ALAMEDA COUNTY GOODS MOVEMENT PLAN

Task 4B: Strategies Evaluation

Technical Memorandum

prepared for

Alameda County Transportation Commission

prepared by

Cambridge Systematics, Inc.

technical report

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1.0 INTRODUCTION

1.1 Purpose

In the *Task 4a Tech Memo: Recommended Projects, Programs and Policies* of the Alameda CTC Goods Movement Plan, a list of strategies (projects, programs and policies) was identified for evaluation to determine which have the greatest potential for meeting the goals of the Goods Movement Plan. This technical memorandum provides:

- **Section 2.0** - Opportunity Packages that contain the highest performing strategies evaluated in Sections 3.0 through Section 9.0. Though these packages builds on the results from the latter sections, presenting them early in this memo can provide a high-level overview of the result of the evaluation.
- **Sections 3.0 through Section 9.0** - Detailed evaluation of each one of these strategies using the performance measures established as part of *Task 3a: Performance Measures*.

For the specific project evaluations, since the performance measures are directly tied to the five goals established for this plan, using them to evaluate strategies provides an indication of how well the strategies meet the goals. Conversely, strategies which hinder the progress towards a certain goal (thus creating a negative impact) can also be identified. Table 1.1 shows the goals and the performance measures related to each goal.

Table 1.1 Goals and Performance Measures

Goals	Performance Measures
(Interconnected/Multimodal) Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions	Travel Time Delay – Highway Travel Time Delay – Air/Rail/Port Connectivity – Highway Connectivity – Air/Rail/Port Freight/Passenger Conflicts Land Use Conflicts
Safe and Reliable Provide safe, reliable, efficient and well-maintained goods movement facilities.	Crashes – Truck and Reliability Crashes – Crossings Bridge Conditions Pavement Condition Resiliency
Innovative Promote innovative technology strategies to improve the efficiency of the goods movement system.	ITS/Technology
Economic Prosperity Increase economic growth and prosperity that supports communities and businesses.	Jobs/Output/Co-Benefits

Goals	Performance Measures
Improved Quality of Life Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.	Emissions Equity

1.2 Individual Strategy Evaluation Methodology

As described in *Task 3a: Performance Measures*, the types of strategies to be evaluated and the limitations of available data/methodologies require a mix of quantitative and qualitative evaluation methods. In order to provide a consistent way of evaluating strategies, a ratings scale was created that could be used with both qualitative and quantitative information. As a result, five ratings were created that can be applied to each strategy, for each performance measure. Two factors are used to come up with a rating - **the importance of the need** and **the effectiveness of the improvement**.

The importance of the need is determined from findings in the needs assessment report. It is an important factor in assigning ratings because a project that addresses a significant need will by nature have a higher priority than those that do not, and thus should receive a higher rating. The importance of a need is viewed in two ways: it addresses a severe problem or provides a high level of countywide benefit. For example, a strategy to improve safety at a location with one of the highest truck-involved crash rates in the county would get a high rating on importance of the need because it is addressing a very severe problem. In the case of a need that addresses an opportunity to achieve a very high level of regional benefits, developing a major logistics center with a large number of jobs could be addressing a regionally significant opportunity even though the lack of such a facility doesn't necessarily indicate a severe problem.

The effectiveness of improvement is related to how effective the strategy is in addressing a particular problem, regardless of the severity of the problem. Since this varies by project type and by measure, more detailed guidance on how ratings are assigned for effectiveness of improvement for each type of strategy is provided at the beginning of sections 3.0 to 9.0. Effectiveness of an improvement may also take account of factors such as how complementary a strategy is and how the complement of related strategies achieves an important benefit.

General descriptions and guidelines for how each rating was assigned are shown in Table 1.2 below. The table shows the 5 possible ratings that could be assigned. The **Description** column offers some description of the overall rating. The **Possible Ratings Combinations Column** shows the possible ratings for the Importance of Need, and the Effectiveness of Improvement in order to get a particular overall rating. In the table, for Importance of the Need (the first rating in the

rating pairs) are always describing how to rate a strategy in terms of a need that could be measured by a particular performance measure. So in the case of the land use conflicts performance measure, the Importance of the Need is determined based on how severe or significant a land use conflict is at the location of the project even if the project is designed to accomplish some other objective. Similar considerations are taken into account in evaluating the Effectiveness of the Improvement with respect to a particular performance measure. Note that in a lot of cases different ratings combinations can generate different overall rating, given the nuances that are present in each project. For instance, a strategy with a High-Medium (H-M) combination may get an H rating overall for one project, but an M overall rating for another project, based on the particular strengths of H and M in each case. Though largely qualitative in nature and subject to the authors' judgment, it is aimed at providing a more accurate rating for a project in lieu of a highly spread-out ratings scale.

Table 1.2 Descriptions and Guidelines for Ratings Assignment

Overall Rating	Description	Possible Ratings Combinations (Importance of Need – Effectiveness of Improvement)
High (H)	Strategy has highest positive impact through a combination of high importance of the need and high effectiveness of improvement.	High-High Medium-High High-Medium
Medium (M)	Strategy has medium positive impact at addressing a given need.	Medium-Medium Medium-High Medium-Low High-Low High-Medium Low-High Low-Medium
Low (L)	Strategy has low overall positive impact in addressing a particular need	Low-Low Medium-Low Low-Medium
Neutral (N)	Strategy has no clear impact on addressing a particular need regardless of the importance of the need	Neutral-Neutral Low-Neutral Medium-Neutral High-Neutral
Negative (-)	Strategy has negative impact on addressing a particular problem regardless of the extent of the need	Low-Negative Medium-Negative High-Negative

There are three important caveats to note for individual project evaluations:

- A strategy will be evaluated by as many performance measures as it they are relevant. For instance, a rail track improvement project can have impacts on not only delay, but also safety, land use conflicts, emissions and equity. However, highway travel time delay will not be applicable for this project and thus the project will not be evaluated on the highway travel time delay measure. This is different from when a neutral rating is used, which indicates the measure was relevant, but there was simply no measurable impact.

- To the extent possible, quantitative data and analysis are used to determine each rating. Where quantitative data are not available, qualitative explanations are used to determine a rating that are aimed to be as consistent as possible with the quantitative ratings.

- Certain strategies that were included in the draft strategies list from Task 4a are not evaluated in this memo. These strategies are either in scoping phase, under going EIR or have very vague project definitions. Strategies in scoping phase does not have a formalized project definition, thus it is impossible to realistically evaluate such a strategy. Strategies undergoing EIR have their impacts identified through formal environmental impact analysis documents and given this document is planning level only, it is not appropriate to conduct an impact analysis. Finally, certain strategies are poorly defined and thus cannot be evaluated. Finally, some strategies are also evaluated together either because data is not available at the disaggregate level, or because evaluating them together can help us better capture their interactions.

1.3 Methodology used to create Opportunity Packages

Implementation of highly ranked strategies will bring the greatest benefit to the County if they can be grouped into packages that combine complementary strategies. These packages should help the County focus on high priority opportunities that move the County towards its goods movement vision. The idea of opportunity packages is that groups of strategies work together to create greater benefits than an uncoordinated set of individual highly ranked projects would.

Figure 1.1 shows the process of how we arrived at the opportunity packages from the individual projects evaluations. Throughout the project, and along each step, stakeholder input was included in the final deliverables. The 3 key steps involved are as follows:

1. **Identify priority opportunities** – Based on the visions and goals of the project as well as the importance of goods movement memo, we build three high level themes that represent the top priorities for goods movement the County should focus on. The opportunity packages represent a refinement of the concept of goods movement opportunities that was first presented in the needs assessment report. They emphasize the unique characteristics of the Alameda County goods movement system and economy.

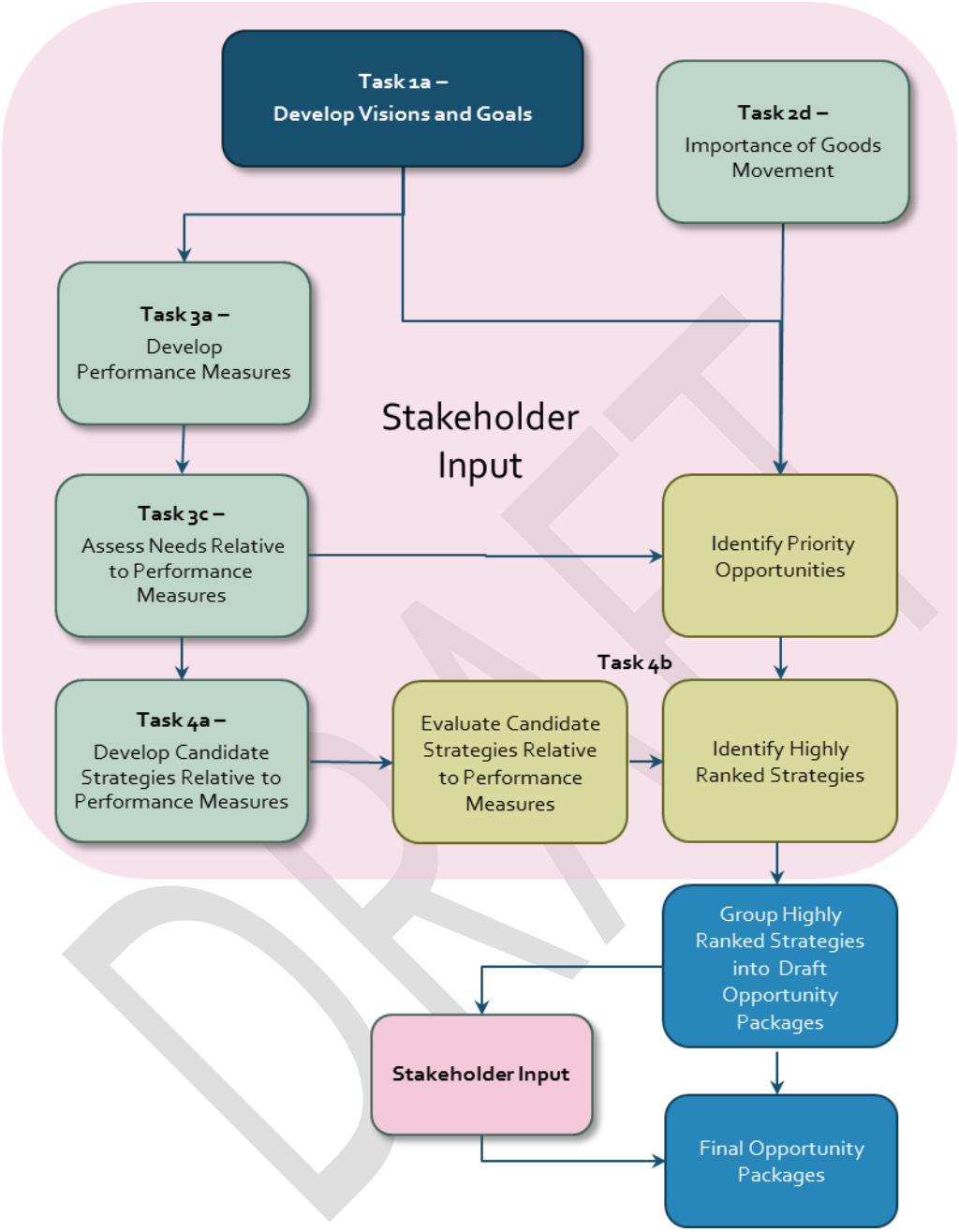
2. **Identify highly ranked strategies** – Strategies in Sections 3.0 through Section 9.0 that are first priority are identified and selected. This does not mean that every strategy that was included in an opportunity packages was rated highly on all performance measures

although strategies that are included are generally rated highly on a number of performance measures and are generally not rated low on more than one performance measure.

3. **Group highly ranked projects into opportunity packages** – This step marries steps 1 and 2 and selects the highly ranked strategies into each appropriate opportunity package. This ensure that each opportunity package contains a "balanced portfolio," meaning that if any of the strategies that rate highly on most performance measures rate poorly on any performance measure, this poor performance must be balanced by other strategies in the package that rate highly on that same performance measure.

This balance is "baked into" the packages to make sure that the offsetting strategies are always considered as part of planning. This ensures, for example, that strategies that help achieve equity and community livability goals are an integral part of the packages. The draft Alameda County Goods Movement Plan will drill deeper into these strategies and opportunities to identify implementation and funding considerations, including more detail on how certain programs might be administered.

Figure 1.1 Development of Opportunity Packages Process Flow Diagram



2.0 ALAMEDA COUNTY OPPORTUNITY PACKAGES

This section present three opportunity packages of highly ranked strategies. The opportunity packages represent a refinement of the concept of goods movement opportunities that was first presented in the needs assessment report. They emphasize the unique characteristics of the Alameda County goods movement system and economy. Organizing strategies around opportunities provides a framework for linking related strategies and better communicating the benefits of the goods movement plan. Based on stakeholder input (as shown in Figure 1.1), a final version of the three opportunity packages will be recommended for inclusion in the final report.

2.1 Opportunity Package 1. Sustainable Global Competitiveness

Support environmentally sustainable investments at key global gateways that create local jobs, protect the community and attract international commerce.

Creating Local Jobs: Today, the Port of Oakland supports an economic ecosystem estimated to provide 73,000 middle-wage jobs throughout Northern California. Continuing investments in the Oakland Army Base Redevelopment/Port of Oakland to improve access and support rail expansion will grow local, middle-wage jobs. The Port plays a critical role in supporting the Alameda County's job diversity, as jobs that pay a living wage with low educational barriers to entry and with opportunities for career advancement have become increasingly difficult to find. Analysis conducted for this plan has reported shortages of skilled logistics professionals and the need for higher skill levels in the modern e-commerce fulfillment centers operated by third party logistics (3PL) service providers. Attracting these jobs to the County could help address the erosion of middle class jobs the county and Bay Area has seen with the loss of traditional manufacturing.

The redevelopment of the Oakland Army Base provides a unique opportunity to build a modern logistics center, provide good jobs for residents and adopt goods movement technologies and operations practices that reduce impacts on adjacent neighborhoods. Retailers and other companies engaged in the expanding e-commerce sector prefer West Coast locations for receiving and fulfilling orders for same day or next day delivery. Few locations on the West Coast offer the availability of seaport, airport, highway, and rail options with land for the development of new logistics facilities that is available around the Oakland port complex. Transportation agencies should coordinate with the Port of Oakland and industrial developers to ensure that investments are made to improve velocity and throughput on the landside at the Port, create good domestic connections so that international and domestic goods can be mixed in Oakland for national distribution, and ensure that warehouse and industrial development emphasizes value-added services such as import cargo transloading to promote job growth and diversity. The 2012 Addendum to the Oakland Army Base Redevelopment Environmental Impact Report estimated that over 2600 direct jobs would be created by the new logistics facilities.

Supporting the local community: This growth must be accomplished in a manner that reduces impacts on adjacent communities. Historically these impacts have included public health effects associated with diesel pollution, noise from trucks; trains, and port activities, and nuisance and safety effects from spillover truck traffic in adjacent neighborhoods. Public and private entities should adopt the wide range of emerging technologies and operating practices for rail, trucking, and cargo handling to significantly reduce emissions from logistics operations. Projects including demonstrations, equipment purchase subsidies and financial incentives, and full-scale adoption of technologies will be necessary to support this program of investments. Public agencies, including local and regional transportation agencies, state agencies providing Cap and Trade grants, and Federal agencies supporting technology R&D, will need to provide funding for demonstrations and may need to provide subsidies for equipment purchases. Ultimately, private trucking companies, terminal operators, and rail operators will need to make investments as commercial versions of the technologies become available.

Increasing Competitiveness by Improving Rail Access: Strategic improvements to the freight rail system to and from the Port and adjacent logistics facilities will also improve access, reduce highway congestion, and increase the region's competitiveness as a logistics hub. While the private freight railroads should generally be expected to make their own investments in capacity and operational improvements, the potential for wider public benefits means that public sector dollars may need to be leveraged alongside private investments. The Class I railroads prioritize their capital investments across their entire, multi-state systems. But public dollars have been effective, in some cases, in improving the private return on investment for profitable projects with public benefits that might not otherwise rise above the private railroads' threshold for making the investment. Using this strategy, the Bay Area transportation agencies, working with the state, can influence private rail investments to achieve public benefits.

Historically, very little domestic intermodal rail traffic has originated or terminated at rail intermodal terminals in the Bay Area. Instead, most of this traffic is loaded or unloaded at intermodal terminals in the Central Valley with truck trips to make the final move to/from the Bay Area. By expanding intermodal terminal capacity at the Oakland Army Base and working with the Class I railroads to change operating practices and encourage greater use of this capacity for domestic intermodal operations, the region could reduce truck traffic on congested I-580 and potentially reduce emissions through use of more fuel efficient (per ton-mile) rail mode in place of trucking. This will require working with the railroads to identify ways to deploy the cleanest available locomotive technologies.

A lack of rail service to the Port of Oakland has long been cited as a constraint to attracting first call vessel services, which is an impediment to growth, especially for import cargo. The Port has generally pursued a strategy of trying to attract direct inland intermodal services, but many shippers would prefer to transload their import cargo – i.e., move it from 40 foot long international containers to 53 foot long domestic containers and trailers – and to perform other value-added services during the transloading process. These value-added services create local jobs and therefore benefit the Bay Area economy more than direct intermodal service. New warehouses being developed by Oakland Global and slated

for development by the Port on its portion of the former Army base would create opportunities to attract this transloading activity. By creating access to near-dock intermodal facilities to handle the domestic containers and trailers that are part of the transloading operation, the Oakland Global facility will provide a more attractive option for shippers.

Table 2.1 summaries the strategies recommended for this opportunity package. As an example of the balanced portfolio, there are some strategies that are negative but are very highly rated on the economic prosperity goal area. Given most of the negative ratings are on improved quality of life, they are balanced by the various emission reduction and community impact mitigation strategies. In implementing these package special attention should be given to ensure that the strategies that balance each other are implemented together to the maximum extent possible.

Table 2.1 Opportunity Package 1 Strategies

ID	Project Description and Project Elements	Project Evaluation Section	Performance Across Goal Areas				
			Interconnected/ Multimodal	Safe and Reliable	Innovative	Economic Prosperity	Improved Quality of Life
C1	7th Street Grade Separation projects (East and West)	3.1	●	◒			◒
C2	Oakland Army Base Phase 2 improvements (Port development)	3.3	●			●	●
C3	Oakland Army Base Phase 2 Intermodal Rail Improvements	3.4	●			●	●
C4	Truck Services at Oakland Army Base	3.5	◒				●
C5	Adeline St Bridge	7.6	○	○			
C6	ITS Improvements to Address Queuing at Interchanges along I-880 and on Local Streets to Port Of Oakland	3.9	●		●		○
C7	Airport Perimeter Dike	8.1	●	●		◒	◒
C8	Rail Quiet Zone Program	9.14	◒		○		◒
C9	An initial demonstration followed by targeted incentives to promote adoption of zero and near-zero emissions truck technology for port drayage	9.3	○		●	◒	●
C10	Rail and Terminal Emission Reduction	9.13	◒				●

	Program					
C11	Freight Corridors Community and Impact Mitigation Initiative	9.16	◓			●
C12	Develop / Support Workforce Training Programs for Goods-Movement Related Jobs (specially transloading and logistics jobs)	9.17			○	●
C13	A program of rail crossing improvements.			Ratings vary by location		
C12	A program of track additions, sidings, and new connections to provide an improved continuous route through Niles Canyon and north to Oakland.	4.3				
a.	Alviso Wetlands Double Track	4.3.1	●	●		
b.	Hayward Double Track (Elmhurst to Industrial Parkway 2nd Track	4.3.4	○			●
c.	Niles Junction Bypass	4.3.5	◓			●

Key: ● - High positive Impact; ◓ - Medium positive Impact; ○ - Low positive Impact; ● - Negative Impact

2.2 Opportunity Package 2. Smart Operations and Deliveries

Support technology and innovative operations strategies to improve goods movement, reduce congestion and increase safety on urban and rural roads.

Alameda County's transportation system is predominately built out, with limited opportunities to build new capacity. Thus, the County's goods movement priority should be to support maximum use of Intelligent Transportation Systems (ITS), connected vehicles, and other technology solutions to more efficiently use existing roadway capacity. A number of models for the adoption of ITS travel information systems, integrated corridor management systems, arterial Smart corridors, and eventually autonomous truck technology are the subject of experiments and demonstrations for freight applications. Several of these have been supported by grants from FHWA and some are eligible for funding under new programs at the California Energy Commission and the Air Resources Board funded with Cap and Trade proceeds. An initiative that is coordinated with that at the regional level that brings together the Bay Area's tech sector with technology users and supports demonstrations and early adoption of the new technologies would help wring more capacity out of the existing system.

This package of projects, programs, and policies can be broadened to encompass new technologies and operating practices that will lead to a more sustainable freight system. As noted in all of the other packages in this framework, it is the intent of the plan that any strategy with the potential to facilitate growth in goods movement demand should include components that reduce the impacts of this growth in demand on adjacent communities. This package of projects and programs seeks to go even further, by pro-actively building partnerships between technology developers, users, and local communities to build a market for innovative technologies and operational strategies that reduce the impact of goods movement on public health and the environment. By embracing this approach, Alameda should be more competitive in applying for and obtaining funding from the expanding state programs related to Sustainable Freight implementation and the Cap and Trade program.

A final element of this package recognizes that with the focus on Priority Development Areas and dense urban form in the Bay Area coupled with the growth of e-commerce, urban deliveries in residential and commercial neighborhoods will continue to expand and create conflicts on local streets and roads. There are a variety of innovative practices that can be applied to help manage this local traffic, and Alameda CTC and other agencies can provide leadership by providing guidance and funding implementation demonstrations.

Table 2.2 summaries the strategies recommended for this opportunity package.

Table 2.2 Opportunity Package 2 Strategies

ID	Project Description and Project Elements	Project Evaluation Section	Performance Across Goal Areas				
			Interconnected/ Multimodal	Safe and Reliable	Innovative	Economic Prosperity	Improved Quality of Life
S1	Off-Peak and Novel Delivery Policy Guidance and Demonstration Program	5.2	●		◒	●	◒
S2	Port of Oakland ITS including FRATIS	3.8	●		●		●
S3	Oakland Airport Area ITS Project	3.7	○	○	●		◒
S4	Freight Guidelines for Complete Streets Initiative	9.18	◒	○			○
S5	I-880 and I-580 Integrated Corridor Management (ICM) Project	5.4	◒	●	●		◒
S6	Bypass Lanes in I-880, I-238, I-580 Corridors	5.3	●	◒			○
S7	Arterial smart corridor	9.1	●	◒	●		○

	program					
S8	Strategies to Improve Port Operations Including Night Gates and Weekend Operations	3.6	●			◒
S9	Clean Truck Policy & Program Collaborative (Joint Working Group with Regulatory Agencies, Freight Industry Representatives, and Public Agencies)	9.15	○	◒		●
S10	Near-Zero and Zero-Emission Goods Movement Technology Advancement Program	9.5	○	●	◒	●

Key: ● - High positive Impact; ◒ - Medium positive Impact; ○ - Low positive Impact;

2.3 Opportunity Package 3. Modernized Infrastructure for Emerging Industries

Support Alameda County's industry and job diversity by modernizing the road network in industrial corridors, improving safe access to industrial corridors and facilities, reducing land use conflicts along freight corridors, and improving last-mile truck routes and rail connections to existing and emerging industries.

In recent years, the shift in the economy towards information technology and services and away from more traditional manufacturing has led to a loss of middle income jobs for residents with lower educational levels. Nonetheless, Alameda County still has a number of key industrial sectors that remain healthy contributors to the expanding economy. Industries such as biotechnology, artisanal food manufacturing, and precision instrument manufacturing, are all expanding in Alameda County. Capitalizing on such growth, warehousing activities in cities like Fremont are booming and additional warehousing spaces are expected to meet future demand.[1] In addition, Alameda County is seeing growth opportunities in the application of advanced manufacturing to more traditional industries, again, taking advantage of Bay Area's well-known technology sector. These businesses continue to locate in the county's traditional industrial centers along I-880 and I-80.

[1] http://www.mercurynews.com/fremont/ci_26168507/largest-speculative-industrial-development-15-years-rising-near

While goods movement investments alone are not likely to be the key ingredient in expanding these industry sectors, viable industrial corridors with good local access, multimodal transportation options to meet a wide variety of supply chain needs, and access to inter-regional highway and rail corridors are important to these emerging industries. Safe and efficient truck access to and from the County's industrial corridors needs to be a critical element of the goods movement strategy.

The County's historically industrial corridors have also been targets of redevelopment in recent years as the region emphasizes compact development, transit oriented development, and housing production. This means the freeways and local truck routes in industrial corridors can create sources of conflict between trucks and other modes. This has led to a growing number of safety issues in corridors with heavy truck use. High levels of truck-involved crashes have been identified at freeway interchanges and approaches on local truck routes, many of which were designed without consideration of the high level of use by heavy trucks they currently receive.

Table 2.3 summaries the strategies recommended for this opportunity package.

Table 2.3 Opportunity Package 3 Strategies

ID	Project Description and Project Elements	Project Evaluation Section	Performance Across Goal Areas				
			Interconnected /Multimodal	**Safe and Reliable**	**Innovative**	**Economic Prosperity**	**Improved Quality of Life**
E1	Land use guidelines and incentive programs to cities that reduce land use conflicts	9.19	◓				◓
E2	A program of freeway interchange and auxiliary lane projects	6	Ratings vary by location				
E3	A program of local street projects to improve truck route access and connectivity	7	Ratings vary by location				
E4	Truck Route Coordination Planning/Guidance, Technical Assistance, and Information to Address Truck Route Connectivity, Health and Community Impacts	9.6	●	○	○		
E5	Development of public or public-private truck parking and full-service truck service facilities	9.10	●				●

	near major industrial centers (most likely in the Hayward, Union City, Fremont area)						
E6	Targeted Programs to Encourage Use of Zero-Emission Trucks and Cargo Handling Equipment Particularly in the I-80, I-880, and I-580 Corridors	9.4	○		●	◒	●
E7	Develop/Support workforce training programs for goods-movement related jobs (industry-focused logistics jobs)	9.17			○		●
E8	Countywide Freight Signage Program	9.8	◒	○			
E9	At-Grade Crossing Safety and Grade Separation Policy and Program	9.2	◒	●	○		●

Key: ● - High positive Impact; ◒ - Medium positive Impact; ○ - Low positive Impact;

3.0 PORT AND AIRPORT PROJECTS

This section evaluates the projects associated with the Port of Oakland and the Oakland International Airport. Table 3.1 explains for each performance measure that is applicable, how ratings for improvement effectiveness were determined. The importance of the Need ratings were based on the results of the needs assessment.

Table 3.1 Guidelines for Ratings Assignment for Port and Airport Projects

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions		
Travel Time Delay - Highway	Yes	This measure evaluates the delay benefits of a project or program. • To receive an H rating, a project must significantly reduce delay, with quantified results. Given that the primary purpose of a large number of these projects are related to delay reduction, projects in this category are expected to have High delay benefits. • To receive an M rating, a project should have at least moderate delay benefits either quantified or determined using qualitative methods. • To receive an L rating, a project will generally have some benefit but the benefit may be small or hard to determine
Travel Time Delay - Air/Rail/Port	Yes	This measure evaluates the project impact of travel time delay at airport and port complex, and on rail lines. Projects on last-mile connectors to the airport and port complex can also generate moderate to low levels of benefits. • A project with an H would directly and significantly reduce such delay • An M is given when the project has moderate delay reduction benefits directly at those locations • An L is given to a project that may indirectly reduce delay at those locations, such as when a highway project benefits access and reduces delay to an airport.
Connectivity - Hwy	No	None of the projects deal with adding linkages to the highway network.
Connectivity - Air/Rail/Port	No	None of the projects deal with connectivity to air/rail/port directly or indirectly.
Freight/ Passenger Conflicts	Yes	This measure evaluates whether a strategy will reduce or remove existing or future freight and passenger conflicts. • An H rating is assigned when the project completely eliminates the conflict, as in the case of truck only lanes that completely separates autos from trucks or a dedicated passenger-only rail line. • An M rating is assigned when there is significant reduction in the conflict but not complete elimination. For instance, a project that significantly reduces truck traffic on a busy corridor will also reduce the conflict significantly as a result of that reduction in traffic by mode. Another example would be adding a siding on a highly used rail corridor which would increase capacity and allow passenger trains to

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		pass slower freight trains. • An L rating is assigned when there are modest levels of conflict reduction.
Land Use Conflicts	Yes	Land use conflicts occur when the project increases the physical footprint or adds through-truck traffic to a route segment that travels through residential areas, past schools or through ecologically sensitive areas. • A project that successfully avoids all impacts with such sensitive land uses or that diverts significant amounts of traffic from sensitive areas is given an H rating, as it would perform as well or better in this regard as any other project intended to address the same goods movement needs. • A project that traverses sensitive zones may include mitigations that would address its noise and emissions and other environmental impacts on surrounding uses. A project that diverts through-truck traffic from a moderate extent of sensitive land use area is also given an M rating. A project that diverts through-truck traffic from a short extent of sensitive land use area is also given an M rating. • If environmental documentation has not been completed or is unknown, but such mitigations are customary for projects of its type in similar settings, the project is assigned a rating of L for land use impact avoidance. • If mitigation is unknown it is given a rating of "N" • If mitigation is unknown or impacts are found to be significant and unavoidable in the project's environmental documentation, a negative rating ("--") is assigned To evaluate potential conflicts, a buffer distance is applied, using distances from the Pacific Institute's report on At a Cross Road for Region's Health. A buffer distance of 1000 ft is applied to roadways, freeways and other corridors. A buffer distance of 1500 ft is applied to seaports and rail lines, and a distance of 2500 ft is applied to airports. Incompatible or sensitive land uses within these buffers represent a land use conflict.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	No	None of the projects deal with truck crashes.
Crashes - Crossings	Yes	This measures the safety impacts of the project on potentially reducing railroad grade crossing crashes. • A project will receive an H rating if its main purpose is to reduce grade crossing crashes and improve safety, or that it completely removes a certain conflict and eliminates safety issues (such as a grade separation). • A project will receive an M rating if it has moderate impacts on crash reduction • A project will receive an L rating if it exhibit marginal safety improvements.
Bridge Conditions	Yes	Several of the local streets projects include rehabilitating or rebuilding existing bridges. • A project will receive an H rating if it replaces or rehabilitates to current standards a bridge identified as deficient in the ACTC Goods

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		Movement Plan Gaps, Needs, Issues and Deficiencies assessment (Task 3C memo) A project will receive an L rating if it replaces or rehabilitates to current standards a bridge not identified as deficient in the ACTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment (Task 3C memo)
Pavement Condition	No	None of the projects deal with pavement conditions.
Resiliency	Yes	A project improves resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A project receives an H rating if its main purpose is resiliency. • A project receives an M rating if it can have significant resiliency benefits though its primary purpose is not to improve resiliency. • A project receives an L (likely the case for projects in this category) when it has marginal resiliency benefits).
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/Technology	Yes	• A project receives an H rating when it is an ITS/technology project by its very nature, or is very innovative by industry standards. • A project receives an M rating when it employs ITS technology to a large extent or is unconventional/new by industry standards. • A project receives an L rating when there are small elements of technology or innovation involved.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	Yes	This measure tracks the economic impact of a project through the number of jobs, amount of output it creates. Given the complex nature of this metric, it is hard to provide a numeric guideline. However, projects that increase freight volumes flowing through the port or airport usually have the highest economic benefits.
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	Yes	Emission impacts come from changes in PM, NOx that are a direct result of the project. These pollutant quantities are determined for some projects using the BAAQMD EMFAC model, which provides an objective and quantifiable metric. • A project with an H rating means its primary purpose is to remove or substantially reduce emissions, such as zero-emission trucks projects. • A project with an M rating means the project will reduce emission significantly but will not eliminate it. • A project with an L rating means it will reduce emissions, but the effect may be small or hard to determine. • Projects can also worsen emissions, in cases where traffic would actually increase. Such projects will receive a "-"rating.
Equity	Yes	Equity measures noise, light, air and other negative effects on communities that are most vulnerable and disproportionally affected by freight. Equity can be measured by determining whether a project is within one of the impact communities as determined in 2013 using the BAAQMD updated methodology. A buffer distance is applied to a project

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		as well (using the same distances from the land use conflicts analysis) to fully capture its impacts. • A project receiving an H on equity means that its primary purpose is to reduce negative impacts on the most impacted neighborhoods. • A project receiving an M on equity means it has moderate to significant benefits on equity. • A project receiving an L means it has some positive effect on equity. • Projects that negatively affect equity are given a negative (_) rating (see Table 2).

3.1 7th Street Grade Separation East and West

To accommodate anticipated increases in shipping volume, the Port of Oakland (the fifth largest container port in the US) plans to build the Outer Harbor Intermodal Terminal (OHIT), a proposed extension of the existing intermodal rail terminals to be located on 160 acres of the former Oakland Army Base. 7th Street connects the Port of Oakland (Port) to I-880 and is a major Port gateway. This project eliminates an at-grade railroad crossing and improves an existing grade separation, both of which cause significant traffic backup throughout the Port area. The western element, shown in light and dark blue, raises the intersection of Maritime and 7th Streets. The eastern element, shown in dark green, modifies the 7th Street underpass beneath the UPRR's rail lines.

The 7th Street Grade Separation West Project includes the construction of an elevated 7th Street/Maritime Street intersection and a tail track extension for the BNSF Oakland Intermodal Gateway (OIG) that facilitates the expansion and re-configuration of OIG. It also includes utility infrastructure upgrade along 7th Street. Parsons Brinckerhoff showed that building the western element, raising the intersection of 7th Street and Maritime Street, with the realigned BNSF tracks, would reduce intersection delays by 80% or more and truck queues by 50% or more.

On the Eastern element of the project, the bridge is due for upgrades to maintain a state of good repair.

Another bottleneck, the 7th Street Union Pacific Railroad underpass, restricts travel flow due to narrow travel lanes and inadequate height clearance for some truck loads. Improvement of this underpass would not increase capacity, but would improve traffic flow, truck operations, and safety (also reflected in Figure 1). This project, in combination with related Port improvement projects, would improve rail throughput by providing an increase in rail capacity to reduce conflicts with UP and BNSF.

Figure 3.1 Preferred OHIT 7th Street Grade Separation Alternative

SCENARIO 2: Alternative B (Full Buildout)

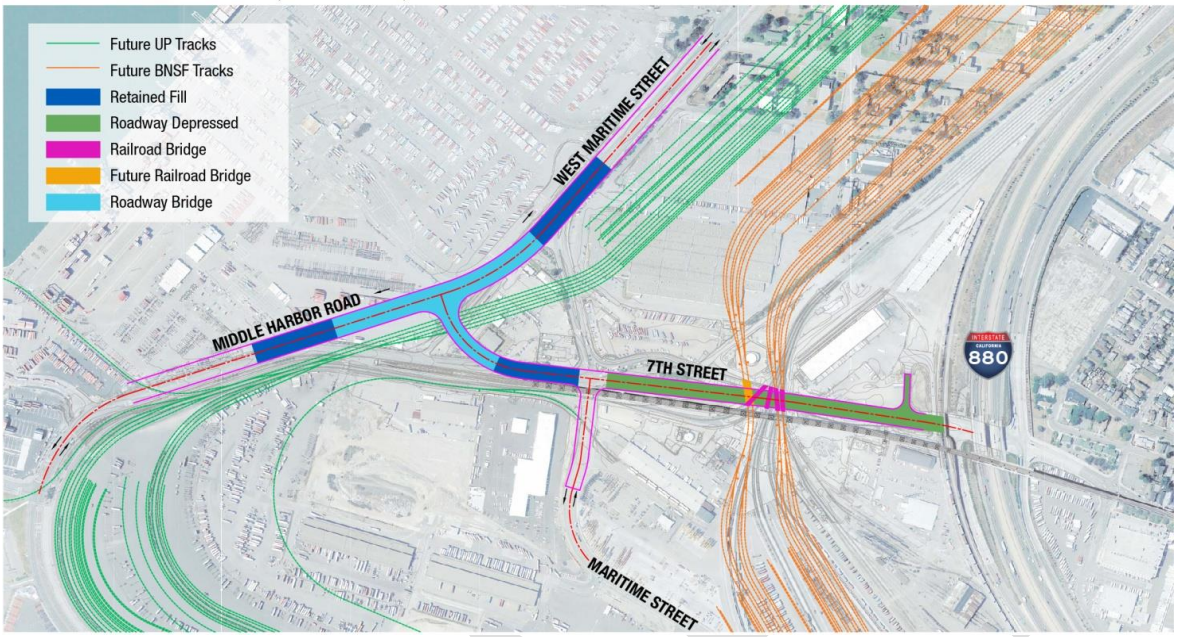


Table 3.2 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	A blockage of the at-grade crossing of Maritime Street near 7th Street results in significant truck queues that can extend as far back as I-880.	H	The Parsons Brinckerhoff 2014 analysis showed that building the western element, raising the intersection of 7th Street and Maritime Street, with the realigned BNSF tracks, would reduce intersection delays by 80% or more and truck queues by 50% or more. The proposed grade separation and roadway reconfiguration of 7th Street from Maritime Street to Navy Roadway, planned as part of the Oakland Army Base Redevelopment Project, would eliminate the at-grade crossing of Maritime Street near 7th Street.	H	H
Land Use Conflicts / Benefits	This location is surrounded entirely by Port land. The parcels on three sides are zoned "Exempt Public Agency". The parcel to the south east is zoned "Property Owned by a Public Utility".	N	There are no nearby land uses that would be in conflict or receive benefits.	N	N

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Crashes - Crossings	No collisions are reported at this location, and pedestrian activity is low within the Port. However, congestion in the truck traffic fosters unsafe driver behavior that may eventually result in a collision.	L	The new grade separation's primary benefit is reducing delay.	N	L
Bridge Conditions	The bridge currently does not meet capacity needs.	H	The project will bring the bridge to current standards for throughput.	H	H
Emissions	While truck and train traffic at this location are not a major regional source of air pollution, they do have significant localized effects, which is considered in the equity performance evaluation. Truck queues and slow moving trucks and trains do produce relatively high levels of emissions per truck VMT and locomotive-mile.	M	By significantly reducing a major source of delay, the project should reduce emissions. However, since it does not significantly change the emissions characteristics of truck and locomotive engines or fuels, it is given a M rating.	M	M
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County The project is within 1500 feet[2] from the closest residential land use, indicating some equity effects for the eastern portion of the project.	H	Reducing truck congestion will reduce emissions, which would be a benefit to the neighboring community. The western portion of the project is beyond the 1000 feet range and would minimally affect the community, while the eastern portion is within the range and would have a moderate positive effect.	M	M

3.2 Middle Harbor Rd Improvements (Maritime St to Matson Terminal)

As cargo shipment at the Port of Oakland (Port) increases, intra-port truck trips are expected to increase and would impact operations at individual roadway intersections. In addition, the Port has entered into agreement for the construction and operation of a new bulk terminal/transload facility at

[2] This distance criteria is chosen for determining equity concerns based on sources cited in the Pacific institute report titled " At a Crossroads in Our Region's Health: Freight Transport and the Future of Community Health in the San Francisco Bay Area." http://pacinst.org/wp-content/uploads/sites/21/2013/02/at-a-crossroads-for-health-full-report.pdf

the Roundhouse site. The new facility is expected to generate additional truck traffic and may increase congestion, if not mitigated. The Port intends to improve a 0.7_mile segment of Middle Harbor Road between Maritime Street and the entrance to Berths 60-63 and the Roundhouse/Sherex property. This project identifies & implements solutions to the traffic circulation issues on Middle Harbor Rd. Solutions may include dedicated queue or turn lanes, signalization, and relocation or reconfiguration of terminal gates and recommendations for Adeline St. Bridge reconfiguration as appropriate. Figure 3.2 displays this location.

