area to Sacramento and northern U.S. states. I-80 also performs functions as an intraregional corridor in Solano, Alameda and Contra Costa Counties, as well as along the San Francisco-Oakland Bay Bridge. In addition to the I-80 freeway, this corridor also contains the UP's Martinez Subdivision rail line and multiple marine terminals serving nearby oil refineries. The corridor also carries truck and/or rail traffic originating from three ports that are close by – the Port of Richmond, near I-580, the Port of Benicia, near I-680, and the Port of Oakland, near I-80 and the approaches to the San Francisco-Oakland Bay Bridge.

In the Needs Assessment report, the most critical needs that were identified in this corridor were:

- **Safety** – I-80 has the third highest truck crash rates (crashes per lane mile) in the region, and Market Avenue in Richmond and Ferry Street in Martinez have high incidents of at-grade rail incidents.
- **Congestion, mobility and reliability** – There is significant congestion in both the AM and PM peak period, especially around the Carquinez and Bay Bridges and from Richmond to Oakland. There is also significant congestion at the I-80/I-680/SR 12 interchange in Solano County. The Martinez Subdivision from Oakland to Richmond has especially severe rail congestion and is expected to worsen with growth in freight traffic in and out of the Port of Oakland and growth of commuter rail traffic on the Capitol Corridor. This is a particularly acute problem through Emeryville where there is very limited right-of-way for expanding track capacity. While the Martinez Subdivision has adequate capacity for growth through Solano County, this creates an opportunity for increased industrial rail traffic from many historically rail-served sites but this will require investments in industrial spurs. At present there is switching that occurs on the mainline that can create bottlenecks for through train traffic. Spurs and sidings could address this issue.
- **Port Access and Capacity** - There is an opportunity to expand bulk exports and auto imports at the public and private terminal facilities at the Port of Richmond but this would require acquisition of additional land with potential impacts on adjacent communities. Waterside access to the Port of Richmond requires continued dredging of the shipping channels and the Army Corps of Engineers has considerably restricted dredging windows making it difficult to complete all of the dredging in the available time and affecting equipment utilization and cost.
- **Air Quality/Public Health/Equity** - Like the I-880 corridor, the concentration of industrial and goods movement activity in the corridor, particularly from Oakland to Richmond and the existence of Communities of Concern in this part of the corridor, creates public health risks if goods movement projects continue to expand. Impacts on communities at rail crossings and along rail lines are particularly acute in this corridor.
- **Sea Level Rise** – Portions of the rail system along I-80, particularly in Western Contra Costa County, are at risk for sea level rise. BCDC is initiating an Adapting to Rising Tides project focused on the Contra Costa waterfront, which will identify risks and vulnerabilities at a greater level of detail than currently known. As that project advances, adaptation strategies should be considered.

Strategies that address these issues are described below.

3.2.1 Highway

For the foreseeable future, interregional highway trips on I-80 are expected to see moderate growth as many carriers prefer use of the I-580 to I-5 interregional connection. However, the recent location of the Tesla battery plant in Reno, the expansion of other industrial shippers and distribution centers

in Northwestern Nevada with trade flows to the Bay Area, and growth in warehousing along the I-80 corridor in former agriculture lands in Solano County, could drive additional growth beyond what is projected in this study.

There is heavy congestion on the portion of I-80 through Alameda and Contra Costa Counties, but this section serves largely intraregional traffic including significant commute traffic. This portion of I-80 also has the worst reliability and the highest levels of truck-involved collisions in the corridor. In light of this and the limited right-of-way available for freeway expansion, interchange projects that improve operations where autos merge into high volumes of trucks, would reduce crashes and improve reliability. Extended auxiliary lanes would also provide spot capacity benefits, but more importantly, would improve operations. This would reduce incidents and provide effective capacity improvements.

Freeway delay reduction strategies are not limited to expanding capacity but also include comprehensive strategies that also can help reach other goals. For instance, the I-680/I-80/SR 12 interchange improvement project, a seven-phase project that just began construction, will relieve congestion, improve safety, and improve access. A related project, improvements to the westbound truck scales near the I-680 interchange, could also have operational benefits and allow the truck scales to be used more effectively.

3.2.2 Rail

Addressing capacity needs on the Martinez Subdivision is critical for continued growth of the Port of Oakland's import business. In addition, a new area of demand has emerged related to growth in movement of crude oil by rail into the region's oil refineries along the northern Contra Costa waterfront. This has created a new source of growth in rail traffic on the Martinez Subdivision, and is also impacting the lesser used UP Tracy and BNSF Stockton Subdivisions. In addition to the capacity issues raised by the anticipated growth in rail traffic, there is a need to continue to assess safety concerns and impacts on roadway-rail grade crossings.

The segment of the Martinez Subdivision from Oakland to Richmond is the busiest rail segment in the Bay Area and it is also one of the most operationally challenged with both UP and BNSF and the Capitol Corridor operating along this line. There was originally a planned project that had been nominated for the Trade Corridor Improvement Fund (TCIF) to make substantial improvements to this segment but the project was ultimately withdrawn because of potential funding and implementation issues. The project would have provided for track and signal upgrades between Emeryville and Richmond, constructing new track between the Port of Oakland and Emeryville, and constructing grade separation structures in Richmond. Portions of this project have been retained in a new North Lead Rail Project proposed by the Port of Oakland and included in the section of this report describing connectivity strategies. There are other strategies that should also be examined to increase rail capacity from Oakland to Richmond in order to separate passenger and freight traffic. While right-of-way acquisition is especially challenging in this track segment, especially

through Emeryville, other, albeit expensive, strategies, such as trenching of the corridor, should be looked at to assess potential feasibility.

As noted previously, there is an opportunity to expand rail usage at historically rail-served sites in Solano County and to address switching that occurs on the mainline through industrial rail spur and siding investments. These are investments that are not typically made by the Class I railroads and are left to the shippers or any short line switching railroad. A programmatic strategy is proposed to examine the potential for developing an industrial rail spur/assistance program at the state level to support these types of investments and to address this in the upcoming 2018 California Rail Plan.

Any programs to address rail capacity needs and expand operations in the I-80 corridor must acknowledge the already high burden that rail traffic places on communities in Oakland, Emeryville, Berkeley, Albany, and Richmond. A programmatic strategy is proposed to provide funding for rail crossing grade separations and safety improvements, quiet zones, and other approaches to addressing rail noise impacts on communities along the corridor. Several specific grade separation projects are also included for this corridor.

3.2.3 Global Gateway

There are no specific projects proposed for the Global Gateways in this corridor (although, rail access improvements such as the North Lead project, overlap access strategies for the Port of Oakland discussed in the I-880 corridor discussion). In order to address the potential opportunity for bulk export expansion at the Port of Richmond, a regional strategy should be considered that would coordinate bulk export needs throughout the Bay Area.

3.2.4 Air Quality/Public Health/Equity

In addition to the strategies described above that address rail impacts on communities, there are cross-cutting strategies at a programmatic level that should be investigated and integrated with projects that would expand rail and truck traffic in the corridor, particularly in northern Alameda and West Contra Costa County. These would be similar to those discussed for the I-880 corridor and would likely overlap, as the sources of community impacts are similar in both corridors.

3.3 The I-580 Corridor

The I-580 (Altamont) Corridor is the most heavily used interregional truck corridor in the Bay Area, and connects with I-205 and I-5 to distribution warehouses in the Northern San Joaquin Valley that serve the Bay Area and is the primary route for agriculture exporters in the San Joaquin Valley. A portion of the route, from the border of San Leandro to the Grand Avenue exit in Oakland, is truck-restricted. Facilities providing connectivity on the corridor include the I-680 and SR 238 freeway. The UP's Oakland Subdivision (which travels through Niles Canyon), and the M-580 marine highway between the Port of Oakland and the Port of Stockton (though it is currently not operational) provide parallel rail and barge options. The corridor also includes the Port of Richmond, a deepwater

marine port with rail terminals managed by the Richmond Pacific Railroad (RPRC) and BNSF (strategies related to the Port of Richmond were described previously in the discussion of the I-80 corridor).

In the Needs Assessment report, the most critical needs that were identified in this corridor are:

- **Safety** – I-580 has the second highest truck crash rates (crashes per lane mile) in the region.
- **Congestion, mobility and reliability** – Truck-related delay is particularly acute in the eastern portion of the corridor from Dublin/Pleasanton to Livermore with trucks moving to and from the regional warehouse and distribution centers to customers throughout the Bay Area. The safety issues described above also contribute to poor truck reliability throughout the corridor. While the primary congestion and reliability issues in the corridor today are related to truck traffic, there are growing concerns about rail congestion on the UP Oakland Subdivision through Niles Canyon. This route is expected to see increased freight traffic growth from bulk and manifest trains along with its use as a reliever route for intermodal traffic as congestion grows on the Martinez Subdivision.
- **Passenger system coordination** – the Altamont Corridor Express (ACE), operating on the Oakland Subdivision, currently has no capacity constraints, but may in the future as ACE seeks to expand.

Strategies to address these needs are described below.

3.3.1 Highway

While the sections of I-580 that have the greatest truck delay may also have the most available right-of-way of any of the goods movement projects in the region, there are other competing demands for this right-of-way to serve passenger needs through HOV/HOT lanes and potentially expanded BART service to Livermore. One policy strategy to be investigated is if there are ways to make more effective use of existing lane capacity through programs that would allow truck usage of the HOV/HOT lanes as was discussed for the I-880 corridor. Another major capacity improvement that is related to policy that will be evaluated is to investigate the impacts of eliminating the truck restrictions that currently exist on portions of I-580. While much of the traffic on I-880 travels to industrial sites and the port and is unlikely to be diverted, there is a growing flow of agricultural and wine products from the North Bay and emerging industries in Contra Costa County that might benefit from an alternate route across Alameda County.

Several of the strategies/projects that address congestion, also address the most pressing safety issues. For example, the SR 238/I-580 truck bypass, westbound I-580 truck climbing lane²,

² This is an important project for the megaregion, but project is in San Joaquin County, so it is not included in our projects list.

interchange modifications at multiple locations, and the addition of auxiliary lanes along this corridor will improve safety along this stretch of I-580. The combination of truck climbing lanes, auxiliary lanes, and interchange improvements will reduce automobile and truck conflicts by providing more space and time for trucks and automobiles to merge and diverge on and off of the freeway. Given that the highest volumes of heavy-truck traffic are found on the I-580 interregional corridor, this is an area of particular concern for long-term maintenance and preservation.

Caltrans and MTC staff are working on projects to address truck “hot spots” throughout the highway system. Programs such as ramp metering and active traffic management help ease the flow of traffic and preventing unexpected and quick mainline traffic speed reductions. A strategy that is also being investigated is the potential to expand Integrated Corridor Management approaches to the I-580 corridor as is being done in the I-80 and I-880 corridors.

With anticipated growth in domestic interregional commodity flows, along with the growth in export traffic and import distribution, a variety of approaches will be needed to address east-west connectivity on interregional corridors. This may include expansion of existing routes, the use of ITS technologies to more effectively manage existing capacity, and the development of alternative modes, such as short-haul intermodal shuttles and inland barge services (such as the M-580 service that was initiated between the Port of Oakland and the Port of Stockton).

3.3.2 Rail

As the I-580 corridor has some of the highest truck delay in the region, a condition which is expected to worsen in the future, rail service is an important strategy for relieving highway congestion. The Altamont Corridor Express (ACE) passenger service on the UP Oakland Subdivision is a relatively low-volume rail corridor, but rail traffic could grow and service conflicts arise if it is used as a reliever route for the Martinez Subdivision. There is also potential for using this route as a short-haul rail connection between the Central Valley and the Port of Oakland.

- Oakland Subdivision:** The Oakland Subdivision through Niles Canyon is expected to experience capacity constraints due to a number of reasons. Projected growth in freight rail traffic (including growth in bulk exports and manifest cargo moving to/from the Port of Oakland), the potential for UP to use this line for nonintermodal cargo, and projected growth in ACE commuter trains together will strain the system. Freight traffic growth on this line seems very likely and supports investments being made to realize the full economic potential of the Oakland Army Base redevelopment. Furthermore, use of this line creates the complementary capacity to the Martinez Subdivision that will allow UP to move a greater volume of domestic intermodal cargo to Oakland that would otherwise be unloaded in Stockton (Lathrop) and brought into the Bay Area by trucks on the already very congested I-580.

There are two basic approaches to expanding capacity on the Oakland Subdivision between Niles Junction and Lathrop. Both approaches involve double-tracking east of Niles Canyon and adding a number of sidings in other sections where the line would remain single track. The

difference in the two approaches is how capacity would be added in Niles Canyon. One approach would involve shifting freight traffic to the old Niles Canyon Railway owned by Alameda County and now used as an excursion train. This would require significant track upgrades and would introduce potential environmental impacts in the Canyon that would need to be addressed. The alternative approach would be to do more double-tracking and more closely spaced sidings (where right-of-way geometry is constrained and precludes through-double-tracking) along the existing alignment through the Canyon.

Both approaches would require the following improvements, which are included in the projects list:

- Radum Siding upgrade and extension
- Midway Siding extension
- Altamont Siding extension.

A related project would involve a new connection between the Oakland Subdivision and the Niles Subdivision at Niles Junction heading north to Oakland. This would create a new route from Niles Canyon to Oakland crossing Alameda Creek as an alternative to the current routing of freight trains on the Niles Subdivision from Niles Junction to Newark and then north along the Coast Subdivision. This would provide better utilization of existing capacity in the I-880 corridor and is part of an overall strategy to improve the southern route from the Central Valley to Oakland.

3.4 The U.S. 101 Corridor

U.S. 101 is the main north-south corridor for distribution of products to the major population centers in Santa Clara, San Mateo, and San Francisco Counties in the South Bay and Peninsula, as well as the only north-south connector in the North Bay serving Marin and Sonoma Counties. Through connections with SR12/SR37 connecting to I-780, I-680 and I-580, U.S. 101 is part of an intraregional network that connects to the interregional system for agricultural producers in the North Bay and serves population centers in Sonoma and Marin Counties. In addition to the U.S. 101 freeway, this corridor also includes the Port of San Francisco, the Port of Redwood City, San Francisco International Airport, and a short-line railroad operating at the Port of San Francisco (the San Francisco Bay Railroad). The corridor also has two rail lines that are primarily intended for passenger use, but that sometimes carry freight – the Caltrain corridor on the Peninsula and the Northwestern Pacific (NWP) rail line operated on the same track as the SMART commuter rail service in Marin and Sonoma Counties.

In the *Needs, Issues and Opportunities* report, several needs were identified in this corridor:

- **Congestion, mobility and reliability** – While the U.S. 101 corridor has generally high levels of congestion in both the North Bay and the Peninsula/South Bay segments, it has much lower truck traffic than the East Bay Corridors already discussed. However, there are a few locations within the corridor where truck mobility and reliability are an issue. There is major truck delay in San Jose from I-880 to I-280 with secondary truck delay in Marin County and in South San Francisco and around SFO. Truck reliability is also poor in the corridor in the South Bay. While capacity is not an immediate issue for the Ports of San Francisco and Redwood City, both see opportunities to expand bulk and break-bulk cargo related to the growth in construction in the Bay Area and this is restricted by land availability. The Port of Redwood City reports that dredging in the Bay is a critical concern to ensuring that they can maintain proper channel depths.
- **Passenger system coordination** – Caltrain capacity and physical constraints along the Peninsula limits the growth potential of both passenger and freight along this line. While these are not major freight rail routes, they do provide important connections to the Port of San Francisco and the Port of Redwood City. In addition to physical constraints (overhead catenary in tunnels needed for the electrified Caltrain service reduce tunnel clearance for freight trains and restrict certain types of non-intermodal trains from accessing industrial customers at the ports), FRA had required restricted operating windows for freight trains to avoid conflicts with the passenger service. Recent reports from the Peninsula JPA (operators of the Caltrain service) suggest these requirements may soon be relaxed.
- **Multimodal Connectivity and Redundancy** – A number of agricultural producers and wineries in the North Bay counties have indicated an interest in shipping by rail and improved short line connectivity could help provide the missing link. This would likely also lead to needs for additional capacity on the SMART/NWP corridor to accommodate planned expansion of the SMART commuter rail service and additional freight traffic. There may also be future connectivity issues related to the Port of San Francisco due to development of the proposed Warriors arena and potential access to the Port via Cesar Chavez Street during events.

3.4.1 Highway

The U.S. 101 South and U.S. 101 North Corridor System Management Plans recommended a multipronged approach to solving congestion problems along the corridor to ensure preservation and maintenance of freeway infrastructure, and encourage alternative modes of traveling. Many projects already are completed or underway, with other planned projects included in *Plan Bay Area*. A consolidation list of these strategies to address identified needs is included in the appendix.

U.S. 101 provides interregional connections, particularly connecting agricultural shippers on the Central Coast with markets and export facilities in the Bay Area, as well as provides connections between the Bay Area and the North Coast of California. U.S. 101 has much lower truck volumes than I-880, in part, because it serves smaller seaports and it does not directly feed a major interregional corridor the way I-880 does. However, there are a number of bottlenecks along U.S.

101 that have relatively high levels of truck delay. Truck volumes on U.S. 101 are generally the highest in Santa Clara County, and collision rates are higher than the statewide average on segments between McKee Road and SR 87, and between I-680 and McKee Road.

The planned projects with the greatest benefit to truck traffic (addressing truck delay, truck reliability, and connectivity to industrial shippers in South San Francisco and agricultural shippers in Petaluma) are those in San Jose, South San Francisco, and Petaluma. Many other planned projects that address delay, interchange operations, and improved access to/from the freeway tend to be in locations that will benefit commuters more than freight movement. Auxiliary lane additions, interchange improvements, freeway performance improvements through advanced ITS programs should be developed particularly in the area between Rowland Boulevard and North San Pedro Road in Marin County, Cesar Chavez Street to Bayshore Boulevard in the vicinity of the Port of San Francisco, San Bruno Avenue to Milbrae Avenue near SFO, and throughout the segment in San Mateo County between the Dumbarton Bridge and the San Mateo Bridge. The Woodside interchange improvement is also particularly important to improve connections between U.S. 101 and the Port of Redwood City. There is also a need to provide additional funding to address specific pavement and bridge maintenance needs that may in part be related to truck activity in Sonoma County near Winsor and in southern Santa Clara County. Regional programs to support this type of project development are proposed in the list of strategies.

3.4.2 Rail

The industrial rail spur programmatic strategy described for the I-80 corridor in Solano County would also have applicability in the U.S. 101 Corridor. In the North Bay this would be aimed primarily at agricultural shippers and wine producers who would connect to the mainline via short line operators. Shippers with the Peninsula Rail Shippers Association have also expressed interest in such a program as have the Ports of San Francisco and Redwood City.

3.5 The I-680 Corridor

The I-680 Corridor is an important intraregional corridor that provides north-south connection from I-80 to the East Bay. The corridor also connects the wine regions of the North Bay to the Central Valley via connections with I-580, and it provides a key link for general freight traffic between the San Joaquin Valley and the South Bay. In addition, the Port of Benicia in Solano County can be accessed via I-680 and I-80, as well as on-dock rail provided by UP that is connected to the Martinez subdivision. The Benicia Industrial Park lies to the northeast of the residential areas of the City and includes the Valero oil refinery. The Fremont industrial area is anchored by the Tesla auto manufacturing plant and a growing cluster of suppliers along with the technology-oriented businesses that have historically formed the manufacturing core of the southern end of the I-680 corridor.

There were very limited needs identified for the I-680 corridor in the *Needs, Issues and Opportunities* report, the primary issue being truck related delay. This occurs both north and south of I-580 but at

different times of day. Another issue that was identified in analysis conducted for Alameda County CTC was the lack of connectivity on local truck routes between I-880 and I-680 in Fremont. Addressing this issue would require investigating the feasibility of designating truck routes on east-west roads that are not currently designated as truck routes.

Strategies for the I-680 corridor include those that reduce delay reductions and improve access. Projects such as auxiliary lane additions, widening, ramp metering and ITS technologies, as well as interchange improvements already are planned and programmed within *Plan Bay Area*. Another potential option to be considered for I-680 would be off-peak use of the HOV lanes for truck auto separation or allowing trucks to “buy-into” the I-680 Express Lanes. This would require new operations planning to get trucks in and out of these lanes and would require a change in Caltrans policy. In addition, the I-80/I-680/SR 12 interchange improvement project, will relieve congestion, improve safety, and provide easier access.

One study underway that can potentially affect traffic on I-680 is the Tri-Link project, which includes construction of a new SR 239 as a potential multimodal link between SR 4 near Brentwood and I-205 west of Tracy in San Joaquin County. If this project were to be approved and constructed, it would provide an alternative linkage between Central Valley and North Bay, thus reducing truck traffic on I-680.³

Freeway improvement strategies can also include auxiliary lane additions to improve operations; an example would be adding auxiliary lanes on I-680 in both directions between Sycamore Valley Road in Danville to Crow Canyon Road in San Ramon.

3.6 The SR 12/SR 37 Corridor

State Route 12 and State Route 37 provide east-west connections between the North Bay and the greater Bay Area as well as the Central Valley and points inland. The SR 12 Corridor is an east-west, mostly rural route that connects the North Bay to the San Joaquin Valley. This two- to four-lane route is used to transport agricultural products from the Napa Valley, Solano County and the Delta region. SR 37 is a parallel corridor offering connection between U.S. 101 and I-80. Because portions of the facilities serve the same areas and industries, the two facilities are discussed together as a combined corridor. A portion of the inactive Northwestern Pacific (NWP) rail line parallels portions of SR 12 and SR 37 between Napa and Novato, and then extends further north along U.S. 101.