Figure 3.2 Middle Harbor Rd between Maritime St to Matson Terminal

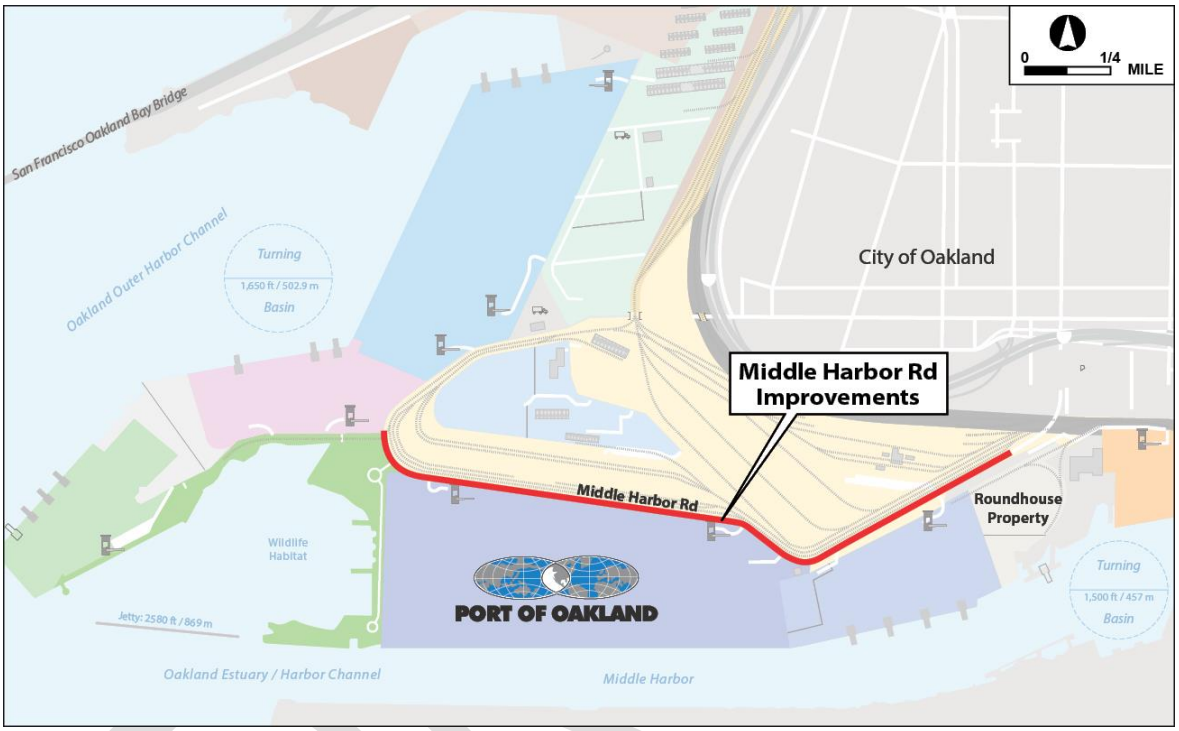


Table 3.3 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Expected growth in intra-port truck trips will impact operations at individual roadway intersections. In addition, a new bulk terminal/transload facility at the Roundhouse site will also increase truck volumes. The intersection of Middle Harbor and B55 Exit would be LOS D in 2035 without the added improvement. The intersection of Maritime Street and Middle Harbor Road would be at LOS "E" under 2035 conditions without the improvement. The intersection of 7th Street and Middle Harbor Road, leading to	M	The improvement would address these future throughput issues and internal delay.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	Berths 30-37, would be at LOS "E" under 2035 conditions without the improvement. Internal circulation delay is a concern.				
Land Use Conflicts / Benefits	This location is surrounded entirely by Port land. The parcel on the north/east of this road way is zoned "Property Owned by a Public Utility". The parcel to the south/west is zoned "Exempt Public Agency".	N	There are no nearby land uses that would be in conflict or receive benefits.	N	N
Jobs / Output / Co - Benefits	Alameda County employment rates are still recovering and providing new job opportunities is a high priority.	M	The project helps support higher freight volumes passing through the Port. Bulk cargo requires the least labor so the job benefits would be moderate.	M	M
Bridge Conditions	The Adeline St. Bridge was not identified as insufficient in the earlier analysis.	L	This bridge would be upgraded if the project identified this need through further analysis.	L	L
Emissions	The West Oakland community is exposed to diesel PM ambient concentrations that are almost three times the average background diesel PM ambient concentrations in the BAAQMD[3].	H	This project supports growth in intra-port truck trips which will increase emissions.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County The eastern-most point of the roadway project is within 1500 feet[4] from the closest residential land use, indicating some equity effects for the eastern portion of the project.	H	Increased truck trips within the Port, which this project supports, would increase emissions impacts on adjacent neighborhoods.	-	-

[3] California Air Resources Board, Diesel Particulate Matter Health Risk Assessment for the West Oakland Community. March.2008

[4] This distance criteria is chosen for determining equity concerns based on sources cited in the Pacific institute report titled " At a Crossroads in Our Region's Health: Freight Transport and the Future of Community Health in the San Francisco Bay Area." http://pacinst.org/wp-content/uploads/sites/21/2013/02/at-a-crossroads-for-health-full-report.pdf

Table 3.4 Level of Service and delay and intersections on Middle Harbor Road

	2020				2035			
	Constrained[5]		Free Flow[6]		Constrained		Free Flow	
Location	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Middle Harbor/B55 Exit	C	21.6			D	28.2		
Maritime/Middle Harbor Rd	C	30.6	C	22.0	E	72.6	D	39.6
Middle Harbor/CVAG/B60	C	26.6	C	21.4	D	42.4	C	27.3

Source 2014 MDAS Summary Report, pg 48

3.3 Oakland Army Base Phase 2 (Intermodal Rail Improvement)

This project would increase yard trackage to provide annual capacity of 900,000 TEU. It would include 8 new intermodal loading tracks totaling 30,000 ft. It also includes infrastructure improvements for potential future use of electric, highly-automated wide-span gantry intermodal yard cranes to replace terminal-dedicated diesel equipment.

The easterly portion of the Oakland Army Base is currently undergoing redevelopment as a rail storage and classification yard, under Phase 1 of the Oakland Army Base Development Program. Phase 2 of the Oakland Army Base Development Program would entail the development of a large intermodal rail operating yard. The proposed configuration of this yard is shown in Figure 3.3.

[5] Constrained means including 2 to 4 trucks per minute processing time, depending on the gate

[6] Unconstrained means unrestricted through-put at the gates

Figure 3.3 Proposed Oakland Army Base Phase 2 Intermodal Rail Configuration

The Oakland Army Base Intermodal Yard would include:

- Wide-span dual-cantilever rail-mounted gantry (RMG) cranes
- Six working tracks for train load and discharge, with two tracks under the RMGs' east cantilevers and four tracks between the RMG rails, encompassing 23,610 linear feet of track
- Five-wide by one-over-five container storage stack
- Truck interchange under the RMGs' west cantilevers
- Internal circulation road west of the RMGs

This is a Port expansion project which works in conjunction with related transportation improvements. Most (95%) of trips at this location have origins and destinations inside the Port (2014 MDAS, pg 44).

According to Port staff, the Phase 2 project will be developed in two stages. The first of these stages is proposed for construction in roughly 2021 and would increase intermodal lift capacity by approximately 300,000 TEUs. This would be done by adding 2 of the additional tracks, adding the smaller gantry

cranes, adding truck lanes, and adding some pavement to increase stacking capability. The staged approach to development allows for capacity to be added incrementally to better match demand growth.

Table 3.5 Rating Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Highway	Currently, containers coming off of ships and destined for the domestic rail network must be trucked to the Central Valley railroad intermodal yards. This practice leads to high truck volumes on I-880 and i-580 contributing to the congestion routinely experienced throughout the day.	H	Containers coming off of ships would be put on the domestic rail network within the Port. In additions, products originating in the East Bay could be taken to Oakland for rail shipment rather than being trucked to the Central Valley railroad intermodal yards. In both cases, truck traffic on I-580 would decrease, thus reducing highway delay.	H	H
Travel Time Delay - Port	This project addresses internal circulation and Port expansion. As the port expands, delay is likely to become a problem without network improvements such as this one.	H	With this project, containers coming off of ships can be placed on rail within the Port. This project will improve internal port circulation.	H	H
Land Use Conflicts	This location is entirely surrounded by Port land. The parcels on the other side of I-880 are generally industrial but are not close enough to be impacted.	N	There are no nearby land uses that would be in conflict or receive benefits.	N	N
Jobs / Output / Co - Benefits	Alameda County employment rates are still recovering and providing new job opportunities is a high priority. As described previously and also alluded to in the evaluation of OAB Phase 2 later, this project facilitates import transloading and is supportive of other investments at the Oakland Army Base to expand warehouse and transload activity. Transload warehouses and third party logistics providers using these warehouses can incorporate value-added services that provide jobs with low educational	H	The project helps support higher freight volumes passing through the Port and supports the development of tranload activity. Without this additional capacity, port cargo throughput would begin to be constrained in the 2025 timeframe or earlier (depending on the success of other port growth strategies)	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	barriers to entry, a critical need in the County economy. When coupled with workforce development activities, this will address a significant economic issue in the community				
Emissions	The West Oakland community is exposed to diesel PM ambient concentrations that are almost three times the average background diesel PM ambient concentrations in the BAAQMD.	H	The 2012 Oakland Army Base Initial Study/Addendum concluded that the project would have significant and unavoidable air quality impacts.[7]	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). This area is entirely comprised of Port land. There are a couple of parcels zoned residential on the other side of I-880 within the 1500 ft buffer.	L	Increased traffic will have some negative impacts on the communities such as congestion, pollution and decreased roadway safety for pedestrians.	-	-

3.4 Oakland Army Base Phase 2 (Warehousing, upgrade utilities, access roads, and gate/intersection improvements)

The Port of Oakland (Port) plans to construct a number of intermodal/transfer facilities to support the increasing use of rail to transport cargoes and containers. The first phase includes the Outer Harbor Intermodal Terminal (OHIT) Phase 1 Railyard, which includes manifest, lead and support tracks, is under construction. The second Phase of the OAB project would cover 44 acres and would include new warehousing, upgraded utility infrastructure, access road, gates and intersection improvements at Maritime Street and 14th Street. Figure 3 displays the project site.

[7] LSA Associates, Inc., 2012 Oakland Army Base Initial Study/Addendum, May 2012

Figure 3.4 Oakland Army Base Phase 2 Project Location

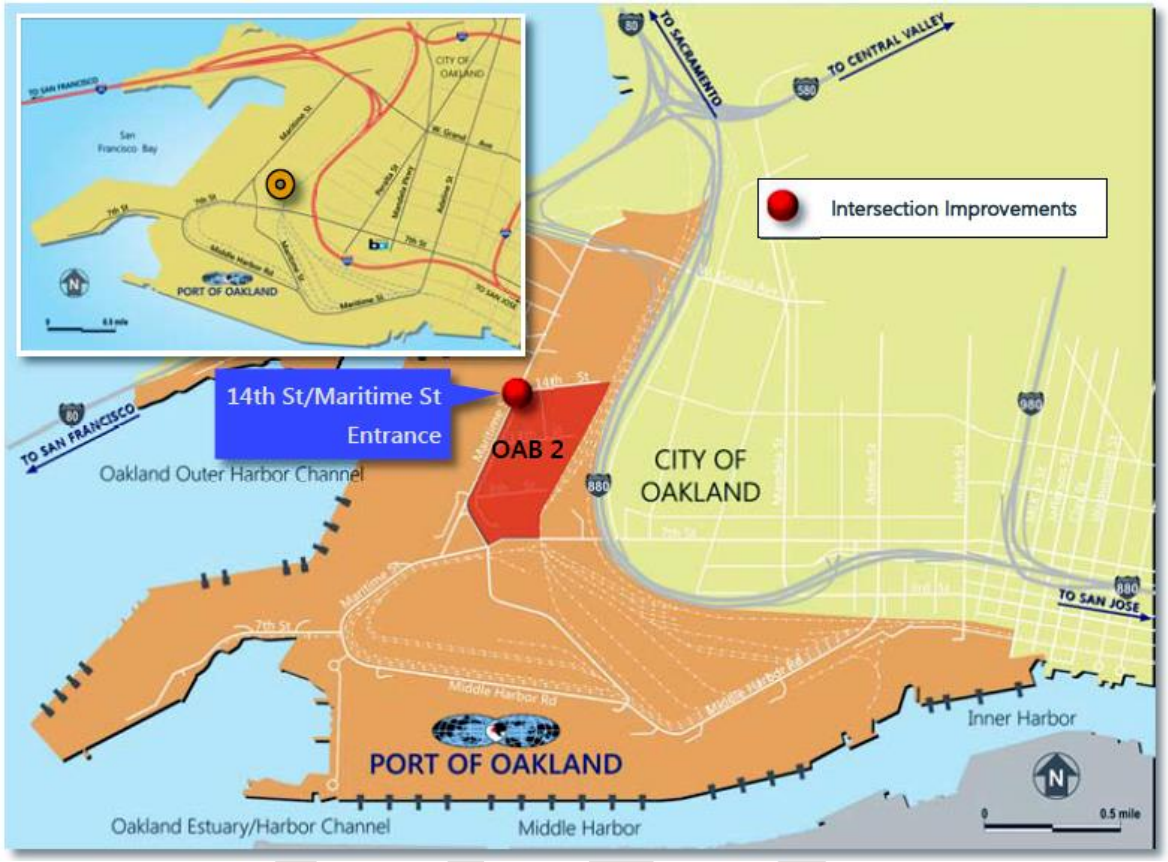


Table 3.6 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	As the port expands, delay on the roadways that access the port is likely to become a problem without network improvements such as this one.	H	This project addresses internal circulation and Port expansion. By supporting transloading from ocean containers to domestic containers, this project would reduce truck trips on local and regional streets/highways. Products originating in the East Bay could be taken to Oakland for rail shipment rather than being trucked to the Central Valley railroad intermodal yards. This project increases capacity and improves traffic operations at the Maritime Street/14th Street intersection.	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Port	This project addresses internal circulation and Port expansion. As the port expands, delay within the port is likely to become a problem without network improvements such as the access roads included with this project.	H	This project will build access roads and other upgrades that will improve internal circulation	H	H
Land Use Conflicts	This location is entirely surrounded by Port land. The parcels on the other side of I-880 are generally industrial but are not close enough to be impacted.	N	There are no nearby land uses that would be in conflict or receive benefits.	N	N
Jobs / Output / Co - Benefits	Alameda County employment rates are still recovering and providing new job opportunities is a high priority.	H	This project facilitates import transloading and is supportive of other investments at the Oakland Army Base to expand warehouse and transload activity. Transload warehouses and third party logistics providers using these warehouses can incorporate value-added services that provide jobs with low educational barriers to entry, a critical need in the County economy. When coupled with workforce development activities, this will address a significant economic issue in the community. The OAB EIR reports that the entire project will create 1461 warehouse jobs, some portion of which are associated with the warehouse and logistics facilities that are already under construction as part of Phase 1. There is evidence (LAEDC study of a major transload facility in Southern California) suggesting that this may underestimate the potential for transload warehouses which have a higher job density than do more traditional warehouses. Also, as these are only direct jobs, there is a local multiplier effect which is estimated at 1.13 in Southern California.	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Emissions	The West Oakland community is exposed to diesel PM ambient concentrations that are almost three times the average background diesel PM ambient concentrations in the BAAQMD.	H	The 2012 Oakland Army Base Initial Study/Addendum concluded that the project would have significant and unavoidable air quality impacts.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). This area is entirely comprised of Port land. There are a couple of parcels zoned residential on the other side of I-880 within the 1500 ft buffer.	L	Increased traffic on roads and tracks will have some negative impacts on the communities such as congestion, pollution and decreased safety for pedestrians.	-	-

3.5 Truck Services at Oakland Army Base

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. This is a program to continue monitoring the effectiveness of these programs and to determine if additional parking is needed.

Table 3.7 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	Trucks often queue on Port roadways waiting for their turn to load or unload.	H	Providing truck services can reduce truck travel time delay, as queuing trucks can wait in designated truck service areas. However, unless this is coordinated with some type of appointment system that prevents queuing, trucks would be less likely to use the truck service areas for staging so as not to lose their place in line. This also does not address operational issues inside the terminal gates and waiting in a staging area would have limited impact on reducing truck overall waiting times.	L	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Emissions	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County), and directly affects the neighborhood nearby.	H	Improving truck services will have a positive impact on emissions in the nearby neighborhoods as it will reduce illegal parking, idling of vehicles, and other adverse effects.	M	M
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Without the parking and truck services that are being added at the Oakland Army Base, trucks frequently drive through the adjacent neighborhoods to access fueling, food, and other services that are not available within the Port complex. Trucks may also park in the neighborhoods and use truck restricted routes.	H	Providing truck services and parking would have the direct effect of addressing critical neighborhood impacts in surrounding communities through reduction of encroaching trucks in neighborhood.	H	H

3.6 Strategies to Improve Port Operations Including Night Gates and Weekend Operations

Congestion at the Port of Oakland is a major issue, and one operational way to help relieve it is to allow the port to operate at night. 24/7 operation at the Ports of Los Angeles and Long Beach has been implemented, and it was reported that as of August 2014, more than 30 million truck trips have been diverted out of peak daytime hours to nights and weekends since the start of the program[8]. There are certainly many factors to consider to ensure success of the program. For one, truckers must be willing to deliver at night and feel that the program would actually benefit their operations. In addition, the program should also ensure it passes a benefit cost analysis to make sure the additional operational costs of operating the port at night is worthwhile. Though this strategy could create externalities on nearby neighborhoods and further disrupt the quality of life of residents by introducing noise and glare, there also would be benefits to the community from less idling and reduced exposure because some trips would be made while people are sleeping.

[8] Source: http://www.pierpass.org/tag/port-of-los-angeles/

Table 3.8 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Trucks traveling to and from the Port are significant contributors to congestion on I-880 and other nearby streets and highways.	H	There will likely be significant reductions in truck trips to the off peak and weekend period depending on the specifics of the program. PierPass Program at Port of Long Beach generated noticeable reduction in peak time congestion in the earlier part of the program. However congestion seems to be shifted to evening peak commuting time later in the program. This will need to be mitigated.[9]	M	M
Travel Time Delay – Air / Rail / Port	Long queues often form on Port roadways as trucks wait for their turn to load or unload.	H	There will likely be significant reductions in truck trips to the off peak and weekend period depending on the specifics of the program. PierPass Program at Port of Long Beach generated a 24% reduction in weekday truck traffic at the port. However this added to congestion for certain periods at night – which should be avoided through a better program design.[10]	H	H
Emissions	The port is one of the largest emission generators in Alameda County and its associated truck trips has significant emission impacts on nearby communities.	H	Given the likely levels of reduction in congestion, there should be associated reductions in emissions.	M	M
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County).	M	Operating trucks at night can have impacts on communities nearby. Significant residential areas existing in West Oakland (an impacted community) that can suffer from noise and light pollution, thought mitigation strategies can be used to overcome this. There also could be community benefits from less idling and reduced emissions exposure (because some proportion of trucks would be operating at night while residents were indoors sleeping).	L	L

[9] http://ops.fhwa.dot.gov/publications/fhwahop09014/sect2.htm

[10] http://ops.fhwa.dot.gov/publications/fhwahop09014/sect2.htm

3.7 Oakland Airport Area ITS Project

This project would design and implement ITS along 98th Ave and Hegenberger Rd from I-880 to OAK and includes installation of CCTV cameras, vehicle detectors, dynamic message signs, transit priority, real-time traveler information displays, etc. to improve management of the corridors leading to/from OAK and the I-880/Coliseum area. This project would interconnect the signals along these routes to minimize delay and improve traffic flow, and provide the Port and City with centralized control for incident management. Real-time traffic-responsive systems would be considered. ITS linkages would benefit OAK access to significant numbers of trucks traversing the arterial linkages to and from I-880, including many high-value air freight shipments.

Table 3.9 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	Access delay at the airport is not an important problem, though any delay has significant impact on the County.	M	This project could provide capability to selectively control traffic flows to and from the airport, thereby reducing delays and increasing roadway capacity in specific directions.	L	L
Resiliency	Airports are one of the most critical facilities for recovery from emergencies and disasters.	M	Real time traffic response system can potentially have positive benefits in times of disasters or emergencies.	L	L
ITS / Technology	This is primarily an ITS project.	H	The utility and benefit-cost of deploying ITS to improve airport traffic operations can provide relatively low cost solutions to improve traffic flow, when compared to new roadway infrastructure.	H	H
Emissions	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County	H	Minor reductions in congestion will reduce emissions	L	M

3.8 Port of Oakland ITS including FRATIS

This project would involve deployment of a truck arrival distribution system that would spread the truck pickups and deliveries at the port of Oakland across each day of operations to reduce peak condition truck queues, especially where they coincide with general traffic morning and afternoon rush hour conditions. To facilitate this strategy, the technologies recently demonstrated under the USDOT's Freight Advanced Traveler Information System (FRATIS) would be deployed at the Port of Oakland

terminals, and throughout the participating major drayage trucking firms that access the port. This deployment would involve three primary elements. First, a communications system that allows trucking companies to communicate with port terminals would be implemented to facilitate notifications in each direction concerning container availability at the terminals. Secondly, this communication system would be enhanced to allow for "automated hand-shakes" between the terminals and trucking companies to agree on specific appointment times; these appointments would be phased by the system to produce the desired steady flow conditions (i.e, reduced peak queues). Thirdly, sensors would continually measure queues at the port terminals, and this information would be shared with the local traffic system operations system.

Table 3.10 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Highway	Trucks traveling to and from the Port are significant contributors to congestion on I-880 and other nearby streets and highways.	H	Potential reductions of queues entering and exiting off-ramps on I-880 near the Port of Oakland (this is a secondary benefit of the FRATIS travel time reduction near the port)	M	M
Travel Time Delay – Air / Rail / Port	Long queues often form on Port roadways as trucks wait for their turn to load or unload.	H	Potential for significant overall trucking travel time reduction through spreading container pickups and deliveries at port terminals across the day/week via the FRATIS drayage-terminal communications system automated appointments.	H	H
ITS / Technology	Given the constraints and limitations of different strategies to solve congestion at the the port, ITS is an important option to explore to smooth operations without adding capacity	M	The FRATIS ITS/Dynamic Mobility Application has demonstrated the ability to provide over 10% reductions in truck VMT when deployed in Los Angeles and Memphis.	H	H
Emissions	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County).	H	Reduction in truck VMT will reduce emissions. Though no quantitative values are available, given the scale of the deployment, the emission reduction should be significant.	H	H

3.9 ITS Improvements to Address Queuing at Interchanges along I-880 and on Local Streets to Port Of Oakland

This project would include deployment of Adaptive Signal Control on key arterials, such as Market Street directly accessing the Port of Oakland. Adaptive Signal Control would allow for multiple signal

timing scenarios to be implemented based on both planned and real time conditions. For example a "Port Peak Period Scenario" would be timed to allow for "staged spacing of trucks" at intersections approaching the Port of Oakland, thereby reducing queues both at I-880 exits and at terminal gates. As another example, when truck congestion is experienced in long queues of trucks departing the terminal complex at arterial intersections, a "Port Throughput Improvement" scenario could implemented to provide extended green lights at the intersections along the corridor to move trucks out and onto I-880 more efficiently. Additional examples could cover incident management, planned events, and port evacuation.

Table 3.11 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Trucks traveling to and from the Port are significant contributors to congestion on I-880 and other nearby streets and highways.	H	Controlling/metering traffic flow at key intersections can improve overall throughput.	H	H
Travel Time Delay – Air / Rail / Port	Long queues often form on Port roadways as trucks wait for their turn to load or unload, or when departing the Port.	H	This project would allow traffic signals to be set on predetermined programs that would meter inbound traffic or expedite departures as required.	M	M
ITS / Technology	This project includes innovative technology and operating practices	H	The effectiveness of this project is somewhat uncertain.	M	H
Emissions	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County).	H	This project could reduce truck queues, which would reduce emissions. However, the project could also facilitate higher truck volumes, which would increase emissions. The net effect is somewhat uncertain.	L	L

3.10 Summary of Findings

3.10.1 Combined Impacts of Port and Rail Projects for Economic Competitiveness

As described previously, the combination of a number of port and rail projects can form an opportunity package that promotes sustainable global competitiveness. While each of the port and rail projects considered for inclusion in the Sustainable Global Competitiveness package have been evaluated individually (the port projects earlier in this section and the rail projects in a subsequent section), it is important to consider the combined impacts of the projects working together. The analysis of the capacity benefits of the individual rail mainline and siding projects presented later in this report assume growth in rail traffic that is associated with growth in rail usage at the Port of Oakland, the Oakland

Army Base redevelopment, and to a lesser extent, growth at the smaller ports throughout the Bay Area and industrial shippers throughout the region. Growth at the Port of Oakland and the Oakland Army Base is driven primarily by growth in international intermodal cargo, bulk cargo (agricultural products, minerals, construction materials, and waste and scrap), and growth in manifest cargo. Rail yards to handle growth in bulk and manifest cargo were included in Phase 1 of the Oakland Army Base redevelopment for which construction is already underway. Future growth in international intermodal cargo will ultimately require additional rail terminal capacity at the Port of Oakland/Oakland Army Base and the Outer Harbor Intermodal Terminal (OHIT) Phase 2 project would provide this capacity.

While the UP Martinez Subdivision is assumed to be the UP's principal intermodal route to/from the Bay Area and the Oakland Subdivision and Coast Subdivision are assumed to be the principal route for bulk and manifest trains (with potential improvements designed to create the opportunity to move via the Niles Subdivision to Oakland in the future, replacing the Coast Subdivision as a principal freight route), it is also likely that capacity constraints on the Martinez Subdivision (with particularly challenging right of way constraints in the segment from Oakland to Richmond) may create a need to use the Oakland Subdivision through Niles Canyon and the Niles Subdivision to Oakland as a reliever route for intermodal cargo moving to/from Oakland. Thus, continued growth at the Port of Oakland and successful development of the Oakland Global Logistics Center at the former Oakland Army Base are major drivers for capacity expansion on Alameda County's freight rail system. The rail projects described in a later section of this report are therefore inextricably linked to and support the improvements at the Oakland Global Logistics Center.

A major objective of the Sustainable Global Competitiveness package is to promote collaborative investment in the seaport and rail system in partnership with the private sector to provide the necessary capacity to support increased transloading of imports at the Port of Oakland and Oakland Global Logistics Center. The Oakland Army Base (OAB) Phase 2 project evaluated later in this section, will provide increased warehouse and logistics space, some of which will support transloading activities. Transloading is a logistics practice where the contents of international containers (usually forty feet in length) are unpacked and repacked into larger domestic containers before being loaded on trains for inland movement. During the transloading process, other value-added services can be performed on the goods and these value-added activities create jobs in the transload warehouses. The Oakland Army Base redevelopment (both Phase 1 and Phase 2) includes the construction of modern transload warehouses. Transloading has been a growing component of modern logistics strategies and shippers look for the availability of transloading services in close proximity to gateway ports. Thus, the development of transload warehouses within the port complex will make shipping through the Port of Oakland much more attractive and will help ensure the success of the Army Base redevelopment project.

At the present time, the Class I railroads handle very little transload import traffic in Oakland because transloaded cargo is loaded into domestic containers or trailers and both railroads handle this type of equipment at their intermodal terminals in the Central Valley. This creates truck trips from Oakland to

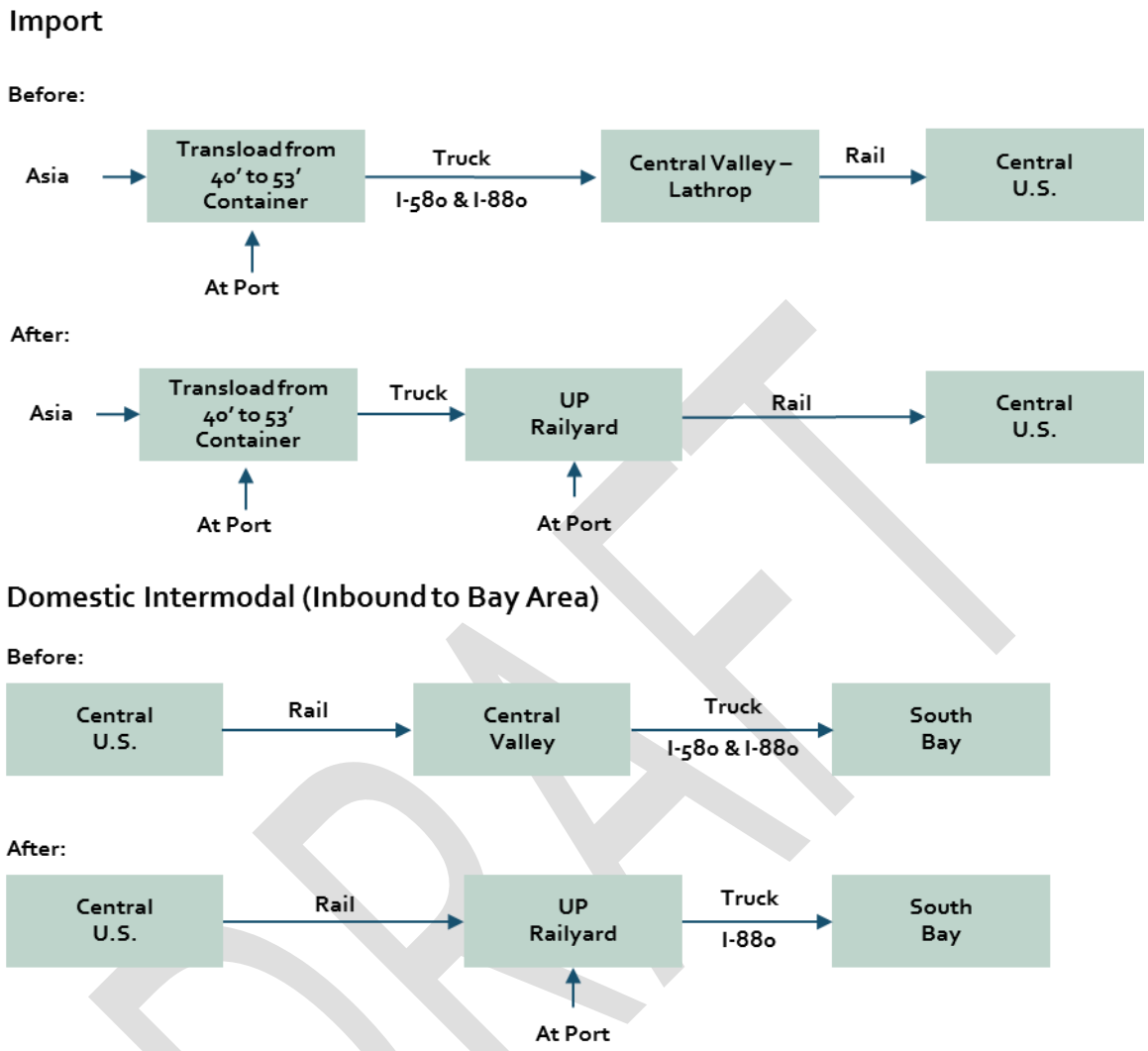
the Central Valley (as well as return trips) along the I-880 and I-580 corridors. If the Oakland Global Logistics Center is successful in attracting transload business, it could increase truck traffic on I-580. However, if transload cargo were handled in Oakland, it would eliminate these truck trips helping to reduce congestion, greenhouse gas emissions, and criteria pollutant emissions.

The 2012 addendum to the Oakland Army Base (OAB) Environmental Impact Report (EIR) also assumed that excess capacity at the OHIT could be used to serve true domestic intermodal traffic with origins and destinations in the Bay Area. At present, this cargo is handled at the Central Valley intermodal terminals with truck trips into and out of the Bay Area to make pickups and deliveries from final customers. Handling this cargo in Oakland also has potential benefits by further reducing truck trips, especially along I-580 but with potential increases in truck trips on I-880 for cargo destined to locations in along the I-880/I-80 corridor from San Leandro to Richmond as well as cargo crossing the Bay Bridge to San Francisco and some cargo destined to the North Bay.

An analysis of the impacts of increased transloading and domestic intermodal in Oakland in terms of potential reductions in truck traffic and shipper cost savings was conducted. To see a graphic illustration of transloading and domestic intermodal rail, please refer to Figure 3.5. Truck traffic reduction should also result in reductions in emissions. It should be noted that the amount of train traffic assumed in our analysis is the same as that analyzed in the OAB EIR. The only difference in our analysis is the explicit consideration of transload cargo as a type of intermodal rail traffic and the mix of traffic among inland point intermodal (IPI)[11], transload, and domestic intermodal. That means that the train volumes analyzed in the needs assessment report to determine mainline capacity needs, are based on the same train volumes as those associated with the truck trip reduction impacts of increased transload and intermodal cargo. What this analysis does that was not included in the OAB EIR is to evaluate truck traffic impacts on roadways outside of the OAB project area (e.g., truck traffic impacts on I-580).

[11] Inland point intermodal (IPI) cargo is cargo that moves in tact by rail in the same marine container in which it was imported.

Figure 3.5 Illustration of Transloading (Export) and Domestic Intermodal Traffic



One difficulty in analyzing the effects of handling more domestic cargo is that little is known about the actual origins and destinations of this cargo within the Bay Area. While it is possible that most of this cargo ends up in locations either near Oakland or that would be accessed by trucks driving past Oakland, it is possible that some of the cargo is picked up or delivered at locations that would not be accessed by routes that pass nearby the OAB. Future study of the potential impacts and benefits of increasing domestic intermodal cargo in Oakland should be conducted to better understand this market.

The analysis was conducted using the following assumptions:

- The cargo throughput at the Port of Oakland used in the analysis is the same as was used in the OAB EIR (approximately 4.2 million TEUs). In the OAB EIR, this cargo throughput was assumed

for the year 2035. The marine terminals and waterside infrastructure at the Port is sufficient to accommodate this growth. However, the latest forecast assumptions used by the Port in their current update of the Maritime Development Alternatives Study (MDAS) are for more modest growth (approximately 3.6 million TEUs by 2035). With more moderate growth, the Port would have sufficient terminal capacity without construction of OHIT until sometime after 2020. As a result the Port has developed a strategy to develop the OHIT Phase 2 improvements in stages with the Stage 1 improvements (completion sometime in the 2023-2025 timeframe) adding roughly 1/3 of the additional intermodal capacity. Staging would allow the capacity additions to more closely match the market developments.

- Future rail share of total cargo moving to/from the Port is assumed to grow from 21% today to 40% in 2020. This is consistent with the assumptions in the OAB EIR. It also means considerable slowing of the rate of growth of truck traffic as more of the future cargo growth is handled by rail.
- Future transload volumes are assumed to be 15% of total cargo volume. This reflects potential market demand for near-dock transloading services that exists at other ports. The specific share assumed is roughly equivalent to the transload share at the Ports of LA/LB.
- Because domestic containers are larger than international containers, the contents of 3 international containers can be handled in 2 domestic containers. This means that the same volume of cargo will create fewer intermodal lifts[12] if it is transloaded. This extends intermodal terminal capacity.

While the analysis considered the possibility that there might not be sufficient space available at facilities planned at the OAB to accommodate all of the transloading demand, this turns out not to be an actual constraint. Assumptions about transload warehouse space utilization developed for warehouse supply and demand studies by the Southern California Association of Governments were used to estimate the amount of tranload cargo that could be handled at the Oakland Global Logistics Center based on the amount of warehouse space included in the development plans and assuming that either 50% or 70% of the space was used for transloading. In the 2035 timeframe, this did not constrain the amount of transloading that could occur. Further, we know that there are third party logistics (3PL) providers who do transloading today and they are not located at the OAB. So warehouse space availability was not a true constraint.

The analysis also included consideration of allowing domestic intermodal cargo to be handled at OHIT. As in the OAB EIR, it was assumed that any intermodal terminal capacity at OHIT that was not used for international intermodal was available for use for domestic intermodal destined to or originating from Bay Area shippers. This was subject to a constraint that reflected our best guess of what future demand for domestic intermodal is in the Bay Area. The OAB EIR reported domestic intermodal demand of 102,413 lifts in 2000 and demand of 531,000 lifts in 2020. This growth forecast was based on intermodal projections from 1995 and seemed excessive in light of the slowdown in rail traffic during the recession.

[12] The term "lifts" refers to the number of containers or trailers that are "lifted" by cranes onto or off of intermodal rail cars. This is a common term used in the railroad industry to measure intermodal volumes and capacity.

Instead, we assumed an intermodal compound annual growth rate of 4.5%, comparable to national growth rates, and applied this to the reported volumes for 2000. We believe this is a conservative estimate of demand but could be verified with future study.

In order to estimate the potential truck VMT and shipper cost impacts, the following assumptions were made.

- It was assumed that only 40% of domestic and transload trips included a loaded return trip. This percentage was determined based on reported data for the off-dock intermodal terminals in Southern California. That means each domestic or transloaded container that uses OHIT avoids 1.6 trips to/from the intermodal yards in the Central Valley.
- Using data from an Oakland third party logistics service provider, the one-way mileage from the Port of Oakland to the Union Pacific Railroad's Lathrop intermodal yard was assumed to be the avoided mileage for a transload container that could use the OHIT. Truck drayage rates were also provided to estimate shipper cost savings.
- Because the true origins and destinations of domestic intermodal cargo in the Bay Area is not known, it was assumed that on average the trips would go to the population centroid of the region and that was estimated to be in Fremont. The savings in truck VMT and cost per trip for domestic intermodal cargo was assumed to be the difference between a trip from Lathrop to Fremont and a trip from Oakland to Fremont. It is likely that a higher percentage of the domestic cargo would be destined to locations in the San Leandro to Richmond industrial corridor to take advantage of proximity to the rail yard and the amount of industrial space in this corridor.

It should be noted that in our analysis there is more available capacity for domestic cargo at full build-out of OHIT than in the OAB EIR. This is due to the assumption that 3 international containers equals 2 domestic containers in terms of cargo volume that can be handled meaning that fewer intermodal lifts are required to handle the transload cargo as compared to what would be required if that cargo were transported in smaller marine containers.

The results of the analysis are presented below.

- At full buildout, the transload strategy would eliminate roughly 1280 truck trips per day from Oakland to the Central Valley. This is equivalent to approximately 20.2 million truck VMT per year and annual savings to shippers in reduced drayage costs of approximately $59.2 million. Since some of this transload cargo could be handled at the port without the project being built (by using existing capacity and allowing more transloading to occur in Oakland), the project reduces truck trips by approximately 730 truck trips per day.
- By utilizing available capacity in Oakland to handle additional domestic cargo, roughly 1730 truck trips per day on I-580 could be eliminated. Using the assumptions about average trip lengths in the Bay Area for these domestic intermodal trips, the total truck VMT reduction would be approximately 12.8 million per year with annual savings to shippers of approximately $27.9 million.

- In total, this strategy would eliminate over 3700 truck trips per day on I-580. Assuming that each truck is the equivalent to 2.5 passenger cars (PCE), the reduction in PCE from this strategy would be approximately 9400 per day.

There are several other impacts of the strategy which should be considered.

- The OAB EIR estimated that the project, including all of the expanded warehouse and logistics facilities, the rail yards, and the trucking activity would create over 2600 direct jobs. It is likely that this underestimates the potential job creation benefits. The EIR estimated that warehouse space created rougly .8 jobs per 1000 sq. feet of building area. Transload facilities may have a higher job density. A study[13] of a major transload facility near the San Pedro Bay ports indicated that on average the facility had job density that was more than 70% higher than what was assumed in the OAB EIR. Transload facilities that provide value-added services tend to have higher job density and wages.
- The truck trips associated with transloading and domestic intermodal in Oakland would be shorter trips than those now going to the Central Valley and would be more likely candidates for zero emission technologies as they develop (in light of potential range limitations associated with battery technology). This would be especially true of the transload truck trips which would stay entirely within the port complex.
- Because all of the truck activity associated with this strategy would be local trucking, it would not create a need for additional overnight parking, reducing the potential for new neighborhood impacts.

3.10.2 Project Prioritization

Table 3.12 summarizes the evaluation results presented above and prioritizes various port projects and programs. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column, which also includes the key points from the combined impacts discussion presented above. In general, a project is included as a first priority project in this category when it has at least 1 high rating.The first priority projects are included in the opportunity packages discussed in Section 2.0.

Table 3.12 Summary of Evaluations of Port and Airport Projects

Projects	Priority	Explanation
Port of Oakland ITS including FRATIS	First	This project has high ratings across multiple performance measures categories.
Strategies to Improve Port Operations Including Night Gates and Weekend Operations	First	This project has high ratings across multiple performance measures categories.
ITS Improvements to Address Queuing at Interchanges along I-880 and on Local Streets to Port Of Oakland	First	This project has high ratings across multiple performance measures categories.

[13] "Economic Impact Study: Ongoing Operations of the CalCartage Transloading Facility," Foreman, Cooper, Poghosyar, Los Angeles Economic Development Corporation, 2010.

Projects	Priority	Explanation
Oakland Army Base Phase 2 (Intermodal Rail Improvement)	First	This project has high ratings across multiple performance measures categories. In addition, it has the highest benefit to the County's economic competitiveness as compared to all other projects in the County.
Oakland Army Base Phase 2 (Warehousing, upgrade utilities, access roads, and gate/intersection improvements)	First	This project has high ratings across multiple performance measures categories. In addition, it has the highest benefit to the County's economic competitiveness as compared to all other projects in the County.
Truck Services at Oakland Army Base	First	This project has high and medium ratings across performance measures categories.
Oakland Airport Area ITS Project	First	This project has high and medium ratings across performance measures categories.
Middle Harbor Rd Improvements (Maritime St to Matson Terminal)	Second	This project has medium and low ratings across performance measures categories.

4.0 RAIL PROJECTS

This group of projects include several types of rail projects aimed at addressing capacity constraints and bottlenecks, operational and access needs, and safety issues through a combination of mostly infrastructure upgrades or expansion projects. These projects include rail grade crossing separations and improvements, new track/siding additions and capacity improvements as well as other upgrades. As mentioned before in Section 3.1, the analysis of the capacity benefits of the individual rail mainline and siding projects presented in this section assumes growth in rail traffic that is associated with growth in rail usage at the Port of Oakland, the Oakland Army Base redevelopment, and to a lesser extent, growth at the smaller ports throughout the Bay Area and industrial shippers throughout the region. Thus, they must be viewed in conjunction with information and assumptions used in Section 3 to provide a comprehensive picture. Table 4.1 below summarizes the guidelines used to evaluate projects in this category.

Table 4.1 Guidelines for Ratings Assignment for Rail Projects

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay - Hwy	Yes[14]	This measure evaluates the delay benefits of a project or program. • To receive an H rating, a project must significantly reduce delay, with quantified results. • To receive an M, a project should have at least moderate delay benefits either quantified or determined using qualitative methods. • To receive an L, a project will generally have some benefit but the benefit may be small or hard to determine
Travel Time Delay - Air/Rail/Port	Yes	This measure evaluates the project impact of travel time delay at airport and port complex, and on rail lines. Rail delay is assessed mainly through examination of changes in level of service, which is a function of volume to capacity ratio. Capacity is measured in terms of the number of tracks in a segment and is a function of the type of signaling on the track and the type of train service that occurs on the line. Benefits on last-mile connectors to the airport and port complex can also generate moderate to low levels of benefits. • A project with an H would directly and significantly reduce such delay (i.e., improve level of service) • An M is given when the project has moderate delay reduction benefits

[14] For new track/siding projects, the benefit on the highway system would be the reduction in VMT on I-580 from the combination of these projects, as described in Section 3.1. Individual project benefits to highway travel time delay is not rated here in this section.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		directly at those locations • An L is given to a project that may indirectly reduce delay at those locations, such as when a highway project benefits access and delay to an airport.
Connectivity - Hwy	No	None of the projects deal with highway connectivity
Connectivity - Air/Rail/Port	Yes	Connectivity measures the ability to provide new rail routes or additional linkages between existing rail routes. • A project that includes a new connection (either a new track alignment or connecting existing tracks) specifically meant to serve freight traffic will receive an H rating. • Projects that include a new connection that is needed to support passenger trains, but also can be used by freight trains, will receive an M rating. • Any new connection will be assumed to have some benefit to rail freight, even if it is minimal, will get an L rating.
Freight / Passenger Conflicts	Yes	This measure evaluates whether a strategy will reduce or remove existing freight and passenger conflicts. • An H rating is assigned when the project completely eliminates the conflict, as in the case of adding or designating passenger-only tracks that completely separates passenger trains from freight trains. • An M rating is assigned when there is significant reduction in the conflict but not complete elimination. For instance, a project that significantly increases capacity in a busy corridor used by both passenger and freight trains will also reduce the conflict significantly as a result of that capacity increase. • An L rating is assigned with there is modest levels of conflict reduction.
Land Use Conflicts	Yes	Land use conflicts occur when the project increases the physical footprint or adds through-truck traffic to a route segment that travels through residential areas, past schools or through ecologically sensitive areas. • A project that successfully avoids all impacts with such sensitive land uses or that diverts significant amounts of traffic from sensitive areas is given an H rating, as it would perform as well or better in this regard as any other project intended to address the same goods movement needs. • A project that traverses sensitive areas may include mitigations. These mitigations would address its noise and emissions and other environmental impacts on surrounding uses. Thus, the project would get an M rating. A project that diverts through-truck traffic from a moderate extent of sensitive land use area is also given an M rating. A project that diverts through-truck traffic from a short extent of sensitive land use area is also given an M rating. • If environmental documentation has not been completed or is unknown, but such mitigations are customary for projects of its type in similar settings, the project is assigned a rating of L for land use impact avoidance. • If mitigation is unknown it is given a rating of N • If mitigation is unknown or impacts are found to be significant and unavoidable in the project's environmental documentation, a negative

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		rating (-) is assigned To evaluate potential conflicts, a buffer distance is applied, using distances from the Pacific Institute's report on At a Cross Road for Region's Health. A buffer distance of 1000 ft is applied to roadways, freeways and other corridors. A buffer distance of 1500 ft is applied to seaports and rail lines, and a distance of 2500 ft is applied to airports. Incompatible or sensitive land uses within these buffers represent a land use conflict.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	No	None of the projects deal with truck crashes.
Crashes - Crossings	No	This measures the safety impacts of the project on potentially reducing railroad-highway crossing crashes. • A project will receive an H rating if its main purpose is to reduce crashes and improve safety, and it completely removes a certain conflict and eliminates safety issues. • A project will receive an M rating if it has moderate impacts on crash reduction. • A project will receive an L rating if it exhibits marginal safety improvements.
Bridge Conditions	No	None of the projects deal with bridge conditions.
Pavement Condition	No	None of the projects deal with pavement conditions.
Resiliency	Yes	A project improve resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A project receives an H rating if its main purpose is resiliency. • A project receives an M rating if it can have significant resiliency benefits though its primary purpose is not to improve resiliency. • A project receives an L (likely the case for projects in this category) when it has marginal resiliency benefits).
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/ Technology	Yes	• A project receives an H rating when it is an ITS/technology project by its very nature, or is very innovative by industry standards. • A project receives an M rating when it employs ITS technology to a large extent or is unconventional/new by industry standards. • A project receives an L rating when there are small elements of technology or innovation involved.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	No	None of the projects would have direct job/output/co-benefits. Though the projects that increase rail capacity would allow a greater number of trains to reach the Port of Oakland and therefore make growth in Port freight volumes possible, the job benefits would occur at the Port itself. These benefits have been noted in Section 3 for projects at the Port that support additional freight throughput.
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Emissions	Yes	Emission impacts come from changes in PM, NOx that are a direct result of the project. These pollutant quantities are determined for some projects using the BAAQMD EMFAC model, which provides an objective and quantifiable metric. • A project with an H rating means its primary purpose is to remove or substantially reduce emissions, such as railroad electrification projects. • A project with an M rating means the project will reduce emissions significantly but will not eliminate it. • A project with an L rating means it will reduce emissions, but the effect may be small or hard to determine. • Projects can also worsen emissions, in cases where traffic is actually increased. Such projects will receive a "-"rating.
Equity	Yes	Equity measures noise, light and air pollution, and other negative effects on communities that are most vulnerable and disproportionally affected by freight. Equity can be measured by determining whether a project is within one of the impact communities as determined in 2013 using the BAAQMD updated methodology. A buffer distance is applied to a project as well (using the same distances from the land use conflicts analysis) to fully capture its impacts. • A project receiving an H on equity means that its primary purpose is to reduce negative impacts on the most impacted neighborhoods. • A project receiving an M on equity means it has moderate to significant benefits on equity. • A project receiving an L means it has some positive effect on equity. • Projects that negatively affect equity are given a "-"rating.

4.1 Rail Grade Separation

4.1.1 Berkeley Railroad Crossing Improvements (Martinez Subdivision)

The Berkeley Railroad Crossing Improvements project is to design and construct railway crossing improvements, including grade separation at Gilman Avenue and quadrant gates road closures, and at-grade improvements at other crossings, per Berkeley's 2009 Quiet Zone Study[15]. This project addresses safety, noise, and congestion delay and community disruption issues identified in the rail impacts case study. The project location is displayed in Figure 4.1.

[15] http://www.ci.berkeley.ca.us/Planning_and_Development/Redevelopment_Agency/Berkeley_Quiet_Zone_Feasibility_Study.aspx

Figure 4.1 Berkeley Railroad Crossing Improvements Location

Source: WilburSmith Associates, 2009. City of Berkeley Railroad Quiet Zone Study Final report, April 13, 2009.

Table 4.2 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	This area is generally industrial/commercial.	L	These roadways includes parking, bike lanes and sidewalks. As a result, there could be a moderate level of land use benefit to the local businesses.	M	L
Crashes - Crossings	The project is on the Martinez Subdivision, which carries 57 daily trains currently and forecast to carry 72 in 2020. There are four tracks at the crossing. Multiple track crossings are more dangerous, because people assume that once one train has passed, it is clear to cross, ignoring the possibility of a train approaching from the other direction. The Gilman location has seen one collision in the 10-year period between 2004 and 2014 which resulted in one injury and one fatality.	H	As a grade separation, the project will completely eliminate the safety issue.	H	H
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 15% of land within 1500 feet is residential.	H	Removing the at-grade railroad crossing provides safety benefits to local residents. It will also reduce their travel time for trips through the crossing, since they will no longer have to wait for trains to pass.	M	M

4.1.2 Implement High Street, Davis Street, and Hesperian Blvd Grade Separations (Niles Subdivision)

These three proposed grade separations are adjacent to industrial areas with significant truck traffic. The locations are subject to delays due to high volume passenger and freight rail activity at at-grade crossings. The primary benefit of these projects would be to reduce truck delay at crossings in industrial areas. Truck delay benefits would need to be evaluated. Figures 4.2 through 4.4 display these locations.

Figure 4.2 High Street Location

Figure 4.3 Davis Street Location

Figure 4.4 Hesperian Boulevard Location

Table 4.3 Collision Rates

High Street, Davis Street, and Hesperian Boulevard

City	Street	Crossing Number	Railroad	Accident History (January 2004 – June 2014) Number of Incidents	Fatal	Injury	Property Damage Only
Oakland	High Street	749712Y	Union Pacific	5	0	0	5
San Leandro	Hesperian Boulevard	834229L	Union Pacific	5	3	1	1
	Davis Street	834250S	Union Pacific	1	1	0	0

Table 4.4 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	High Street: This area is primarily industrial. Davis Street: The area near the Davis Street railroad crossing is a mix of residential, office, commercial and public park. Hesperian Boulevard: This area is a mix of residential, commercial and public use.	L	There are minimal land use conflicts and some benefit to the local residents and businesses by separating the train travel from the roadway making it safer and less congested to walk or drive personal vehicles.	L	L

Crashes – Crossings	The table above displays the number of collisions in the 10-year period between 2004 and 2014. As shown, High Street and Hesperian Boulevard have each seen 5 collisions, with 3 fatalities at Hesperian. Davis Street has seen one collision which resulted in a fatality.	H	As a grade separation, the project will completely eliminate the safety issue.	H	H
Equity	These locations are included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). High Street: Approximately 10% of land area within 1500 feet of this location is residential. Davis Street: Approximately 40% of land area within 1500 feet of this location is residential. Hesperian Blvd.: Approximately 60% of land area within 1500 feet of this location is residential.	H	Removing the at-grade railroad crossing provides safety benefits to local residents. It will also reduce their travel time for trips through the crossing, since they will no longer have to wait for trains to pass. However, there is the potential for train horn noise which could be mitigated.	M	M

4.1.3 Tennyson Road Railroad Grade Separation in Hayward (Niles Subdivision)

This project would alleviate existing traffic hazards caused by conflicts between vehicles and trains at the intersection. The proposed underpass would eliminate an at grade crossing that is currently dangerous for pedestrians and a potential hazard for automobiles and trains. This project is similar to the Harder Road underpass project which the City completed several years ago. It strengthens Central County industrial access and truck routes network in keeping with needs identified in Alameda CTC Goods Movement Plan Case Study submitted in January 2015. The location is displayed in Figure 4.5.

Figure 4.5 Tennyson Road Railroad Grade Separation in Hayward Location

Table 4.5 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	This location is primarily commercial in use with a school yard on the northern corner (Cesar Chavez Middle School).	H	Land use impacts would likely be minimal, and pedestrian safety improvements benefit this area given its school and commercial uses.	H	H
Crashes - Crossings	No collisions have been recorded at this location for the 10-year period between 2004 and 2014. As a result the collision benefit is Low.	L	As a grade separation, the project will completely eliminate any potential future safety issue.	H	L
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 50% of the land uses within a 1500 feet radius have residential uses.	H	Removing the at-grade railroad crossing provides safety benefits to local residents. It will also reduce their travel time for trips through the crossing, since they will no longer have to wait for trains to pass. There are also noise benefits since trains will no longer need to sound their horn.	H	H

4.1.4 Construct Grade Separation on Central Avenue/ UPRR Railroad Grade Separation in Newark (Coast Subdivision)

The project to construct a grade separation structure on Central Avenue (4-lane arterial) at Union Pacific Railroad crossing is an enhancement on the Coast subdivision. This project would help address a general truck route grade crossing issue. Figure 4.6 displays this site.

Figure 4.6 Construct grade separation on Central Avenue/UPRR railroad grade separation in Newark

Table 4.6 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts/Benefits	This is an industrial area. The parcels to the west and north are zoned "Warehouse". The parcel to the east is zoned "Vacant Industrial Land (May Include Miscellaneous Improvements)". The parcel to the south is zoned "Heavy Industrial".	L	Land use impacts/benefits would not be significant.	N	N
Crashes - Crossings	No collisions have been recorded at this location for the 10-year period between 2004 and 2014.	L	As a grade separation, the project will completely eliminate the safety issue.	H	M
Equity	There does not appear to be anyone living within 1500 feet of this location.	N	There is no residential land use to be affected.	N	N

4.1.5 Mowry Avenue/ UPRR Railroad Grade Separation for Access to Area 4 in Newark (Coast Subdivision)

The Mowry Avenue/ UPRR railroad grade separation project would provide a grade separation structure on Mowry Avenue at the Union Pacific Railroad crossing. This will provide access to

Area 4 in Newark on the Coast subdivision. This project helps address current rail-truck conflicts. Figure 4.7 displays the location of this project on the map.

Figure 4.7 Mowry Avenue/UPRR railroad grade separation for access to Area 4 in Newark location

Table 4.7 Collision Rates

Mowry Avenue

City	Street	Crossing Number	Railroad	Accident History (January 2004 – June 2014) Number of Incidents	Fatal	Injury	Property Damage Only
Newark	Mowry Avenue	749946C	Union Pacific	1	0	0	1

Table 4.8 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	Land uses in this area include salt flats, a Community Recreation Center and Park (The Silliman Activity and Family Aquatic Center), and Industrial/Office	L	Land use conflicts/benefits are unlikely.	N	N
Crashes - Crossings	This location has seen one collision in the past 10 years which resulted in property damage as shown in Figure 4.7.	L	As a grade separation, the project will completely eliminate the safety issue.	H	M

Equity	No one lives within 1500 feet of this intersection.	N	There is no residential land use to be affected.	N	N

4.1.6 Grade Separations over Decoto Road through the Residential Neighborhood (Niles Subdivision)

In conjunction with the grade separation over Decoto Road on the Oakland Subdivision that is part of the Union City Passenger Rail Station Project, this project provides continued grade separations of both rail lines through the residential neighborhood of Decoto. Th e Decoto neighborhood is located between Decoto Road and Alameda Creek. The project addresses safety, noise, congestion delay, and community disruption issues. Figure 4.8 displays the project location.

Figure 4.8 Decoto Neighborhood

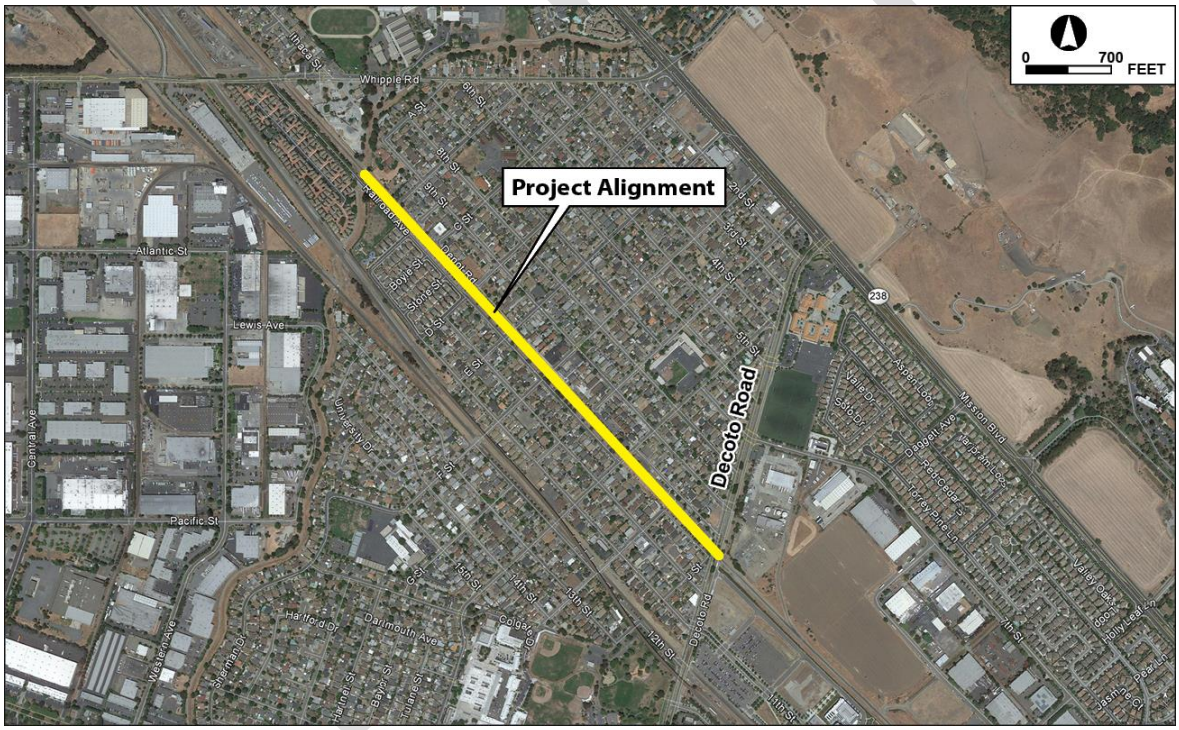


Table 4.9 Collision History
Decoto Road

City	Street	Crossing Number	Railroad	Accident History (January 2004 – June 2014) Number of Incidents	Fatal	Injury	Property Damage Only
Union City	Decoto Road	749781G	Union Pacific	0	0	0	0

Table 4.10 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	This neighborhood is almost entirely single family homes. Some multi-unit buildings or multi-unit lots are located along the tracks.	H	Land use benefits would exist for residents benefiting from and safety improvements.	H	H
Crashes - Crossings	This location has no recorded collisions in the 10-year period between 2004 and 2014.	L	As a grade separation, the project will completely eliminate the safety issue.	H	M
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Most of the land within 1500 feet of the tracks is residential.	H	Removing the at-grade railroad crossing provides safety benefits to local residents. It will also reduce their travel time for trips through the crossing, since they will no longer have to wait for trains to pass. There are also noise benefits since trains will no longer need to sound their horn.	H	H

4.2 Rail Crossing Improvement - Non Grade Separation

4.2.1 Local Road Safety - Rail improvements at 65th, 66th, 67th streets in Emeryville

This project is the implementation of rail safety improvements consisting of 4-quad gates and detection technology at local roadway crossings at the UPRR main line at 65th, 66th, and 67th Streets consistent with Quiet Zone approval. It is eligible under RTP 240386, Local Road Improvements Program. The program explicitly addresses safety issues. The location is displayed in Figure 4.9.

Figure 4.9 Local Road Safety

Rail improvements at 65th, 66th, 67th streets in Emeryville location

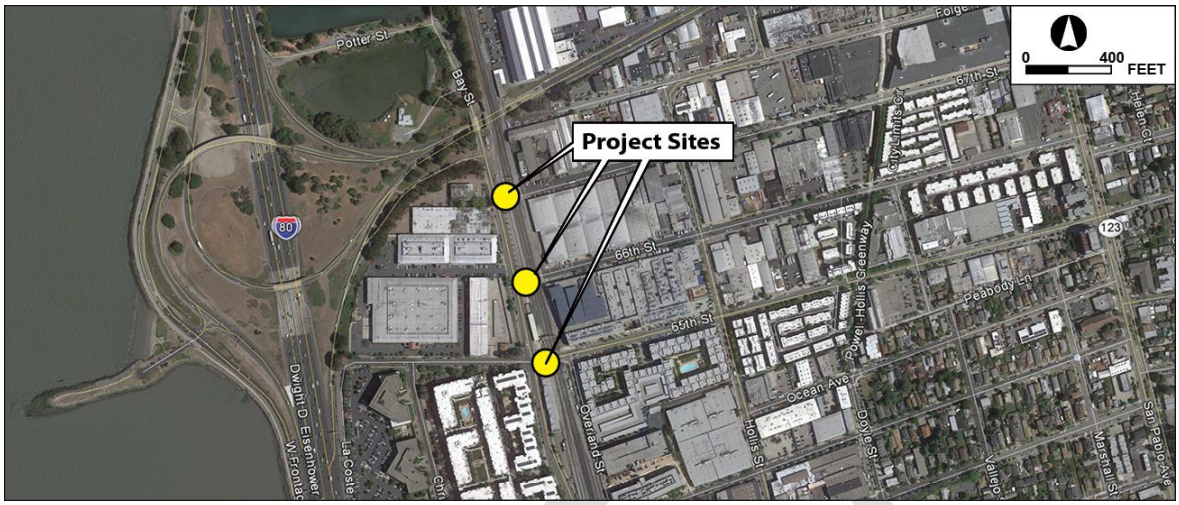


Table 4.11 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	This area has housing south of 65th Street, industrial land to the north, aquatic Park to the north.	M	These improvements would likely represent a significant benefit to the area.	H	H
Crashes - Crossings	Records indicate no collisions in the 10-year period between 2004 and 2014 at 65th Street in Emeryville. There is no data for the other two intersections.	L	4-quad gates and detection technology will improve the safety issue.	H	M
ITS / Technology	The project includes detection technology.	M	The detection technology will improve safety.	M	M
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 25% of the area within 1500 feet of the intersections (combined) is residential.	M	Improving crossing gates at the at-grade railroad crossing provides safety benefits to local residents. There are also noise benefits since trains will no longer need to sound their horn.	M	M

4.2.2 Improve Fremont Rail Crossing Safety with Gates and Medians at: Fremont Blvd, Maple St, Dusterberry Way, Nursery Ave.

Improve highway-rail crossing safety at four at-grade crossings in the City of Fremont by installing raised medians, railroad gate improvements, and sidewalk. Rail crossing locations are: Fremont Blvd., Maple St., Dusterberry Way., and Nursery Ave. This benefits grade crossing safety and reduces delays by addressing potential driver confusion at the intersections. Figure 4.10 displays the location of the Fremont Blvd., Maple St., Dusterberry Way intersections. Figure 4.11 displays the Nursery Ave. location.

Figure 4.10 Fremont Blvd., Maple St., Dusterberry Way Locations

Figure 4.11 Nursery Avenue Location

Table 4.12 Traffic Delay

Fremont Blvd.

			Traffic Delay (Vehicle Hours)		
City	Street	Railroad	Freight	Passenger	Total
Fremont	Fremont Boulevard	Union Pacific	0.31	0.09	0.40
Fremont	Dusterberry Way	Union Pacific	0.31	0.09	0.40
Fremont	Maple St.	Union Pacific	0.30	0.08	0.38
Fremont	Nursery Ave.	Union Pacific	0.30	0.08	0.38

Table 4.13 Collision History

Fremont Boulevard

				Accident History (January 2004 – June 2014)			
City	Street	Crossing Number	Railroad	Number of Incidents	Fatal	Injury	Property Damage Only
Fremont	Fremont Boulevard	750039X	Union Pacific	0	0	0	0
Fremont	Dusterberry Way	750037J	Union Pacific	1	0	1	0
Fremont	Maple St.	750038R	Union Pacific	0	0	0	0
Fremont	Nursery Ave.	749787X	Union Pacific	1	1	0	0

Table 4.14 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	These crossings have some of the highest levels of traffic delay on this corridor based on the number of lanes in the impacted roadway. However, these rates are significantly lower than other corridors such as those along the Martinez Subdivision. Thus, the impact remains Low.	L	The proposed improvement would not impact the highway conditions.	N	N
Land Use Conflicts / Benefits	The Fremont Blvd (Fremont Station) area is primary commercial in use. The Maple St area is primarily commercial in use. The Dusterberry Way area is	M	Improvements at all of these crossings would likely have a positive impact on adjacent land uses.	M	M

	primarily Industrial/Housing/Commerical. The Nursery Ave area is primarily a California Historical Nursery Park (south), housing (north), also auto repair and worship.				
Crashes - Crossings	Over the past 10 years, collisions were reported at Dusterberry and at Nursery. The collision at Dusterberry resulted in an injury, but at Nursery it was a fatality. The importance of this problem is High.	H	4-quad gates and detection technology will improve the safety issue.	H	H
Equity	At Fremont Blvd., Maple St., Dusterberry Way, approximately 50% of the land within 1500 feet is residential. At Nursery Ave., approximately 70% of the land within 1500 feet of the intersection is residential. These areas are not in included in the 2014 updated Air District methodology estimating health effects on vulnerable populations. Given the high levels of residential development at these locations, equity remains a consideration with regard to safety of residents.	M	Improving crossing gates at the at-grade railroad crossing provides safety benefits to local residents.	M	M

4.3 Rail New Track/Siding

4.3.1 Alviso Wetlands Double Track

The project is to add a 2nd (and possible 3rd) main line track between Newark and San Jose on the Coast Subdivision. In Alameda County, the project is from Albrae through wildlife refuge/wetlands area to the Santa Clara County Line. Beyond the county line, the project would continue to Alviso. This provides additional capacity on a line with moderate level of passenger and freight rail traffic and poor level of service. Figure 4.12 displays this location.

Figure 4.12 Alviso Wetlands Double Track Location

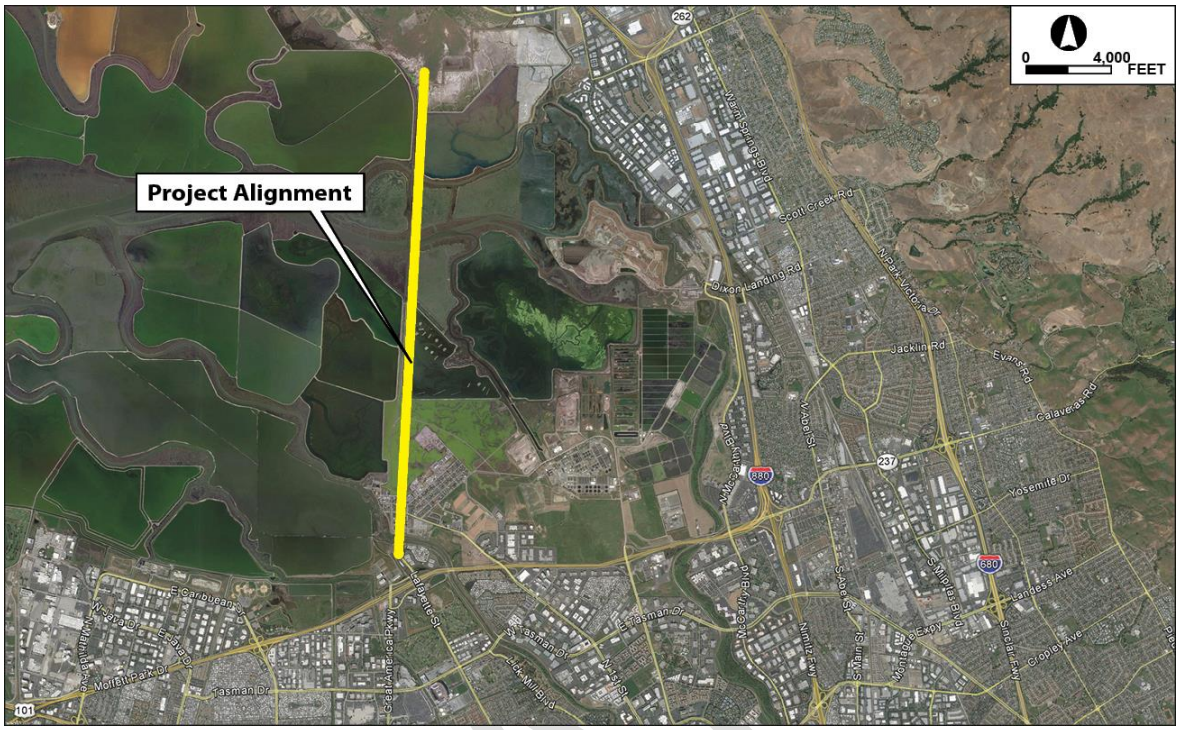


Table 4.15 Volume/Capacity and Level of Service

Alviso Segment

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS
Current	UP Coast	San Jose	Newark	3/1	30	30	100%	F
2020	UP Coast	San Jose	Newark	3/1	42	30	140%	F
2020 with improvement	UP Coast	San Jose	Newark	3/2	42	60	70%	C

Source: AECOM calculations

Table 4.16 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This segment currently has a v/c ratio of 100% and operates at LOS F. Projections are that total daily trains would increase to 42 (from 30) in 2020 and level of service would worsen. The single track segment	H	Capacity is assumed to increase by 100% with the addition of one main track on the corridor, to 60 from 30. This would decrease the v/c ratio to 70% and increase the LOS to C. If a third track is added, service would improve further to a v/c of 47% (and a better LOS C).	H	H

	represents a pinch point in the corridor.				
Freight / Passenger Conflicts	The mix of trains operating on this segment is about 80% passenger and 20% freight. However, the freight trains are often long manifest trains heading to and from Los Angeles via the Coast Subdivision. With the high frequency of passenger trains, it is difficult to find a gap where a long freight can fit and traverse this section without blocking a passenger train.	H	Increasing capacity would decrease freight / passenger conflicts.	H	H
Land Use Conflicts / Benefits	The Alameda County portion of the project is about 4 miles long. Much of the route is adjacent to or in a wetland. Most the land uses nearby are either parkland, agricultural or industrial. About 2 miles of the Alameda County portion of the project are in the Don Edwards National Wildlife Refuge. Other zoning adjacent to the corridor includes General Industrial Nonmanufacturing or Combination of Mfg and Non-Mfg, Offices, High-Rise Ofc Bldgs and so on.	H	The project is likely to have significant impacts to wetland areas and parklands. It may be possible to mitigate these impacts. A formal EIR process is required.	-	-
Equity	This location was not identified in the 2014 updated Air District methodology estimating health effects on vulnerable.	N	There are no residential areas near the project.	N	N

4.3.2 Jack London - Elmhurst 3rd track

The project is to add a 3rd main track on the Niles Subdivision between Jack London Sq. and Elmhurst. In combination with other projects on Oakland Subdivision and Niles Subdivision, this project would create an improved southern access route to the Port of Oakland and the Oakland Army Base to serve bulk exports and act as a reliever route for Martinez Subdivision intermodal traffic. Figure X displays the location of this corridor. The entire project could be built within the UPRR ROW. This is one of several projects along the Niles Subdivision that would improve the southern access route to Oakland. The evaluations of these projects are based on projections of freight traffic from the 2013 California Rail Plan adjusted for increases in bulk and manifest trains that are projected to access the Oakland Army Base rail yards. The analysis does not take into

account the potential growth in intermodal traffic along this route if it proves too difficult to make necessary improvements along the Martinez Subdivision through Emeryville, where there are considerable right-of-way constraints and community impacts. While it is difficult to forecast train volumes in as operationally complex a rail system as exists in Alameda County, it is likely that the UP will move more intermodal trains along the Oakland/Niles Subdivision to reduce pressure on the Martinez Subdivision. Moving intermodal traffic to the southern route without improvements could reduce LOS on the Niles Subdivision in the future to LOS E (as compared to the reported LOS D shown in the subsequent evaluations) and would increase the travel time benefits for these projects from M to H. For this reason, these projects are incorporated in the Sustainable Global Gateways opportunity package as an alternative approach to meeting future capacity needs supporting the developments at the Port of Oakland and Oakland Army Base.

Figure 4.13 Jack London
Elmhurst 3rd track

Table 4.17 Volume/Capacity and Level of Service
Jack London – Elmhurst Segment

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS[a]
Current	UP Niles	Niles	Oakland	2/1	16	30	53%	C
2020	UP Niles	Niles	Oakland	2/1	26	30	86.7%	D

2020 with improvement	UP Niles	Niles	Oakland	3	26	40	65%	C

Table 4.18 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This subdivision has is functioning at a v/c ratio of 53% and a LOS of C. Projections to 2020 indicate the v/c ratio would increase to 80% and LOS decrease to D without this improvement.	M	Capacity is assumed to increase by 33% with the addition of one main track on the corridor, to 40 from 30. This would decrease the v/c ratio to 30% and increase the LOS to B.	H	M
Freight / Passenger Conflicts	The mix of trains operating on this segment is about 70% passenger and 30% freight.	M	Increasing capacity would decrease freight / passenger conflicts.	M	M
Land Use Conflicts / Benefits	This is a long segment which travels through a range of land uses including residential, industrial, public use, and commercial.	H	Negative land use impacts may be moderate to significant given the diversity of land use types. The entire project could be built within the UPRR ROW.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 50% of land uses within 1,500 feet of the corridor are residential.	H	Operation of additional trains, which this project would help make possible, will increase emissions and potential train horn noise which could be mitigated.	-	-

4.3.3 Embarcadero - Jack London 3rd track

Provides third main track from Embarcadero to Jack London Sq. on Niles Subdivision as part of overall capacity expansion. In combination with other projects on Oakland Subdivision and Niles Subdivision, this project would create an improved southern access route to Port of Oakland and Oakland Army Base to serve bulk exports and act as a reliever route for Martinez Subdivision intermodal traffic. The portion of the project between Magnolia St. and Clay St. could be built within the UPRR ROW. The portion between Clay St. and Webster St. is in the street. Ownership in this portion is unclear. Figure X displays this location.

Figure 4.14 Embarcadero

Jack London 3rd Track Location

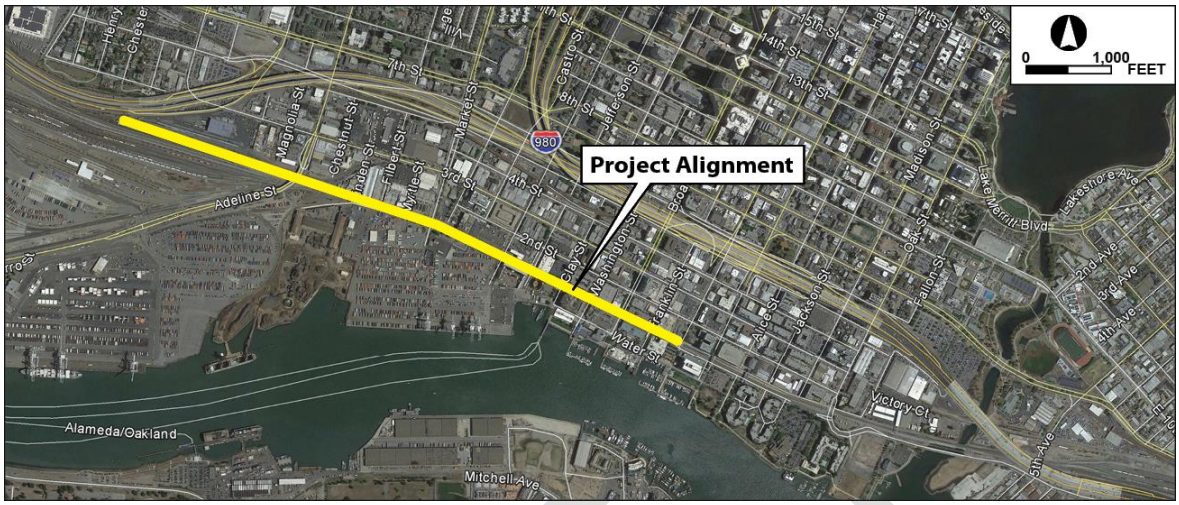


Table 4.19 Volume/Capacity and Level of Service

Embarcadero – Jack London Segment

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS[a]
Current	UP Niles	Niles	Oakland	2/1	16	30	53%	C
2020	UP Niles	Niles	Oakland	2/1	24	30	80%	D
2020 with improvement	UP Niles	Niles	Oakland	3/1	24	40	30%	B

Table 4.20 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This subdivision is functioning at a v/c ratio of 53% and a LOS of C. Projections to 2020 indicate the v/c ratio would increase to 80% and LOS decrease to D without this improvement	M	Capacity is assumed to increase by 33% with the addition of one main track on the corridor, to 40 from 30. This would decrease the v/c ratio to 30% and increase the LOS to B.	H	M
Freight / Passenger Conflicts	The mix of trains operating on this segment is about 70% passenger and 30% freight.	M	Increasing capacity would decrease freight / passenger conflicts.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts / Benefits	This is a diverse segment which travels through a range of land uses including residential, industrial, public use, and commercial.	M	Negative land use impacts are likely to be moderate given the diversity of land use types. This area is currently experiencing significant development, and project sponsors will need to work closely with the local planning department to avoid conflicts.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 10% of land uses within 1,500 feet of the corridor are residential.	L	Operation of additional trains, which this project would help make possible, will increase emissions and potential train horn noise which could be mitigated.	-	-

4.3.4 Hayward Double Track (Elmhurst to Industrial Parkway) 2nd Track

This project adds second track on Niles Subdivision as part of overall capacity expansion on this line. In combination with other projects on Oakland Subdivision and Niles Subdivision, this project would create an improved southern access route to Port of Oakland and Oakland Army Base to serve bulk exports and act as a reliever route for Martinez Subdivision intermodal traffic. There would be no ROW impact. Figure 4.15 displays this data.

Figure 4.15 Hayward Double Track

Elmhurst to Industrial Parkway

Table 4.21 Volume/Capacity and Level of Service

Elmhurst to Industrial Parkway

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS[a]
Current	UP Niles	Niles	Oakland	2/1	16	30	53%	C
2020	UP Niles	Niles	Oakland	2/1	24	30	80%	D
2020 with improvement	UP Niles	Niles	Oakland	2	24	40	30%	B

Table 4.22 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This subdivision is functioning at a v/c ratio of 53% and a LOS of C. Projections to 2020 indicate the v/c ratio would increase to 80% and LOS decrease to D without this improvement	M	Capacity is assumed to increase by 33% with the addition of one main track on the corridor, to 40 from 30. This would decrease the v/c ratio to 30% and increase the LOS to B.	H	M
Freight / Passenger Conflicts	The mix of trains operating on this segment is about 70% passenger and 30% freight.	M	Increasing capacity would decrease freight / passenger conflicts.	M	M
Land Use Conflicts / Benefits	This is a diverse segment which travels through a range of land uses including residential, industrial, public use, and commercial. Long portions are residential.	H	Negative land use impacts could be moderate to significant given the diversity of land use types.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 75% of land uses are residential within 1500 feet of the tracks.	H	Operation of additional trains, which this project would help make possible, will increase emissions and potential train horn noise which could be mitigated.	-	-

4.3.5 Niles Junction Bypass

This project would construct a new rail bridge over Alameda Creek at Niles Junction to allow movement between the Oakland Subdivision at the mouth of Niles Canyon and the Niles Subdivision including a new bridge over Alameda Creek. In combination with other projects on Oakland Subdivision and Niles Subdivision, this project would create an improved southern access route to Port of Oakland and Oakland Army Base to serve bulk exports, and act as a reliever route for Martinez Subdivision intermodal traffic.