In the *Needs, Issues and Opportunities* report, several needs were identified in this corridor. All of these are related to highway needs, with the exception of sea level rise concerns along SR-37. The strategies for each roadway are presented below.

³ <http://trilink239.org/about/about-the-project/>.

3.6.1 SR-12

SR 12 has high levels of seasonal fluctuation in truck traffic, as it serves seasonal agricultural traffic, and delays can be significant during peak season. The top congested locations along SR 12 are at the intersections with SR 29, North Kelly Road, Red Top Road and Pennsylvania Avenue, as well the segment from SR 29 to I-80. Because of these needs, and the potential of SR 12 to serve increasing levels of interregional traffic, a SR 12 Corridor Study (I-80 to I-5) was conducted that looked at several improvement options for the corridor, which included operational improvements as well as lane widening. The study recommended operational and safety improvements along the entire corridor, including construction of a four-lane divided highway from the SR 12/SR 113 intersection to a location east of SR 160, replacement of Sacramento River and Mokehumne River bridges, and installation of ITS devices.⁴

The I-80/I-680/SR 12 interchange improvement project will benefit freight movement along SR 12 and is one of the most significant projects along the corridor. One other project, the Jameson Canyon project that calls for the widening of SR 12 from I-80 to SR 29⁵ also will directly address the bottleneck on the segment and is listed in *Plan Bay Area*.

3.6.2 SR-37

SR-37 is subject to poor reliability because of event-driven traffic and seasonal traffic fluctuations. There are no specific projects identified to address capacity needs because of the relatively low levels of truck traffic on this road. However, as an important alternative route for agriculture and wine industry traffic, the major concern that is addressed in strategies for this corridor are improvements to address sea level rise vulnerability, as the corridor passes through low-level wetlands at the north end of the San Pablo Bay. A corridor protection and enhancement project is proposed to address these issues and improve capacity where possible along the corridor.

3.7 The SR 152 Corridor

The SR 152 Corridor is an east-west corridor for interregional traffic connecting the South Bay, North Central Coast and Central Valley regions. Though only a relatively small portion of SR 152 is within the Bay Area, it offers an important connection to the Central Valley. SR 152 is the only continuous east-west route connecting SR 99 and U.S. 101, and provides a viable alternative to the heavily congested I-580/I-238/I-880 east-west corridor.

In the *Needs, Issues and Opportunities* report, few current needs were identified in this corridor. However, the needs assessment did note that there is a lack of east-west connectivity between the Bay Area and the rest of the Northern California mega-region, creating congestion and mobility

⁴ <http://www.sta.ca.gov/Content/10055/CountywidePlansampStudies.html#8oto5>.

⁵http://www.dot.ca.gov/dist4/systemplanning/docs/csmp/SR-12_CSMP_Fulldocument.pdf.

issues on the primary east-west connection, I 580. If improved, SR152 could provide an important alternative route.

The integration of the Bay Area economy and that of neighboring regions in Northern California is creating new emphasis on interregional goods movement corridors that link the various regions that comprise the Northern California mega-region. One such interregional corridor is the SR 152 corridor. While not a major goods movement corridor today, SR 152 could become an important interregional corridor in the future.

In order to develop SR 152 as an important east-west trade corridor, the roadway needs to be improved to freeway or expressway standards. SR 152 has potential to offer increased inter-regional benefits to agricultural traffic traversing the Bay Area between the Central Coast and the Central Valley. It also could provide an alternative route for distributing traffic from warehouses in the Central Valley to South Bay population centers. It has been proposed that a new alignment be established between U.S. 101 and SR 156, which could include upgrading the alignment to a continuous four-lane facility, upgrade 12 miles of the route to freeway standards, and providing an alternative route for interregional traffic to potentially lessen the burden of carrying such traffic on Gilroy's local roadways.⁶ Currently, this proposed project is included in *Plan Bay Area* programmed for long-range planning.

SR 152 has been designated as a Focus Route in Caltrans' Interregional Transportation Strategic Plan (ITSP). Focus Routes are the highest priority for completion to minimum standards (usually expressway or freeway standards) in order to serve interregional trips and provide access to statewide gateways. Caltrans' ITSP recommends that the various MPOs and RTPAs along the corridor should study a range of alternatives to completing the necessary improvements to make SR 152 a major interregional corridor. The Appendix provides a program of improvements for SR152 that would be necessary to achieve the status of a more significant interregional goods movement corridor.

3.8 The SR 4 Corridor

The SR 4 Corridor is an east-west route providing intraregional and interregional travel between the Central Valley and Bay Area for commuter and commercial traffic. The corridor serves local and intercity truck traffic for surrounding communities and provides connections between the oil refineries and other industrial producers along the Contra Costa County Northern Waterfront with the rest of the intraregional network and customers in the Bay Area. This corridor also includes the BNSF and UP rail lines from Stege/Port Chicago to Stockton, as well as the UP Tracy line from Martinez to Lathrop, following similar alignments to the SR 4 highway corridor, connecting the Bay Area to the rest of the nation.

⁶ Route 152 Trade Corridor Summary Report, VTA, 2013.

In the *Needs, Issues and Opportunities* report, a few needs were identified in this corridor:

- **Infrastructure condition** – this corridor has the second lowest pavement condition ratings among all corridors, with 15% in distressed condition. Pavement improvements are needed in the portion of the corridor through Pittsburg. The bridge ratings are the highest for the corridors reviewed in this plan.
- **Congestion, mobility and reliability** – there is AM peak travel time delay east of I-680, and PM delay is evident at the intersection of SR and I-680. Future train volumes on the BNSF Stockton Subdivision could lead to increasing congestion on this line. This is BNSF’s primary connection from the Bay Area to its Transcontinental line for intermodal and auto trains. Some of the future train connection on this line would be due to increased passenger service on the *San Joaquin* connecting to the California High Speed Rail service in the future. In addition, if plans to encourage industrial development on the Contra Costa County Northern Waterfront are successful, this could also increase train traffic on this line leading to the need for increased capacity and potential needs for grade separations at rail crossings. The SR4 corridor provides an extensive network of mostly private marine terminal facilities serving the oil refineries and industrial Northern Waterfront. The full utilization of the marine mode requires regular dredging of the Baldwin Ship Channel from the Carquinez Strait to the San Joaquin/Sacramento River Delta. As was noted for the I-80 corridor, limitations in dredging windows sometimes makes it difficult to keep the channel dredged to its authorized depths, limiting the size of vessels that can use the channel.
- **Connectivity** –With its current configuration, SR4 becomes restricted for heavy truck traffic at its eastern end and as such, it is unable to play a role as a true interregional corridor that could connect to I-580 further south.
- **Air Quality/Public Health/Equity Impacts** – There are Communities of Concern in several locations along the SR4 Corridor and the impacts of truck and rail emissions and general impacts of rail traffic (noise and safety issues at rail crossings) are present in the corridor.

A list of the potential strategies to address these needs is included in the Appendix.

Currently in *Plan Bay Area*, several projects are planned that will improve the SR 4 corridor. The I-680/SR 4 interchange project for instance will eliminate weaving between I-680 and Pacheco Boulevard, thereby reducing delay and improving safety. This is the worst area of truck delay and truck-involved collisions on the corridor.

Other key projects that will benefit goods movement include constructing a freeway-to-freeway direction connection between SR 4 Bypass and SR 160, and widening the SR 4 Bypass from Laurel Road to San Creek Road.

To help aid corridor operational and connectivity issues, and the lack of east-west connectivity to the San Joaquin Valley, studying a new alignment for SR 239 and develop corridor improvements from Brentwood to Tracy may help facilitate new industrial growth options. There are several different proposals for improvements to SR 239 and during the evaluation of goods movement strategies for inclusion in the final Regional Goods Movement Plan, MTC and the consultant team will work with Contra Costa County Transportation Authority to identify the most appropriate definition of this project for evaluation.

Additionally, the SR 4 Corridor System Management Plan lists corridor management strategies for the short- and long-term within the corridor. Strategies include deploying ITS technologies and capacity enhancements, including interchanges.

As noted, there are potential capacity needs on the BNSF Stockton Subdivision but none are noted at this time. Future industrial development on the Contra Costa County Northern Waterfront would benefit from a statewide program to provide grants and loans for industrial rail spur improvements/construction.

4.0 GLOBAL GATEWAY STRATEGIES

This section of the report presents strategies for the global gateway corridor components in the Bay Area, as shown in Table 3.1. These gateways function as conduits for the region's international trade. The primary global gateways in the region include the major maritime facilities at the Port of Oakland, and Oakland and San Francisco international airports. At the regional scale, there are also several smaller seaports in Contra Costa, Solano, San Francisco, and San Mateo Counties that serve this same function. This section is divided in two parts, first to present strategies for seaports and second to present strategies for airports. Much of the information presented herein has been adapted from the San Francisco Bay Area Freight Mobility Study and analysis of the Port of Oakland and Oakland International Airport needs and strategies prepared for the Alameda CTC Countywide Goods Movement Plan.

Table 4.1 Global Gateways in the Bay Area

Global Gateway Corridor Elements	Corridor
Seaports	
Port of Oakland	I-880
M580 Marine Highway Port of Richmond	I-580/SR 238 (Altamont Corridor)
Port of San Francisco Port of Redwood City	U.S. 101
Port of Benicia	I-80 (Central Corridor)
Port of Benicia	I-680
Airports	
Oakland International Airport (OAK) Mineta San Jose International Airport (SFO)	I-880
San Francisco International Airport (SFO)	U.S. 101

4.1 Seaports

4.1.1 Port of Oakland

The Port of Oakland is the largest port in the region handling 99 percent of the containerized goods moving through Northern California and some break bulk cargo. In the future, the Port expects to expand its operations to include bulk cargo movements. The Port has a channel depth of 50 feet (dredged annually), and it differs from the State's other two large container ports (the Ports of Los Angeles and Long Beach) because it handles a greater share of exports as compared to imports. The Port has 8 container terminals, 18 deepwater berths, and 36 container cranes, 30 of which are Post-

Panamax size. The Port is served by I-880 and I-80; the two Class I railroads; and 10 miles of short line track, warehouses, and two nearby intermodal terminals. The Port also has a break bulk terminal, Burma Road Terminal, Berth 7, which is located in the Outer Harbor waterway and ships and receives break bulk general cargo.

There exist several constraints at the Port for which accompanying strategies have been identified.

- Capacity Needs** - The Port of Oakland is experiencing severe congestion both inside and outside of the marine terminals. At present, most of this congestion is related to operational issues, whereas in the future, it will be impacted by infrastructure constraints, primarily on the landside (road and rail connections). Since the international trade recovery of 2010, the Port has been operating with total container throughput of about 2.3 million TEU (loaded container throughput of about 1.8 million TEU) and with very modest growth. However, the most recent growth plans included in the 2012 Addendum to the Oakland Army Base Environmental Impact Report (EIR) suggest potential growth to 4 million TEUs by 2035. The *Needs, Issues and Opportunities* report found that marine terminal capacity was not a constraint to growth at the Port of Oakland although improvements for particular types of cargo (bulk terminals and cold storage facilities for agricultural exports) were needed. Funded projects are underway to address these needs.