Figure 4.16 Niles Junction Bypass Location

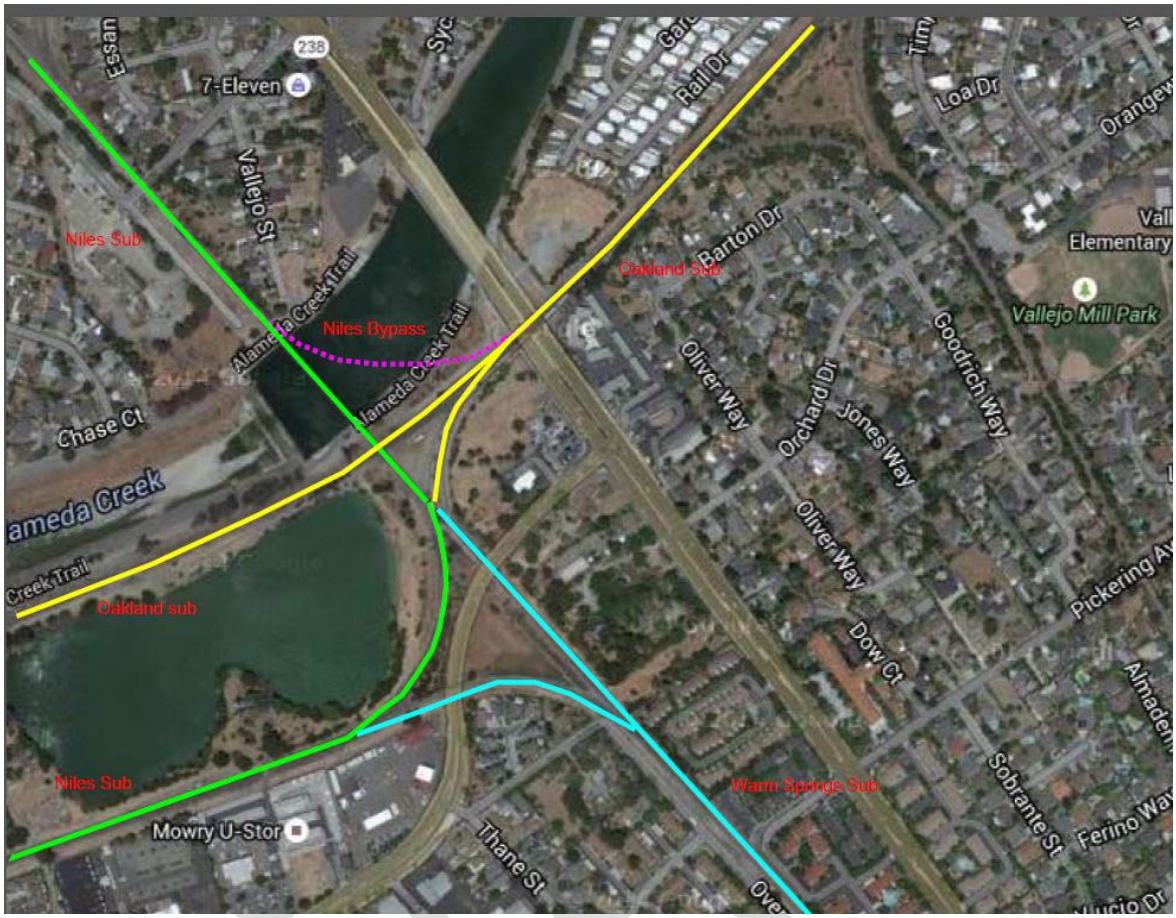


Table 4.23 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This project does not affect delay.	N	This is a reliever route which could improve LOS on the northern line.	M	L
Connectivity – Air/Rail/Port	Currently, trains traveling through Niles Canyon on the Oakland Subdivision cannot directly access the Niles Subdivision heading towards Oakland.	H	The project's purpose is to provide the ability for trains to take this route instead of the coastal route. This route option could be much more efficient. See Section 4.4.1 for additional discussions.	H	H
Freight / Passenger Conflicts	There are no passenger trains currently routed from Oakland through Niles Canyon, and no plans to do so.	N	This project is required to shift all freight traffic to the Niles sub and all passenger traffic to the Coast sub north of Newark.	H	N
Land Use Conflicts /	This location is industrial on 2 sides, public park on	L	The tracks are not likely to negatively impact the nearby houses	N	N

Benefits	one side (25% of land uses) and residential on the 4th (25% of land uses). However, there is a culvert buffer between the houses and these tracks				
Equity	This location was not identified in the 2014 updated Air District methodology estimating health effects on vulnerable populations. Approximately 25% of the land within 1500 feet of the site is residential.	L	Operation of additional trains along this route, which this project would help make possible, will increase emissions and horn noise	-	-

4.3.6 Short Haul Rail Service

This project would provide short haul service linking Central Valley shippers with Port of Oakland or Oakland Army Base rail yards. The inland terminus is to be determined by updated market studies. Future studies should be conducted to determine capital cost and operating subsidy needs. This is a mode shift project to provide better rail capacity to replace current trucking. It would help reduce truck traffic on I-580 from Central Valley shippers and distribution centers. Because the Martinez Subdivision is already subject of significant plans for improvements also described in this document and elsewhere, this document assumes the Short Haul Rail Service would be provided on the Oakland Subdivision for the purpose of analysis. This analysis assumes travel to the Port would be on the Coast Subdivision. The Niles Bypass would be needed to route trains on the Niles Sub between Oakland and Niles.

Figure 4.17 Oakland Sub Location Assumption

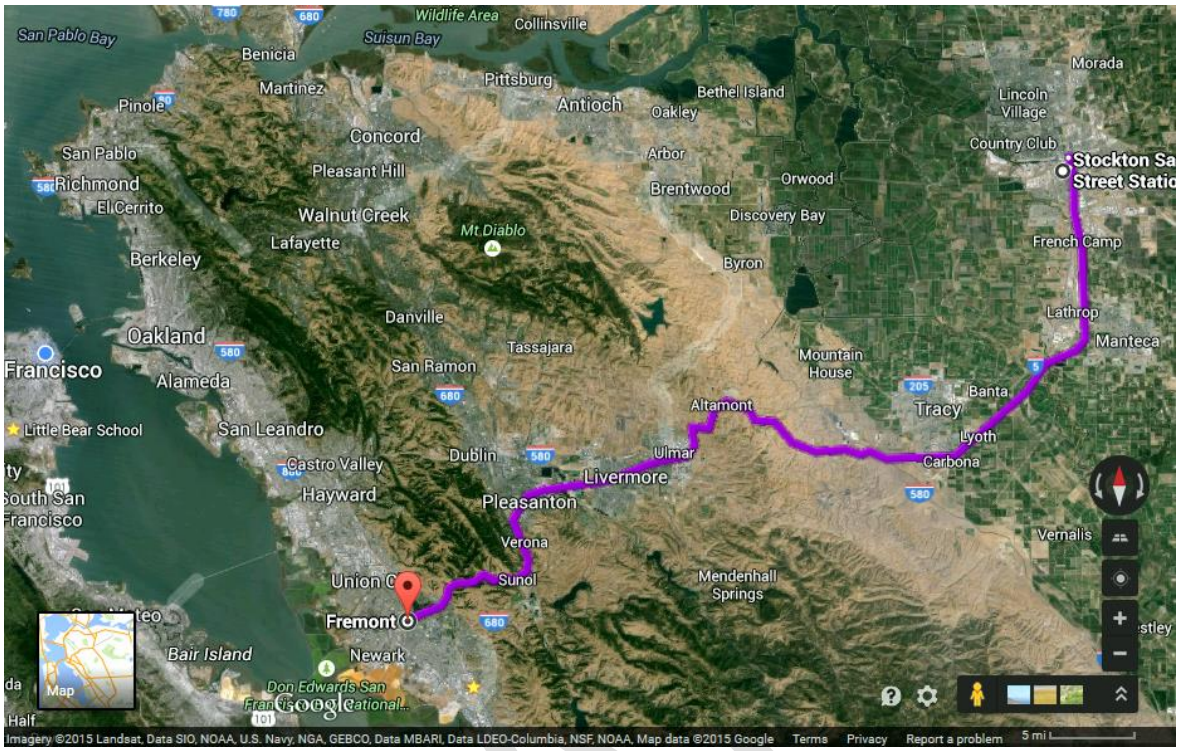


Table 4.24 Volume/Capacity and Level of Service

Oakland Sub assumed for Short Haul Concept

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS
Current	UP Oakland	Niles	Stockton	1	12	30	40.0%	B
Current	UP Oakland	Niles	Stockton	1	12	30	40.0%	B

Table 4.25 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	This segment currently functions with a v/c ratio of 40% and LOS B. Total trains are projected to increase substantially in the next 5 years bringing v/c up to 77% and LOS down to D.	M	Project could increase delay.	-	-
Travel Time Delay - Highway	Trucks carrying containers between the Port and intermodal yards in the Central Valley are a large	H	The project's purpose is to put incoming containers on rail within the port, thereby reducing the number of trucks on the	L	M

	component of congestion on freeways in this corridor.		highway, and potentially reducing travel time and congestion.		
Freight / Passenger Conflicts	ACE passenger trains use the Oakland Subdivision through Niles Canyon and on to Tracy and Lathrop.	M	The project would increase freight train traffic through Niles Canyon, thereby increasing the potential for conflicts.	-	-
Land Use Conflicts / Benefits	Most the land adjacent to this segment is open space. However, there is some residential which may be impacted by an increased number of trains.	L	Land use impacts/benefits are likely to be low.	L	L
Emissions	Part of this project is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County).	M	Shifting truck traffic to rail could reduce emissions significantly.	H	M
Equity	This location was not identified in the 2014 updated Air District methodology estimating health effects on vulnerable populations. Approximately 10% of the land within 1000 feet of the site is residential.	L	Equity effects will be minimal.	L	L

4.3.7 Add Capacity on Martinez Subdivision between Port of Oakland and 65th Street to Separate Passenger and Freight Trains

This section of the Martinez Subdivision is constrained and does not have sufficient width to accommodate projected future demand. Project could consist of ROW acquisition, trenching, or other alternatives. This project would need to be coordinated with Capitol Corridor plans, UPRR plans, city and community groups. The location of the segment in question is displayed in Figure 4.18.

Figure 4.18 Martinez Subdivision between Port of Oakland and 65th Street

Table 4.26 Average Daily Train Volumes

Martinez Subdivision

	From	To	Average Daily Freight	Daily Passenger Trains	Total Daily Trains
Current	Emeryville	Oakland	17	40	57
2020	Emeryville	Oakland	30	42	72

Sources: Freight train counts based on 2010 BNSF and 2008 UP train count data. Passenger train counts based on weekday published timetables for summer 2014.

Table 4.27 Volume/Capacity and Level of Service

Martinez Subdivision

	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS
Current	Emeryville	Oakland	2	57	75	76.0%	D
2020 projections	Emeryville	Oakland	2	72	75	96.0%	E
2020 projections with an additional track	Emeryville	Oakland	3	72	112	64.0%	C

Source: AECOM calculations.

Table 4.28 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	These tracks are shared between freight and passenger trains. Freight volumes are projected to increase significant in the next few years.	H	As shown, the current LOS is projected to worsen to LOS E with the additional freight trains. While this concept does not specifically outline how capacity would be expanded, for the purposes of analysis, an additional track is assumed. With three tracks instead of 2, LOS improves to C with projected 2020 volumes.	H	H
Freight / Passenger Conflicts	The future mix of trains operating on this segment is forecast to be about 60% passenger and 40% freight.	M	Increasing capacity would decrease freight / passenger conflicts.	M	M
Land Use Conflicts / Benefits	Land uses along the corridor include primarily industrial, shifting to big-box commercial as the tracks go north. Some apartment complexes are located next to the track in Emeryville.	-	This segment is highly constrained, an expansion project is likely to require property acquisition which would represent negative land use impacts.	-	-
Equity	This location is included in the 2014 updated Air District methodology estimating health effects on vulnerable populations (Western Alameda County). Approximately 10% of the land near this segment is housing; however, it is generally newer apartment complexes (potentially with affordable units).	L	Operation of additional trains, which this project would help make possible, will increase emissions and noise impacts.	-	-

4.3.8 ACE Corridor Improvements (Currently under EIR review)

ACE regional rail trains use the Niles Subdivision segment between Newark and Niles Junction. A total of 20 Capitol Corridor and ACE trains use the Coast Subdivision segment between Newark and San Jose, which is mostly single track. ACE runs primarily on the Oakland subdivision currently have no capacity constraints. ACE Train is currently proposing to expand its service, and proposed ACE Corridor Improvement are under environmental review as a result. ACE service is now operating 8 trains each weekday. ACE has reached a tentative agreement with the UP to run up to 12 trains per day between Stockton and San Jose, which is under study as part of the EIR. The proposed improvements include:

- Altamont Siding extension
- Double tracking east of Niles Canyon
- Extend and upgrade Radum Siding
- Midway Siding extension
- Niles Canyon double track and sidings
- Signal upgrades east of Niles Junction
- Rehabilitating the old Niles Canyon Railroad
- Track realignment UPRR Oakland Sub MP 55.5 to MP 54.0, Remove Permanent "Shoofly" (Extension of Altamont Siding)

Figure 4.19 displays the location.

Figure 4.19 ACE Corridor

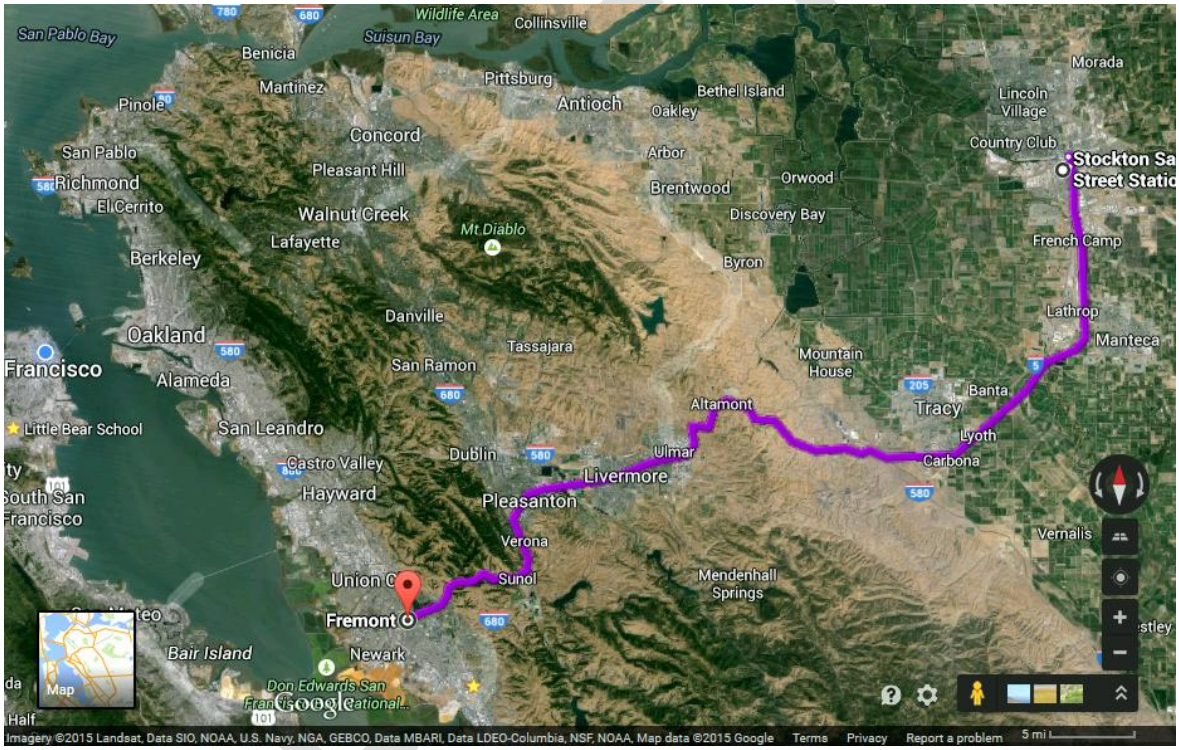


Table 4.29 Volume/Capacity and Level of Service
Oakland Subdivision

	Subdivision	From	To	Number of Main Tracks	Total Daily Trains	Average Capacity	v/c Ratio	LOS
Current	UP Oakland	Niles	Stockton	1	12	30	40.0%	B
2020 Projection	UP Oakland	Niles	Stockton	1	23	30	76.7%	D

Table 4.30 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air / Rail / Port	The Oakland Subdivision currently functions with a v/c ratio of 40% and LOS B. Total trains are projected to increase substantially in the next 5 years bringing v/c up to 77% and LOS down to D (and could be further degraded if UPRR uses the Oakland Subdivision to move intermodal trains to serve the Oakland Global project).	H	This concept does not specifically outline how capacity would be expanded.	N	N
Freight / Passenger Conflicts	Increased volumes of both freight and passenger trains are under consideration for this corridor. This makes it difficult to estimate the severity of the problem.	N	This segment is a single track, and the addition of sidings and double tracking would improve potential passenger conflicts.	M	N
Land Use Conflicts / Benefits	Most the land adjacent to this segment is open space. However, there is some residential land which may be impacted by an expansion here.	M	These issues will be addressed in the EIR.	N	N
Equity	This location was not identified in the 2014 updated Air District methodology estimating health effects on vulnerable populations. Approximately 10% of the land area within 1500 feet of this segment is residential.	L	Operation of additional trains, which this project would help make possible, could increase emissions and noise impacts. This is being evaluated in the EIR.	-	-

4.4 Summary of Findings

4.4.1 Combined Impacts of Rail New Track/Siding Projects

Identifying high priority rail mainline capacity projects is complicated by a number of operational considerations. This was alluded to in the Section 4.3.2, the Jack London to Elmhurst 3rd track project. Section 3.10.1 recommends a rail strategy that would involve expanding intermodal and bulk terminal capacity at the Port of Oakland and Oakland Global Logistics Center in order to support growth in international intermodal cargo moved to and from Oakland by rail (both direct intermodal and transloading) and to create the opportunity to move more domestic intermodal

traffic destined for the Bay Area directly to and from Oakland by rail. This strategy would create more jobs in value-added logistics services in Oakland as well as diverting some traffic from truck to rail, reducing truck traffic and truck emissions on I-580 and, to a lesser extent, on I-880. This strategy will increase rail traffic moving to/from Oakland. There are multiple rail routes to/from Oakland and several of these are also used by intercity commuter rail services – rail services that are also anticipated to grow and to provide improved connections to the state's planned high speed rail system. This increased rail traffic will require expanded mainline capacity for the rail system in Alameda County.

Which capacity expansion projects receive the highest priority depends to a large extent on how the multiple rail routes in and out of Oakland are used. The analysis of capacity projects presented previously in this report assumes that future rail traffic will be routed in the same general pattern as it is routed today. That means that virtually all of the growth in intermodal traffic originating or terminating in Oakland is assumed to be international cargo and that it will be routed on the Martinez Subdivision. Growth in bulk and manifest cargo created by new demand at the Port of Oakland is assumed to be routed on the Oakland Subdivision over the Altamont Pass and through Niles Canyon and then along the Coast Subdivision from Newark to Oakland (because there is no connection today between the Oakland Subdivision in Niles Canyon and the Niles Subdivision at Niles Junction). The analysis also relies heavily on data from the 2013 California Rail Plan which did not have passenger train forecasts for years after 2020. Therefore, the capacity needs were only determined based on traffic growth to 2020. As a result, the analysis shows that capacity constraints are severe on the Martinez Subdivision and moderate on the Oakland Subdivision through Niles Canyon. Capacity on the Coast Division from Newark to Elmhurst is less constrained.

This picture changes somewhat considering growth in traffic beyond 2020, taking into account some increment of growth in domestic intermodal traffic going to/from Oakland, and considering the right-of-way constraints on the Martinez Subdivision, especially between Oakland and Emeryville. As noted in the evaluations, adding more capacity on the Martinez Subdivision between Oakland and Emeryville would require obtaining additional right-of-way that would have serious impacts on the community and making this a less desirable option than one that would re-route some of the growth in intermodal traffic to the southern route. In fact, train projections developed by the UPRR for the Northern California Unified Service Concept Analysis suggests that UP is assuming that more of its growth in Oakland traffic will be handled on the southern route than has been assumed in past forecasts.

Taking into account the expected growth in freight traffic between 2020 and 2040 and assuming even modest shifting of future intermodal growth from the Martinez Subdivision to the Oakland Subdivision through Niles Canyon, the capacity needs will become greater on the Oakland Subdivision between Stockton and Niles Junction. Without any shifting of intermodal traffic from Martinez Subdivision, level of service on the Oakland Subdivision from freight growth alone

would be reduced to LOS E. If growth could not be accommodated on the Martinez Subdivision due the right of way constraints from Oakland to Emeryville, the capacity expansion projects on the Oakland Subdivision would rise to a high priority even earlier than 2020. Therefore, most of the capacity expansion projects (siding and double-tracking) on this segment of the Oakland Subdivision are considered top priority and are included in the Sustainable Global Competitiveness Opportunity Package.

As described in the needs assessment report, the Coast Subdivision currently is the southern route to/from Oakland connecting to/from the Oakland Subdivision through Niles Canyon. The needs assessment report did not identify this segment of the Coast Subdivision (from Newark to Oakland) as a capacity constrained rail corridor because it has such low volumes of passenger traffic and modest levels of freight traffic. Without diversion of any of the projected growth on the Martinez Subdivision to the southern route, the Coast Subdivision would have LOS C in 2020 and freight growth alone after 2020 would only reduce LOS to D. However, this segment of the Coast Subdivision has very limited capacity available for expansion and diversion of any traffic from the Martinez Subdivision to this line (even as little as 2 or 3 trains per day) would cause this line to be reduced to unstable operating conditions. It is for this reason that the UP would prefer using the Niles Subdivision, which is a higher quality line, for a southern route to/from Oakland. However, given current passenger operations on this line and the fact that the Niles Subdivision is a single track rail line from Niles Junction to Elmhurst, this segment would need to have additional capacity if the growth in freight traffic that is projected for the Coast Subdivision were shifted to the Niles Subdivision and if any of the growth in intermodal traffic that this study forecasts for the Martinez Subdivision is shifted to the Niles Subdivision. Adding track to the Niles Subdivision should be easier to accomplish than adding capacity on the Martinez Subdivision because there is room in the existing right-of-way in most parts of this segment of the Niles Subdivision (i.e., Niles Junction to Oakland). Therefore, the double-tracking projects in this segment of the Niles Subdivision are given a top priority and are included in the Sustainable Global Competitiveness Opportunity Package. A related project, the Niles Junction Bypass (Alameda Creek Bridge) would also be needed to allow trains to move to/from the Oakland Subdivision at the mouth of Niles Canyon to/from the Niles Subdivision. To complete this expanded southern route to/from Oakland, this project is also considered a top priority project.

In summary, the high priority rail capacity expansion projects presented below, favor investment to build up the southern route to/from Oakland to act as a reliever route for the congested Martinez Subdivision. This will allow expanded use of rail at the Port of Oakland and Oakland Army Base, realizing the opportunity described in the Sustainable Global Competitiveness Opportunity Package. This would solve the problem of how to increase mainline capacity to/from Oakland without creating significant right-of-way impacts in the very constrained segments on the Martinez Subdivision between Oakland and Richmond.

4.4.2 Project Prioritization

Table 4.31 summarizes the evaluation results presented above and prioritizes various rail projects. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column, which also includes the key points from the combined impacts discussion presented above. In general, projects are included if they have at least one high rating. The first priority projects are included in the opportunity packages discussed in Section 2.0.

Table 4.31 Summary of Evaluations of Rail Projects

Rail Grade Separation	Priority	Explanation
Grade Separations over Decoto Road Through the Residential Neighborhood (Niles Subdivision)	First	This project has two high ratings and a medium rating.
Berkeley Railroad Crossing Improvements (Martinez Subdivision)	First	This project has a high, medium and low rating.
Tennyson Road Railroad Grade Separation in Hayward (Niles Subdivision)	First	This project has 2 high ratings and 1 low rating.
Implement High Street, Davis Street, and Hesperian Blvd Grade Separations (Niles Subdivision)	First	This project has a high, medium and low rating.
Construct Grade Separation on Central Avenue/ UPRR Railroad Grade Separation in Newark (Coast Subdivision)	Second	This project has a medium rating.
Mowry Avenue/ UPRR Railroad Grade Separation for Access to Area 4 in Newark (Coast Subdivision)	Second	This project has a medium rating.
Rail Crossing Improvement - Nongrade Separation		
Local Road Safety - Rail improvements at 65th, 66th, 67th streets in Emeryville	First	This project has a high rating and three medium ratings.
Improve Fremont Rail Crossing Safety with Gates and Medians at: Fremont Blvd, Maple St, Dusterberry Way, Nursery Ave.	First	This project has a high rating and two medium ratings.
Rail New Track/Siding		
Alviso Wetlands Double Track	First	This project has two high ratings. Given its negative land use conflict impact, a formal EIR process should be done before implementation.
Hayward Double Track (Elmhurst to Industrial Parkway 2nd Track	First	This project has two medium ratings and two negative ratings, but as mentioned in the section above, it is needed if UP decides to shift traffic from Coast and Martinez to Niles subdivision. In addition, adding traffic on this line is easier than on Martinez given sufficient ROW.
Niles Junction Bypass	First	This project has a high rating, a low rating and a negative rating, but as mentioned in the section above, it is need to allow trains to move to/from the Oakland subdivision at Niles Canyon.

Rail Grade Separation	Priority	Explanation
Add Capacity on Martinez Subdivision between Port of Oakland and 65th Street to Separate Passenger and Freight Trains	Second	This project has a high rating, a medium rating and two negative ratings. However, as discussed in Section 4.4.1, this project has significant ROW constraints and if implemented will create significant land use impacts. Thus it is not a first priority project.
Short Haul Rail Service	Second	This project has two medium and two low ratings, and also two negative ratings.
Jack London - Elmhurst 3rd track	Second	This project has two medium rating and two negative ratings.
Embarcadero - Jack London 3rd track	Second	This project has two medium rating and two negative ratings.
ACE Corridor Improvements (Currently under EIR review)	Second	This project has a negative rating and all other ratings are neutral.

5.0 MAJOR HIGHWAY PROJECTS AND PROGRAMS

This group of projects and programs include major highway projects that are aimed at solving the most pressing issues associated with urban congestion. Each project covers a large geographic area and some projects can be implemented Countywide. These projects are meant to significantly improve highway truck movements through a combination of operational, infrastructure and innovative approaches. Given limited room for capacity expansion, these types of projects are attractive and much needed options to "squeeze" out capacity, improve safety and reliability on existing systems.

It should be noted that for all highway projects in this section and Section 6.0, all projects were evaluated from a goods movement-specific perspective and do not address auto or transit benefits that projects could provide. In addition, one program that had been suggested for evaluation but that could not be evaluated at this time was increased reliance on transit in high freight activity corridors. The specific project of BART to Livermore had been suggested as a primary example of this type of project. Since this project is currently the subject of an EIR, consistent with our treatment of such projects as described in Section 1.2, this project is not evaluated at this time. When new ridership estimates and impacts are completed for the EIR it may be appropriate to revisit this project.

The guidelines for how these projects are rated are shown in Table 5.1.

Table 5.1 Guidelines for Rating Assignment for Major Highway Projects and Programs

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay – Hwy	Yes	This measure evaluates the delay benefits of a project or program. • To receive an H rating, a project must significantly reduce delay, with quantified results. Given that the primary purpose of a large number of these projects are related to delay reduction, projects in this category are expected to have High delay benefits. • To receive an M, a project should have at least moderate delay benefits either quantified or determined using qualitative methods. • To receive an L, a project will generally have some benefit but the benefit may be small or hard to determine
Travel Time Delay - Air/Rail/Port	Yes	This measure evaluates the project impact of travel time delay at airport and port complex, and on rail lines. Benefits on last-mile connectors to the airport and port complex can also generate moderate to low levels of benefits. • A project with an H would directly and significantly reduce such delay • An M is given when the project has moderate delay reduction benefits

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		directly at those locations • An L is given to a project that may indirectly reduce delay at those locations, such as when a highway project benefits access and delay to an airport.
Connectivity – Hwy	Yes	Connectivity measures the ability to provide additional linkages between freight generators/attractors. • A project that includes a new connection (either a new road or connecting existing roads) specifically meant to serve a freight-generating facility (i.e. airport, port, industrial/manufacturing district, etc.) will receive an H rating. • Projects that include a new connection that is proximate to, but not specifically meant to serve, a freight-generating facility will receive an M rating. Any new connection will be assumed to have some benefit to truck traffic even if it is minimal will get an L rating.
Connectivity - Air/Rail/Port	No	None of the projects deal with connectivity to air/rail/port directly or indirectly.
Freight/Passenger Conflicts	Yes	This measure evaluates whether a strategy will reduce or remove existing freight and passenger conflicts. • An H rating is assigned when the project completely eliminates the conflict, as in the case of truck only lanes that completely separate autos from trucks. • An M rating is assigned when there is significant reduction in the conflict but not complete elimination. For instance, a project that significantly reduces truck traffic on a busy corridor will also reduce the conflict significantly as a result of that reduction. • An L rating is assigned with there is modest levels of conflict reduction.
Land Use Conflicts	Yes	Land use conflicts occur when the project increases the physical footprint or adds through-truck traffic to a route segment that travels through residential areas, past schools or through ecologically sensitive areas. • A project that successfully avoids all impacts with such sensitive land uses or that diverts significant amounts of through-truck traffic from sensitive areas is given an H rating, as it would perform as well or better in this regard as any other project intended to address the same goods movement needs. • A project that traverses sensitive zones may include mitigations that would address its noise and emissions and other environmental impacts on surrounding uses. A project that diverts through-truck traffic from a moderate extent of sensitive land use area is also given an M rating. A project that diverts through-truck traffic from a short extent of sensitive land use area is also given an M rating. • If environmental documentation has not been completed or is unknown, but such mitigations are customary for projects of its type in similar settings, the project is assigned a rating of L for land use impact avoidance. • If mitigation is unknown it is given a rating of N • If mitigation is unknown or impacts are found to be significant and unavoidable in the project's environmental documentation, a negative

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		rating (-) is assigned In assessing the segment length over which potential land use conflicts exist, a buffer distance of 1000 feet will be applied based on the Pacific Institute's report on At a Cross Road for Region's Health.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	Yes	This measures the safety impacts of the project on potentially reducing truck-involved crashes, which in turn improves reliability. • A project will receive an H rating if its main purpose is to reduce truck crashes and improve safety, or that it completely removes a certain conflict and eliminates safety issues. • A project will receive an M rating if it has moderate impacts on crash reduction A project will receive an L rating if it exhibit marginal safety improvements.
Crashes – Crossings	No	None of the projects deal with grade crossings
Bridge Conditions	No	None of the projects deal with bridge conditions.
Pavement Condition	No	None of the projects deal with pavement conditions. Though some projects may slow the deterioration of the pavement, it is not a focus and is thus not considered
Resiliency	Yes	A project improves resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A project receives an H rating if its main purpose is resiliency. • A project receives an M rating if it can have significant resiliency benefits though its primary purpose is not to improve resiliency. • A project receives an L (likely the case for projects in this category) when it has marginal resiliency benefits).
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/Technology	Yes	• A project receives an H rating when it is an ITS/technology project by its very nature, or is very innovative by industry standards. • A project receives an M rating when it employs ITS technology to a large extent or is unconventional/new by industry standards. • A project receives an L rating when there are small elements of technology or innovation involved.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	Yes	This measure tracks the economic impact of a project through the number of jobs and amount of output it generates. It is applicable here as larger projects tends to create more sustained and more noticeable economic impacts. While it is impossible to quantify the impact of most projects due to lack of data, in selected cases REMI was used to estimate direct, indirect and induced impacts, and in other cases existing documentation was used to estimate the direct impacts. • Projects with the largest delay and miles traveled savings usually have the highest economic benefits. Projects with an H rating should have significant output and job number increases that are upwards of millions of dollars in output, and hundreds of jobs generated per year. • Projects with an M rating will have about 1 million dollar of output per

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		year, and up to 100 jobs generated per year. Projects with an L rating will have some output increase per year and any number of jobs generated. It will also include projects where economic benefits cannot be quantified.
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	Yes	Emission impacts come from changes in PM, NOx that are a direct result of the project. These pollutant quantities are determined for some projects using the BAAQMD EMFAC model, which provides an objective and quantifiable metric. • A project with an H rating means its primary purpose is to remove or drastically reduce emissions, such as zero-emission trucks projects. • A project with an M rating means the project will reduce emission significantly but will not eliminate it. • A project with an L rating means it will reduce emission, but the effect may be small or hard to determine. • Projects can also worsen emission, in cases where traffic is actually increased. Such projects will receive a "-"rating.
Equity	Yes	Equity measures noise, light and air and other negative effects on communities that are most vulnerable and disproportionally affected by freight. Equity can be measured by determining whether a project is within one of the impact communities as determined in 2013 using the BAAQMD updated methodology. A buffer distance is applied to a project as well (using the same distances from the land use conflicts analysis) to fully capture its impacts. • A project receiving an H on equity means that its primary purpose is to reduce negative impacts on the most impacted neighborhoods. • A project receiving an M on equity means it has moderate to significant benefits on equity. • A project receiving an L means it has some positive effect on equity. • Projects that negatively affect equity are given a - rating.

5.1 Assess Freeway Truck Restrictions

One way to open up capacity is to analyze impacts to freeway safety, capacity, emissions, and system performance from changes in freeway truck restrictions, including restrictions to particular facilities and lanes. This strategy could be attractive in that it does not involve any capital investment and thus has minimal costs. For Alameda County, this strategy primarily involves lifting the truck ban on I-580 from San Leandro to Grand Ave in Oakland. Eliminating the ban would allow trucks to use the segment that is currently restricted so that truck traffic that is on nearby routes such as I-880, I-80 and I-980 in Oakland and San Leandro area can be reduced.

To estimate the impacts of this strategy, we performed a macro-simulation analysis using the Alameda County Truck Travel Demand Model.[16] First, we performed a model run where we removed the restriction on I-580, and compared that with the model run where the restriction exists. Second, we reported the difference between the model runs using several parameters: changes in passenger and truck vehicle miles traveled (VMT), changes in vehicle hours traveled (VHT) and changes in vehicles hours of delay (VHD). Table 5.2 shows the results of these changes between the truck restriction and no-truck restriction scenario for the impact on the county as a whole, as well as within sub-regions of the project. Looking at how the parameters changed at a finer level of detail provides additional information for us to understand the impacts of the project at different locations which is important for the equity and emissions analysis.

Table 5.2 Freeway Truck Restriction Model Run Results

Route/Area	Total VMT	Truck VMT	Total VHT	Truck VHT	Total VHD	Truck VHD
I-980	-0.1%	-13.2%	0.3%	-9.7%	67.2%	225.1%
I – 80	0.8%	-16.8%	0.5%	-14.8%	-1.0%	-11.9%
I – 580	0.8%	497.6%	2.0%	363.9%	19.0%	700.3%
I – 880	0.0%	-18.9%	-0.9%	-19.4%	-4.5%	-22.6%
Dotted – Focused Area	-0.1%	4.6%	-0.2%	-0.2%	3.5%	-5.1%
Countywide	0.0%	1.8%	-0.2%	0.2%	-0.3%	-1.4%

Figure 5.1 indicates the project location as well as the sub-regions where we reported results. The colors and descriptions correspond to that indicated in Table 5.2.

[16] The model used for all projects in this report are updated based on freight forecasts developed as part of Task 3b of the project.

Figure 5.1 Truck Restriction Project Location and Subregions

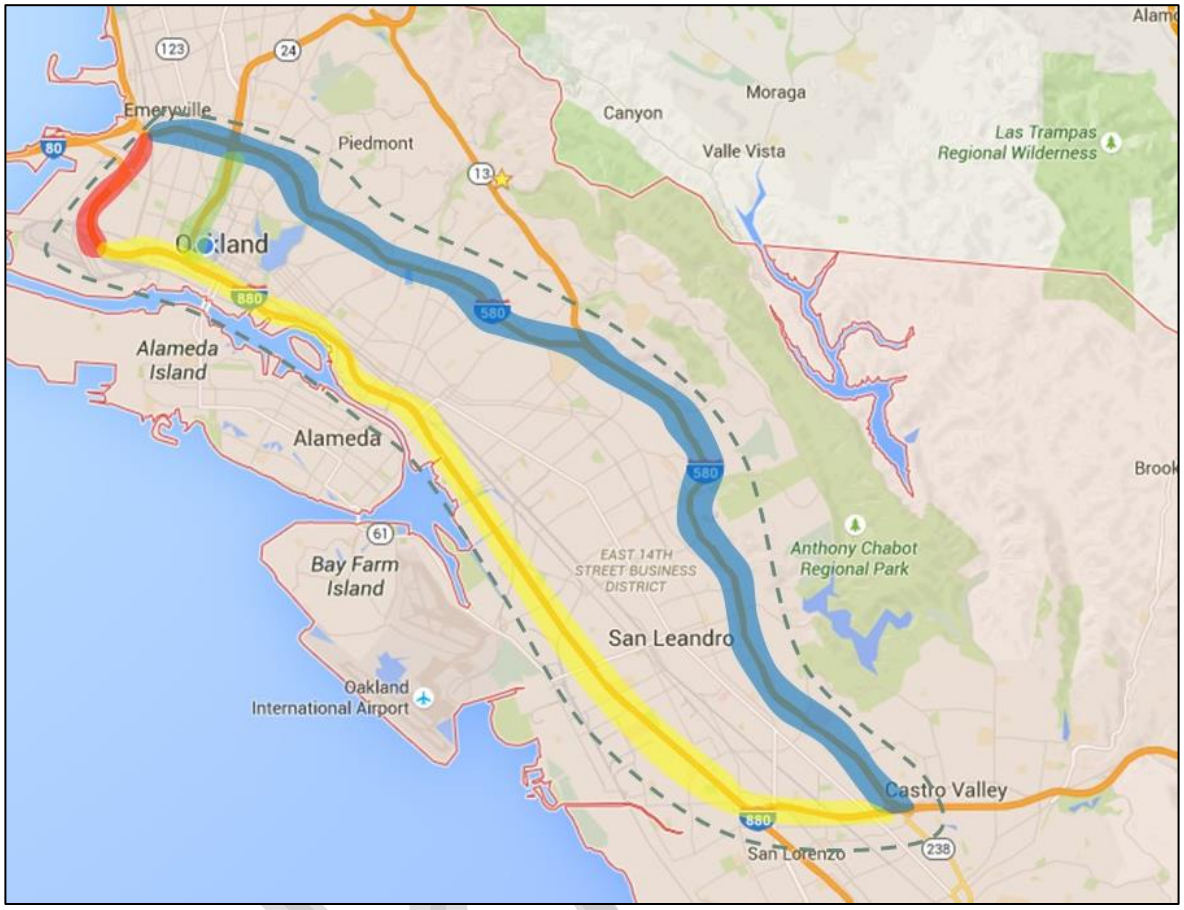


Table 5.3 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Travel time delay on I-880 through Oakland and San Leandro is one of the highest in Alameda County, and is identified as a severe need	H	From the analysis of results above, 19% of truck VMT that are on I-880 shifted away from I-880, which resulted in a reduction of 19% in truck VHT and 22.6% in truck delay on I-880. This indicates that I-880 congestion truck traffic is noticeably reduced. Similar truck delay reduction is also experienced on I-80, and I-980 that bounds west Oakland. From a countywide perspective, The overall effect around a 1 mile buffer region of I-580 and I-880 shows a net reduction of 5.1% of truck delay. This number is marginally significant on a countywide level, however, at only 1.4% reduction in truck delay. However, total delay in the impact	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
			area (within the dotted line) is increased by 3.5%. This suggests that the overall impact of increased delay on I-580 and I-980 more than make up for the delay benefits on I-880. This is because these routes are generally congested without trucks today and because as capacity is freed up on I-880 by diversion of trucks it is backfilled with auto traffic. The project effectiveness is rated M on this measure because of the significant benefit to trucks offset by the disbenefits to commuters. It may be possible to fine tune the project and the analysis to remove the restriction in off-peak hours when congestion on I-580 is not as great. Since truck traffic tends to peak during the day and I-880 experiences localized congestion throughout the day, this may still provide delay benefits for trucks.		
Travel Time Delay –Port and Airport	Travel time delay at the Port is a significant issue, and it is a moderate issue at the airport.	M	The reduction in truck delay around the OAK airport is around 22.6%, and around the Port of Oakland and its rail terminals it averages 15% (between I-880 and I-80). However, this is not directly related to traffic going into and out of the port.	L	L
Connectivity - Highway	The existing I-800 route provides a relatively complete circulatory network for trucks accessing the Bay Area and residences/businesses along I-580, though direct connectivity to I-580 could be better.	L	Opening up I-580 provides an additional connection to truckers that move between San Joaquin Valley, North Bay and the industrial areas in between. The level of truck diversion that was shown by the models suggests that even with congestion on I-580 there is demand for this alternative. However the diversion to I-980 suggests that much of the diverted truck traffic is still trying to access Oakland.	M	M
Land Use Conflicts / Benefits	The existing I-580 truck restricted portion is immediately adjacent to residential neighborhoods. The I-880 northern portion highlighted is immediately adjacent to residents as well as many businesses. I-80 and I-980 in Oakland are immediately adjacent to	M	The shifting of the truck traffic to I-580 would potentially increase impacts in nearby neighborhoods due to increased traffic, however this would reduce impacts in sensitive lands around I-880, I-980 and I-80 near Oakland. Provided that mitigation measures are adopted for this project, the impact on land uses in this case is	N	N

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	businesses and residences as well.		approximately neutral.		
Crashes - Truck	Many locations along northern I-880 are high truck crash locations, crashes also happen on I-80 and I-980.	M	The effect of this project on crashes is unclear	N	N
Jobs / Output / Co-Benefits	Providing jobs and increasing economic competitiveness is a primary goal of Alameda County	M	According to REMI results for this study, for the future year 2040, the project will generate a negligible number of jobs and will generate about $28,000 in terms of output.	L	L
Emissions	The West Oakland and Oakland neighborhoods are one of the areas with the worst emissions problems according to the needs assessment	H	According to our emissions analysis using the EMFAC emission factors, the project, on a countywide basis will create a health impact of $4,000 dollars.	-	-
Equity	The project area west of I-580 is in one of the 2013 impacted communities according to the BAAQMD study. The West Oakland area bounded by I-880, I-980 and I-80 is one of the most impacted communities.	H	This project will increase truck traffic on the I-580 corridor and in neighborhood areas of Piedmont, San Leandro and Oakland. Since only the area to the west of I-580 is an impacted community (based on BAAQMD study), and given that reduction in truck traffic along I-880, I-980 and I-80 directly reduce the burden on the West Oakland community, there should be a net benefit of equity impacts as it alleviates some adverse effects on the most impacted communities.	H	H

5.2 Off-Peak and Novel Delivery Policy Guidance and Demonstration Program

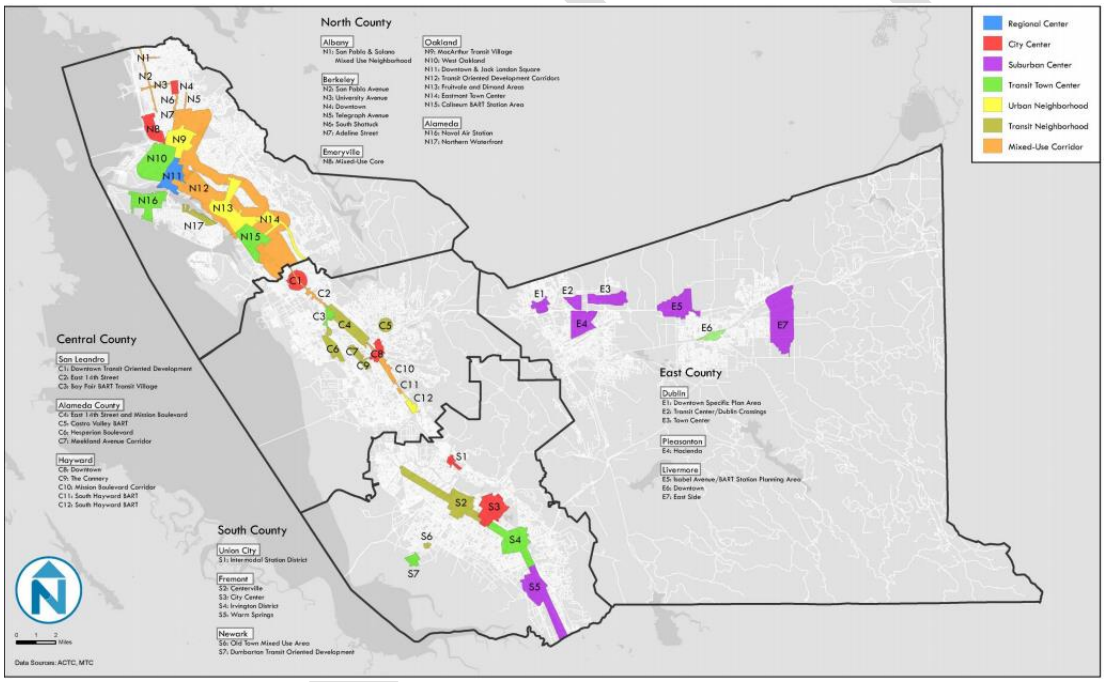
The Off peak delivery program was a concept that was successfully tested in New York City that shifted city delivery truck traffic from peak congested hours to off peak times at night. It is estimated that, if fully funded, the program could switch in excess of 20% of the congested day hours freight traffic deliveries to the off-hours (between 7PM and 6AM). The impacts in New York City were significant: $150-$200 million/year in economic benefits associated with travel time savings, productivity increases, and sizable pollution reductions.[17]

[17] The New York City Off-Hour Delivery Project: Lessons for City Logistics, Holguin-Veras et. al, 2014

Of course, the success of the program would depend on many factors, and a successful pilot program relies on a good design which includes identification of target groups, incentives, and proper coordination. While in reality the first pilot test would likely happen at a city level, for our evaluation purposes we simulated a pilot test situation in which shipments to all of the existing and proposed PDAs in Alameda County were delivered in the off-peak. PDAs are specifically chosen as target geographies because they will serve as the future centers for urban deliveries.

Specifically, in order to quantify the impact of such a project, we conducted a macro-simulation run using the Alameda County Truck Travel Demand model. For all the PDAs in Alameda County as shown in Figure 5.2, we reduced the AM and PM peak period truck trips by 20 percent (consistent with the results from the NYC study) and shifted into the night time, for the year 2040. Then we compared the changes in VMT, VHT and VHD for the build and no-build scenario to determine the impact of the project.

Figure 5.2 Alameda County's PDAs



Source: http://www.Alamedalameda CTC.org/files/managed/Document/10698/AlamedaCounty_PDA_IGS_Final_March_2013.pdf

Table 5.4 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Travel time delay and congestion during peak times is one of the major issues facing Alameda County.	H	On a countywide level, the simulation generated a 10.5% reduction in truck delay and 14.7% in total vehicle delay, which is the highest out of all the simulation runs, and represents a significant reduction in travel time delay on a countywide level.	H	H
Crashes - Truck	High levels of congestion is directly correlated with high truck crashes. Some of the PDAs contain crash hotspots.	H	A reduction of crashes will likely happen as a result of the reduced delay. The small reductions in VMT and VHT also improves truck safety by reducing rates of exposure.	M	M
Passenger/Freight Conflicts	Urban delivery activities create significant conflicts with pedestrians and cyclists in downtown centers	H	Reduction of peak time delivery activities will reduce the conflict as shown in several studies	H	H
Land Use Conflicts/ Benefits	The PDAs in the county are by themselves mixed use developments that contain sensitive land uses. However, given that their purpose is to mix work and play, the land use conflicts here is not an important consideration.	L	Shifting delivery activities to off peak hours can have effects though the specific effect is unclear.	N	N
ITS/Technology	Innovative operational based strategies are important to help address congestion issues in urban areas without having to expand capacity	H	This project uses a new and unconventional approach to address congestion.	M	M
Jobs / Output / Co-Benefits	Providing jobs and increasing economic competitiveness is a primary goal of Alameda County	M	According to REMI results for this study, for the future year 2040, the project will generate about 11 jobs and will gain about 1.9 million dollars in terms of output. While the jobs generate is only a small amount, the 1.9 million dollars generated is significant.	H	H
Emissions	The neighborhoods in the I-880 corridor are one of the areas with the worst emissions problems according to the needs assessment.	H	According to our emissions analysis using the EMFAC emission factors, the project, on a countywide basis will create about 4,000 dollars in savings.	M	M
Equity	The PDAs in the county are by themselves mixed use	H	Shifting delivery activities to off peak hours have unclear effects	N	N

	developments that overlap with several impacted communities.	on equity.

5.3 Bypass Lanes in I-880, I-238, I-580 Corridors

This project involves constructing truck bypass lanes at I-238/I-580 and I-238/I-880 interchanges. Truck bypasses would address operational conflicts between trucks and autos in merge/weave sections of these two interchanges which experiences heavy truck traffic. The primary purpose of truck bypass lanes is to enhance safety and stabilize the traffic flow. While bypass lanes can be simulated using microsimulation software, for our study, the travel demand model is not detailed enough to allow this project to be simulated. Thus, only qualitative evaluations are done for this project.

Table 5.5 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	The interchanges at I-238/I-580 and I-238/I-880 are top delay locations in Alameda County and experience significant congestion.	H	A truck bypass lane at the junction of I-880, I-238, and I-580 will reduce truck delay by stabilizing truck flow and providing them with dedicated lanes of travel, and reduce weaving/merging activities.	M	H
Connectivity - Highway	Existing connectivity will allow trucks to access all areas but additional connectivity is a plus.	L	The bypass lanes would reduce delay but would not provide a new connection or shorter route.	N	L
Land Use Conflicts/ Benefits	The area is adjacent to some residential areas as well as a high school.	M	The project will not create noticeable impacts on land use.	N	N
Passenger/Freight Conflict	Conflicts between freight and passenger cars is an issue here due to significant merge and weave at the interchanges.	M	This would eliminate the conflict between autos and trucks as trucks will travel on dedicated lanes	H	H
Crashes - Truck	The two interchanges are high crash locations in the County due to high volumes of heterogeneous traffic and acute roadway geometry.	H	Truck involved accidents with autos would be nearly eliminated due to the physical separation. However truck-truck crashes can still happen is the volumes remain high.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Resiliency	Resiliency along the corridors is of marginal importance to the region	L	This would also provide an alternative connection in case of emergency situations, though because truck traffic will still merge with auto traffic eventually, there is only marginal resiliency benefit	L	L
Emissions	Air quality issues is associated with the high truck volumes here.	M	The project will have some emission benefits provided that trucks do not take a significantly longer path.	L	L

5.4 I-880 and I-580 Integrated Corridor Management (ICM) Project

This project would implement Integrated Corridor Management (ICM) technologies to allow for managed throughput of vehicles onto the I-880 and I-580 freeways during freeway traffic incidents. This would be accomplished through two elements. First, the deployment of Adaptive Ramp Metering (ARM) on all freeway ramps in this corridor would provide the means to control the number of vehicles entering the facility during an incident. Secondly, through deployment of an Advanced Traffic Management (ATM) system, based on the freeway conditions during the incident (monitored through traffic sensors), the ramp metering timing of each on-ramp would be optimized to support the freeway throughput limitations caused by the incident; and this system would be dynamic, and self-adjust itself as conditions change (e.g. and closed lanes from the incident are opened). This project will be very similar to the I-80 ICM project that is already completed, with projected significant reduction in crashes and improvements in speeds.[18] Its main goal will be to improve travel time reliability and reduce accidents and associated congestion. This type of project is attractive because of the high benefit cost ratio. For instance, the ICM project in Dallas has a calculated ratio of 20:1.[19]

[18] http://www.alamedactc.org/files/managed/Document/5086/I-80_ICM_Concept_of_Operations_Final.pdf

[19] http://www.nctcog.org/trans/committees/sttc/Itm_6.ICMSTTCApril2013.pdf

Table 5.6 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Travel time delay on I-880 through Oakland and San Leandro is one of the highest in Alameda County, and travel time delay on I-580 east of I-880 is also one of the highest in the County	H	Modeling on the Dallas ICM has forecasted a 3% improvement in travel time reliability, this value increase to about 10% for San Diego ICM and 4% for Minneapolis ICM. The I-80 ICM expected increases in peak hour speeds of 10 to 25%.	L	M
Connectivity - Highway	Connectivity on the highway currently is generally sufficient.	L	Traveler information that integrates freeway and arterial information can provide for more comprehensive alternate routing that uses both freeways and arterials	H	M
Crashes – Highway	These two highway segments contain significant crash hotspots	H	ICM will allow for rerouting of traffic in the event of incident and reduce secondary crashes, thus improving safety significantly. The I-80 ICM concept operations cited potential crash reductions in the range of 15% to 50%.	H	H
ITS/Technology	ITS technology is an important strategy for major freight corridors with lots of expansion constraints.	H	Traveler information systems that provide accurate information on real-time conditions has been a historically successful ITS deployment in major metro areas	H	H
Resiliency	Resiliency along the corridors is of marginal importance to the region	L	Through proactive strategic control of ramp metering by the Advanced Traffic Management System, the corridor can recover more quickly from an incident	M	M
Emissions	Emissions along the corridors are directly correlated with the high traffic volumes.	H	There will likely be corresponding reductions in emissions from reductions in travel time and improved vehicle movement efficiency. Dallas ICM demonstrated an annual saving of 9,400 tons of mobile source emissions.	M	M

5.5 Summary of Findings

Table 5.7 summarizes the evaluation results presented above and prioritizes the four major road projects and programs. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column. In general, a project is selected as a first priority project

when it has at least one high rating. The first priority projects are included in the opportunity packages discussed in Section 2.0.

Table 5.7 Summary of Evaluations of Major Highway Projects and Programs

Strategy Name	Priority	Explanation
Off-Peak and Novel Delivery Policy Guidance and Demonstration Program	First	This project is rated high across multiple categories Provide significant congestion relief on a countywide basis without capital investment, reduces conflict of urban delivery in priority development areas and has shown demonstrated success in New York City.
I-880 and I-580 Integrated Corridor Management (ICM) Project	First	This project is rated high across multiple categories. Improved travel time reliability and demonstrated benefit in safety as witnessed through the existing I-80 ICM project. Travel time delay and associated emissions also noticeably reduced as demonstrated by various metro area ICM pilots.
Bypass Lanes in I-880, I-238, I-580 Corridors	First	This project is rated high across several categories. Reduces operational conflicts at the two key freeway-freeway interchanges with high traffic throughput in Alameda County to streamline operations and improve safety.
Assess Freeway Truck Restrictions	Second	This project is rated high on equity but medium and low ratings on other measures due to modest delay savings. Given that it creates some additional negative emissions it is not recommended as a first priority project.

6.0 INTERCHANGE AND AUXILIARY LANE PROJECTS

This group of projects include interchange improvement and auxiliary lane improvement projects. The guidelines for assigning ratings effectiveness are shown in Table 6.1. For this group of projects, the importance of the problem is determined from 3 factors: the total truck volume on the mainline, whether the location is a top delay location, and whether the location is a top crash hotspot based on results from the needs assessment. These three pieces of information are displayed in a table within each project section.

Table 6.1 Guidelines for Assigning Ratings for Interchange and Auxiliary Lane Projects

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay – Highway	Yes	This measure evaluates the delay benefits of a project or program. • To receive an H rating, the interchange reconstruction project must include spot capacity expansions. Capacity expansions at interchanges have the potential to limit the formation of queues that spill over onto the mainline. • To receive an M ranking the project must include some operational component that could potentially increase throughput and limit the potential for queue formation on the mainline (i.e. signal timing, re-striping to add a turn lane, etc.). This in turn would help to reduce truck delay. • To receive an L, an interchange reconstruction would generally have some benefit to mainline traffic, even if it is only minimal. Note that though a model run was performed to quantify delay savings at select interchanges, the observed delay reductions are negligible and therefore not discussed on a project-by-project basis. The modeling results are discussed in Section 6.5.
Travel Time Delay - Air/Rail/Port	No	This metric is not applicable for interchange projects.
Connectivity – Hwy	Yes	Connectivity measures the ability to provide additional linkages between freight generators/attractors. • Only interchange projects that include a new connection (either a new road or connecting existing roads) specifically meant to serve a freight-generating facility (i.e. airport, port, industrial/manufacturing district, etc.) will receive an H rating. • Interchange projects that include a new connection that is proximate to, but not specifically meant to serve, a freight-generating facility will receive an M rating. • Any new connection will be assumed to have some benefit to truck traffic even if it is minimal will receive an L rating.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Connectivity - Air/Rail/Port	No	None of the projects deal with connectivity to air/rail/port directly or indirectly.
Freight/Passenger Conflicts	No	None of the projects deal with freight/passenger conflicts.
Land Use Conflicts	Yes	None of the projects deal with land use conflicts.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	Yes	This measures the safety impacts of the project on potentially reducing truck-involved crashes, which in turn improves reliability. • Only intersection projects that include a component to address a specific safety issue will receive an H rating. Interchange projects that add auxiliary lanes, or other moderate safety improvements, to high truck crash sections of the highway are considered medium-level safety improvements. This ranking assumes that an interchange reconstruction would generally have some benefit to truck safety. Interchange reconstruction projects that include auxiliary lanes, or other low to moderate safety improvements, but are on low truck-crash sections of the network will receive a low rating.
Crashes – Crossings	No	None of the projects deal with grade crossings
Bridge Conditions	No	None of the projects deal with bridge conditions.
Pavement Condition	No	None of the projects deal with pavement conditions.
Resiliency	No	None of the projects deal with resiliency.
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/ Technology	No	None of the projects deal with ITS/Technology.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	Yes	None of the projects would have direct job/output/co-benefits. Though the projects that increase highway capacity can allow for more trucks to travel between freight generators and attractors, thus facilitating economic development.
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	No	Note that though a model run was performed to quantify delay savings, and its consequent emissions savings at select interchanges, the observed emission reductions are negligible and therefore not discussed on a project-by-project basis. The modeling results are discussed in Section 6.5.
Equity	No	These projects are not expected to have measurable equity benefits.

6.1 I-880 Corridor Projects

6.1.1 I-880/Winton Avenue Interchange

The Winton Avenue/I-880 Interchange Improvement Project proposes to modify the existing deficient cloverleaf interchange configuration to a partial cloverleaf by making the on- and off-ramp connections intersect at 90 degrees with Winton Avenue. The project also proposes a direct connection from southbound I-880 off-ramp to the Southland Mall with access to La Playa Drive, providing a new route to the mall and avoiding the short weave from the interchange to Winton Avenue left-turn lanes to Southland Mall Drive. Other interchange improvements include implementing Complete Streets designs with bike lanes and sidewalk on both sides of the bridge overcrossing, eliminating the free flowing ramps onto Winton Avenue and signalizing the ramp intersections. Figures 6.1 and 6.2 show the before and after pictures of the interchange.

Figure 6.1 I-880/Winton Avenue Interchange
Before

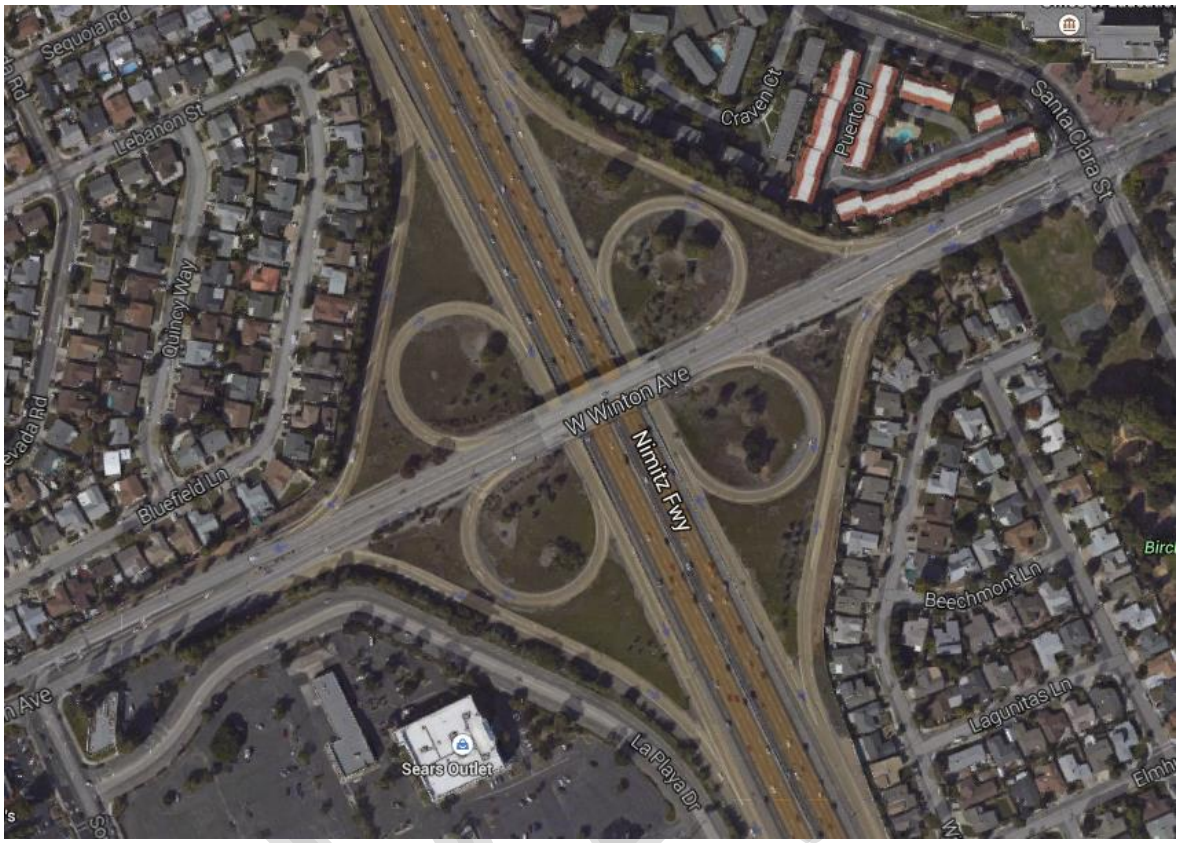


Figure 6.2 I-880/Winton Avenue Interchange
After

Source: Alameda CTC.

Table 6.2 Location Volumes and Importance

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	219,000	14,454	No	No

Table 6.3 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	There is limited truck delay along this portion of the I-880 corridor based on the demand model results. Though Caltrans data indicates that it does carry significant numbers of trucks (14,454), they are a relatively small fraction of total traffic (219,000).	L	The rebuilding of the ramps and the new connection to Southland Mall will have limited impact on truck delay. These improvements will have a larger benefit for passenger vehicles.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Safety	Based on truck crash data this site does not currently pose a safety problem. Though there are significant safety problems for passenger vehicles at this site, its truck crash rate does not rank among the County's highest.	L	The rebuilding of the ramps will improve the turning radii for trucks which can reduce rollover risk. However, this benefit will be moderate.	L	L
Connectivity	Though Southland Mall does generate truck traffic, it is not a major source of truck trips for the region. Truck connectivity to this site is not as important as connectivity to larger freight generators.	N	The new connection to Southland Mall will primarily benefit passenger vehicles. The reconfigured ramp does not directly affect connectivity.	N	N

6.1.2 I-880/A Street Interchange Improvements in Hayward

This project will reconstruct the interchange in order to accommodate widening of A Street from five lanes to six lanes underneath the overpass. The final alignment will consist of two continuous through lanes and one continuous left turn lane in each direction. As part of this project, there will also be modifications to the intersection design and signal timing.

Figure 6.3 I-880/A Street Interchange Project Location

This project will benefit trucks turning onto I-880 entry and exit ramps since capacity along A Street will be increased. This area also has relatively high volumes of trucks (half of them 5-axle) and truck delay. Improving capacity on A Street will improve conditions on the major bottleneck that exists underneath the overpass. The combination of capacity improvements on A Street and the addition of auxiliary lanes along I-880 as part of another project should prevent the development of long queues from forming along the highway. This is important since capacity improvements on A Street may also attract more trucks seeking to access Hayward Executive Airport, which serves as an operation center for the air cargo carrier Ameriflight, and the industrial area southwest of the airport.

Table 6.4 Location Characteristics

	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	223,000	18,955	Yes	Yes

Table 6.5 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	This location was identified as one that experiences significant truck delays as it is an identified truck bottleneck.	H	Adding continuous through lanes in each direction and left-turn lanes will alleviate delay on A Street. They will also benefit delay on I-880, but only if the capacity expansion is significant enough to help prevent the development of queues on I-880	M	M
Safety	There is a relatively high rate of truck-involved crashes along this corridor, and the location is a truck crashes hotspot.	H	The addition of left-turn lanes will have a positive impact on safety.	M	M
Connectivity	Connectivity is not a problem at this location.	N	None of the improvements will affect connectivity.	N	N

6.1.3 I-880 NB and SB Auxiliary Lanes between West A Street and Winton in Hayward

This project will add auxiliary lanes to the NB and SB segment of I-880 between West A Street and Winton Street for the northbound and southbound directions. Auxiliary lanes will be added between A Street and Paseo Grande on the northbound segment only. The addition of auxiliary lanes will benefit truck traffic as these lanes facilitate truck climbing, speed change, and maneuvering of entering and leaving traffic. This section of I-880 has a relatively high number of truck-involved collisions. The addition of auxiliary lanes should help with truck safety as they would allow trucks to more easily enter and exit the freeway. Also, the combined benefits of this project and the A Street interchange reconstruction should help to ease delay on this section of I-880.

Figure 6.4 I-880 NB and SB Auxiliary Lanes Project Location

Table 6.6 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	196,000	11,564	Yes	Yes

Table 6.7 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Though truck volumes are only approximately 6 percent of total traffic, this location is identified as a significant truck bottleneck.	H	Adding auxiliary lanes along the corridor will directly benefit truck traffic. Auxiliary lanes allow vehicles more room to execute weaving maneuvers and climb entry/exit ramps.	H	H
Crashes – truck	This location is a truck crash hotspot.	H	The safety effectiveness of the lanes are more moderate. They should help vehicles avoid conflicts.	M	M
Connectivity	Connectivity is not a problem at this location.	N	None of the improvements will affect connectivity.	N	N

6.1.4 I-880/High St Interchange Improvements on Jensen, Howard Streets, High Street, 42nd Ave, Coliseum Way in Oakland

This project will extend and align 42nd Avenue with Alameda Avenue in order to provide a parallel route to High Street. High Street will be widened in order to provide additional capacity at the intersections of Oakport Street and Coliseum Way. In addition, E. 8th Street near Alameda Avenue, Jensen Street, and Howard Street will all be realigned. Jensen and Howard Streets will also be extended to connect to High Street and 42nd Avenue.

These improvements will improve traffic circulation on local roadways near the I-880/42nd Avenue interchange and improve access to the Cities of Oakland and Alameda for vehicles traveling along 42nd Avenue and High Street from I-880. This improved access will be particularly beneficial to trucks given the significant amount of "big box" retail, warehousing, and wholesale distribution that appears to be present in the project area. In addition, traffic flow on I-880 and the local streets connecting to it (i.e. High Street, Jensen Street, etc.) will be improved by the increased storage capacity on the highway's entry and exit ramps. Given that truck delay is significant along this portion of the I-880 corridor, especially southbound, this project potentially offers much relief.

Figure 6.5 I-880/High St Interchange Improvements Project Location

Table 6.8 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	205,000	21,115	Yes	No
Caltrans Total on SR 77/42nd Ave. (2012)	20,000	506	N/A	N/A

Table 6.9 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	This portion of the I-880 corridor was identified as having significant truck delays. Trucks comprise approximately 10 percent of traffic at this location and it is also a significant truck bottleneck.	H	The extensions, realignments, and widening of local roads will not directly impact mainline truck delay. However, these improvements will lessen delay for trucks that use this interchange to a limited extent. Also, the improvements may alleviate truck delay on I-880 if it prevents queue spillovers onto the highway.	L	M
Crashes – truck	Truck safety is not a significant issue along this portion of the I-880 corridor. It was not identified as having a relatively high crash rate.	L	None of these projects directly address truck safety on I-880. However, the realignment of several intersections that are closely clustered together should help with truck safety on local roads.	L	N
Connectivity	Connectivity is not a problem at this location.	N	The extension of local streets will improve connectivity, though not on the highway.	N	L

6.1.5 I-880 Auxiliary Lanes between Whipple in Union City and Industrial Parkway West in Hayward

This project will add auxiliary lanes to this section of I-880 by widening the freeway and reconfiguring the lane layout to provide the minimum lane widths identified by Caltrans. This assumes the existing I-880 bridge over Alameda Creek would be widened to accommodate the new cross-section. Though truck delay on this portion of I-880 is relatively moderate, the addition of auxiliary lanes will benefit truck traffic flow as these lanes facilitate truck climbing, speed change, and maneuvering of entering and leaving traffic. The addition of auxiliary lanes should also help to improve overall safety in addition to improving truck traffic flow as truck-involved collisions along this section of the I-880 corridor are relatively high.

Figure 6.6 I-880 Auxiliary Lanes between Whipple in Union City and Industrial Parkway West in Hayward Project Location

Table 6.10 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	209,000	12,331	No	Yes

Table 6.11 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Truck delay is not a significant problem at this point in the I-880 corridor.	N	Though auxiliary lanes would help to alleviate delay by facilitating weaving movements and truck climbing, delay is not a significant issue at this point in the corridor.	L	L
Crashes – truck	This portion of the I-880 corridor was identified as having relatively high truck-involved crash rates. However, trucks comprise 6 percent of total traffic.	M	Auxiliary lanes will moderately improve safety as they will potentially decrease dangerous weaving as vehicles enter and exit the highway.	M	M
Connectivity	Connectivity is not an issue at this location.	N	These improvements will not affect connectivity.	N	N

6.1.6 I-880 at Industrial Parkway Interchange Improvement

Economic development in Hayward has been restricted by the inadequate and ineffective interchange system in the southern part of the city. In particular, there is no northbound off ramp at Industrial Parkway that can provide direct access to employment and business centers on Industrial Parkway. Drivers and trucks must utilize the Whipple off ramp and get to Industrial Parkway via Industrial Parkway southwest. This is very inefficient, causes extra delay and results in additional congestion at the I - 880/Whipple Road interchange.

This project will provide a northbound off ramp and a southbound HOV bypass lane on the southbound loop on-ramp, also it will reconstruct the bridge over I-880. Benefits include overall congestion relief on I-880 between Whipple Road and Tennyson Road as well as at the I-880/Whipple Road interchange. This project will enhance the economy and goods movement by providing direct access to businesses in Hayward and in Union City. Provide for the routine accommodation of bicyclists.

Figure 6.7 I-880 at Industrial Parkway Interchange Project Location

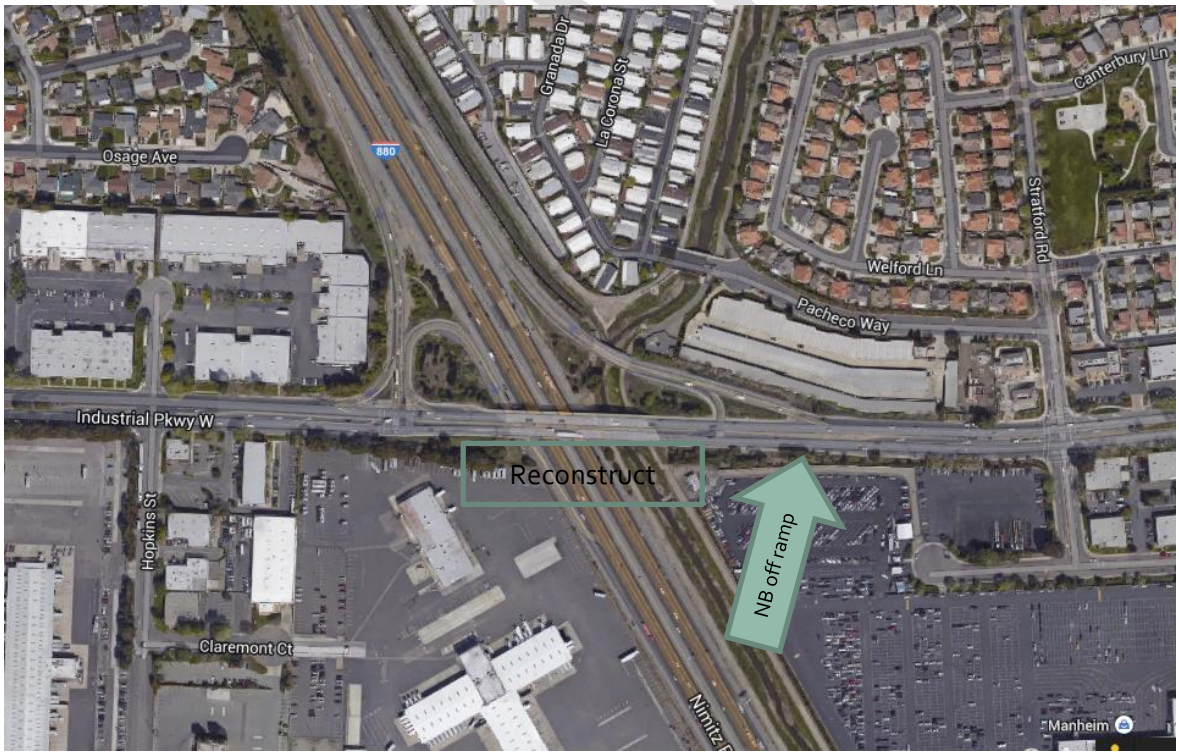


Table 6.12 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	196,000	11,564	No	Yes

Table 6.13 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Truck delay is not a significant problem at this point in the I-880 corridor.	N	The addition of the off-ramp will likely reduce overall system delay by reducing delay at Whipple and Tennyson Rd.	M	L
Crashes – truck	This portion of the I-880 corridor was identified as having relatively high truck-involved crash rates. However, trucks comprise approximately 6 percent of total traffic.	M	The addition of HOV lanes will remove truck-passenger conflicts which should help to improve the safety problem.	M	M
Connectivity	There are industrial facilities in this area that the interchange grants access to.	M	The addition of a NB off-ramp to this interchange will improve connectivity to neighboring industrial areas.	L	L

6.2 I-580 Corridor Projects

6.2.1 I-580/San Ramon Road/Foothill Road Interchange Improvements

This project will eliminate both the eastbound diagonal off-ramp and eastbound loop off-ramp (which appears to be partially removed in the latest Google Maps image). They will be replaced with new signalized intersections. The new configuration will aid traffic circulation and prevent weaving at the interchange. The primary generators of truck traffic along this portion of the I-580 corridor are most likely the Stoneridge Shopping Center and Dublin Place malls. However, given the relatively small truck volumes these facilities are likely to generate and the lack of a truck bottleneck on this segment, the project is not expected to have a large impact on regional truck flows.

Figure 6.8 I-580/San Ramon Road/Foothill Road Interchange Project Location

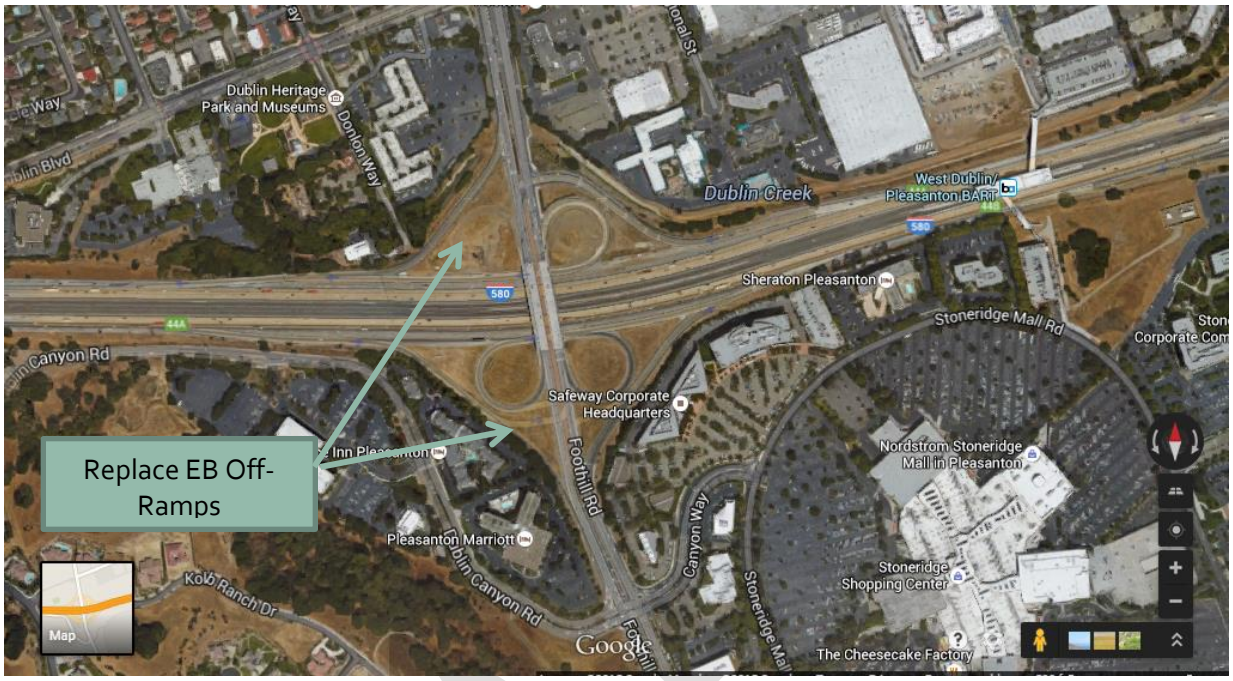


Table 6.14 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-580 (2012)	184,000	12,457	No	No

Table 6.15 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Truck delay is not a significant problem at this point in the I-580 corridor.	N	Adding signals to this interchange will increase delay for the trucks that utilize it. It will not affect mainline operations.	N	N
Crashes – truck	Truck-involved incidents are relatively low along this portion of the I-580 corridor.	N	Though truck-involved incidents are not high, adding a traffic signal will improve safety for trucks that are present.	H	L
Connectivity	Connectivity is not an issue at this location as the surrounding area's land use is mostly residential and commercial.	N	None of these projects directly address connectivity.	N	N

6.2.2 Freeway/Expressway Interchange Modifications (I-580/Fallon and I-580/Hacienda)

The I-580/Fallon Road interchange (Figure 6.9) will be reconstructed so that the overpass consists of four lanes in each direction. Other improvements include reconstructing the southbound-to-eastbound on-ramp; widening the eastbound off-ramp to provide two exit lanes with two left-turn and two right-turn lanes; widening the eastbound on-ramp; widening the westbound off-ramp to provide-two left turn and two right-turn lanes; and widening the westbound on-ramp. Likewise, the I-580/Hacienda Drive interchange (Figure bottom) will be reconstructed so that an additional northbound lane is added to the overpass. In addition, both the eastbound and westbound off-ramps will be widened to include a third left-turn lane.

These projects are likely to improve conditions for trucks accessing the large retail centers that sit between the two interchanges. However, other than these facilities there appear to be no other significant generators of truck traffic in the area.

Figure 6.9 Freeway/Expressway Interchange Modifications I-580/Fallon Project Location

Figure 6.10 Freeway/Expressway Interchange I 580/Hacienda Project Location

Table 6.16 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-580 (2012)	184,000	12,457	Yes (Primarily AM Peak)	No

Table 6.17 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	There is truck delay in this corridor. However it is primarily in the AM peak period.	M	Widening the interstate off-ramps could help to improve mainline operations. Though queue spillovers do not seem to be a significant issue at this location, the widening of the off-ramps will improve conditions to the extent that they are problematic.	L	L
Crashes – truck	Truck-involved incidents are relatively low along this portion of the I-580 corridor.	N	The addition of left-turn lanes will remove left-turning vehicles from the traffic stream. This will help to improve safety on the interchange, but not on the highway.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Connectivity	Connectivity is not an issue at this location as the surrounding area's land use is mostly residential and commercial.	N	None of the improvements affect connectivity.	N	N

6.2.3 I-580/I-680 Interchange Truck Safety Improvements

This project will perform scoping/feasibility studies to identify potential project alternatives or other measures to reduce truck-involved crashes on the I-580 mainline east of the I-680 interchange. Given that truck-involved collisions on this portion of the freeway is relatively high, this project may ultimately result in good solutions to an existing problem.

Figure 6.11 I-580/I-680 Interchange Truck Safety Improvements Project Location

Table 6.18 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-580 (2012)	184,000	12,457	Yes (Primarily PM Peak)	Yes

Table 6.19 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	There is truck delay in this corridor. However it is primarily in the PM peak period.	M	None of the improvements directly affect truck delay.	N	N
Crashes – truck	Truck-involved incidents are relatively low along this portion of the I-580 corridor.	H	Though the project is for a scoping/feasibility study, its results should directly benefit truck safety in the long-term.	M	M
Connectivity	Connectivity is not an issue at this location as the surrounding area's land use is mostly residential and commercial.	N	None of the improvements specifically address freight connectivity.	N	N

6.2.4 I-580/Vasco Road interchange Improvements in Livermore

This project will modify the interchange by widening the I-580 overcrossing and add new loop ramp in southwest quadrant. It will also widen Vasco Road to 8 lanes between Northfront Road and Las Positas Road and include other local roadway improvements. The improvements will expand capacity, enhance operations and safety, reduce congestion, and mitigate future congestion generated by continuing development as part of the City's and Eastern Contra Costa County's General Plan. It will mitigate weaving problems and improve access between North Livermore and the remainder of the City. These improvements will be important for trucks accessing the commercial and industrial area that sits between I-580 and the BART rail line as well as the Lawrence Livermore National Laboratory.

These improvements are also important because Vasco Road/I-880 interchange is a top truck delay segment in both the morning and evening peak periods. The geometry of the interchange creates significant conflicts resulting in queues that extend for miles during peak hours. In addition, the number of truck involved collisions at this intersection is significant.

Figure 6.12 I-580/Vasco Road interchange Improvements Project Location

Table 6.20 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-580 (2012)	166,000	7,553	Yes	Yes

Table 6.21 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	This portion of the I-580 corridor was identified as having relatively high values of truck delay. It is also a top truck bottleneck.	H	Widening the overpass will alleviate delay by expanding capacity. Also, the addition of the southbound-to-eastbound on-ramp will allow passenger vehicles (coming from the residential area north of I-580) to bypass the industrial area south of the highway. This will prevent trucks from being delayed getting onto the highway.	H	H
Crashes – truck	This location was also identified as having a relatively high number of truck-involved collisions.	M	Widening will also help with truck safety for the same reasons as they alleviate delay.	L	L

Connectivity	Trucks cannot directly access the industrial area southwest of the interchange.	L	The addition of a new southbound-to-eastbound ramp creates a new connection, though it would likely be more heavily used by passenger vehicles than trucks.	L	L

6.2.5 I-580/Isabel Avenue Interchange, Phase 2 in Livermore

This project addresses issues at both the I-580/Isabel Avenue interchange and the Portola Avenue flyover east of the interchange. As part of this project, Isabel Avenue will be widened to 6 lanes over I-580 while the Portola Avenue flyover will be widened to 4 lanes. The interchange is located near the Livermore Municipal Airport, however, this airport does not likely generate much truck traffic.