In order to meet the cargo growth projections in the longer term, the Port will need to provide modern cargo handling facilities for a wide range of cargo types, significantly improved operations to reduce in-terminal delays and gate queues, and improved landside connections (both road and rail). Recently, the new, larger vessels calling at the Port create large surges of goods in a 24-hour period (or less) rather than the same amount of goods over three or more days. This further exacerbates the limited roadway capacity, but is not impacting the rail system at this time. The lack of on-dock rail facilities creates demand strain on the local street network connections between the marine terminals and the near-dock rail yards. A related problem is that currently both BNSF and UP handle very little domestic cargo at their intermodal terminals serving the Port of Oakland. As a result, containerized imports that are transloaded from international containers to larger domestic containers for inland intermodal shipping are generally trucked from the Port to intermodal terminals in the San Joaquin Valley, creating additional truck-related congestion on I-880 and I-580. The congestion results in emissions as trucks wait for hours to pick up and deliver goods to the marine terminals, and the length of the queues creates impacts beyond the Port extending to several ramps on I-880. Trucks moving between terminals can also impact neighborhoods in West Oakland and East Oakland, even though many of the routes through the neighborhoods have truck prohibitions.

To address these problems, there are several proposed strategies including the development of an advanced Freight ITS program (FRATIS) that could be coordinated with a new appointment system, further examination of options for extended gate hours to reduce congestion at the terminal gates, improved circulation projects on the local street network accessing the marine

terminals, and projects to improve rail access to the existing intermodal terminals along with a longer term project to expand intermodal rail terminal capacity as markets develop.

Rail capacity issues at the Port of Oakland are also constrained by mainline capacity on the Martinez Subdivision and the southern routes via the Coast/Niles/Oakland Subdivisions of the UP.

- **Connectivity/Access Needs** - Current issues in port operations are resulting in gate queues that have spillover impacts on streets accessing the Port. Even if these operational issues are resolved, there will be gate queue and other roadway access problems that need to be addressed. The current configuration of rail access to the near-dock rail terminals creates access issues, especially at the 7th Street at-grade rail crossing, where trains move slowly in and out of the yard and can block truck access to marine terminals for long periods. In general, improved rail connections are needed in order for the Port to achieve future growth projections and shift from a current rail mode share of 25% to a future rail mode share of 40% , as projected in the 2012 Addendum to the Oakland Army Base EIR. To address these needs, projects are proposed including a major project to separate the 7th Street at-grade rail crossing and rail access improvements.
- **Community Impacts** - Continued growth at the Port of Oakland can provide significant economic benefits to the Bay Area and the Northern California megaregion. But if not properly planned for, this growth can exacerbate long-standing neighborhood issues. The Port has made significant progress, in partnership with the community of West Oakland, environmental justice advocacy groups, the Bay Area Air Quality Management District, the California Air Resources Board, the U.S. Environmental Protection Agency, and the City of Oakland, to reduce the health risks associated with port operations. But beyond the target dates in the Maritime Air Quality Improvement Plan, it is possible that growth in activity may drive emissions upward again if additional steps are not taken. As the City and Port move forward with continuing implementation of the mitigation measures required by the Oakland Army Base EIR and as the City continues its implementation of the West Oakland Specific Plan, there could be needs for supporting programs specifically aimed at reducing community impacts. Most of these programs and policies are described in a broader context in Section 4.0, Cross-Cutting Strategies.

Another community issue related to the port has to do with active transportation access through the Port of Oakland. The Port currently provides bicycle and pedestrian facilities that connect to Middle Harbor Shoreline Park adjacent to TraPac and Evergreen marine terminals via 7th Street and Maritime Street. As part of the Oakland Army Base project, additional bicycle and pedestrian improvements are planned adjacent to the project along Maritime Street. Strategies are proposed to include better separation of bicycle/pedestrian paths and trucks on designated truck routes.

4.1.2 Port of Richmond

The Port of Richmond is a deepwater seaport (channel depth of 38 feet), and is California's third largest port in terms of annual tonnage, handling more than 19 million short tons of cargo. Currently, the Port ranks at the top in liquid bulk and automobile tonnage among the ports in the San Francisco Bay. The main exports include scrap metal, coke, coal, aggregate, zinc, and lead; and the main imports include petroleum, bauxite, magnetite, vegetable oils, and vehicles. The city-owned terminals handle mostly vehicles, whereas the largest private terminal is Chevron, handling more than three times as many vessel calls as all publicly owned terminals combined.⁷

There are both public and private marine terminal facilities at the Port of Richmond. The public Port is owned by the City of Richmond and is governed by the State Tidelands Trust. I-580 passes through the port area, which connects with I-80 and U.S. 101. The Port of Richmond is also served by UP and BNSF. In 2010, due to a \$40 million Honda Port of Entry Project, a new rail yard was added to Point Potrero Marine Terminal (PPMT) to enable imported autos to be loaded directly onto rail cars, with the goal of reducing individual auto shuttle trips on local streets in the City of Richmond.

Rail mainline capacity on the Martinez Subdivision and the BNSF Stockton Subdivision could become issues for further growth at the Port although are not a constraint at this time. Rail access to the Port related to BNSF trains crossing UP tracks are being addressed in a funded Trade Corridor Improvement Fund (TCIF) project. At-grade rail crossings at the Port of Richmond are also an issue, especially at Cutting Boulevard and Carlson Boulevard.

4.1.3 Port of San Francisco

The Port of San Francisco is a deepwater port with a channel depth of 38 to 40 feet. The Port has the largest floating dry-dock dedicated to ship repair on the West Coast and is owned by the City of San Francisco and governed by a Port Commission. The main exports include tallow and vegetable oil; and the main imports include steel products, boats/yachts, wind turbines, aggregate, and sand. I-80 and U.S. 101 are the nearest highways, and on-dock rail service is available to Pier 80. Like other Bay Area ports, the Port of San Francisco sees opportunities to expand its bulk export cargo and to handle the demand for construction related project cargo and bulk construction materials that has been created by the latest surge in Bay Area development.

There exist several constraints and opportunities at the Port that have accompanying strategies.

- **Tunnel height limitations related to Caltrain impact access** - This issue is related to the electrification of Caltrain which will include overhead catenary in tunnels, limiting the height of freight cars that can move through the tunnels. The current heights under consideration do not impede existing traffic but could preclude future cargo growth. While there are no specific

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<http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Emission%20Inventory/Port%20of%20Richmond%202005%20Emissions%20Inventory%20June%202010.ashx>

projects recommended to address the issue at this time, as rail access needs continue to grow at the Port of San Francisco, it will be important to examine opportunities to develop projects to raise tunnel clearance.

- **Potential conflicts with auto traffic on Caesar Chavez** - Implement direct access routes from U.S. 101 to the Hunters Point Shipyard along Cesar Chavez Street to Illinois Street, Cargo Way and Jennings Street, and along Cesar Chavez Street to Evans Avenue. The direct access route from U.S. 280 will travel along Pennsylvania Avenue to Illinois Street, then on to Cargo and Jennings. Improvements will include repaving existing roadway and adding new curbs, curb ramps, sidewalks, street lighting, trees, and route signage.
- **Capitalize on forecast growth in bulk and auto freight** – Because of this new opportunity, there is a project proposed to develop and operate a bulk marine cargo-handling terminal on approximately 15 acres of open land with direct berthing access located at the Port’s Pier 96. Additional land on the Port’s adjacent Backlands area may also be made available for lease to support the cargo handling operation.

It should be noted that the Quint Street Lead Port Rail Access Project will relocate and improve a one-mile spur connecting Caltrain mainline track to Port of San Francisco’s railyard. The improvements will streamline access to and from the Port and facilitate the handling of locomotives and rail traffic in the markets that the Port is pursuing. Since this project is already funded by the Federal Railroad Administration, it is not included in this project list.

4.1.4 Port of Redwood City

The Port of Redwood City is a deepwater port with mean low water depth of 30 feet. It is located in San Mateo County in South San Francisco Bay between the Dumbarton Bridge and the San Mateo – Hayward Bridge. The Port is owned by Redwood City and is self-supporting. It handles mostly dry-bulk, neo-bulk, and liquid-bulk cargoes. Land uses mainly consist of handling, processing, storage, and transportation of imported construction materials, scrap metal exports, construction debris for recycling, and chemicals. The Port is served by U.S. 101 (with the closest interchange at Woodside Road), and UP rail line.

The Port of Redwood City has seen growth as a niche port for bulk commodities, such as construction materials including aggregate. Projected growth in these materials over the next 25 years will place strain on existing facilities unless bulk terminal capacity is increased. Upland improvements including new utilities, paving, drainage, and seawall will increase capacity to handle and store dry bulk cargo. One of the key issues the port faces is channel depth. Currently the Channel drafts are as low as 26 feet which is forcing vessels to light load and/or top off at other ports. A project to deepen Redwood City Channel and San Bruno Channel is proposed.

4.1.5 Port of Benicia

The Port of Benicia is a deepwater seaport (channel depth of 38 feet) with inland transportation access via I-680 and I-80. UP provides on-terminal rail. The Benicia Industrial Park lies to the northeast of the residential areas of the City and includes the Valero oil refinery. The main exports are Valero's petroleum coke and the main imports are automobiles. The Port of Benicia is privately owned and operated by APS West Coast, Inc. AMPORTS, a leader in the vehicle-processing industry, operates the terminal facilities at Benicia. CODA Automotive, Inc. began assembly of all-electric cars on March 13, 2012, creating 50 new jobs at the AMPORT facility. Access improvements proposed for the I-680 and I-80 corridors would benefit the Port of Benicia, and no other needs have been identified at this time.

4.1.6 M 580

The M 580 Marine Highway, currently not in full operation, is a inland waterway between the Ports of Oakland, Stockton, and West Sacramento that provides marine alternatives to shipping particular bulk goods that would otherwise travel by highway or rail.

Providing modal alternatives can relieve some of the pressure on congested highway corridors. The portion of the M-580 Marine Highway that has had limited operations is a barge service for containerized cargo, providing increased connectivity between the Port of Oakland and the Port of Stockton. Projects such as the Marine Highway and short-haul rail services can create important system redundancy and resiliency, along with diverting truck traffic off of especially congested interregional corridors. Continuing reevaluation of these alternative modal services should be conducted.

4.2 Airports

A list of the potential strategies to address air cargo needs is included in Table 3.3, and is described further in the following subsections.

4.2.1 Oakland International Airport

Oakland International Airport is a domestic air cargo gateway located on the east side of San Francisco Bay in Alameda County. The airport is owned and operated by the Port of Oakland. The airport has four runways, and the longest runway is 10,001 feet long. The largest cargo carrier, FedEx, occupies 250,000 square feet of sorting, distribution, and warehouse space at OAK. U.S. Customs and Border Protection officials are located on-site. The Oakland Foreign Trade Zone, located 1.5 miles away, consists of 500,000 square feet of buildings with direct highway access.