Figure 6.13 I-580/Isabel Avenue Interchange Phase 2 Project Location

Table 6.22 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-580 (2012)	166,000 – 176,000	7,553 – 16,174	Yes (Primarily in the AM Peak)	No

Table 6.23 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	This portion of the I-580 corridor was identified as having relatively high values of truck delay.	M	Widening the local roads will impact truck delay on the highway only if the added capacity allows the off-ramp to be cleared of vehicles with greater frequency.	L	L
Crashes – truck	Truck-involved incidents at this location were relatively low.	N	These improvements do not directly address safety.	N	N
Connectivity	There were no connectivity issues identified at this location.	N	These improvements do not directly address connectivity.	N	N

6.3 I-80 Corridor Projects

6.3.1 I-80/ Ashby Avenue Interchange Improvement

In this project, the interchange will be reconstructed so that it is fully accessible to vehicles traveling to and from Emeryville and Berkeley. The two existing bridges will be replaced by a single bridge and two roundabouts will be added to the interchange. Also, the eastbound on-ramp in Aquatic Park in Berkeley will be relocated to a more efficient location. The interchange reconstruction will reduce traffic congestion at Ashby Ave. and 7th Street in Berkeley and at Powell Street and Christie Street in Emeryville. The improvements will facilitate truck mobility because the existing bridges have heights that do not meet Caltrans height standards. The new bridge will be built to meet current specifications.

Figure 6.14 I-80/ Ashby Avenue Interchange Project Location

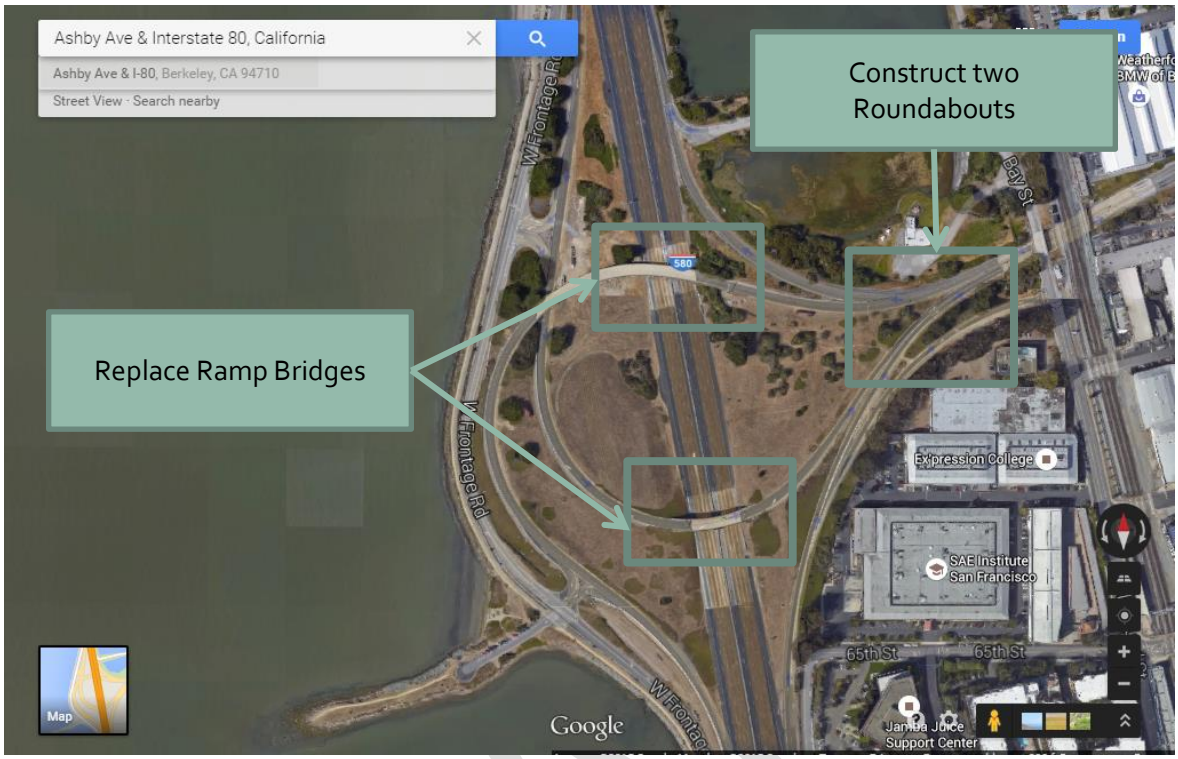


Table 6.24 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-80 (2012)	234,000	2,808	Yes	No

Table 6.25 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	I-80 at Ashby Avenue was determined to exhibit relatively high truck delay in the peak periods.	M	None of the improvements directly address truck delay.	N	N
Crashes – truck	Truck-involved collisions are relatively low at this location.	N	The addition of roundabouts should improve safety on local roads connecting to the highway but not on the highway itself.	N	L
Connectivity	Connectivity is not as much of an issue at this location as accessibility, given it is not immediately	M	The reconstruction will allow trucks of heavier weights to operate and thus improve connectivity.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	adjacent to freight generators/attractors.				

6.4 Other Interchange Projects

6.4.1 SR 92/Clawiter Road- Whitesell Street Interchange and Reliever Route Phase 2

Unlike many of the other interchange projects, this phase 2 of the project will upgrade the SR 92/ Clawiter Road interchange as opposed to fully reconstructing it. It will also develop a new interchange west of this location at Whitesell Street. Ramps for both interchanges will be signalized, which should have a positive impact on safety by controlling conflicting vehicle movements. Once complete, this project will relieve traffic congestion within the City of Hayward's industrial core as well as improve access between the industrial core, SR 92, and I-880. Based on 2012 Caltrans counts, this corridor experiences heavy volumes from both passenger vehicles and trucks.

Figure 6.15 SR 92/Clawiter Project Location

Source: http://www.Alamedactc.org/files/managed/Document/16059/ACTIA6150_Rte92ClawiterWhitesellInterchangeRelieverRoute_factsheet.pdf

Table 6.26 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on I-880 (2012)	219,000	14,454	No	No

Table 6.27 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Truck delay on SR 92 is not high relative to other roadways in the county.	N	None of the improvements will decrease truck delay.	N	N
Crashes – truck	SR 92 was not identified as having a relatively high number or truck-involved crashes.	N	The addition of traffic signals will improve safety for trucks entering or exiting SR 92 at the interchange.	L	L
Connectivity	Given that the current and proposed interchanges are in the industrial core of Hayward, connectivity is a more significant issue than with many other projects. However, it is a larger issue locally than on a county-wide scale.	L	The second phase of this project will improve truck movement though it will not directly improve connectivity.	L	L

Table 6.28 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on SR 92 (2012)	111,000	7,770	No	No

6.4.2 Widen SR 92/Industrial Boulevard Interchange

This project will widen the westbound-to-southbound loop off-ramp at the SR 92/ Industrial Boulevard interchange. The geometry of Industrial Blvd. will be altered to conform to the new off-ramp width and will also be re-striped. Widening the off-ramp should help to relieve truck delay on SR 92 by allowing southbound trucks to access Industrial Blvd. more easily. The current design potentially facilitates the development of queues on the off-ramp which can block the right turn lane and unnecessarily delay southbound vehicles. Widening the off-ramp should help with this issue. To the extent that queue lengths stretch to SR 92, it may help westbound vehicles as well.

Figure 6.16 SR 92/Industrial Boulevard Interchange Project Location

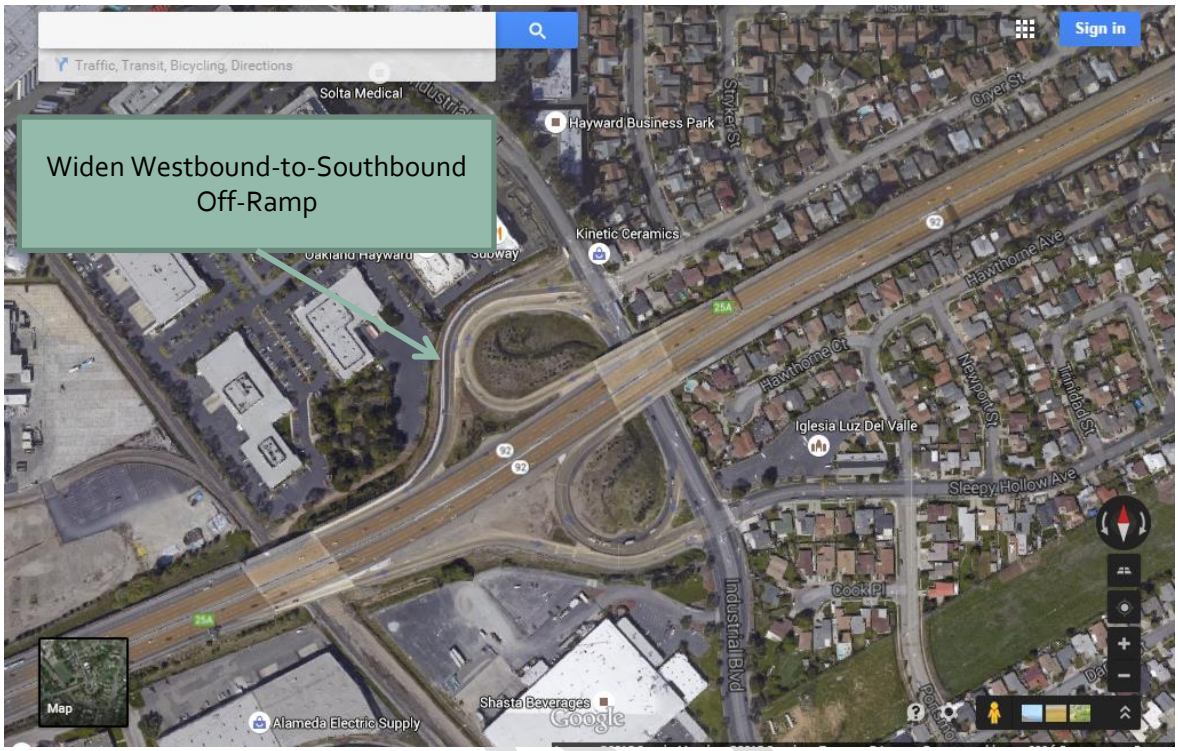


Table 6.29 Location Characteristics

Improvements	Current Volume	Current Truck Volume	Truck Bottleneck?	Top Crash Spot?
Caltrans Total on SR 92 (2012)	111,000	7,770	No	No

Table 6.30 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Truck delay on SR 92 is not high relative to other roadways in the county.	N	Widening the off-ramp should alleviate delay for trucks utilizing that ramp.	M	L
Crashes – truck	SR 92 was not identified as having a relatively high number or truck-involved crashes.	N	None of the improvements will decrease truck safety.	N	N
Connectivity	There are no connectivity issues at this point along the SR 92 corridor.	N	None of the improvements address connectivity.	N	N

6.5 Modeling of Interchange and Local Street Projects

As the individual project evaluations above indicate, interchange projects generate a variety of localized benefits to the County. Given that some of them are already contained in the Alameda County Truck Travel Demand Model, we can perform model runs to quantify their impacts and provide additional information on the extent of the benefit they generate. However, given that each project is very small in geographic scope compared to projects in other categories, modeling individual project will generate only very negligible benefits. Furthermore, the inter-relationship between the projects will fail to be captured in this process. To overcome this, we performed a macro-simulation run using the model for a bundle of interchange as well local roads projects (discussed in Section 7 to determine their collective impact). To preserve some their individual project benefits, we grouped the projects into 5 clusters based on their geographic proximity as shown in Figure 6.17. The full list of projects included in this run is shown below. The specific zone that corresponds to Figure 6.17 each project falls in is included as well.

Interchange Projects:

- Freeway/Expressway Interchange Modifications (I-580/Fallon & I-580/Hacienda) – Zone 5
- I-580/Vasco Road interchange improvements in Livermore – Zone 5
- I-580/Isabel Avenue Interchange, Phase 2 in Livermore – Zone 5
- I-880/High St Interchange Improvements on Jensen, Howard Streets, High Street, 42nd Ave, Coliseum Way in Oakland – Zone 1
- I-880 auxiliary lanes between Whipple in Union City and Industrial Parkway West in Hayward – Zone 2
- I-880/Industrial Parkway interchange improvements including addition of northbound off-ramp – Zone 2

Local Road Projects:

- Clement Ave extension Broadway to Grand St. Alameda to access industrial area, direct connection to northern truck route – Zone 1
- Auto Mall Parkway Cross Connector widening between I-680 and I-880 in Fremont – Zone 4
- East-west connector between I-880 and Route 238/Mission Boulevard just south of Decoto Road – Zone 3
- Route 262 Mission Blvd Cross Connector Improvements between I-680 and Warm Springs Blvd/SR 262 (East segment) – Zone 4

- Fremont Blvd widening from I-880 to Grimmer Blvd in Fremont – Zone 4
- Widen Route 84 from Pigeon Pass to Stanley Boulevard – Zone 5
- Widen Union City Boulevard from 2-lanes to 3-lanes between Whipple Road and Industrial Parkway – Zone 2

The resulting changes in the VMT, VHT, and VHD are summarized in Table 6.31. Overall at the countywide level, the cumulative impact of all the project generated about 4% reduction in vehicle hours of delay, and negligible reductions in hours travels and miles traveled. Zones 2 and 5 produced the highest reductions in truck delay. These delay reductions are small and thus we can conclude that the key benefits of the interchange projects, as they are intended, are not to reduce delay significantly, but to improve safety and connectivity through better configurations and design. As a point for comparison, the off-peak delivery project discussed in Section 5.2 generated 10.4% total truck delay reductions.

Table 6.32 reports the emissions reductions for each of the zones. Overall, there are slight increases in NOx emissions but the reductions in PM emissions more than make up for it.

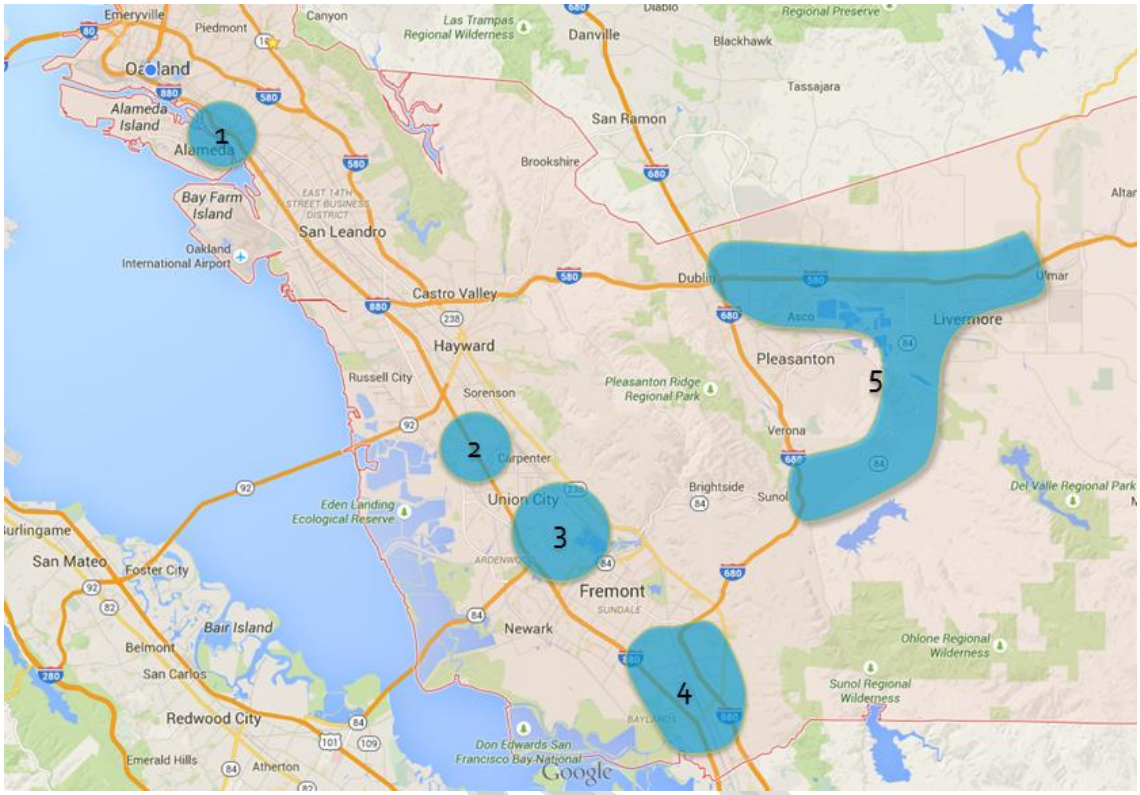
Table 6.31 Interchanges and Local Streets Projects Modeling Results

	Total VMT	Truck VMT	Total VHT	Truck VHT	Total VHD	Truck VHD
Countywide	-0.1%	-0.1%	-0.7%	-0.7%	-4.6%	-4.0%
1	-0.24%	0.10%	-0.34%	-0.27%	-1.50%	-1.50%
2	-0.52%	0.13%	-3.55%	-4.74%	-14.18%	-15.08%
3	1.09%	0.61%	0.17%	0.47%	-2.48%	-0.05%
4	0.99%	1.46%	0.33%	1.05%	-3.77%	-3.21%
5	0.91%	1.20%	-1.76%	-2.12%	-29.60%	-33.80%

Table 6.32 Emissions Reductions

Item	Scenario	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
NOx Emissions (g)	Difference	(254)	(337)	231	467	619
PM Emissions (g)	Difference	(3,021)	(2,478)	(1,849)	603	(12,449)

Figure 6.17 Interchanges and Local Street Projects Modeling Zones



6.6 Summary of Findings

Table 6.33 summarizes the evaluation results presented above and prioritizes the interchange and auxiliary lane projects. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column. For this category of project, to be included as first priority a project must have at least 1 high rating, two medium rating, or a medium rating with at least one low rating. The first priority projects are included in the opportunity packages discussed in Section 2.0.

Table 6.33 Summary of Evaluations of Interchange and Auxiliary Lane Projects

Interchange and Auxiliary Lane Projects	Priority	Explanation
I-880 NB and SB auxiliary lanes between West A Street and Winton in Hayward	First	This project has a high and medium rating
I-580/Vasco Road interchange improvements in Livermore	First	This project has one high and two low ratings
I-880/A St Interchange Improvements in Hayward	First	This project has two medium ratings
I-880 at Industrial Parkway Interchange Improvement	First	This project has one medium and two low ratings
I-880 Auxiliary Lanes between Whipple in Union City and	First	This project has one medium and one

Interchange and Auxiliary Lane Projects	Priority	Explanation
Industrial Parkway West in Hayward		low rating
I-880/High St Interchange Improvements on Jensen, Howard Streets, High Street, 42nd Ave, Coliseum Way in Oakland	First	This project has one medium and one low ratings
I-580/I-680 Interchange Truck Safety Improvements	Second	This project has a medium rating
SR 92/Clawiter Road- Whitesell Street Interchange and Reliever Route Phase 2	Second	This project has two low ratings
I-880/Winton Avenue Interchange	Second	This project has two low ratings
Freeway/Expressway Interchange Modifications (I-580/Fallon & I-580/Hacienda)	Second	This project has two low ratings
I-80/ Ashby Avenue Interchange Improvement	Second	This project has two low ratings
I-580/Isabel Avenue Interchange, Phase 2 in Livermore	Second	This project has one low rating
I-580/San Ramon Road/Foothill Road Interchange Improvements	Second	This project has one low rating
Widen SR 92/Industrial Boulevard Interchange	Second	This project has one low rating

7.0 Local Streets Projects

The projects evaluated in this chapter include extensions, expansions, completions, rehabilitations and re-designations of local streets and bridges to improve truck route connectivity, reduce congestion, and provide last-mile access to local goods movement destinations. Each project is evaluated individually in the context of the surrounding street network, freeway access points, major industrial areas, and other freight generators. Each is also evaluated within a group of related local projects to reveal trade-offs and complementarity among individual projects. The projects primarily benefit local truck access and circulation, and some secondarily benefit sub-regional mobility by providing more effective freeway reliever routes.

The table below describes how the effectiveness ratings are applied to the projects evaluated in this section in conjunction with the general guidelines and severity rating criteria provided in Table 7.1.

Table 7.1 Guidelines for Assigning Ratings for Local Streets Projects

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay – Roadway	Yes	This measure evaluates the delay benefits of a local street project or group. • To receive an H rating, a project must significantly reduce delay, with quantified results. For projects whose primary purpose is delay reduction, projects rated as having High delay benefits are those which significantly improve a severe congestion problem. • To receive an M, a project should have at least moderate quantitative or qualitative delay benefits for a moderate or severe accessibility condition. • To receive an L, a project will generally have some benefit but the benefit may be small or hard to determine • A project receives an N rating if it's purpose is not to relieve congestion but to provide route continuity or improvements to bridge of pavement condition
Travel Time Delay - Air/Rail/Port	No	For local street projects, truck delay in accessing port and airport destinations are considered in the Roadway Delay ratings described above.
Connectivity - Hwy	Yes	Connectivity measures a project's ability to provide additional linkages between freight generators/attractors. • A local street project that includes a new connection (either a new road or gap closure along or route designation applied to an existing road) specifically meant to serve a freight-generating facility (airport, port, industrial/ manufacturing district) will receive an H rating, as will

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		a project that fills a critical gap or provides a critical alternate route within the local truck route network for last-mile access between freeway and local destinations. • Projects that include a new connection that addresses a moderately severe access condition or provides a redundant route to ensure reliability of access to a generator of regional significance will receive an M rating. • Any new truck route connection will be assumed to have some benefit to truck traffic even if it is minimal will get an L rating. • A project receives an N rating if its purpose is not to provide new route continuity but to improve the physical condition of a bridge of pavement section.
Connectivity - Air/Rail/Port	No	For local street projects, truck route connectivity to port and airport destinations are considered in the Roadway Connectivity ratings described above.
Freight/Passenger Conflicts	Yes	This measure evaluates whether a strategy will reduce or remove existing freight and passenger conflicts or create new conflicts. • An H rating is assigned when the project completely eliminates through-truck traffic from routes preliminarily designated in the Alameda CTC Multi-Modal Corridors Plan as high priority routes for pedestrians and bicycles • An M rating is assigned when the project accomplishes a significant reduction in pedestrian and bicycle conflict, eliminates through-truck conflicts on priority transit routes, and/or contains design features that meet all local and State standards for mitigating conflict-related impacts. For instance, a project that significantly reduces through-truck traffic on a priority pedestrian, bicycle or transit corridor will also reduce freight/passenger conflict • An L rating is assigned with there are modest levels of conflict reduction on pedestrian, bicycle or transit priority routes. • An N rating is assigned if the project affects streets on which nether pedestrians, bicycles nor transit are identified as high priorities in the Alameda CTC Multi-Modal Corridors Plan preliminarily segment priority designations • A negative "-" rating is assigned if the project adds through truck traffic on streets on which pedestrians, bicycles or transit are identified as high priorities in the Alameda CTC Multi-Modal Corridors Plan preliminarily designations and if no mitigations or counter-measures have been identified.
Land Use Conflicts	Yes	Land use conflicts occur when the project increases a street's physical footprint or adds through-truck traffic to a route segment that travels through residential areas, past schools or through ecologically sensitive areas. • A project that successfully avoids all impacts with such sensitive land uses or that diverts significant amounts of through-truck traffic from sensitive areas is given an H rating, as it would perform as well or better in this regard as any other project intended to address the same goods movement needs. • A project that traverses sensitive zones may include mitigations that would address its noise and emissions and other environmental

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		impacts on surrounding uses. If a project EIR contains such measures and concludes that impacts would be less-than-significant following mitigation, the project is rated has having M land use impact avoidance. A project that diverts through-truck traffic from a moderate extent of sensitive land use area is also given an M rating. • If environmental documentation has not been completed or is unknown, but such mitigations are customary for projects of its type in similar settings, and if the extent of the project through such sensitive zones is less than ½ mile, the project is assigned a rating of L for land use impact avoidance. A project that diverts through-truck traffic from a short extent of sensitive land use area is also given an M rating. • If mitigation is unknown and the project less than ½ mile of sensitive land use exposure, it is given a rating of "N" • If mitigation is unknown or impacts are found to be significant and unavoidable in the project's environmental documentation, a negative rating ("--") is assigned In assessing the segment length over which potential land use conflicts exist, a buffer distance of 1000 feet will be applied based on the Pacific Institute's report on At a Cross Road for Region's Health.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	No	This measures the safety impacts of the project on potentially reducing truck-involved crashes, which in turn improves reliability. • A project will receive an H rating if its main purpose is to reduce truck crashes and improve safety, or that it completely removes a certain conflict and eliminates safety issues. • A project will receive an M rating if it would have moderate impacts on crash reduction • A project will receive an L rating if it exhibits marginal safety improvements. • A project will receive an N rating if its safety benefits are unclear or if it affects a road segment that was not identified as a high crash location in the Alameda CTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment (Task 3C memo)
Crashes - Crossings	No	This measures the safety impacts for trucks at existing at-grade rail crossings. Grade crossing projects and their effects on local street safety are addressed in a separate section of this report.
Bridge Conditions	Yes	Several of the local streets projects include rehabilitating or rebuilding existing bridges. • A project will receive an H rating if it replaces or rehabilitates to current standards a bridge identified as deficient in the Alameda CTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment (Task 3C memo) • A project will receive an L rating if it replaces or rehabilitates to current standards a bridge not identified as deficient in the Alameda CTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment (Task 3C memo)
Pavement Condition	Yes	Local streets projects whose primary purpose is to rehabilitate and/or increase load bearing capabilities of local truck routes and access roads

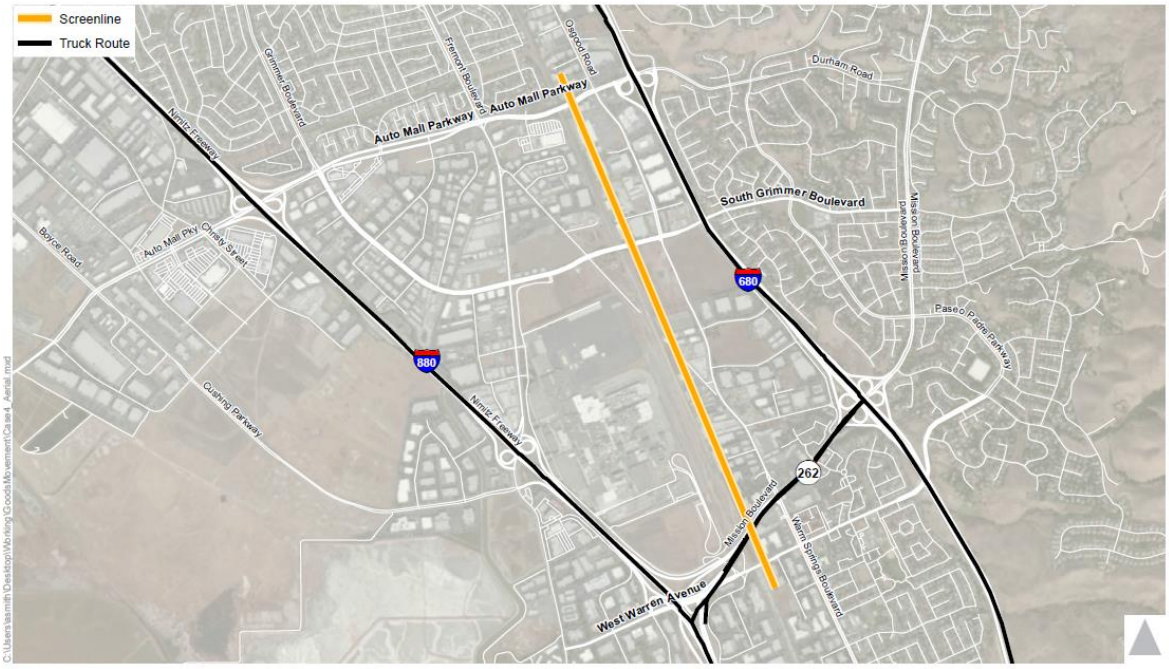
Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		will be rated based on the importance of the affected route to sub-regional goods movement and the severity of the existing condition. • A project will receive an H rating if it rehabilitates or upgrades the load bearing capability of a street segment identified as deficient in the ALAMEDA CTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment • A project will receive an M rating if it rehabilitates or upgrades the load bearing capability of an arterial truck route not identified as deficient in the ALAMEDA CTC Goods Movement Plan Gaps, Needs, Issues and Deficiencies assessment • A project will receive an L rating if it rehabilitates or upgrades the load bearing capability of local truck collectors within a regional industrial zone or port rather than inter-community corridors.
Resiliency	No	A project improves resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A project receives an H rating if its main purpose is resiliency. • A project receives an M rating if it can have significant resiliency benefits though its primary purpose is not to improve resiliency. • A project receives an L (likely the case for projects in this category) when it has marginal resiliency benefits).
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/ Technology	No	For local streets projects that prominently include innovative technology or ITS elements: • A project receives an H rating if it is an ITS/ technology project by its very nature, or is very innovative by industry standards and it addresses a high volume truck corridor or critical reliever route within a freeway corridor system management plan. • A project receives an M rating when it employs ITS or innovative technology on a truck route with local access importance but not regional significance as a freeway reliever or access to major regional industrial area or port. • A project receives an L rating when it consists of minor or unproven innovation technology or ITS elements.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	No	This measure tracks the economic impact of a project through the number of jobs, amount of output it creates. Given the complex nature of this metric, and difficulty of quantifiably predicting effects at a local scale, local street projects will not be evaluated in terms of this measure. For freeway projects, countywide programs and projects that affect global and national gateways covered in other sections of this report, significant reductions in regional and corridor truck delay and miles traveled will be taken into account in assessing economic benefits

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	No	Emission impacts come from changes in PM, NOx that are a direct result of the project. Data and model forecasts with which to quantify these effects for local street projects are limited and unreliable. As reported in this section of the report, the land use conflicts metric provides an indirect measure of potential local emissions impacts. Other sections of this report rate the performance of freeways and other major projects and programs with the potential to significantly shift truck speeds and miles travelled through BAAQMD EMFAC modeling to provide an objective and quantifiable metric
Equity	Yes	Equity measures noise, light and air and other negative effects on communities that are most vulnerable and disproportionally affected by freight. Equity can be measured by determining whether a project is within one of the impacted communities as determined in 2013 using the BAAQMD updated methodology. The following ratings are applied if a local street project has a negative land use impact according to the land use metrics above and it lies within a designated impact community, or conversely, it diverts truck traffic away from a vulnerable community: • A project receiving an H on equity means that it would divert significant truck traffic from a route through a designated impacted community to a route outside an impacted community. • A project receiving an M on equity means it would divert a moderate amount of truck traffic from a route through a designated impacted community to a route outside an impacted community. • A project receiving an L means it divert a small amount of truck traffic from a route through a designated impacted community to a route outside an impacted community. • An N rating is applied to a local street project whose route and its reasonable alternative route either both lie within or both lie outside a designated impacted community • Projects that would shift truck traffic from a route outside an impacted community to a route within an impacted community receive a negative equity rating.

7.1 Fremont Industrial Area and Freeway Connector Routes

The south Fremont industrial area extends six miles along I-880 from Stevenson and Auto Mall Parkway to Dixon Landing Road. Access is available via a number of industrial collectors and arterials, including Stevenson, Cushing, Auto Mall, Grimmer, Fremont Blvd, Warren, Warm Springs, Osgood and State Route 262. However, truck route designations are limited to Stevenson and Route 262 and capacity limitations and operational inefficiencies create high congestion levels. Truck circulation to and through the large area would benefit from clearer and more efficient routing options along with operational and capacity measures to ensure more efficient traffic flow.

Figure 7.1 Fremont Industrial Area and Freeway Access Routes



The table below lists the projects that have the potential to improve understanding and effectiveness of the area's truck route network.

Table 7.2 Project Descriptions

Project	Description
Auto Mall Parkway Cross Connector widening between I-680 and I-880 in Fremont	I-680/I-880 Cross Connector Project. Intended to improve freeway-to-freeway link and provide routing options in area with high truck volumes and numerous freight reliant businesses, and improve alternate route options for congested Mission 262
Route 262 Mission Blvd Cross between I-680 and I-880 with reconstruction of UPRR underpasses	Improve Route 262 Mission Boulevard cross connector, including widening of Mission Boulevard to 3 lanes per direction through I-680 interchange, extending turn lanes at Warm Springs, rebuilding I-680 ramps Intended to improve mobility options, circulation for high truck volumes and access to freight reliant businesses with associated reconstruction of the Route 262 Boulevard/Warren Avenue/I-880 Interchange and widening of I-880 and Route 262
Fremont Blvd widening from I-880 to Grimmer Blvd in Fremont	Widen Fremont Blvd to 6 lanes and bike lanes from Grimmer Blvd to I-880, new traffic signals at Grimmer and Industrial Drive. Intended to strengthen I-680 to I-880 cross connector route, improve truck circulation options and access to freight reliant businesses, and reduce delays on key industrial access and freeway connector routes.

The combination of projects would also result in truck route designations on segment of Auto Mall Parkway, Boyce/Cushing, Fremont Blvd, Warm Spring and Warren.

The following table presents the results of the performance evaluation for all of the projects combined. The results for key metrics for the individual projects and the evaluations supporting those conclusions appear in the subsequent table. These evaluations help identify which of the three projects help provide the needed screenline capacity. Transportation modeling has not been conducted that would independently evaluate each project, so trade-offs are based on judgment and other evidence such as the relative directness and amounts of capacity offered by each project.

Table 7.3 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay	Average speeds through the area are approximately 35 mph, within the generally expected range for arterial streets, but slower than desirable for a primary freeway-to-freeway connector. Existing severity could be considered low (L), but with projected traffic and truck growth is likely to become of moderate (M) severity.	M	The projects are projected to increase corridor capacity about 35%. Capacity and connectivity improvements would substantially offset effects of the projected 35% increase in overall traffic and 75% increase in trucks.	M	M
Freight Connectivity	The network of industrial access collectors and arterials and freeway-to-freeway connectors provide relatively complete circulation network, but and lack of truck route designations may generate additional truck mileage, and compromise wayfinding, use of alternate routes, and network efficiency.	M	Delineation of the area's truck route network could further improve circulation and route directness and reduce vehicle miles and congestion impacts	L	L
Land Use Conflict	Stretch of Route 262 between the I-880 and I-680 travels through and provides direct access to several retail locations. Residential areas impacted along Warren Ave (0.5 miles). Auto Mall Pkwy travels through residential areas between the freeways (0.6 miles).	M	Better freeway-to-freeway connectivity and congestion relief on Route 262 will potentially divert some traffic from sensitive land use areas that would otherwise be exposed to growth in truck traffic along 0.6 miles of the 1.5-mile stretch of Auto Mall Pkwy between I-880 and I-680.	L	L
Passenger System	Potential passenger system conflicts within this corridor were not identified in the	N	The corridor serves predominantly industrial land uses and freeway-to-freeway	N	N

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Conflicts	needs assessment.		connectivity for traffic and trucks. Prioritization of passenger modes was not identified as a potential issue in the needs and deficiencies assessment.		
Pavement Condition	The needs and deficiencies assessment identified Route 262 as moderately deficient (45% distressed)	M	Construction to accomplish the project capacity improvements would upgrade pavement conditions along the affected segments.	N	M
Bridge Conditions	The corridor route segments don't include any bridges identified in the deficient in the needs the goods movement needs assessment. .	N	Route segments affected by the project were not identified as deficient in the goods movement needs assessment.	N	N
Equity	The project route segments lie entirely outside of impacted communities as determined in the BAAQMD updated methodology for identifying communities of need. The alternative truck routes within the project influence area would not shift truck traffic from outside to inside of communities of need.	N	As the alternative truck routes within the project influence area all lie outside of communities of need, any shifting of traffic from one facility to another would not produce a net impact on equity.	N	N

Table 7.4 Individual Project Evaluation Ratings

	Route 262	Auto Mall Parkway	Grimmer, Warren, Fremont Blvd
Travel Time Delay	H	M	M
Freight Connectivity	N	L	L
Land Use Conflict	L	-	N

7.1.1 Travel Time Delay

Alameda CTC travel forecasting models project a 35% increase in traffic in the area by 2040 and a 75% increase in truck volumes in the corridor. The model was calibrated to 2010 travel conditions, but also provides synthesized information on 2013 conditions from traffic count data and model estimation. It forecasts conditions in 2040 based on adopted regional projections of population, employment and other socio-economic factors as well as adopted regional transportation programs and projects contained in the Regional Transportation Plan. Between

2013 and 2040, congestion-related truck delays in the corridor are projected to increase about five-fold. Capacity increases and routing options and efficiencies will be critical to industrial access and truck circulation within the area, and to long distance freight movement along and between I-880 and I-680, The projects above are expected to produce a 30%-35% increase in corridor capacity to help off-set the growth in congestion.

Individually, the Route 262 project provides greater benefit to travel time delay than do the other projects. As a group, Route 262, Auto Mall Parkway, Grimmer and Warren are projected to experience a 75% increase in truck traffic by 2040 and, in terms of total capacity use, about a 40% increase in passenger car equivalents. Route 262 offers a greater capacity increase than the other projects and absorbs more of the traffic and growth in trucks. Among the four streets measured by the screenline shown in Figure 5-1, Route 262 carries 40-45% of screenline traffic and almost 60% of screenline trucks. Its higher speed and lower delay also helps protect other streets in the local network, such as Warren, from excessive truck impacts.

7.1.2 Freight Connectivity

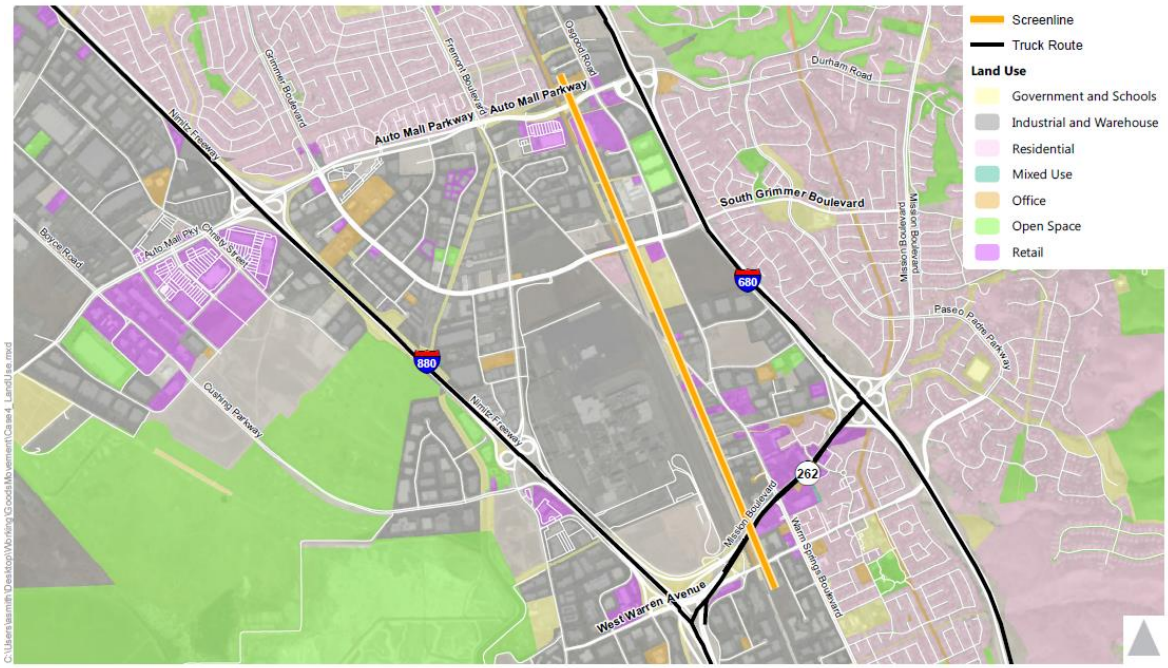
The network of industrial access collectors and arterials and freeway-to-freeway connectors provide relatively complete circulation network consisting of designated routes State Route 262 and Stevenson, and undesignated streets including Auto Mall Parkway, Cushing, Grimmer, Fremont Blvd, Warren, Warm Springs and Osgood. However, lack of truck route designations compromise way-finding and use of alternate routes and may reduce network efficiency. The projects also improve the functional capacity of the corridor to handle truck routing without diversion to alternate undesignated routes, and in conjunction with delineation of the area's truck route network, could further improve truck routing directness and reduce impacts.

7.1.3 Land Use Compatibility

Route 262 between I-880 and I-680, identified in the needs assessment as a congested corridor, impacts a large number of retail establishments along its ¾--mile freeway-to-freeway stretch. Residential areas along about ½ mile of Warren Ave, just south of Route 262, are also affected by truck traffic.

Widening of Auto Mall Pkwy would improve connectivity between the two freeways, and more complete identification and signing throughout the area truck network would help reduce excess truck mileage and congestion. Shifting some truck traffic to Auto Mall, Fremont Blvd and Grimmer could reduce noise, vibration, emissions and access impacts for retail locations along Route 262 and residential areas along Warren Ave, but it would increase residential exposure along about 0.6 miles of Auto Mall Parkway.

Figure 7.2 Fremont Industrial Area Land Use Context



7.2 Santa Rita Road/ East Pleasanton Truck Access

I-580 freeway access to industrial areas in southeast Pleasanton is limited to a few routes that provide indirect or out-of-direction connections without full opportunity for trucks to avoid bottlenecks. This affects industrial zones near the intersection of Stanley Blvd and Bernal Road and business parks near Santa Rita Road and Stoneridge Drive shown in the figure below. Truck routes along Stoneridge and northern segments of Hopyard and Santa Rita provide reasonable connections to both I-580 and I-680 for the northern zone. The route along Sunol and Stanley Boulevards provides access for the southern zone to 680 south and 580 east. However, access to 680 north and 580 west is limited for the southern Stanley/Bernal zone.

A potential measure to address this issue is a truck signing, route designation and gap closure along Santa Rita Road (from Stoneridge to Valley) and Valley Ave (from Stanley to Santa Rita). The proposed route designation would allow trucks generated in the Stanley and Bernal industrial zone to more directly reach I-580 west and I-680 north and warehouse and business parks near Stoneridge/ Santa Rita and along Stoneridge to reach the primary non-freeway east/west Tri Valley truck route along Stanley and Sunol Blvd.

Figure 7.3 Existing and Proposed Truck Routes Serving South Pleasanton Industrial Zones

Evaluation of the possible conversion includes its effects on travel time delay, freight connectivity, passenger systems and land use compatibility. Evaluations relative to other measures are also included for completeness. The following table presents to results of the evaluation. Discussion of the primary evaluations appear below the table.

Table 7.5 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay	Out-of-direction travel distance and congestion on Sunol Blvd, I-580 and 680 add 4-5 minutes travel time to reach 580 west and 680 north. Congestion growth on I-580 and Sunol Blvd are projected to almost triple truck delays by 2040	H	Santa Rita Road would provide a more direct and alternate route for trucks to reach 580 west and 680 north from the southeast Pleasanton industrial zone, reducing travel times by 4-5 minutes or more.	M	H
Freight Connectivity	Indirect route to SE Pleasanton industrial zone for access to/from 580 west and 680 north. No route redundancy for access to/from 580 east.	H	Reduces travel distance to/ from 580 west and 680 north by 1.8 miles (20%). Creates a second routing option for access to/from 580 east.	M	M
Passenger System Compatibility	No conflict at present. Alameda CTC MMAP draft modal priorities place trucks at 3rd or 4th priority along about 1.2 miles of the proposed route.	N	Trucks would impact about 1.2 miles of arterial designated for other modal priorities. However, comparing current conditions along other Pleasanton truck routes and land use compatibility (below), may make it reasonable to raise truck priority	-	-
Land Use Compatibility	Existing truck routes in Pleasanton (1st St, Stoneridge, Santa Rita north) have segments with soundwall-protected residential	N	Designating Valley and Santa Rita south would add about 0.7 miles truck route along soundwall-protected residential frontage.	-	-
Pavement Condition	Route segments affected by the project were not identified as deficient in the goods movement needs assessment.	N	The project does not directly affect segments identified as deficient in the goods movement needs assessment.	N	N
Bridge Conditions	The project does not affect any deficient bridges.	N	The project does not affect any deficient bridges.	N	N
Equity	The project route segments lie entirely outside of impacted communities as determined in the BAAQMD updated methodology for identifying communities of need	N	As the alternative truck routes within the project influence area all lie outside of communities of need, any shift in traffic from one facility to another would not produce a net impact on equity.	N	N

7.2.1 Travel Time Delay

Benefits of the Valley Ave and Santa Rita truck route designation will primarily affect travel between the southeast Pleasanton industrial area and I-580 west and I-680 north. Travel to the east and south will be relatively unaffected. Based on Alameda CTC travel data and modeling of

2013 and 2040 traffic congestion conditions, travel between the Stanley/Bernal industrial zone and the I-580/680 interchange will take about 4-5 minutes (34%) longer via the Sunol Boulevard to I-680 route than via Santa Rita Road to I-580. Travel between the industrial zone and I-580 in Livermore will take about one minute (8%) longer by Santa Rita and 580 than by Stanley Blvd and Route 84. This is partly due to planned widenings to both streets Stanley and Route 84 in Livermore, and is not likely to be the case during times when 580 is uncongested.

The following table presents Alameda CTC modeling results for traffic and truck volume growth on routes accessing the southeast Pleasanton industrial area from Tri-Valley gateways: a) westerly access as measured at a screenline east of 680 intercepting Sunol Boulevard, Stoneridge and I-580, and b) northerly and easterly access as measured at a screenline along Stoneridge/Jack London intercepting Santa Rita Road, Hopyard Road, Route 84 and Stanley Blvd east of 84.

Table 7.6 Project Traffic Growth

	Growth from 2013 to 2014		
Screenline Measuring Overall Travel from Southeast Industrial Area to Tri-Valley Gateways	**Traffic Volume**	**Truck Volume**	**Truck Delay**
Travel to/from West and South (Sunol, Stoneridge, I-580)	16%	46%	170%
Travel to/from North and East (Stanley, 84, Santa Rita, Hopyard)	30%	69%	negligible

In spite of the larger growth in total traffic and trucks for travel to/from the east, proposed widenings of Isabel (Route 84) and Stanley Blvd in Livermore are projected to prevent an increase in truck delay. However, for travel to/from the west via I-580 and Sunol Blvd, a 40% traffic increase and 80% truck increase on Sunol and a 10%-15% traffic increase and 40% truck increase on 580 are projected to raise truck delays by about 170%, heightening the importance of acceptable alternative routes to bypass bottlenecks.

For travel to and from the west and north, the Santa Rita truck route designation would reduce travel time by 4-5 minutes (about 34%) when compared with the existing route, Sunol Boulevard.

Table 7.7 Santa Rita 2040 Travel Time

Point-to-Point Travel Time with/wo Santa Rita Truck Route	**2040 Travel Time**
Industrial Zone to I-580/I-680 Interchange	
Via Sunol Blvd (existing)	12.3
Via Santa Rita Road (proposed new route)	8.1
Time Difference	-4.2
Percent Difference	-34%

Industrial Zone to I-580 in Livermore	
Via Stanley and First Street (existing)	11.7 min
Via Santa Rita Road and I-580 (proposed new route)	12.6 min
Time Difference	0.9 min
Percent Difference	+8%

7.2.2 Freight Connectivity

In addition to the travel time delay benefits noted above, designation of the Santa Rita/ Valley Ave truck route would reduce truck travel distance between the industrial zone and I-580 west and I-680 north 1.8 miles or about 20%. It would also create a second option to Stanley Blvd for truck travel between the southeast Pleasanton industrial area and the I-580 regional gateway through the Altamont Pass,

7.2.3 Passenger System Compatibility

The Alameda CTC Countywide Multimodal Arterial Plan (MMAP) has developed draft modal priorities for arterials through technical review of circulation networks for each travel mode, land use and demand context, and outreach to the affected jurisdictions. However, those priorities have not been adopted, and the study is on-going. Evaluation of truck routes compatibility with passenger systems is deferred to the MMAP.

The draft priorities for the segments of the proposed Santa Rita Road and Valley Ave route suggest that the proposed truck route designation on Santa Rita and the western segment of Valley may not be consistent with the draft priority ratings. Some truck traffic would be shifted from Stanley and Sunol Boulevards, on which autos and trucks are the highest designated priorities, to street segments where trucks may be lower priority. The priorities may be reconsidered as part of the MMAP and in consultation with the City of Pleasanton, taking into account the balanced set of modal concerns for the area as well as the issue land use compatibility as summarized below.

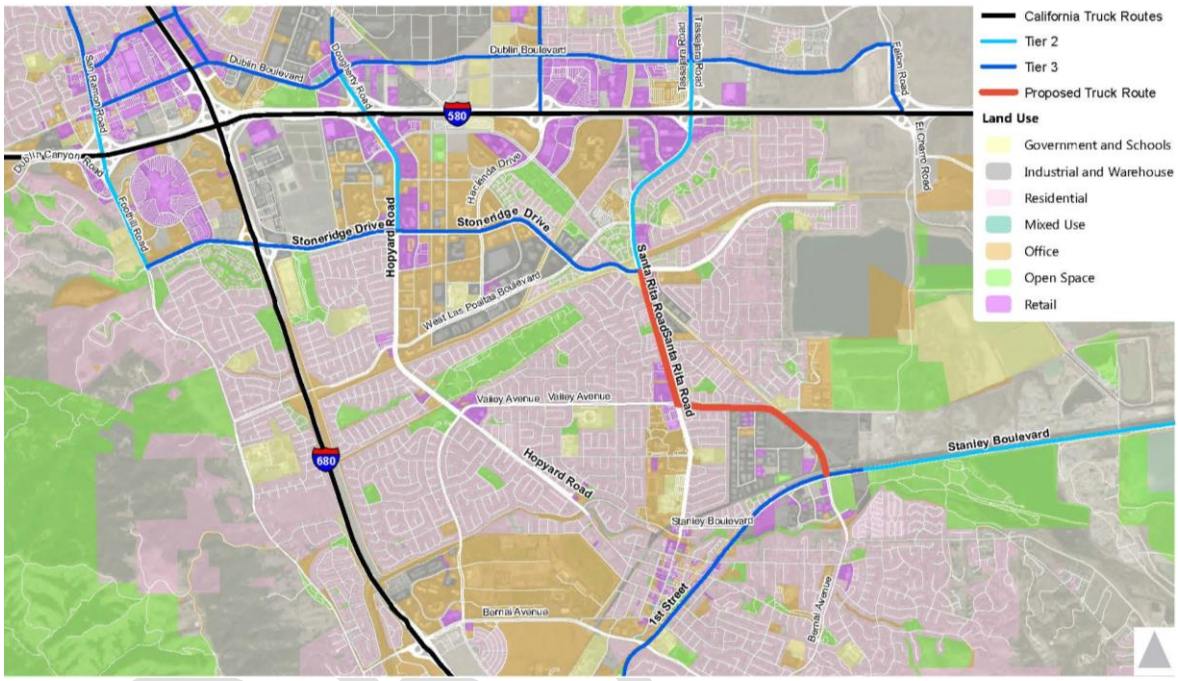
7.2.4 Land Use Compatibility

The majority of the 0.4 miles of Valley Ave between Quarry Lane and Santa Rita Road is abutted by single-family residential land use. The residential areas are buffered by sound walls along the full frontage and the majority have ample setbacks. Orloff Park has about 0.1 mile of street frontage near the Valley/Santa Rita intersection. On Santa Rita Road, about half of the 0.8 miles proposed for truck route designation is abutted by commercial and industrial use. About 0.3 miles abuts single-family residential behind soundwalls and multi-family residential without such protection. Along there residential frontages, the land use setting along the segments of Valley

and Santa Rita under consideration is similar to that presently found along Stoneridge Drive and Santa Rita north of Stoneridge that are designated truck routes.

However, increases in heavy truck traffic are often community concerns, and changes along Valley Ave and Santa Rita Road would need to be carefully considered by Alameda CTC and the City of Pleasanton before a decision to apply a truck route designation could be approved.

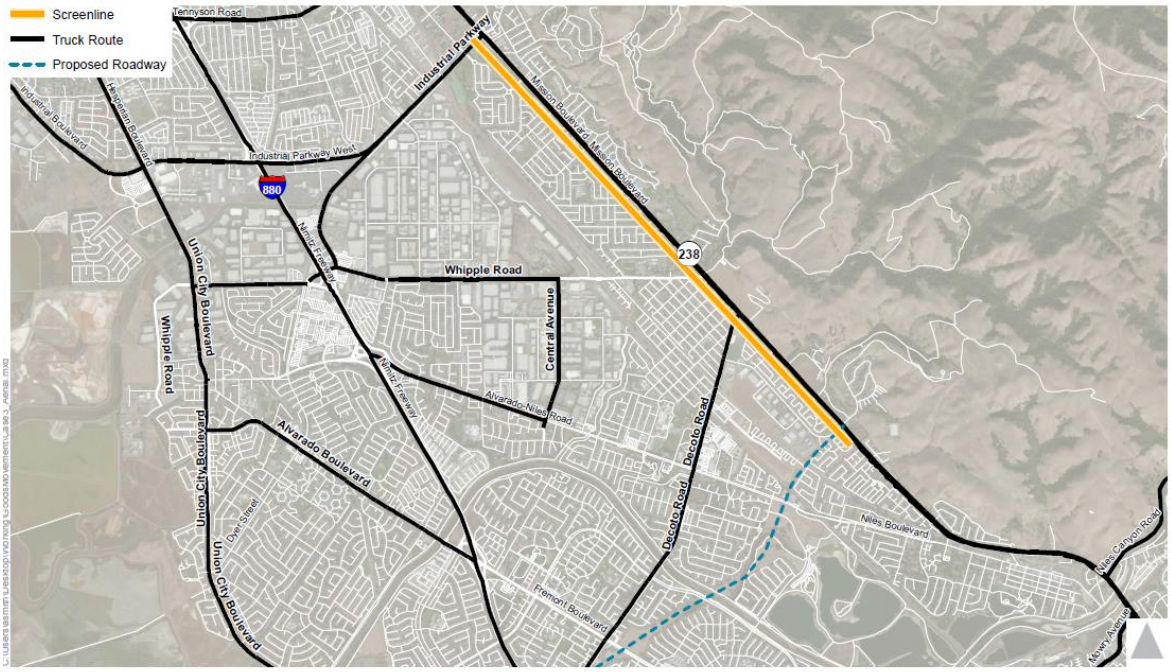
Figure 7.4 Santa Rita Road Land Use Context



7.3 Central County East / West Truck Routes

Truck circulation in Union City, Newark, south Hayward and north Fremont are limited by the lack of east-west truck routes and cross-connections between I-880 and Mission Blvd (Route 238). Major warehouse and industrial zones along Industrial Parkway, Whipple Road and Alvarado Niles Road have limited easterly access to/from Route 238. Such access would provide an alternate route to I-880 for travel to eastern Alameda County and the regional gateways to the Central Valley via I-580 and I-680, although under most circumstances I-880 would be a preferred route from the standpoint of land use and multi-modal corridor priorities. During periods of substantial I-880 congestion, however, alternate access via 238 would benefit travel time productivity, regional air quality and other environmental issues. One evident network gap is the lack of full truck route designation on Whipple Road extending east of Central Ave to 238. Another possible enhancement to the network is a proposed new connection from 880 to 238 just south of Decoto Road.

Figure 7.5 Central County East/West Truck Routes



The two primary improvements available to address the Central County east/west circulation issue are:

- Whipple Rd widening and truck route designation Central to Mission Blvd in Union City providing multi-direction access to large warehouse and industrial zones and a completed goods movement connection between Mission Blvd Tier 2 truck route and I-880.
- East-west connector between I-880 and Route 238/Mission Boulevard just south of Decoto Road comprised of a combination of new roadways along preserved rights of way and improvements to existing roadways and intersections along Decoto Road, Fremont Boulevard, Paseo Padre Parkway, Alvarado-Niles Road and Route 238.

Evaluation of the Central County east/west circulation improvement needs addresses the four relevant criteria established for the facilities in earlier phases of the Alameda CTC Goods Movement study: travel time and delay, freight connectivity, passenger system compatibility, and land use compatibility. Evaluations relative to other measures are also included for completeness. The following table presents to results of the evaluation for the two projects combined. The results for the individual projects and the evaluations supporting those conclusions appear below the table. Transportation modeling has not been conducted that would independently evaluate each project, so trade-offs are based on judgment and other evidence such as the relative directness and amounts of capacity offered by each project.

Table 7.8 Evaluation Ratings for Combined Effects of Whipple Gap Closure and East/West Connector

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay	Projected 80% increase in trucks and 50% to 60% increase in total traffic and congestion-related delays by 2040. Because current congestion levels are low/moderate, problem is rated as moderate	M	Whipple truck route extension and new east/ west connector would increase capacity of truck network by 100% off-setting traffic and congestion growth	M	M
Freight Connectivity	Limited east/west truck routes connecting I-880 and SR238 in Union City affect highway-to-highway freight movement and access for large industrial areas in Union City and Newark.	M	Extension of Whipple Road truck route designation to SR238 and/or construction of high capacity east/west connector south of Decoto Road would provide multiple route choices and more direct access	M	M
Passenger System Compatibility	Existing designated truck routes are compatible with draft Alameda CTC MMAP study modal priorities	N	Passenger system compatibility evaluation is deferred to the MMAP	N	N
Land Use Compatibility	Decoto Rd truck route impacts residential areas on 2.5 mile stretch between I-880 and SR238. Industrial Pkwy also in close proximity to residential areas along the 0.3 stretch just west of Route 238.	M	Reduces exposure along existing truck routes through improved connectivity between I-880 and SR238. Potential increase in exposure of sensitive areas along Whipple extension (½ mile), and portion of proposed new connector (½ mile).	M	N
Pavement Condition	Route segments affected by the project were not identified as deficient in the goods movement needs assessment.	N	The project does not directly affect to segments identified as deficient in the goods movement needs assessment.	N	N
Bridge Conditions	The project does not affect any deficient bridges.	N	The project does not affect any deficient bridges.	N	N
Equity	Industrial Blvd is adjacent to an impacted community as determined in the BAAQMD updated methodology for identifying communities of need. Whipple Decoto and the proposed East/West Connector are not. Industrial carries about 50% of the 2013 truck traffic through the corridor and across the screenline.	M	With the Whipple truck route extension and East/West Connector, the Industrial Blvd share of truck traffic through the corridor would decrease to about 35%. Although 2040 truck counts on Industrial Blvd would be higher in 2040 than in 2013 the projects, volumes and impacts on communities of need would be about 50% higher without the projects than with them.	M	M

Table 7.9 Evaluation Ratings for Individual Effects of Whipple Gap Closure and East/West Connector

	Whipple Gap Closure		East/West Connector	
		Improvement Rating		Improvement Rating
Travel Time Delay	Ability to redistribute truck traffic currently concentrated on congested Industrial Blvd	L	Creates substantial additional capacity for Central County east/west truck travel and access to main north/south truck routes	H
Freight Connectivity	Creates complete connection from I-880 to SR238 and easterly access to major industrial areas	M	Creates complete connection from I-880 to SR238 and direct access to Dumbarton Bridge approach	M
Passenger System Compatibility	Designs will need to accommodate pedestrian and bicycle modes to meet modern multi-modal design standards. Truck route designation could still present conflicts with multi-modal access to residential neighborhood and schools, and would require reconsideration of draft MMAP modal priorities. .	-	Available right-of-way to accommodate reasonable pedestrian, bicycle and transit to modern multi-modal design standards. Route would divert truck traffic from routes with greater passenger mode conflicts	N
Land Use Compatibility	Designs would need to include noise, light mitigation such as sound-walls and other protections for activities of the school, housing. Localized emissions impacts still likely	-	Available right-of-way to accommodate reasonable setbacks, sound protection and other mitigation. Route would divert truck traffic from routes with higher land use exposure	L

7.3.1 Travel Time Delay

Alameda CTC travel data and modeling indicates that that current congestion levels on the principal arterials crossing the screenline are relatively low. Volume/capacity (v/c) ratios average less than 30% on Industrial, Whipple and Decoto, and average congested traffic speeds are about 35 mph. However, the Alameda CTC travel forecasts indicate that the number of trucks travelling east/west through the corridor is projected to grow from about 410 daily in 2013 to about 720 in 2040 (80%), and congestion-related truck delays are projected to increase by 50% to 60%. Concurrently, total corridor traffic is projected to grow from about 39,000 to about 61,000 (57%). By comparison, I-880 in Union City presently carries about 30,000 trucks daily. So truck delays

through the east/west corridor are relatively minor (less than 3% of) truck delays on I-880. They are also considerably lower than the traffic and truck demand in the east/west corridor through Fremont connecting I-680 and I-880, where combined volumes forecast for 2040 on Route 262, Auto Mall Parkway, Grimmer and Warren total 160,000 total vehicles including 9650 trucks.

Enabling Whipple to carry truck traffic and constructing the new east/west connector would increase the capacity of truck facilities in the corridor by about 100%. Not doing so would result in congestion delays in 2040 far greater than the 50-60% increase otherwise projected.

Together, the Whipple gap closure and new east/west connector would provide substantial benefit to freight connectivity and travel times though the area. Individually, the east/west connector provides the greater benefit of the two projects. The connector would attract considerably more of the traffic and truck growth crossing the screenline than would Whipple, operate with lower truck delays and experience lower volume/capacity ratios and congestion. It would also be more effective at distributing truck traffic, reducing the amounts of growth on both Decoto and Whipple. The Alameda CTC model forecasts that the new connector would carry 27% of the 2040 traffic and 24% of the trucks crossing the screenline, second most behind Industrial Boulevard's 35%.

7.3.2 Freight Connectivity

The fact that Whipple Road is not presently designated a truck route east of Central Avenue in Union City results in an approximately three-mile spacing between east/west truck connections between I-880 and SR 238. The majority of acreage within that area is devoted to industrial and warehouse use. Access to those areas from the east can require several miles of out-of-direction travel for trucks following the truck route system. To the extent that connectivity during peak periods or incidents can be affected by extreme congestion on certain routes, the Whipple connection would also improve connectivity by increasing the capacity of facilities designated for trucks in the corridor by about 25%. Completion of the cross-connector from I-880 to SR238 south of Decoto Road would increase the capacity of facilities designated for trucks in the corridor by about 80% above that provided by the existing truck routes.

Comparing the two proposed projects, the new connector would be a more effective element of a sub-regional goods movement network than would Whipple. The connector offers the advantages of higher capacity, higher design speed and ability to link key state highways including I-880, SR238, and Route 84 and the Dumbarton Bridge into a connected network of both local and regional travel.

The Alameda CTC Countywide Multimodal Arterial Plan (MMAP) has developed draft modal priorities for arterials. They generally indicate that trucks are one of the top two priorities on each of the study routes except east Whipple. However, because the recommendations have not

yet been adopted, they do not represent suitable evaluation criteria for this analysis. Passenger system compatibility evaluation is deferred to the MMAP.

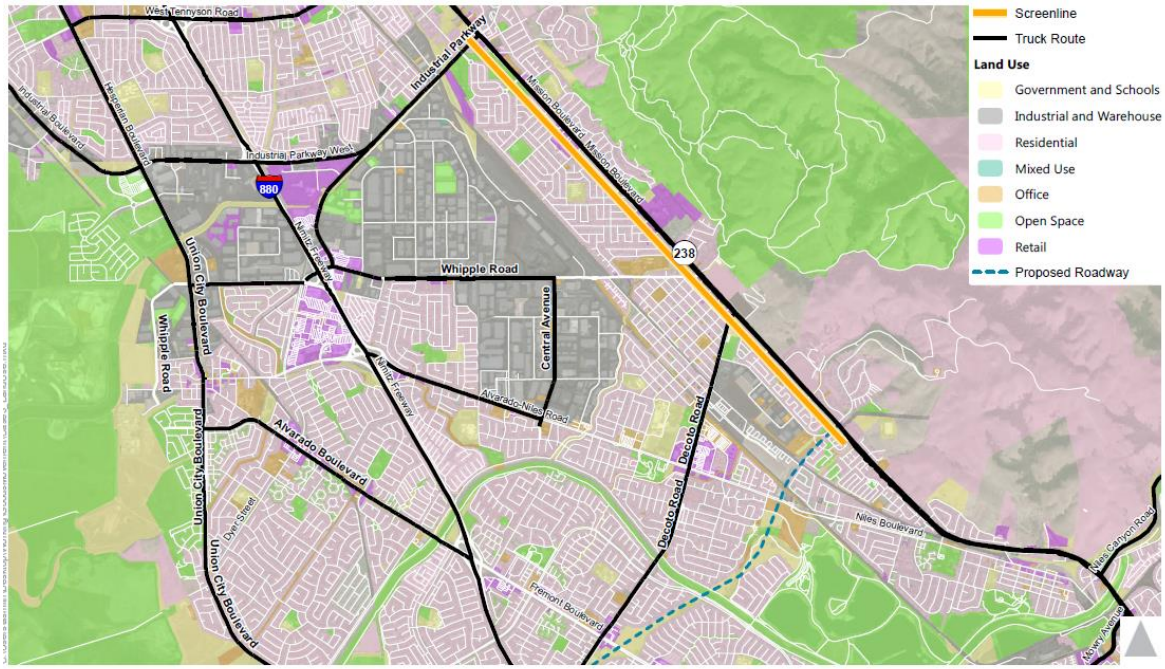
7.3.3 Land Use Compatibility

Both the Whipple Rd extension and the additional east/west connector route option south of Decoto Rd may reduce the impact of truck traffic along existing routes that pass through sensitive areas. Such areas include the residential neighborhoods located along the 2.5 mile stretch of Decoto Rd between I-880 and Route 238. Industrial Pkwy also impacts residential areas in the 0.3 mile section just west of Route 238.

The proposed new connector roadway south of Decoto Rd would travel through a wide protected right-of-way allowing for buffering of the adjacent residential land uses, although additional measures may be needed in order to minimize impacts on residential areas within a half mile stretch near residential areas west of Route 238. Designating Whipple Rd as a truck route would occur in conjunction with widening the road to four lanes consistent with the Union City General Plan.

None of the four existing or additional truck routes under consideration in this evaluation are areas of equity concern according to the MTC 2013 Impacted Communities map. Therefore shifts of truck traffic from one route to another as a result of the proposed re-designation would not result in a net effect on truck routing through areas designated as communities of regional equity concerns.

Figure 7.6 Land Use Context for Central County East/West Truck Routes



7.4 Union City Boulevard Widening, Union City

Union City Boulevard (aka Hesperian Blvd and Ardenwood Blvd) provides access to extended industrial zones west of I-880 in Union City and Hayward and serves as a truck and traffic reliever route to 880 between Routes 84 and 238, a distance of over 12 miles. The section between Whipple Road and Industrial Blvd is one of the more congested segments. This project proposes to widen Union City Boulevard from two lanes to three lanes from Whipple Road in Union City to Industrial Parkway in Hayward. The widening would help create more effective routing alternatives for Central County truck route network to address issues identified in needs assessment and case study.

Evaluation criteria identified as relevant to the proposed widening are the effects on travel time delay and freight connectivity. Evaluations relative to other measures are also included for completeness. The following table presents to results of the evaluation. The individual evaluations appear below the table.

Table 7.10 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay	An average 22 hours of daily truck delay in 2013 on 880 and Union City Blvd through the proposed project area are projected to increase to almost 28 hours in 2040 even with the proposed widening.	H	Project would add 10% capacity to the corridor, preserving corridor V/C ratio slightly below 1.0 and, along with operational improvements on 880, would prevent even more significant growth in delay and loss of reliability. The incremental capacity improvements on 880 translate to a capacity increase roughly equivalent to the capacity increase resulting from the widening of Union City Blvd, so both projects are equally beneficial in terms of capacity. However, the 2040 truck volume on 880 is projected to be about 15 times the volume on Union City, so the 880 project would provide considerably greater benefit to goods movement	L	M
Freight Connectivity	Key access route to major industrial areas in Central County and reliever route to 880 with limited ability to sustain those functions with projected demand growth.	M	Added capacity would allow Union City Blvd to absorb traffic growth without increased congestion and continue to provide reasonable travel time alternative to 880 However, it would not add a physical network element that would provide route connectivity that does not presently exist	N	N

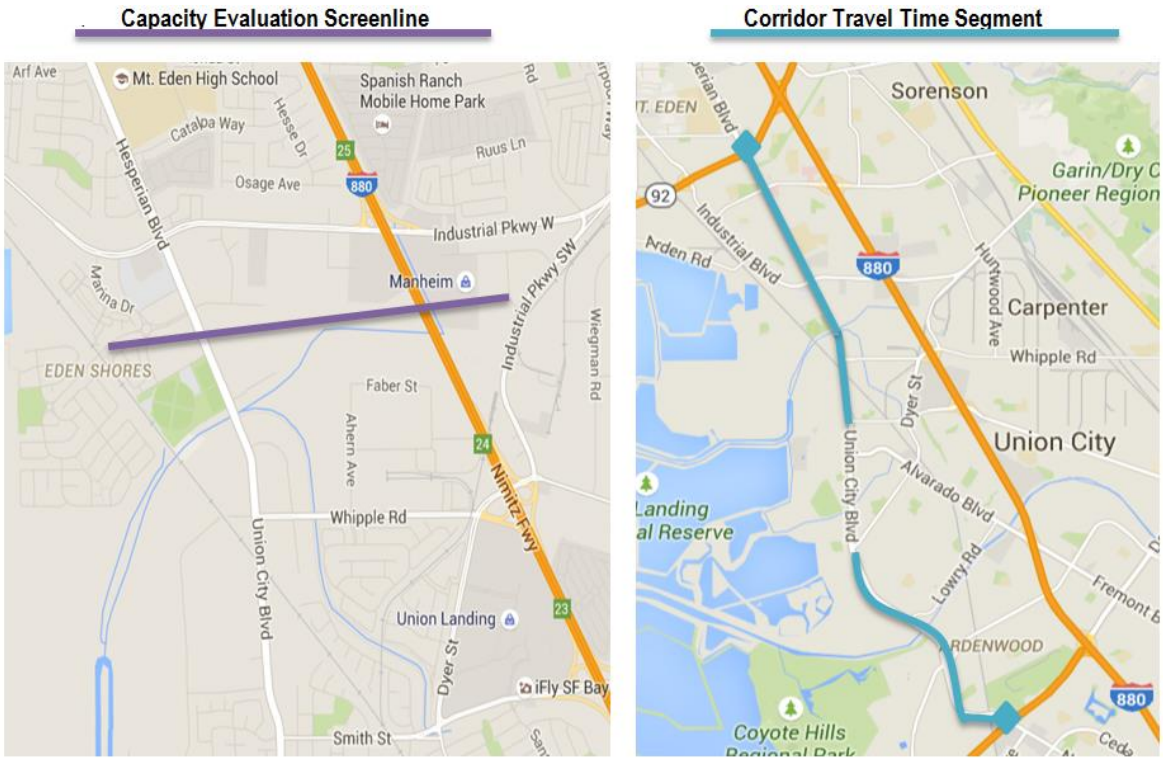
Passenger System Compatibility	Passenger system compatibility is deferred to the Alameda CTC, Multi-Modal Arterials Plan (MMAP)	N	Passenger system compatibility evaluation is deferred to the MMAP study	N	N
Land Use Conflict	The project segment is located within an industrial area	N	The project segment is located within an industrial area	N	N
Pavement Condition	Union City Blvd was not identified as deficient in the goods movement needs assessment.	N	The project does not directly affect segments identified as deficient in the goods movement needs assessment.	N	N
Bridge Conditions	The project does not affect any deficient bridges.	N	The project does not affect any deficient bridges.	N	N
Equity	The project route segment lies outside of impacted communities as determined in the BAAQMD updated methodology for identifying communities of need	N	The project route segment and parallel segment of 880 both lie outside of BAAQMD impacted communities. Any traffic shifts between the two routes would not shift traffic or trucks from outside to within communities of need	N	N

7.4.1 Travel Time Delay

The travel congestion analysis takes into account Union City Blvd individually and in the context of its role as a reliever route to I-880. The reliever route function is analyzed using a screenline that intersects the two routes through the section of the proposed Union City Blvd widening, as shown in Figure 1. It also considers the travel time for longer journeys through the directly affected corridor extending from Route 92 on the north to Route 84 on the south, as illustrated in Figure 2.

In terms of travel time for a trip from the San Mateo Bridge approach (Route 92) and southwest Hayward industrial areas to the Dumbarton Bridge approach (Route 84), traffic growth between the present and 2040 would increase travel times and delays on I-880 by about 10% even with the proposed operational improvements. With the Union City Blvd widening project, travel delay along the parallel route of Hesperian, Union City and Ardenwood Boulevards would not increase between 2013 and 2040, providing a more reliable alternative to 880 than it does at present. On average, the travel time advantage of I-880 over the Union City Blvd route would decline from about 35% faster in 2013 to about 25% to 30% faster in 2040.

Figure 7.7 Union City Boulevard Evaluation Screenline and Travel Time Analysis Segment



The table below presents Alameda CTC travel data and modeling results for 2013 and 2040 traffic congestion in terms of growth in traffic and truck volumes, capacity and truck delay. In addition to the proposed widening of Union City Blvd, operational improvements on I-880 are projected to increase its capacity. Even with the improvements to both facilities, truck delay is forecast to grow 24%.

The following table presents the projected growth in demand and congestion in Union City Blvd corridor. While the 880 operational improvements represent a smaller proportional increase to the freeway's exiting, in terms of vehicle throughput per hour the incremental improvements on 880 translate to a capacity increase roughly equivalent to the capacity increase resulting from the widening of Union City Blvd. In terms of capacity improvement, therefore, both projects are equally beneficial. However, the 2040 truck volumes on 880 are projected to be about 15 times the volume on Union City, so the 880 project would provide considerably greater benefit to goods movement

Table 7.11 Union City Projects Traffic Growth

	Change from 2013 to 2014			
	Traffic Volume	Truck Volume	Capacity	Truck Delay
Union City Blvd	22%	-7%	33%	-33%

I-880	19%	20%	17%	24%
Combined	20%	18%	25%	24%

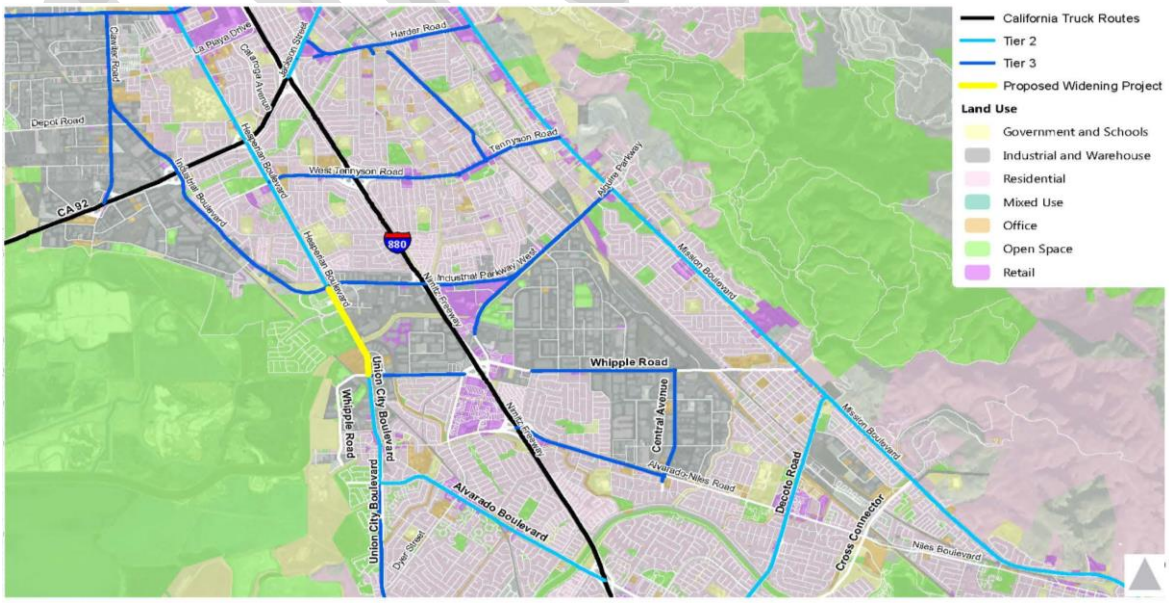
Because Union City Boulevard is projected to carry 15% of the corridor traffic and only 6% of the trucks, its direct effect on routine congestion and truck delays is expected to be minor. However, with the growing congestion on 880, during traffic incidents and non-routine events, it will play a role as a reliever route and an alternate means of access to the major industrial areas in central Alameda County. In this role, while traffic and truck volumes in the corridor would increase by 20% and 18%, and truck delay on I-880 by 24%, the widening project on Union City Blvd would reduce its own truck delay and allow that segment of the alternate route to operate within 5 mph of the adjacent congested freeway speed.

Within the I-880 and Union City Blvd corridor from the Dumbarton Bridge approach (Route 84) to the San Mateo Bridge approach (Route 92), the 2040 congested travel time would be about 10 minutes along I-880 versus about 13 minutes along Ardenwood/ Union City Blvd/ Hesperian.

7.4.2 Freight Connectivity

Added capacity would allow Union City Blvd to absorb traffic growth without increased congestion and continue to provide reasonable travel time alternative to 880. However, it would not add a physical network element that would provide route connectivity that does not presently exist. Therefore, this evaluation gives the project a "negligible" rating for connectivity improvement.

Figure 7.8 Union City Boulevard Land Use Context



7.5 Alameda Island Bridges

The principal means of unrestricted truck access to the City of Alameda are three bridges connecting the southeast edge of the island to Oakland and the regional freeway system. Based on Alameda CTC data and modeling, the bridges carry over 1300 medium and heavy trucks a day and are projected to grow by 5% to 10% by 2040. Regional Transportation Plan projects 240101, 240394, 240324 and 240100 propose to improve the bridges through retrofit and expansion to better accommodate all modes of passenger travel while still providing truck access. An additional project, identified in the Caltrans Bay Area Freight Mobility Study proposes to extend Clement Ave from Broadway to Grand St. Alameda to access industrial area, provide a direct connection to northern truck route and more complete access through and around the island's central business district to the three bridges.

The proposed projects are described as follows:

- Fruitvale Avenue (Miller Sweeney) Lifeline Bridge Project between Tilden Way in Alameda and Fruitvale Avenue in Oakland. The project would retrofit the existing bridge to provide dedicated bike lanes, median, and sidewalks and to maintain structurally reliable truck route access and hazardous material access to Alameda island in view of restrictions on hazardous materials in other key island access routes, the Webster and Posey tubes.

- Replace Park Street Bridge between Park Street in Alameda and 29th Avenue in Oakland. Project would help maintain structurally reliable truck route access and hazardous material access to Alameda Island and provide dedicated bike lanes, median, and sidewalks.

- Reconstruct Lesser, Tidewater, and High Streets west of the I-880 approaches to High Street Bridge to serve overweight truck traffic and provide public sidewalks and bikeway.

- Clement Ave extension Broadway to Grand Street in Alameda to access industrial area and provide direct connection to northern truck route. Involves signalization improvements, right-of-way acquisition, and new construction, as well as resurfacing segment between Broadway and Grand St.

Evaluation of the project addresses the three relevant criteria established for the Alameda CTC Goods Movement study: freight connectivity and infrastructure condition for bridges and pavement sections. The following table presents to results of the evaluation. The individual evaluations appear below the table.

Figure 7.9 Alameda Island Bridges

Table 7.12 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Freight Connectivity	The bridges and connectors provide essential access to City of Alameda businesses, industrial and warehouse areas. Connectivity is threatened during emergencies.	L	Longevity and reliability of bridges would be substantially enhanced. Potential loss of connectivity due to bridge damage or structural insufficiency is addressed the bridge condition rating below and as they represent the primary benefit of the bridge improvements are given higher performance ratings than connectivity.	N	N
Travel Time Delay	The bridge projects will not directly address routine delay, but they will reduce the possibility that bridge malfunction could introduce incident-induced delay	L	Although they will not directly address routine delay, they will reduce the possibility that bridge malfunction could result in incident-induced delay. Travel model projections indicate negligible increases in delay for trucks on the three bridges between 2013 and 2040.	N	N
Passenger System Compatibility	Passenger system compatibility is deferred to the Alameda CTC Multi-Modal Arterials Plan (MMAP)	N	Passenger system compatibility evaluation is deferred to the MMAP study	N	N

Land Use Conflict	The projects are not intended to address truck routing relative to existing land uses	N	Structural upgrades to the bridges is not expected to result in rerouting trucks to sensitive areas	N	N
Infrastructure Condition	The bridge sufficiency ratings are below the countywide average and eligible for federal funding for rehabilitation but not replacement	M	The bridge improvements would increase their longevity, the reliability of access to the island and reduce O&M costs.	N	M
Pavement Condition	The bridge retrofit projects would also include improvements to the bridge deck surfaces	M	The bridge retrofit projects would also include improvements to the bridge deck surfaces	N	M
Equity	The bridge projects all lie within impacted communities as determined in the BAAQMD updated methodology for identifying communities of need.	M	As the alternative truck routes within the influence area all of the projects lie within communities of need Any shifting of traffic from one facility to another would not produce a net change in the effects on equity.	N	N

7.5.1 Freight Connectivity

All three bridges and/or their approaches are designated truck routes, and their Priority 1 function in the Alameda County Multi-Modal Arterial Plan study is truck movement. Second and third priorities include automobile and bike use. Clement Avenue is a designated truck route with bicycles its highest priority use.

Limited capacity on each bridge due to narrow cross-sections closely spaced terminus intersections and closures for marine traffic can disrupt reliable access to and from Alameda. Truck volumes are only projected to grow by about 7% over the next 25 years, with the number of medium and large trucks expected to average about 300 per day per bridge in 2040.

The primary benefits of the bridge improvements and approach routes are to continue to provide reliable redundant access to the city for its residents and businesses and goods movement destinations including community retail and industrial and warehouses along the north shore of the island.