The *Needs, Issues and Opportunities* report noted the significant declines in air cargo at all of the Bay Area airports over the last 15 years. Growth in e-commerce and rapid fulfillment strategies would appear to create potential for air cargo growth at OAK, but much of this activity is likely to involve ground operations. These ground operations could impact roadways connecting to OAK because major sort facilities including ground operations occur at the airport. OAK continues to experience congestion on all its connecting roadways (e.g., Doolittle Drive, Hegenberger Road, 98th Avenue). Strategies are primarily aimed at improving these connections and addressing congestion issues.

There has historically been interest in developing an ITS project or program to improve traveler information and incident response on approaches to the airport. Since the Port of Oakland has not recommended a specific project at this time choosing to focus more on ITS applications to the seaport, it is recommended that a project for future ITS improvements at the airport be evaluated.

Another issue is the vulnerability of the South Field to flooding and earthquake damage. Several strategies identified by the region to address the impacts of climate change involve major infrastructure projects, such as the Oakland Airport Perimeter Dike (APD) project, which has also been identified as a project in the Airport section of this report.

Future air cargo growth is expected to be dominated by international cargo and despite repeated efforts to attract international air cargo operations, OAK has generally been unsuccessful as compared to SFO. As a result, this report does not recommend any strategies for expanding air cargo capacity at OAK.

4.2.2 San Francisco International Airport

San Francisco International Airport is an international air cargo trade gateway located at the north edge of San Mateo County on the west side of the Bay. The Airport has four runways, and the longest runway is 11,870 feet long. Cargo service is available from 56 airlines, including seven cargo-only airlines. SFO's 11 cargo facilities provide over 1,026,000 square feet of warehouse and office space, including newly added cargo facilities. Approximately 74 percent of cargo at SFO is carried on passenger aircraft (also known as belly cargo because it is carried in the "belly" of the passenger aircraft). While most of the region's airports have sufficient cargo capacity and support facilities to meet projected demand, efforts should be taken at SFO to maintain existing cargo-handling capability.

Similar to OAK, highway congestion is a key constraint to air cargo growth and reliability at SFO. Multiple improvements are recommended along U.S. 101 to improve mobility. One project directly relates to SFO, the U.S. 101 North Project which includes Airport Boulevard interchange improvements and modifies the existing 2-lane cloverloop interchange with a modern minimum 5-lane interchange with ramp improvements.

Other strategies that could improve airport operations including providing modal alternative to trucking, such as freight delivery by transit and ferry. Because these projects are very vaguely defined, they are not included in the projects list.

4.2.3 Mineta San Jose International Airport

Mineta San Jose International Airport is located northwest of downtown San Jose at the southern tip of the San Francisco Bay in Santa Clara County. The airport has three runways, and the longest runway is 11,000 feet long. There are seven freight-only and three cargo or freight carriers at SJC, and in 2012 SJC handled about 4 percent of Bay Area air cargo.

SJC has seen its cargo volumes fall dramatically over the last decade, largely due to competition from SFO and OAK. However, there is growth potential at SJC as a reliever airport for both OAK and SFO. SJC's runways can handle up to 103 takeoffs and landings per hour, well above projected demand for 2035. Due to congestion at the region's other airports, redistribution of passenger and freight traffic between SFO, OAK, and SJC has been discussed as a primary strategy for congestion reduction but never pursued given the competitive nature of the airline industry and competition amongst the airports.⁸

⁸ Regional Airport Planning Committee (Metropolitan Transportation Commission, Bay Conservation and Development Commission, and Association of Bay Area Governments), *Regional Airport System Planning Analysis (RASPA), 2011 Update*.

Some increases in air cargo have been seen in recent years. International operations, in particular, are expected to increase about one to two percent per year, according to analysis of FAF data, and supported by service being provided by international carriers to SJC, such as Nippon Airways which began service to Tokyo Narita in 2012. Strategies to accommodate these opportunities have been identified and include relocation/expansion of belly-freight facilities to a new site on east side of SJC, including up to 93,000 square feet of building and vehicle parking/movement space. Also construction of new cargo airline facilities at or adjacent to existing east side cargo airline areas, including up to 1.2 million square feet of ramp, building, and vehicle parking/movement space have been identified.

On one hand, San Jose has significant advantages over its neighboring airports, in particular, due to better weather conditions. However, like its Bay Area neighbors, the SJC is faced with the challenges of its urban surroundings, including lack of expansion capacity, congestion on area roadways, and noise. In order to improve access directly to the airport, a new interchange connecting Zanker Road, an Old Bayshore Highway, with North Fourth Street and Skyport Drive at U.S. 101 is included as a strategy. The interchange would provide an overcrossing across U.S. 101 to improve limited existing connectivity across U.S. 101 to the North San Jose employment centers. In addition, the interchange would improve access to SJC from U.S. 101.

5.0 LOCAL STREETS AND ROADS STRATEGIES

Local streets and roads provide first- and last-mile connections to the major freight hubs and industrial areas in the region, as well as the pickup and delivery network for consumer and business-related goods movement. Due to the limitations of the regional good movement planning effort and the focus on regionally significant strategies, the needs assessment did not conduct analysis of local street and road issues. However, the parallel effort in Alameda County did conduct a more comprehensive analysis of local street and road issues in that county and much of what was learned has applicability to the region as a whole. Using the information from Alameda County as a point of departure, this section provides suggestions for potential regional programs that can help cities and counties throughout the region address the needs of the local streets and roads element of the regional goods movement system.

5.1 Modal and Land Use Conflicts and Coordination with Passenger Systems

These issues were raised to some extent as a cross-cutting issue in the regional needs assessment. The issues are summarized below:

- Intercity arterial truck routes designated by cities often pass through residential neighborhoods or form the boundaries between residential neighborhoods and industrial areas. Often these routes were designated long ago and have not been updated to reflect changing lane use patterns. In other cases, the particular routes are the best alternatives to congested freeways or provide access to a city's major commercial areas and truck movements cannot be avoided.
- Designated truck routes on major arterials may conflict with high frequency bus routes or new bus rapid transit routes.
- Major arterials are often slated for Complete Streets treatments and truck movements or truck's double-parked while making deliveries can create conflicts and safety hazards for bicyclists and pedestrians.
- Increased demand for housing and commercial development along historical freight corridors can encroach on these corridors and create hazards to residents (including public health impacts associated with goods movement emissions) or create demands from neighbors to restrict freight operations that impact upstream and downstream goods movement-oriented businesses.

Strategies that responds to these needs include:

- Develop guidance and provide funding for Complete Streets considering truck movements. Possible street treatments can include developing time-of-day delivery windows to reduce conflicts with other street users; design guidelines for curb pullouts that can be used at different times for bus pullouts, truck parking, or pedestrian paths.
- Fund a pilot program to demonstrate night-delivery policies and incentives to building owners.
- Provide land use guidance for truck routes (appropriate buffers and methods of buffering truck routes adjacent to residential neighborhoods, provision of truck services away from neighborhoods along truck routes, truck route planning tools).
- Enforcement strategies for truck prohibitions.

5.2 Truck and Rail Safety Issues on Local Streets and Roads

The three biggest safety issues on the local street and road system are high crash rates at approaches to freeway on ramps; conflicts on high speed rural routes that provide commuter access and truck access (especially in agricultural areas); and railroad at-grade crossings. Strategies that can address these issues would include:

- Programs to fund projects that would address safety and truck congestion at freeway on-ramps including adjusting signal timing to allow greater truck movements through intersections; ramp metering; construction of turn pockets and appropriate storage for heavy trucks.
- Program for truck access and speed safety projects on rural roads with growing commute travel.
- Regional program to fund grade separation projects at rail crossings that would include developing a prioritization procedure based on amount of vehicle delay, emissions and noise, number of accidents at crossings, and alternatives for routing vehicular traffic.

5.2.1 Truck Travel Delay and Congestion on Local Streets and Roads

Just like the freeway system, local truck routes may also experience congestion. Yet, when coordinated with freeways, arterial truck routes can form an important part of an overall strategy to manage truck movements. A regional program focused on providing funding to address congestion on local truck routes could fund projects including:

- Selective widening of arterials

- Smart arterial corridors that are coordinated freeway truck travel information systems, signal prioritization for trucks, and signal timing improvements
- Freeway access improvements to reduce congestion at freeway on/off ramps

5.2.2 Truck Route Connectivity

There have been a number of instances around the region where lack of coordination of truck routes at city boundaries has resulted in discontinuities in the truck route system and circuitous routing for trucks. In Alameda County there were also instances where truck routes did not fully connect to the freeways particularly in cases where there were nearby parallel freeways (such as I-880 and I-680 in Fremont). In some cases, this is because a main truck route passes from an industrial area to a residential area or there is a narrowing of the street that is a truck route or a vertical clearance issue at an underpass that makes the route unsuitable for trucks. A regional program that addresses truck route connectivity could be part of a larger regional effort to improve and provide guidance for truck route planning. Examples of appropriate strategies would include:

- New or expanded truck route designations (with time of day restrictions when routes pass through residential areas)
- Selective upgrading and widening of routes for trucks
- Coordinated cross-jurisdictional truck route planning including consideration of overweight networks in the vicinity of the region's ports.

6.0 STRATEGIES TO CAPITALIZE ON OPPORTUNITIES

The *Needs, Issues and Opportunities* report identified seven significant opportunities that could be pursued through creative investments and policies. These opportunities would help maximize the economic benefits that the goods movement system in the Bay Area provides to residents and businesses. The approach to pursuing these investments would involve combining several strategies from those presented previously in this report. It should be noted that all of these investments have the potential to create impacts on adjacent communities if not managed properly. To address potential impacts, the strategies should also include projects, programs, and policies that directly address these impacts as well as programs to train local residents for any of the jobs that will be created.

6.1 Opportunity #1 – Goods Movement to Support Emerging Industries

This opportunity would involve investments and programs to support the goods movement needs of emerging industries such as biotechnology, artisanal food production, clean energy and advanced transportation manufacturing, and advanced manufacturing for traditional industries. It is expected that many of these industries would locate in the region's existing industrial corridors as these corridors would provide space that could be effectively adapted to the needs of these businesses.. Examples include the I-880/I-80 corridor in Alameda County, the Contra Costa Northern Waterfront (SR 4 and I-80 corridor), portions of the I-80 corridor in Solano County (with Benicia industrial area being one of the few industrial parks nominated as a Priority Development Area), portions of the U.S. 101 corridor in South San Francisco, and remaining warehousing and light industrial corridors in San Jose. The types of strategies that would be necessary to support this opportunity would include:

- Programs that provide guidance to cities for land use planning along industrial freight routes (truck and rail) to create buffers along the corridor. The buffers would reduce the likelihood of residential and commercial development encroaching on the corridors and creating conflicts between freight transportation and noncompatible uses. The buffers would also ensure that future freight operations do not compromise the health of residents in immediately adjacent neighborhoods.
- Interchange improvements along key corridors to ensure safe and efficient access between the arterial truck routes (e.g., San Leandro Street) and the intraregional/interregional highway corridors.
- Smart corridor approaches to arterial truck routes to manage congestion and improve reliability for businesses located in these corridors.

- Industrial rail access programs to preserve and improve rail spurs to sites that have potential for development of new industries that require these connections (such as, clean energy production).
- Incentive programs and technology demonstrations to bring near-zero and zero-emission truck technology into greater use serving this corridor.
- Develop a special funding category in local streets and roads programs to fund improvements and maintenance of first-mile/last-mile connectors to the region's ports, airports, rail terminals, and industrial parks and centers. FHWA has designated intermodal connectors as part of the National Highway System. When these were initially designated, states were asked to nominate connectors. FHWA has not had a mandate from Congress to regularly review these designations nor to broaden the definition of what should qualify as an intermodal connector. There is no special program that funds maintenance and improvements to the intermodal connector system although FHWA does have to provide periodic condition and performance reports. FHWA is currently looking at the condition and performance of connectors and there are a variety of proposals to include these as a special category for funding in freight programs in the next reauthorization of the federal surface transportation act. MTC could monitor these developments and lead regional coalitions, joining with MPOs around the country, to support new funding categories and redesignation of the intermodal connector system to address regional first/last-mile connectors to ensure access to the facilities and industrial corridors that are critical to the region's emerging industries. This can be used as a consideration and therefore is not explicitly listed in the programs list.

6.2 Opportunity #2 – E-Commerce and Advanced Retail Distribution – capture value-added economic activity; neighborhood & commercial center impacts

The development of new high-tech, smaller, strategically placed warehouse facilities within close proximity to major population bases continues to grow. The region has an opportunity to capture warehousing that supports same-day delivery of consumer product. Capturing a piece of this market could reduce overall vehicle miles traveled in the Bay Area, improve economic efficiency for the goods movement industry, and result in reuse of vacant industrial land. The region would need to begin by identifying demand for this new activity in the region, compiling industrial real estate vacancies and characteristics, and preparing regional guidance on land, access, and the warehouse specifications typically required for e-commerce and advanced retail distribution.

There is growing demand by third-party logistics service providers who support advanced retail distribution and e-commerce at the Oakland Army Base and along the I-880 corridor from Oakland to San Leandro. This is an ideal location in which to support this type of industrial development because of proximity to the seaport and airport as well as large population and business base and the potential for increasing domestic intermodal rail access at the new and expanding rail yards on the Oakland Army Base property. The new logistics-based development at the OAB also provides the types of warehouse space that this industry is looking for. There may also be demand for these types of facilities in Solano County, where industrial land is relatively less expensive and there are available sites for large high-cube warehouses that serve the needs of modern fulfillment centers.

The following strategies would support these opportunities:

- Projects improving intermodal rail access to the logistics developments at the Oakland Army Base such as the North Lead Rail project, the OHIT Phase 2 railyard developments, and the rail capacity improvements.
- Interchange and capacity improvements along the I-880 corridor between Oakland and San Leandro, and the I-80 Corridor, that would reduce safety issues, improve reliability, and increase overall capacity
- Airport ITS projects to ensure more efficient freight movements of trucks to and from OAK, SFO, and SJV.
- Examine industrial land use demands associated with the space needs of expanding third-party logistics providers looking to locate near the region's airports and the Port of Oakland and provide guidance to cities on how best to balance the region's industrial land use needs with affordable housing and commercial space needs as part of overall regional economic development strategies. This should include working with the real estate development community, who regularly monitor key data such as rental rates, vacancy rates, and demand for various categories of land use demand.
- Develop near and zero-emission corridor strategies in partnership with agencies such as the California Energy Commission and the California Air Resources Board to encourage siting of solar energy systems on warehouse roofs and incentives for low-emission short-haul trucking fleets (many of these trucks would likely be smaller, short-range trucks that could more feasibly adopt zero-emission technology).

As originally presented in the needs assessment report, this opportunity is also meant to creatively address the challenges created by increased e-commerce activity and urban goods

movement in general throughout the region. Strategies that would address these challenges would include:

- Revised Complete Streets guidance to cities for downtown areas to manage potential modal conflicts in delivery zones.
- Time-of-day management of curbside activities to ensure truck access at times least likely to conflict with other uses.
- Model off-peak delivery programs and demonstrations.
- Neighborhood delivery pickup/dropoff centers (this is an approach that many of the private e-commerce service providers are beginning to offer so this might involve greater public/private collaboration).

6.3 Opportunity #3 – Bulk Exports and Expanded Rail Services – growth in bulk exports at seaports; increased demand on rail corridors

The *Needs, Issues and Opportunities* report noted the forecasts for increased export demand for bulk commodities, the investments in bulk terminals being made at the Oakland Army Base, and increased demand potential that could be served by rail at other ports in the region that might use rail infrastructure in the region. The *Needs, Issues and Opportunities* report also described the potential to reduce some truck traffic on I-880 by bringing more domestic intermodal cargo ultimately destined for the Bay Area (and the new logistics facilities at the Oakland Army Base) to expanded intermodal terminals at the Oakland Army Base and to create greater opportunities for transloading import cargo at the Port of Oakland. All of these rail-served activities would involve new economic development potential but they would also require upgrades and improvements to the rail system. Other ports in the Bay Area, including the Port of Richmond and the Port of San Francisco, also see opportunities for similar cargo. The types of strategies that would need to be adopted to pursue this opportunity would include:

- Rail mainline capacity improvements accessing the Port of Oakland and the Oakland Army Base from both the north and south including the North Lead rail project, capacity improvements on the Niles Subdivision, and improvements on the Oakland Subdivision (including the connection between the Oakland Subdivision and the Niles Subdivision) and Martinez Subdivision.
- At-grade crossing improvements including upgraded signals and/or grade separation projects to reduce safety incidents and potential delays at crossings.

- Implementation of quiet zones and wayside horns to reduce impacts on communities adjacent to the rail lines.
- Re-examine timing and potential for short-haul rail shuttles between the San Joaquin Valley and Port of Oakland.
- Rail Improvements accessing the Port of San Francisco, Port of Richmond.

In addition to reducing congestion, shifting movements from truck to rail has the potential for positive environmental benefits. But these will only be realized if the railroads use locomotives and intermodal terminal technologies that meet or exceed the latest standards. To the extent that adopting these technologies is not required by regulation (when applied to the existing in-service fleet), incentives will need to be provided and even with these, some changes may prove to be operationally challenging. Before investments of the type described above are made, The region and its partner agencies should discuss the potential for bringing cleaner operations to expanded Bay Area rail facilities.

6.4 Opportunity #4 – Goods Movement Workforce Development – key source of job diversity; need to focus on access to jobs for impacted communities

There are several opportunities for increasing the employment pool for freight-related jobs. One of the most promising aspects of freight-related jobs is upward mobility. With increasing automation in warehousing, there is also a growing need for technical workers who can program, operate and maintain the new automated retrieval and automated sortation equipment that is being increasingly installed in warehouse facilities. The technical jobs often require a college education, but even with automation, warehouses require workers, as do marine terminals, airport cargo facilities and intermodal terminals. Many of the entry-level jobs at these facilities require only a high school education.

Trucking is more challenging. Unlike other freight-related jobs where someone can find an entry-level job with only a high school (or less) education, trucking requires that drivers be at least 25 years old and obtain a Class A drivers license, which is usually obtained after attending costly truck driving school. By the time most workers reach 25, they have already begun a different career. And unlike the times prior to deregulation when truck drivers earned high salaries, the industry now offers fairly low wages and long hours, thus significantly reducing the attraction for becoming a truck driver. For owner-operator truck drivers, the costs and revenue risks have created barriers to new drivers entering the industry while also causing many existing drivers to leave the industry. This has worsened over the past few years as the number of turns that a driver can accomplish in one day has been on the decline.

This section focuses on projects, programs and policies that can improve the freight jobs labor pool through education and job resource centers.

To meet the region's demand for freight industry workers, the freight industry can collaborate with the region's community colleges and county workforce development programs to focus attention on the needs of this important sector of the economy. The East Bay community and junior colleges have already joined together and obtained a U.S. Department of Labor grant to develop workforce development programs in the area of transportation and logistics. The East Bay Transportation and Logistics Collaboration has brought employers together with the region's college and training resources to analyze hiring patterns, wages, and industry needs and to work with the business community to develop job resource centers and training programs. MTC can play a role to coordinate the transportation agency resources in the East Bay into these discussions and to identify ways that workforce development programs can be coordinated with projects that are designed to expand the region's major good movement facilities (such as the Oakland Army Base redevelopment). Building on this model in the East Bay, MTC can work with the community colleges and transportation agencies in other parts of the region to develop targeted programs to support goods movement workforce needs in the agriculture and wine industries and high technology sectors, for example.

6.5 Opportunity #5 – Promoting Advanced Goods Movement Technologies

The concept behind this opportunity is to couple the various project concepts that would incorporate advanced technology solutions (such as freight ITS, integrated corridor management, and advanced freight vehicle technologies) with the region's internationally recognized innovative technology sector. The types of strategies that could be employed might include:

- Inviting local technology producers into discussions with regional and local planning agencies to have advanced discussions about procurement opportunities to help build interest and a core market for locally produced products.
- Work with local technology producers and users to identify where new freight technology systems are in need of application demonstrations and provide public support or joint public-private sponsorships for demonstrations.
- Support technology transfer activities in partnership with state and federal research agencies to ensure that local technology companies and universities are aware of advanced freight technology needs and that research funds are spent to develop local production capability.

6.6 Opportunity #6 – Integrated Freight Transportation Planning Processes

The need to coordinate land use and transportation planning is widely recognized in the context of residential and commercial development and transit, Complete Streets, and other forms of passenger transportation planning. But there is perhaps an even greater need to bring regional and county goods movement planners together with economic development and land use planners, industrial site development planners, and industrial real estate developers. The Bay Area could develop models for how best to pursue this opportunity that might be applicable throughout the country and as such could receive support from national funding agencies. Regional strategies that could encourage this would include:

- Incorporating guidance for Complete Streets planning and policy that would show how goods movement considerations can be balance with the needs of other modes in mixed use development and encouraging the implementation of this guidance through changing criteria for One Bay Area Grants (OBAG).
- Developing funding support for comprehensive corridor plans in the major goods movement corridors identified in this Regional Goods Movement Plan that would require integrated corridor plans to be eligible for certain categories of goods movement funds. These plans would require consideration of economic development objectives in the corridor including industrial development needs; adoption of land use policies to provide appropriate buffers along goods movement corridors; incorporation of Complete Streets policies that include consideration of goods movement.

6.7 Opportunity #7 – National Model of Sustainable Goods Movement

This opportunity has some overlap with Opportunities #5 and #6 but would focus more on how to integrate consideration of community, environmental, and public health issues into goods movement plans. Many communities around the country are grappling with this issue, particularly those that have ports, rail yards, and industrial centers adjacent to communities with environmental justice issues or those where older industrial space is being redeveloped with housing and commercial space adjacent to goods movement facilities. The specific strategies for addressing community, environmental, and public health considerations have been discussed in the cross-cutting strategies. The opportunity in this case is to develop a planning model that integrates these considerations in the design of goods movement facilities. As described above in the opportunity for integrated goods movement planning, the approach to developing a model of sustainable goods movement may be best developed through corridor planning efforts or major goods movement facility plans. In these cases targets can be established that include

significant reductions in community, environmental, and public health impacts to be achieved in a corridor and every project that is advanced in the corridor should include strategies to advance towards these targets. The methods for achieving the targets should be flexible to allow innovative private sector solutions. This can be coordinated with the new technology development strategies to engage the innovation sectors in the Bay Area and allow them to play a leadership role.

Appendix A. PROJECTS, PROGRAMS AND POLICIES LIST - DRAFT

Table A.1 Projects, Programs and Policies List

Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
Airport	Air	Santa Clara	Project	Construction of new cargo airline facilities at Mineta San Jose International Airport	G			■		
Airport	Air	Alameda	Project	Oakland Airport Area ITS Project	G, L				■	■
Airport	Air	Santa Clara	Project	Relocation of belly-freight facilities at Mineta San Jose International Airport	G, L			■		
Airport	Air	San Mateo	Project	San Francisco International Airport Cargo Storage Capacity Enhancement	G			■		
Airport	All	Alameda	Project	Airport Perimeter Dike (APD)	G, X			■		
All Corridors	Highway	Regionwide	Policy	Assess freeway truck restrictions	I	■			■	■
All Corridors	Highway	Regional	Program	Freeway Performance Initiative ITS infrastructure, arterial management, incident management, traveler information/511	I, X		■		■	
All Corridors	Highway	Regional	Program	Goods Movement Infrastructure State of Good Repair Program	I, L, G, R			■		
All Corridors	Highway	Regional	Program	Highway and freeway safety improvements (including interchange improvements, ramp metering and soundwalls)	I, X		■		■	
All Corridors	Highway	Regionwide	Program	Transit alternatives to reduce delay and improve reliability on interregional freeway corridors	I		■		■	
All Corridors	Rail	Regional	Policy and Program	At-Grade Crossing Safety and Grade Separation Policy and Program	L, G, R, X					
Cross-Cutting	All	Regionwide	Project	Adapting to Rising Tides (ART) program to increase the preparedness and resilience of Bay Area communities to sea level rise and other climate change-related impacts	X		■	■		
Cross-Cutting	All	Alameda	Project	Bay Bridge Living Levee Installation	X, I, G	■		■		
Cross-Cutting	All	Alameda	Project	Damon Slough Living Levee Installation	X, I	■		■		
Cross-Cutting	All	Regionwide	Policy & Program	Develop / support workforce training programs for goods-movement related jobs	X	■				
Cross-Cutting	All	Regionwide	Program	Freight Corridors Community Enhancement and Impact Mitigation Initiative	X	■				
Cross-Cutting	All	Regionwide	Policy & Program	Land use guidelines and policies to support industrial land use planning and preservation	L, X	■				
Cross-Cutting	All	Alameda	Project	Bay Bridge Offshore Breakwater Installation	X, I, G	■		■		
Cross-Cutting	Highway	Regionwide	Policy & Program	Clean Truck Policy & Program Collaborative (joint working group with regulatory agencies, freight industry representatives, and public agencies)	X	■				
Cross-Cutting	Highway	Regionwide	Policy & Program	Freight Guidelines for Complete Streets Initiative	L, X	■	■			■
Cross-Cutting	Highway	Regionwide	Program	Local road and county road safety program on truck routes	L		■			
Cross-Cutting	Highway	Regionwide	Program	Near-Zero and Zero-Emission Goods Movement Technology Advancement Program	X	■				
Cross-Cutting	Highway	Regionwide	Policy & Program	Off-Peak and Novel Delivery Policy Guidance and Demonstration Program	L	■	■		■	
Cross-Cutting	Highway	Regionwide	Program	Overweight truck route implementation and maintenance	L			■		■
Cross-Cutting	Highway	Regionwide	Program	Regionwide Freight Signage Program	L	■	■			■
Cross-Cutting	Highway	Regionwide	Program	Truck access and speed safety projects on rural roads with growing commute travel	L					■
Cross-Cutting	Highway	Regionwide	Policy & Program	Truck Route Coordination Planning/Guidance, Technical Assistance, and Information to address truck route connectivity, health and community impacts	L	■				■

Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
Cross-Cutting	Highway	Regionwide	Program	Truck route ITS and Signal Synchronization Program	L				■	
Cross-Cutting	Highway	Alameda	Program	Update ACTC Truck Parking Facility Feasibility and Location Study to 2015 conditions, and identify specific projects that can be implemented in near term to provide full service parking facilities	L, I, X	■				
Cross-Cutting	Ocean	Alameda	Policy	Strategies to improve port operations including night gates	G, X	■			■	
Cross-Cutting	Rail	Regionwide	Policy	Crude by Rail Safety	R, X		■			
Cross-Cutting	Rail	Regionwide	Program	Industrial Rail Access Program	R					■
Cross-Cutting	Rail	Regionwide	Policy	Monitor regulatory proceedings on crude by rail	R, X	■	■			■
Cross-Cutting	Rail	Regionwide	Policy & Program	Rail and Terminal Emission Reduction Program	R					
Cross-Cutting	Rail	Regionwide	Program	Rail Quiet Zone Program	R	■				
Cross-Cutting	Rail	Regionwide	Project	Railroad ROW Preservation and Track Improvements			■	■		
I-580	Highway	Alameda	Project	Freeway/Expressway Interchange Modifications (I-580/Fallon & I-580/Hacienda)	I		■		■	
I-580	Highway	Alameda	Project	I-580/First St Interchange Improvements in Livermore	I		■		■	
I-580	Highway	Alameda	Project	I-580/Greenville Rd Interchange Improvements in Livermore	I		■		■	
I-580	Highway	Alameda	Project	I-580/I-680 Interchange Truck Safety Improvements	I		■			
I-580	Highway	Alameda	Project	I-580/Isabel Avenue Interchange, Phase 2 in Livermore	I		■		■	
I-580	Highway	Alameda	Project	I-580/San Ramon Road/Foothill Road interchange improvements	I		■		■	
I-580	Highway	Alameda	Project	I-580/Vasco Road interchange improvements in Livermore	I		■		■	
I-580	Rail	Alameda	Project	Altamont Siding extension	R				■	
I-580	Rail	Alameda	Project	Double tracking east of Niles Canyon	R				■	
I-580	Rail	Alameda	Project	Extend and upgrade Radum Siding	R				■	
I-580	Rail	Alameda	Project	Midway Siding extension	R				■	
I-580	Rail	Alameda	Project	Niles Canyon double track and sidings	R				■	
I-580	Rail	Alameda	Project	Niles Junction Bypass	R				■	■
I-580	Rail	Alameda	Project	Rehabilitate Niles Canyon Railway	R				■	
I-580	Rail	Alameda	Project	Short haul Rail Service	R, I				■	■
I-580	Rail	Alameda	Project	Signal upgrades east of Niles Junction	R				■	
I-580	Rail	Alameda	Project	Track realignment UPRR Oakland Sub MP 55.5 to MP 54.0, Remove Permanent "Shoofly" (Extension of Altamont Siding)	R				■	■
I-580		Alameda	Project to be developed	Strategies to reduce truck-involved crashes on I-580 WB from Center to I-580/238	I		■		■	
I-680	Highway	Alameda, Contra Costa	Policy	Allow truck access to HOV/HOT lanes in off-peak or buy-into HOT lanes	I				■	
I-680	Highway	Contra Costa	Project	Construct auxiliary lane on I-680 in both directions between Sycamore Valley Road in Danville to Crow Canyon Road in San Ramon	I		■		■	
I-680	Highway	Alameda, Contra Costa	Program	New project development for spot widening, additional auxiliary lanes, and interchange improvements at locations identified as having high truck delay/poor reliability from Fremont to Walnut Creek	I		■		■	

Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
I-680	Highway	Alameda	Project to be developed	Strategies to reduce PM travel time delay on I-680 near Fremont	I	■			■	
I-680	Highway	Contra Costa	Program	Examine a link between SR and I-580 to create greater connectivity for East Contra Costa County Shippers	I				■	■
I-80	Highway	Alameda	Project	I-80 Ashby Interchange Improvement	L, I		■	■	■	■
I-80	Highway	Alameda	Project	I-80/Gilman interchange reconfiguration in Berkeley	I		■		■	
I-80	Highway	Solano	Project	I-80/Lagoon Valley Rd Interchange Improvements	I			■	■	
I-80	Highway	Contra Costa	Project	Implement I-80 Integrated Corridor Mobility Project	I				■	
I-80	Highway	Solano	Project	Improve I-80/I-680/Route 12 Interchange (All Remaining Phases)	I		■		■	
I-80	Highway	Contra Costa	Project	Modify I-80/Central Avenue interchange	I				■	
I-80	Highway	Solano	Project	Provide auxiliary lanes on I-80	I		■		■	
I-80	Highway	Contra Costa	Project	Reconstruct I-80/San Pablo Dam Road interchange	I			■	■	
I-80	Highway	Alameda	Project to be developed	Strategies to reduce truck-involved crashes on I-80 WB from I-580 to University	I		■		■	
I-80	Highway	Solano	Project	WB truck scales relocation	I		■		■	
I-80	Highway	Solano	Project	Widen American Canyon Rd overpass at I- 80	I			■	■	
I-80	Rail	Alameda	Project	Berkeley Railroad Crossing Improvements	L, X	■	■		■	
I-80	Rail	Regional	Project	Union Pacific Martinez Subdivision Rail Improvements	R, G			■	■	
I-880	Highway	Alameda	Project	Bypass lanes in I-880, I-238, I-580 corridors	I	■	■		■	
I-880	Highway	Alameda	Project	East-west connector between I-880 and Route 238/Mission Boulevard just south of Decoto Road	L				■	■
I-880	Highway	Alameda	Project	I-880 auxiliary lanes between Whipple in Union City and Industrial Parkway West in Hayward	I		■		■	
I-880	Highway	Alameda	Project	I-880 NB and SB auxiliary lanes between West A and Winton in Hayward	I		■		■	
I-880	Highway	Alameda	Project	I-880/A St interchange improvements in Hayward	I		■		■	
I-880	Highway	Alameda	Project	I-880/High St Interchange Improvements on Jensen, Howard Streets, High Street, 42nd Ave, Coliseum Way in Oakland	I		■	■	■	■
I-880	Highway	Alameda	Project	I-880/Industrial Parkway interchange improvements including addition of northbound off-ramp	L, I		■		■	■
I-880	Highway	Alameda	Project	I-880/West Winton Ave interchange improvements in Hayward	I		■		■	
I-880	Highway	Alameda	Project	I-880/Whipple Rd interchange improvements	I		■		■	
I-880	Highway	Santa Clara	Project	Interchange at I-880 and Montague Expressway	I				■	
I-880	Highway	Alameda	Project to be developed	MTC I-880 Integrated Corridor Management Project through Oakland and San Leandro	I	■	■		■	
I-880	Highway	Alameda	Project	Whipple Road/I-880 interchange improvements in Union City, Hayward	L, I				■	■
I-880	Rail	Alameda	Project	Alviso Wetlands Double Track	R				■	
I-880	Rail	Alameda	Project	Construct grade separation on Central Avenue/UPRR railroad grade separation in Newark	L		■		■	■
I-880	Rail	Alameda	Project	Embarcadero – Jack London 3rd track	R				■	
I-880	Rail	Alameda	Project	Grade separations over Decoto Road through the residential neighborhood	L	■	■		■	■
I-880	Rail	Alameda	Project	Hayward Double Track (Elmhurst to Industrial Parkway)	R				■	
I-880	Rail	Alameda	Project	Implement High Street, Davis Street, and Hesperian Blvd grade separation projects	L				■	■

Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
I-880	Rail	Alameda	Project	Improve Fremont rail crossing safety with gates and medians at: Fremont Blvd, Maple St, Dusterberry Way, Nursery Avenue	X		■			■
I-880	Rail	Alameda	Project	Jack London – Elmhurst 3rd track	R				■	
I-880	Rail	Alameda	Project	Mowry Avenue/ UPRR railroad grade separation for access to Area 4 in Newark	L		■		■	
I-880	Rail	Alameda	Project	Tennyson Road railroad grade separation in Hayward	L		■		■	■
Seaport	Highway	Alameda	Project to be developed	Assess feasibility of a project to separate bike and ped pathways within the Port of Oakland	L, G	■	■		■	
Seaport	Highway	San Francisco	Project	Implement Bayview Transportation Improvements	G				■	
Seaport	Highway	Alameda	Project	Middle Harbor Rd Improvements (Maritime St to Matson Terminal)	G				■	
Seaport	Highway	Alameda	Project	Replace Adeline overpass at 3 rd St in Oakland to accommodate overweight trucks.	L, G			■		■
Seaport	Highway	Alameda	Project	Strategy to address queueing at Interchanges along I-880 and on local streets from last-mile truck access to Port of Oakland	L, I, G	■			■	
Seaport	Highway	Alameda	Project	Truck Services at Oakland Army Base	G, X	■				
Seaport	Ocean	San Mateo	Project	Cargo capacity enhancement at Port of Redwood City	G			■	■	
Seaport	Ocean	San Mateo	Project	Dredge Channel to Port of Redwood City	G			■		
Seaport	Ocean	Solano	Project	Dredge Channel to Port of Stockton	G			■		
Seaport	Ocean	San Francisco	Project	Pier 96 Proposed Bulk Export Terminal	G			■	■	
Seaport	Ocean	Alameda	Project	Port of Oakland ITS including FRATIS	G	■			■	
Seaport	Ocean	San Mateo	Project	Redevelopment of Wharves 1 and 2 at Port of Redwood City	G			■		
Seaport	Rail	Alameda	Project	7 th Street Grade Separation West	G		■		■	■
Seaport	Rail	Alameda	Project	Add capacity on Martinez Subdivision between Port of Oakland and 65th Street to separate passenger and freight trains	R				■	
Seaport	Rail	Alameda	Project	Oakland Army Base Phase 2 Intermodal Rail Improvement	G	■			■	■
Seaport	Rail	Alameda	Program	Rail Study to determine feasibility of Port of Oakland Intermodal Yard North Lead Track	R, G				■	■
Seaport	Rail	Solano	Project	Sacramento – Benicia 3 rd Track Improvement	R			■	■	
SR 12/SR 37	Highway	Napa	Project	Construct an interchange at the intersection of SR 12/29/ Airport Road, grade separated in Napa County. Environmental underway.	I		■		■	
SR 12/SR 37	Highway	Napa/Solano	Project	Implement upgrade to SR 12 (Jameson Canyon) between Napa and Solano Counties (includes grade realignment and full safety barrier).	I		■		■	
SR 12/SR 37	Highway	Sonoma	Project	Implement Windsor River Road/Windsor Road/NWPRR Intersection improvements. Re-configure intersection and improve railroad, vehicle, pedestrian interface.	R		■	■	■	
SR 12/SR 37	Highway	Sonoma	Project	State Route 37 corridor protection and enhancement project.	I		■	■	■	
SR 12/SR 37	Highway	Napa/Solano	Project	Widen SR 12 (Jameson Canyon) from State Route 29 in Napa County to Interstate 80 in Solano County from 2 lanes to 4 lanes.	I		■		■	
SR 12/SR 37	Rail	Solano	Project	A Street Grade Separation (Dixon)	I				■	
SR 12/SR 37	Rail	Solano	Project	Cannon Road Grade Separation (Fairfield)	I				■	
SR 12/SR 37	Rail	Contra Costa/Solano	Project	High-Level Benicia-Martinez Rail Crossing and Viaduct	R				■	

Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
SR 12/SR 37	Rail	Sonoma	Project	Shellville Yard Climate Adaptation	R, X	■	■	■	■	
SR 12/SR 37	Rail	Sonoma	Project	SMART Track Relocation off HWY 12	R		■	■	■	
SR 152	Highway	Santa Clara	Project	Improve intersections on SR 152 at Frazier Lake Road, Bloomfield Road, Watsonville Road, and Ferguson Road	I		■		■	
SR 152	Highway	Santa Clara	Project	Widen and create new alignment for SR 152 (from SR 156 to U.S. 101)	I		■		■	
SR 4	Highway	Contra Costa	Project	Add a westbound mixed-flow lane from east of Willow Pass Road (West) to the lane-add west of Willow Pass Road (West)	I				■	
SR 4	Highway	Contra Costa	Project	Add an eastbound mixed-flow lane on SR 4 from the lane drop 1,500 feet west of Port Chicago Highway to east of Willow Pass Road (west) on-ramp	I				■	
SR 4	Highway	Contra Costa	Project	Conduct environmental and design studies to create a new alignment for SR 239 and develop corridor improvements from Brentwood to Tracy – project development	I				■	
SR 4	Highway	Contra Costa	Project	Construct freeway-to-freeway direct connectors between SR 4 Bypass and SR 160	I				■	
SR 4	Highway	Contra Costa	Project	Construct northbound truck climbing lane from Clearbrook Drive in Concord to crest of Kirker Pass Road, includes 12-foot dedicated truck climbing lane, bike lane and 8-foot paved shoulder.	I		■		■	
SR 4	Highway	Contra Costa	Project	Improve I-680/SR 4 interchange (includes connecting northbound I-680 to westbound SR 4, connecting eastbound SR 4 to southbound I-680, and widening SR 4 between Morello and SR 242)	I		■	■	■	
SR 4	Highway	Contra Costa	Project	Improve I-680/SR 4 interchange Phases 4 and 5 (includes connecting southbound I-680 to eastbound State Route 4, connecting westbound State Route 4 to northbound I-680, and constructing HOV flyover ramps from westbound State Route 4 to I-680 southbound from I-680 northbound to eastbound State Route 4.	I		■		■	
SR 4	Rail	Contra Costa	Project	Construct grade separation underpass at Lone Tree Way and Union Pacific Railroad.	R		■		■	
U.S. 101	Highway	Regional	Project	Add auxiliary lanes on U.S. 101 between Rowland Blvd and North San Pedro Road, near Port of San Francisco, near SFO, and segments between San Mateo and Dumbarton Bridge	I				■	
U.S. 101	Highway	Regional	Program	Additional project development funding for lane widening, auxiliary lane additions, and interchange improvements to address truck delay issues and reliability in identified locations in Marin, San Francisco, and San Mateo Counties that do not have planned projects	I				■	
U.S. 101	Highway	Santa Clara	Project	Construct a lane on southbound U.S. 101 using the existing median from south of Story Road to Yerba Buena Road; modify the U.S. 101/Tully Road Interchange to a partial cloverleaf.	I			■	■	
U.S. 101	Highway	Santa Clara	Project	Construct auxiliary lane on southbound U.S. 101 from Ellis Street to eastbound Route 237.	I				■	
U.S. 101	Highway	Santa Clara	Project	Construct auxiliary lane on southbound U.S. 101 from Great America Parkway to Lawrence Expressway.	I				■	
U.S. 101	Highway	San Mateo	Project	Construct new interchange at U.S. 101/Produce Avenue.	I				■	
U.S. 101	Highway	San Mateo	Project	Construct southbound on-and off-ramps to U.S. 101 at Peninsula Avenue to add on and off ramps from southbound U.S. 101.	I				■	
U.S. 101	Highway	Marin	Project	Implement Marin Sonoma Narrows HOV lane and corridor improvements.	I	■	■	■	■	
U.S. 101	Highway	Sonoma	Project	Implement Marin/Sonoma Narrows project (Sonoma County)	I		■	■	■	
U.S. 101	Highway	Santa Clara	Project	Improve interchange at U.S. 101/Zanker Road/Skyport Drive/Fourth Street.	I			■	■	
U.S. 101	Highway	Santa Clara	Project	Improve interchange at U.S. 101/Oregon Expressway/Embarcadero Road.	I			■	■	
U.S. 101	Highway	San Mateo	Project	Improve operations at U.S. 101 near Route 92.	I			■	■	



Corridor or Strategies Type	Primary Mode	Location	Type	Freight Transportation Projects, Programs, and Policies	Function	Environment	Safety	Infrastructure Condition	Travel-Time Delay	Freight Connectivity
U.S. 101	Highway	Santa Clara	Project	Improve southbound U.S. 101 between San Antonio Road and Carlston Road/Rengstorff Road.	I			■	■	
U.S. 101	Highway	Sonoma	Project	Improve U.S. 101/E. Washington Street Interchange (includes new NB on-ramp and improvements to SB onramp).	I					
U.S. 101	Highway	San Mateo	Project	U.S. 101/ Willow Road interchange reconstruction.	I		■		■	
U.S. 101	Highway	San Mateo	Project	U.S. 101/ Woodside Road interchange improvements.	I		■		■	
U.S. 101	Highway	Santa Clara	Project	Widen U.S. 101 from Monterey Street to Route 129 – project development.	I				■	
U.S. 101	Rail	Regional	Project	Rail Bridge Systems Replacement Sonoma/Napa	R		■	■		
U.S. 101	Rail	Sonoma	Project	Replace Russian River Rail Bridge in Healdsburg	L		■	■	■	
U.S. 101	Rail	Regional	Project	SMART Freight Spurs	R		■		■	■
U.S. 101	Rail	Sonoma	Project	SMART Windsor Freight Sidings	R		■	■	■	

Note: Projects List is sorted by Corridor/Strategy Type, then by Primary Mode, and then by Project Name. Function indicates the functional elements the projects address (G = Global Gateway, I= Inter-and Intraregional corridors, L = local streets and roads, R = Rail, X = Crossing-cutting. Columns to the right indicate the primary benefits categories of the project.