7.5.2 Infrastructure Condition

The National Bridge Inventory Sufficiency Rating (SR) of the bridges is a composite score of structural adequacy and safety, serviceability and functional obsolescence. On a scale of 100 for an entirely sufficient bridge to zero for entirely insufficient or deficient, the three Alameda bridges rate in the range between 50 and 80, below the countywide average of 85. The below-80

rating makes the three bridges are eligible for federal funding for rehabilitation but not replacement.

In terms of network continuity and completeness, the bridges and their access systems on either side of the estuary are crucial elements for local goods circulation and access to the regional goods movement system.

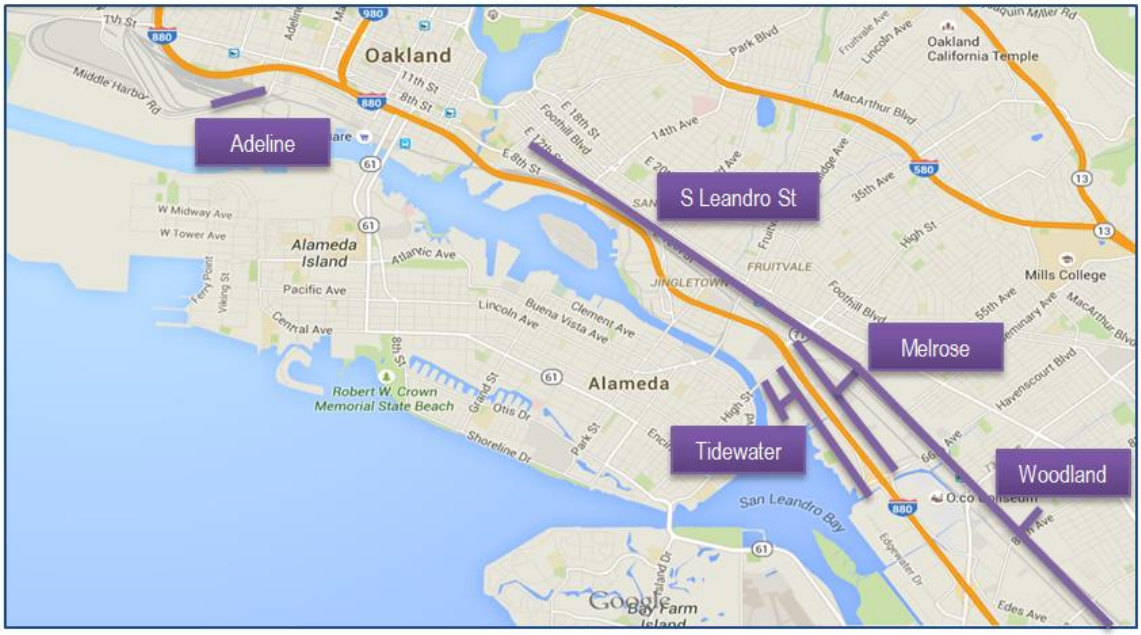
7.6 Oakland Industrial Truck Routes

Five of the proposed projects involve individual or groups of upgrades to truck routes in Oakland to allow them to better accommodate industrial truck movement between the Port and industrial areas in south Oakland and San Leandro. The routes provide a combination of parallel -truck capacity to I-880 and access to the Port itself and to the industrial Tidewater, Melrose-Coliseum or Woodland Districts. The projects also support already existent truck routing largely available along San Leandro Street east of 880 and Doolittle Dr. to the west, although gaps exist in both routes. The following proposed projects are evaluated below.

Table 7.13 Project Descriptions

Project	Description
Tidewater District street reconstruction for overweight trucks Oakport, Lesser, Tidewater, High Streets in Oakland west I-880	Reconstruct Oakport, Lesser, Tidewater, and High Streets in Oakland west of the I-880 to serve overweight truck traffic, reconfigure roadway intersection configurations, and provide sidewalks, bikeway
Melrose - Coliseum District: 50th Ave and Coliseum Way reconstruction for overweight truck traffic, Oakland	Reconstruct Coliseum Way and 50th Avenue to handle overweight truck traffic, reduce safety hazards due to sight distance, and provide bicycle and pedestrian safety facilities.
Reconstruct streets and add rail crossing safety for heavyweight trucks in Woodland-81st Avenue industrial area, Oakland	Reconstruct goods movement streets within the Woodland-81st Avenue industrial area to withstand overweight truck traffic; provide at-grade safe RR crossings
Replace Adeline overpass at 3rd St in Oakland to accommodate overweight trucks.	Replace the existing Adeline St railroad overpass at 3rd St to reduce the grade, improve structure to accommodate overweight trucks, meet seismic standards, provide bike path to Shoreline Park
Truck route signage to divert truck traffic to San Leandro St	Recommended companion project to elimination of San Leandro street truck route gaps at Fruitvale and 105th to serve as continuous heavy-truck route

Figure 7.10 Oakland Industrial Truck Routes



The individual projects address network connectivity for industrial trucking in the following ways.

Table 7.14 Individual Project Benefits

	Improve heavy truck routing for distance travel	Improve overweight load access within industrial areas	Replace sub-standard bridges	Rail crossing, cycling, pedestrian safety
Tidewater District	√	√		√
Melrose-Coliseum District	√	√		
Woodland-81st Ave District		√		√
Port District - Adeline Bridge	√		√	
San Leandro Street Routing	√			√

Evaluation of the projects' focuses on two criteria identified as relevant in earlier phases of the study: freight connectivity and infrastructure condition. For completeness, the projects are also evaluated against other criteria of general importance to local street improvements. The following table summarizes the findings for the five individual projects, followed by a table that evaluates all five as a group.

Table 7.15 Individual Project Performance Ratings

Metric	Project	Current Condition	Issue Severity Rating	Project Performance	Improvement Effectiveness Rating	Overall Rating
Freight Connectivity	Tidewater District	Recurring congestion on I-880 results in limits on truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.	M	Project complements the existing industrial truck routes along I-880 and San Leandro Street by providing limited parallel capacity and last mile access to industrial truck destinations. It does not unilaterally provide significant new connections for longer distance overweight trucking.	N	N
	Melrose-Coliseum District	Recurring congestion on I-880 results in limits on truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.	M	Project complements the existing industrial truck routes along I-880 and San Leandro Street by providing limited parallel capacity and last mile access to industrial truck destinations. It does not unilaterally provide significant new connections for longer distance overweight trucking.	N	N
	Woodland-81st Ave District	Recurring congestion on I-880 results in limits on truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.	M	Project complements the existing industrial truck routes along I-880 and San Leandro Street by providing limited parallel capacity and last mile access to industrial truck destinations. It does not unilaterally provide significant new connections for longer distance overweight trucking.	N	N
	Port District -	Recurring congestion on I-880 results in limits on	M	Project improves design and reliability	N	N

Metric	Project	Current Condition	Issue Severity Rating	Project Performance	Improvement Effectiveness Rating	Overall Rating
	Adeline Bridge	truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.		of last mile access to Port of Oakland. It does not unilaterally provide significant new connections for longer distance overweight trucking.		
	San Leandro Street Routing	Recurring congestion on I-880 results in limits on truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.	M	Project complements the existing industrial truck routes along I-880 and San Leandro Street by providing limited parallel capacity and last mile access to industrial truck destinations. It does not unilaterally provide significant new connections for longer distance overweight trucking.	N	N
Infrastructure Condition	Tidewater District	While not identified in the countywide needs and deficiencies assessment, pavement conditions in the area have been locally determined to warrant rehabilitation	L	Project would upgrade pavement conditions for local access and circulation	L	L
	Melrose-Coliseum District	While not identified in the countywide needs and deficiencies assessment, pavement conditions in the area have been locally determined to warrant rehabilitation	L	Project would upgrade pavement conditions for local access and circulation	L	L
	Woodland-81st Ave District	While not identified in the countywide needs and deficiencies assessment, pavement conditions in the area have been locally determined to warrant rehabilitation	L	Project would upgrade pavement conditions for local access and circulation	:	L
	Port District -	Bridge provides critical access to Port for	H	Project would upgrade bridge and	M	M

Metric	Project	Current Condition	Issue Severity Rating	Project Performance	Improvement Effectiveness Rating	Overall Rating
	Adeline Bridge	overweight and other trucks		pavement conditions for local access and circulation		
	San Leandro Street Routing	While not identified in the countywide needs and deficiencies assessment, pavement conditions in the area have been locally determined to warrant rehabilitation	L	Project would upgrade pavement conditions for local access and circulation	N	L
	Tidewater District	Industrial area with relatively low pedestrian, bicycle or transit activity	L	Project includes pedestrian and bicycle facilities	L	L
Passenger Conflicts	Melrose-Coliseum DistrictTidewater District	Industrial area with relatively low pedestrian, bicycle or transit activity	L	No substantial improvement to passenger modes	N	N
	Woodland-81st Ave District Melrose-Coliseum District	Industrial area with relatively low pedestrian, bicycle or transit activity	L	Project improves an railroad grade crossing	N	N
	Port District - Adeline BridgeWoodland-81st Ave District	Port access and industrial area with demand for active-travel access to Bay Trail	M	Project includes pedestrian and bicycle facilities	M	M
	San Leandro Street Routing Port	San Leandro Blvd is a mixed auto, pedestrian and bicycle corridor, but potential reliever for both 880 and International Blvd. Truck route gap create additional impacts to other modes and International Blvd, creating a diversion route to reduce traffic through designated bus, bicycle and pedestrian corridor	H	San Leandro routing reduces truck use of high transit, bicycle and pedestrian areas, but it also creates a freeway diversion route adding traffic through some residential and sensitive areas.	M	M

Table 7.16 Performance Ratings for Combined Effects of Five Oakland Industrial Truck Route Projects

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Truck Route Connectivity	Recurring congestion on I-880 limits on truck access and circulation along the corridor, and due to bridge weight limits, 880 cannot accommodate overweight trucks between the Port and San Leandro.	M	Each project complements the existing industrial truck routes along I-880 and San Leandro Street by providing limited parallel capacity and last mile access to industrial truck destinations. As the projects are not fully contiguous, even as a group they do not provide significant new connections for longer distance overweight trucking.	M	L
Travel Time Delay	The projects mainly affect low / moderate volume industrial access streets	L	The projects will not add street capacity and will have negligible impact on congestion or delay	N	N
Passenger System Compatibility	The projects are all located in industrial areas with relatively low pedestrian, bicycle or transit activity.	L	Adeline Bridge and Tidewater improvements include pedestrian and bicycle facilities, San Leandro routing reduces truck use of high transit, bicycle and pedestrian areas, and 81st Ave project improves a railroad grade crossing	L	L
Land Use Conflicts	The projects are all located in industrial areas.	L	The projects are all located in industrial areas.	L	N
Pavement Condition	Route segments were not identified as deficient in the goods movement needs assessment, but are based on local evaluation and decisions regarding infrastructure expenditures	M	The projects address six to seven miles of pavement deficiency and the substandard Adeline Bridge.	N	M
Bridge Conditions	Aside from the Adeline bridge, the projects do not affect any deficient bridges.	L	The Adeline bridge project creates a new for critical access to Port of Oakland	L	L
Equity	The projects are all located in within impacted communities as determined in the BAAQMD updated methodology for identifying communities of need	N	of the projects are not expected to shift traffic from one facility to another and so would not produce net impacts on equity.	N	N

7.6.1 Freight Connectivity

The improvements address some of the most significant needs for truck route connectivity near the Oakland's Port and Airport and major industrial, processing and warehouse areas. While they complement the existing overweight system, providing last-mile access and make the system

more functional, they do not create significant new network elements for longer distance travel. The longest segments in the project group are Oakport Drive and Coliseum Way, which span less than 3 miles parallel to the I-880 and San Leandro Street truck routes. San Leandro Street, with proposed gap closures, provides an almost continuous parallel route to I-880 for almost ten miles south from downtown Oakland.

7.6.2 Infrastructure Condition

The Adeline Bridge replacement addresses a critical access point to the Port of Oakland and the primary gateway for travel via 880 and to intra- and interregional points south. The reconstruction will improve safety and reliability of port access, meeting current seismic standards, and reducing the maximum grade for safer deceleration and stopping,

Aside from the Adeline Bridge, none of the routes directly address deficient bridge conditions identified in this study's Task 3 assessment of countywide goods movement gaps, needs, issues and deficiencies. In total they address about six to seven miles of street pavement deficiencies and upgrades needed to support heavy trucks.

7.6.3 Safety and Passenger Mode Accommodation

The new Adeline Street bridge will include accommodations and amenities for pedestrians and cyclists, completing a missing segment in the San Francisco Bay Trail. Improvements to the 81st Ave will include safety enhancements to the at-grade railroad crossing. Signing and way-finding to guide overweight trucks to San Leandro Street are intended to reduce truck use of International Boulevard and other streets on which transit, pedestrian and bicycles are higher priority modes.

7.7 San Leandro Street Gap Closure Oakland/ San Leandro

The discontinuity on San Leandro Street at 105th Avenue creates a gap in the truck route that prevents it from being a functional trucking connection between Oakland and San Leandro and alternative to International Blvd/ 14 Street. International and 14th are undergoing design and functional changes including installation of a protected bus rapid transit (BRT) alignment and pedestrian and bicycle improvements. The BRT project will also resolve an existing discontinuity in San Leandro Street at Fruitvale Ave to allow it to serve as a highly effective trucking alternative for International as well as a reliever to I-880. The gap at 105th Avenue would continue to prevent achievement of these objectives.

Figure 7.11 San Leandro Street Truck Route Gap

The proposed 105th undercrossing project would be adjacent to a segment of the East Bay Greenway project, which is presently in scoping/ environmental phase. The Greenway would construct a multi-use trail along the BART alignment in the vicinity of San Leandro Street. The removal of the undercrossing could create a continuous street connection along San Leandro Street from north to south of 105th Ave. The modifications would eliminate the low-clearance vehicular grade separation connecting San Leandro Street south and north of 105th which presently creates a gap in the truck route. As a result, San Leandro Street could function as an alternate truck route to International Blvd/ East 14th multimodal corridor.

Evaluation of the San Leandro Street undercrossing project addresses the three relevant criteria established for the ALAMEDA CTC Goods Movement study: freight connectivity, passenger system compatibility, and land use compatibility. The following table presents to results of the evaluation. The individual evaluations appear below the table.

Table 7.17 Ratings Summary

	Current Condition		Condition Following Improvement		Improvement Rating
Truck Route Connectivity	Lack of a fully functional reliever route for 880 and a connection between Port of Oakland and San Leandro processing centers. Unnecessary truck use of International Blvd multi-modal	H	A functional reliever route for 880, key portion of overweight truck connection from Port, alternative truck route and reduced truck use of International Blvd	H	H

	corridor				
Travel Time Delay	I-880 experiences congestion during peak periods with average speeds between 45 and 50 mph. Projections of 2040 conditions anticipate 15% growth in all traffic and 45% increase in trucks traffic projected on 880. Traffic and truck speeds on International Blvd may also be expected to decline as a result of the bus rapid transit project and improvements to pedestrian and bicycle facilities	H	By adding approximately 15% to the functional truck route capacity through the corridor and across the screenline. The project would marginally offset the 45% increase in truck traffic. However, even with the project, truck delays are projected to increase by 65%. The project's role would be one of diversion route and element of a corridor system management plan.	H	L
Passenger System Conflict	Gap on San Leandro Street results in higher truck use of International Blvd, in conflict with plans to make International a multi-modal passenger corridor.	H	Reduced conflict with International multi-modal passenger corridor. Consistent with East Bay Greenway Plan for pedestrians and bikes.	M	M
Land Use Conflict	3.5 mile stretch of International Blvd between Marina Blvd and Hegenberger Rd is bordered by retail and residential land uses.	M	Reduced impact of overweight truck traffic in residential and retail areas with addition of San Leandro St route option, with lower exposure (1.5 miles) to residential use.	L	L
Pavement Condition	The route segment was not identified as deficient in the goods movement needs assessment.	N	The project does not directly affect a route identified as deficient in the goods movement needs assessment.	N	N
Bridge Conditions	The needs assessment did not identify the San Leandro Street undercrossing as structurally deficient, although its horizontal and vertical clearances are sub-standard for large trucks.	M	The project does would address substandard vertical and horizontal alignment of the of the undercrossing	N	L
Equity	The project lies entirely within an impacted communities as determined in the BAAQMD updated methodology for identifying communities of need	N	As the alternative truck route to I-880 and International Blvd, which both also lie within communities of need, any shifting of traffic from one facility to another would not produce a net change in impact on equity.	N	N

7.7.1 Freight Connectivity

San Leandro Boulevard's primary role in the local truck route network is as a parallel and complementary route to I-880 and International and a direct access to industrial areas abutting its alignment. Based on ALAMEDA CTC travel data and modeling, the three routes carried over

20,000 trucks a day in 2013 and are projected to increase 45% to about 30,000 by 2040. Over 95% of trucks are projected to use I-880, but both San Leandro Street and International Blvd are forecast to grow by significant percentages over their 2013 truck counts.[20] In spite of the conversion of International Blvd to a transit priority BRT street, the forecasts show an increase in through truck traffic from about 50 in 2013 to about 100 in 2040.

San Leandro Blvd would also become a functional element of the Corridor System Management Plan. To manage congestion levels on 880, San Leandro Street and other parallel truck routes such as Doolittle Drive west of I-880 could sever as diversion routes during peak times. Further justifying the importance of San Leandro Street's role as a critical truck route, the majority of land area abutting or along the corridor from west and south of downtown Oakland to downtown San Leandro is presently in warehouse and industrial use.

Completing the San Leandro Street connection as proposed by the project would:

- Close a gap in a critical part of the local and inter-city truck route network allowing International Blvd to fulfill its proposed role as a multi-modal passenger movement and business corridor
- Provide a functional goods movement reliever route for I-880
- Provide truck network redundancy in this a critical part of the County and regional goods movement network

In terms of network continuity and completeness for local and regional goods movement, the project making these connections possible would justifiably be considered a high priority project warranting a high rating in goods movement qualitative and quantitative evaluation criteria.

Table 7.18 San Leandro Street/International Boulevard Corridor Truck Volumes and Delay

Truck Route Corridor and Direction	Congested Travel Time (minutes)			Truck Volume		
	2013	2040	Percent Increase	2013	2040	Percent Increase
I-880 WBSB	7.04	7.11	1%	10442	14944	43%
I-880 EBNB	6.09	6.48	6%	10210	14706	44%
San Leandro WBSB	8.15	8.15	0%	12	128	959%
San Leandro EBNB	8.15	8.16	0%	15	112	635%

[20] It should be noted that there is limited truck count data available for the arterial street system. The trucking elements of truck travel demand models often over-assign truck traffic to the freeways in comparison with arterial roads. It is likely that actual truck volumes on San Leandro Street are higher than reported here.

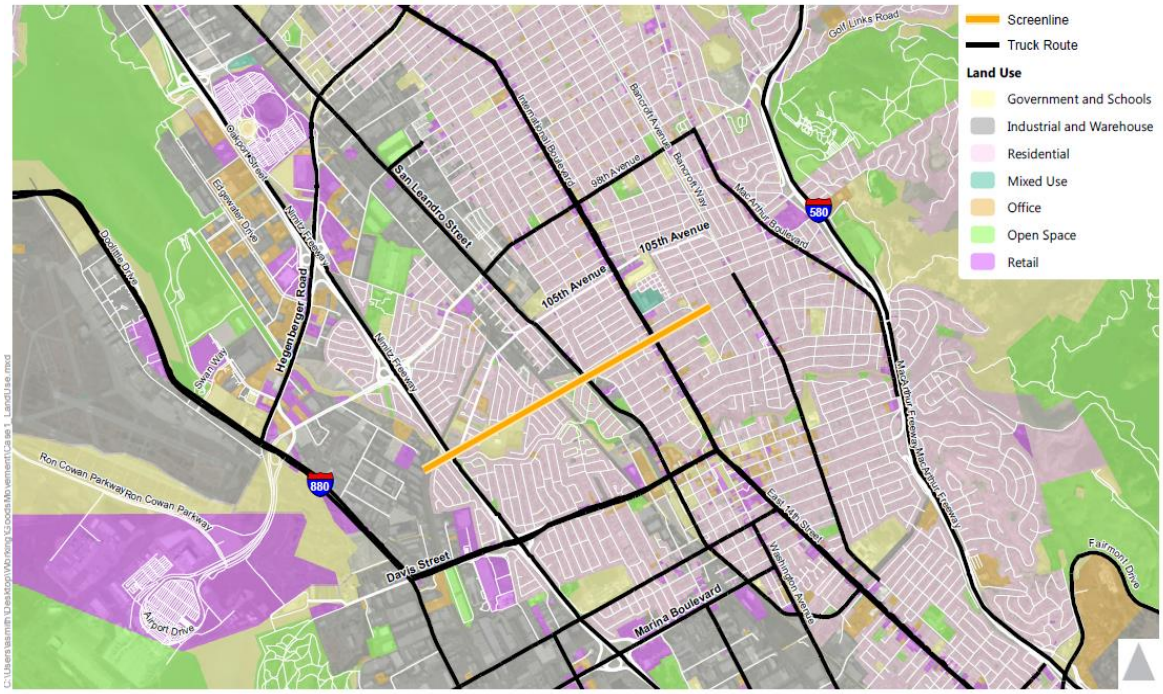
International WBSB	9.42	9.47	1%	24	57	133%
International EBNB	9.42	9.47	1%	21	45	109%
	6.58	**6.82**	**4%**	**20725**	**29991**	**45%**

7.7.2 Land Use Compatibility

Truck traffic on International Boulevard between Marina Blvd and Hegenberger Rd travels through primarily residential and retail land areas, with the full extent of this 3.5 mile stretch of roadway adjacent to these land uses. In comparison, San Leandro St in this area is in close proximity to approximately 1.5 miles of residential land uses, with the remaining 2 miles of the 3.5 mile stretch traveling through industrial areas. The proposed project would provide additional route options for increasing truck traffic in this area, serving to reduce the impact of truck traffic in sensitive areas along International Blvd.

All of the truck routes under consideration in this evaluation are within the Western Alameda County subarea on the MTC 2013 Impacted Communities map. Therefore shifts of truck traffic from one route to another as a result of the proposed upgrades and route re-designations would not result in a net effect of additional truck routing through areas designated as communities of regional equity concerns.

Figure 7.12 San Leandro Street Corridor Land Use Compatibility



7.8 Summary of Findings on Local Street Evaluations

Table 7.20 summarizes the evaluation results presented above and prioritizes the local streets projects. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column. Generally a project is first priority when it has at least 1 high rating. The first priority projects are included in the opportunity packages discussed in Section 2.0.

Table 7.19 Summary of Evaluations of Local Street Projects

Project Name	Priority	Explanation
San Leandro St	First	This project has a high rating and multiple medium and low ratings.
Route 262	First	This project has a high rating and low ratings.
Adeline Bridge	First	This project has a high and two medium ratings.
Dumbarton/ 238 Connector	First	This project has a high, medium and low rating.
Santa Rita Road Truck Route	First	This project has one high and medium rating but also some negative land use impacts which should be mitigated.
One of the Alameda Bridges	First	This is a moderately rated project, project should select one of the multiple bridges over Alameda
Whipple gap closure	Second	This project has a medium and low rating and also two negative ratings.
Union City Blvd	Second	This project has one medium rating.
Auto Mall Pkwy Widening, other Fremont truck routes	Second	This project has a medium, a low and a negative rating.
Other Alameda bridges, Clement Street	Second	Given one of the bridges should be prioritized, the remaining bridges will have secondary priority.
Tidewater, Melrose, Woodland District Street Rehab	Second	This project has one medium rating.

8.0 SEA-LEVEL RISE PROJECTS

This section contains several projects that deals with systems resilience in the event of sea-level rise. The table below describes how the effectiveness ratings are applied to the projects evaluated in this section in conjunction with the general guidelines and severity rating criteria provided in Table 8.1.

Table 8.1 Guidelines for Assigning Ratings for Sea-Level Rise Projects

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay – Highway	Yes	This measure evaluates the delay benefits of a sea level rise project. • To receive an H rating, a project must significantly protect goods movement assets in whole. • To receive an M, a project must protect the vast majority of a goods movement asset or assets. • To receive an L, a project should protect asset that performs some levels of goods movement functionality.
Travel Time Delay - Air/Rail/Port	Yes	This measure evaluates the project impact of travel time delay at airport. Benefits on last-mile connectors to the airport and port complex can also generate moderate to low levels of benefits. • To receive an H rating, a project must significantly protect the airport in whole. • To receive an M, a project must protect the vast majority of the airport. • To receive an L, a project should protect some parts of the airport.
Connectivity - Highway	Yes	Connectivity measures the ability to provide additional linkages between freight generators/attractors. • To receive an H rating, a project must significantly protect assets that provide essential connectivity to goods movement centers. • To receive an M rating, a project must at least partially protect assets that provide important connectivity to goods movement centers. • To receive an L rating, a project must provide some protection of assets that provide some connectivity to goods movement centers.
Connectivity - Air/Rail/Port	Yes	Connectivity for the airport is measured as the ability to access the airport to perform shipping and receiving activities. • To receive an H rating, a project must significantly protect the airport asset. • To receive an M rating, a project must at least partially protect the airport asset. • To receive an L rating, a project must provide some protection of the airport asset.
Freight/Passenger Conflicts	No	This measure is not applicable.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Land Use Conflicts	No	This measure is not applicable.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	No	This measure is not applicable.
Crashes – Crossings	No	This measure is not applicable.
Bridge Conditions	Yes	This measure evaluates the impact of the project on bridge conditions. • A project receives an H rating if it completely protects the bridge asset that performs essential goods movement function. • A project receives an M rating if it protects the bridge asset in a significant way, and that the bridge is important for goods movement. • A project receive an L rating if it protects parts of the bridge asset that performs non-essential functions and facilitates goods movement.
Pavement Condition	Yes	This measure evaluates the impact of the project on pavement conditions. • A project receives an H rating if it protects the pavement of an asset that performs essential goods movement functions. • A project receives an M rating if it protects the pavement of an asset that is important for goods movement. • A project receives an L rating if it protects the pavement of an asset that performance some goods movement functions.
Resiliency	Yes	A project improves resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A project receives an H rating if it protects an infrastructure that that can be affected with a +16 in sea level rise. • A project receives an H rating if it protects an infrastructure that that can be affected with a +36 in sea level rise. • A project receives an H rating if it protects an infrastructure that that can be affected with a +48 in sea level rise.
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/Technology	No	This measure is not applicable.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	Yes	This measure tracks the economic impact of a project through the number of jobs and amount of output it generates. • A project receives an H rating if it is able to protect significant numbers of goods movement related jobs. • A project receives an M rating if it is able to protect a moderate number of goods movement related jobs. • A project receives an L rating if it is able to protect any number of goods movement related jobs.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	Yes	Emission impacts come from changes in PM, NOx that are a direct result of the project. • A project with an H rating means it will prevent significant increases in emissions in the no-project scenario. • A project with an H rating means it will prevent moderate increases in emissions in the no-project scenario. • A project with an H rating means it will prevent marginal increases in emissions in the no-project scenario.
Equity	No	This measure is not applicable.

8.1 Airport Perimeter Dike

At the Oakland airport and surrounding area, the minimum level of inundation that is projected to adversely impact key airport assets and result in broader environmental, social, and economic consequences in the area and region occurs at the Mean Higher High Water Level + 16 inches of sea level rise , when combined with a storm event. This is one of the most vulnerable assets in the event of sea level rise. Improvements to the existing Airport Perimeter Dike at the South Field section of the airport can potentially prevent some of these impacts to the airport assets. The project is shown in Figure 8.1. The ratings summary is presented in Table 8.2. All information was used to help assign ratings is from the report Adapting to Rising Tides: Vulnerability and Risk Assessment Report, 2012.

Figure 8.1 Airport Perimeter Dike Project Location

Table 8.2 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air/Rail/Port	Any inundation-related impacts to Oakland Airport's runways could mean that all of these flights and networks will be affected in the form of significant delays or re-routings, resulting in lost time or lost money for both passengers and air carriers.	H	This project will preserve important airport assets and thus prevent reductions in travel time. The project impact is not quantified at the project level and thus cannot be presented here.	H	H
Connectivity – Air/Rail/Port	With 16 inches of sea level rise, all sections of Hegenberger Road south of Interstate 880 could	H	This project will preserve some of the assets and thus preserve some of the connectivity. The project impact is not quantified at the	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	experience up to 2 feet of inundation during storm events. Airport Road, the only link between all three major access roads and the airport's terminal facilities will be impassable because it is an underpass, and could be inundated by up to 26 feet. Ron Cowan Parkway, an alternate route to the airport from Alameda and Bay Farm Island, could be vulnerable to inundation under all sea level rise scenarios. With 16 inches of sea level rise, Ron Cowan Parkway may face 15 feet of inundation at high tide.		project level and thus cannot be presented here.		
Pavement/Other Infrastructure Condition	With 16-inch sea level rise + storm event , 10 taxiways/runways in North Field and 7 in South Field will be either temporarily flooded or permanently inundated	H	The project will prevent the run way from liquefaction and other flooding and seismic events, thus preserving the pavement and infrastructure conditions.	H	H
Resilience	This is of high importance as the minimum level of sea level rise that can result in adverse impacts is at 16 inches, the lowest in the County.	H	Planned improvements to the perimeter dike near the Oakland Airport's South Field by the Port of Oakland will make it compliant with FEMA's 100=-year flood protection requirements and mitigate its susceptibility to liquefaction from seismic events.	H	H
Jobs	Public transport and road closures to Oakland Airport will cause problems for large numbers of employees who work on or near the airport's premises.	H	This project will help preserve the jobs at the Oakland airport. In the Bay Area in 2010, aviation activity from Oakland generated 7,680 direct, 5,578 induced, and 1,408 indirect jobs, for a total of 14,466 jobs.	L	M
Emissions	The increase in passenger vehicle and truck trips due to the closure of access roads to/from Oakland will result an increase in PM2.5 emissions.	H	The project will prevent the increases in emissions but quantitative numbers are not available.	L	M

8.2 Bay Bridge Living Levee and Offshore Breakwater Installation

In the Bay Bridge focus area, the minimum level of inundation that is projected to adversely impact key transportation assets and result in broader environmental, social, and economic consequences in the area occurs at the Mean Higher High Water Level + 36 inches of sea level rise. The installation of the Bay Bridge Living Levee and Offshore Breakwater can potentially prevent some of these impacts to the transportation assets and the area's environment, society, and economy. The strategy proposed to increase the resilience of the bay bridge focus area is a two-part strategy.

The first part includes the installation of a living levee. The living levee is designed to protect against flooding from at least a mid-century sea level rise magnitude coupled with a 100-year extreme tide event. The assets protected as a result of this strategy include the westbound portion of the Bay Bridge toll plaza, westbound lanes of the I-80 approach, the Emeryville Crescent tidal wetland, Radio Beach, three radio towers and associated facilities, and several partially paved access roads. The living levee location is shown in Figure 8.2.

The second part of the strategy includes the installation of an offshore breakwater. The offshore breakwater is designed to protect against increased wave overtopping and wave-induced erosion along the shoreline that is expected to come with sea level rise. The breakwater is shown in Figure 8.3.

Figure 8.2 Bay Bridge Living Levee

Figure 8.3 Bay Bridge Breakwater

Table 8.3 Results Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	Without the project, it is anticipated that in the event of a 36 in sea level rise, both passenger vehicles and trucks will experience delays regionally as a result of a key highway segment going partially out of service. However given that trucks volumes are only moderate on this portion of I-80, this is of moderate importance.	M	The project will help preserve the bay bridge infrastructure including westbound portion of the Bay Bridge toll plaza, westbound lanes of the I-80 approach, and prevent they system from increases in truck VHT of 12,613 hours (+48%) annually.	H	M

Connectivity - Highway	The primary highway segment projected to be disrupted is the westbound section of I-80 between the beginning of the Bay Bridge and its Toll plaza. Given the importance of the Bay Bridge as an East-West conduit, connectivity will be affected.	M	The project will help prevent the occurrence of the disruption in the no project scenario and thus maintaining connectivity.	M	M
Bridge Condition	This is of moderate importance as the minimum level of sea level rise that can result in adverse impacts is at 36 inches.	M	The highway segment examined in this project does not include the Bay Bridge structure.	N	N
Pavement Condition	This is of moderate importance as the minimum level of sea level rise that can result in adverse impacts is at 36 inches.	M	Without the project, infrastructure serving the Bay Bridge toll plaza (e.g., tunnel, pump house, and power lines) is potentially susceptible to salt water intrusion/corrosion.	L	L
Resilience	This is of moderate importance as the minimum level of sea level rise that can result in adverse impacts is at 36 inches.	M	The project will significantly improve the resilience of the Bay bridge by protecting it against flooding from mid-century sea rise and 100-year extreme tide event. The assets protected as a result of this strategy include the westbound portion of the Bay Bridge toll plaza, westbound lanes of the I-80 approach, the Emeryville Crescent tidal wetland, Radio Beach, three radio towers and associated facilities, and several partially paved access roads. The breakwater will protect the proposed levee from overtopping and erosion.	H	H
Jobs	The number of jobs impacted by under the no-action scenario in the focus area is 971.	M	The project will help project some of these jobs, though it is unclear how many of these are related to goods movement.	L	L
Emissions	There are estimated increase in emissions of PM2.5 as a result of increased vehicle miles traveled.	M	This project will help prevent emission increases which is projected to be about 42.0 tons per day (+2.6%).	M	M

8.3 Damon Slough Living Levee Installation

In the Oakland Coliseum focus area, the minimum level of inundation that is projected to adversely impact key transportation assets and result in broader environmental, social, and economic

consequences in the area occurs at the Mean Higher High Water Level + 48 inches of sea level rise. The projected impacts from this level of inundation are described in detail below. The installation of the Damon Slough Living Levee can potentially prevent some of these impacts to the transportation assets and the area's environment, society, and economy.

Figure 8.4 Damon Slough Living Levee

Table 8.4 Results Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay - Highway	With out the project, it is anticipated that, in an event of a + 48 in sea level rise, that both passenger vehicles and trucks will experience delays regionally as a result of a key highway and roadway segments going partially out of service. The segments going out of service including some portions of I-880, San Leandro and Hegenberger that carries truck traffic.	M	The project will prevent the roadways from going out of service, and thus preventing delay for trucks of 2,167 hour (8%).	L	L
Connectivity - Highway	Without the project, highways in the vicinity, including I-880, San Leandro St, Hegenberger Road, and other airport connectors will likely be disrupted in an event of a + 48 in sea level rise.	L	This project will likely preserve the connectivity of those routes.	L	L
Bridge Condition	The Damon Slough Bridge has been noted to have water levels close to the road deck at extremely high tide, indicating that it is likely already undersized under current conditions. It is not a truck route though.	H	The project will reduce the potential for bridge scour.	M	M
Pavement Condition	This is of low importance as the minimum level of sea level rise that can result in adverse impacts is at 48 inches.	L	If discharge is hindered such as by a rise in elevation of the bay, such that the outlets are now below the tide elevation, the drainage system could back up based on a "dam" effect as well as the additional head pressure this may create.	L	L
Resilience	This is of low importance as the minimum level of sea level rise that can result in adverse impacts is at 48 inches.	L	The project will significantly improve the resilience of the Damon Slough.	H	M
Jobs	A high number of jobs will be impacted as a result of the project.	M	About 4,730 jobs will be preserved as a result of this project, but it is unclear how many of those are goods movement related.	L	L
Emissions	There are estimated increase in emissions of PM2.5 as a result of increased vehicle miles traveled.	L	This project will help prevent emission increases which is projected to be about 9.9 tons per day (+0.23%).	L	L

8.4 Summary of Findings

Table 8.5 summarizes the evaluation results presented above and prioritizes the three projects. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column. The first priority project, the airport perimeter dike, is included in the opportunity packages discussed in Section 2.0.

Table 8.5 Summary of Evaluations of Sea-Level Rise Projects

Sea Level Rise Projects	Priority	Explanation
Airport Perimeter Dike	Top	This project has high ratings across multiple performance measures.
Bay Bridge Living Levee and Offshore Breakwater Installation	Second	This project has a high ratings and multiple medium ratings.
Damon Slough Living Levee Installation	Second	This project has medium and low ratings.

9.0 PROGRAMS AND POLICIES

This section discusses a wide variety of complementary policies and programs that can help augment the benefits of some of the projects described above as well as mitigate some of the negative impacts of freight activity more generally. These programs and policies are typically broadly defined, because they are designed to address a general need across all of Alameda County, rather than a specific localized deficiency. As a result, the ratings for programs and policies are necessarily less detailed and more qualitative that the project-level evaluations presented earlier in this document.

The following table provides a description of the rating criteria used in this section. As with other sections, the N (neutral) rating is used whenever there is a likely nexus between the program or policy and a particular metric, but there is no impact on outcomes or the impact is unknown. Also, across all metrics, a negative rating is used to indicate when a program or policy could have a detrimental effect on desired outcomes for a particular metric. Details for the H (high), M (medium), and L (low) ratings for each metric are provided below.

Table 9.1 Guidelines for Assigning Ratings for Programs and Policies

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Goal: Preserve and strengthen an integrated and connected, multimodal goods movement system that supports freight mobility and access, and is coordinated with passenger transportation systems and local land use decisions.		
Travel Time Delay - Hwy	Yes	This measure evaluates the highway delay benefits of a program or policy. • To receive an H rating, a program/policy must be closely related to highway performance and expected to significantly reduce delay. • To receive an M, a program/policy should have either a strong relationship to highway performance with an expectation of modest delay improvement, or a relatively weak relationship with highway performance but a high likelihood of at least some delay reduction. • To receive an L, a program/policy will generally have some benefit, but the benefit may be very small or hard to predict with certainty.
Travel Time Delay - Air/Rail/Port	Yes	This measure evaluates how the program or policy will affect travel time delay at airport and port facilities and on rail lines. Where relevant, last-mile connectors to the airport and port complex can also generate some benefits for this metric. • To receive an H rating, a program/policy must be closely related to air/rail/port travel time and expected to significantly reduce delay. • To receive an M, a program/policy should have either a strong relationship to air/rail/port performance with an expectation of modest delay improvement, or a relatively weak relationship with air/rail/port performance but a high likelihood of at least some delay reduction. • To receive an L, a program/policy will generally have some benefit, but the benefit may be very small or hard to predict with certainty.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
Connectivity – Hwy	Yes	Connectivity measures the ability to provide additional linkages between freight generators/attractors. • A program or policy that directly supports new connections (such as a new road or connecting two existing roads) specifically meant to serve freight-generating facilities (i.e. airport, port, industrial/manufacturing district, etc.) will receive an H rating. • An M rating is used when a program or policy is likely to support new connections to freight facilities, but with less certainty about the outcomes (e.g., when there are competing priorities that could delay implementation). • An L rating is used for any new connection that is assumed to have some benefit to truck traffic even if it is minimal.
Connectivity - Air/Rail/Port	Yes	Connectivity measures the ability to provide additional linkages between freight generators/attractors. • A program or policy that directly supports new connections (such as a new rail spur or airport access road) specifically meant to serve freight-generating facilities will receive an H rating. • An M rating is used when a program or policy is likely to support new connections to freight facilities, but with less certainty about the outcomes (e.g., when there are competing priorities that could delay implementation). • An L rating is used for any new connection that is assumed to have some benefit to freight traffic at air/rail/port facilities, even if it is minimal.
Freight/Passenger Conflicts	Yes	This measure evaluates whether a strategy will reduce or remove existing freight and passenger conflicts. • An H rating is assigned when the program or policy is directly targeted at reducing or eliminating the conflict, as in the case of street design guidelines for different users. • An M rating is assigned when there is a strong likelihood that the program or policy will reduce conflicts, but the scale of the reduction is less clear, for example due to uncertainty about exactly how freight users will respond to the changes. • An L rating is assigned with there are only minor levels of conflict reduction.
Land Use Conflicts	Yes	Land use conflicts occur when existing or proposed freight facilities are adjacent to or travel through land uses that are incompatible with freight activities. Examples of sensitive land uses include wetlands, residential areas, and schools. • An H rating is assigned when the program or policy is directly targeted at reducing or eliminating an existing conflict, or will avoid creation of new conflicts (e.g., guidance on planning for industrial uses). • An M rating is assigned when a program or policy will reduce the negative impacts of land use conflicts, but does not actually remove the conflict itself. For example, efforts to reduce a particular impact on a nearby school would be helpful, but does not eliminate the underlying conflict of having freight close to the school. • An L rating is assigned for programs or policies that may have either of the effects described above (reduced land use conflict or impact

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		mitigation) but where the degree of benefit is small or difficult to determine.
Goal: Provide safe, reliable, efficient and well-maintained goods movement facilities.		
Crashes - Truck and Reliability	Yes	This measures the degree to which a program or policy reduces the incidence of crashes for at-grade rail crossings. • A program or policy will receive an H rating if its main purpose is to eliminate the road-rail conflict for at-grade crossings. • A program or policy will receive an M rating if it would have moderate impacts on crash reduction. • An L rating will be assigned if the program or policy has only a minor indirect benefit for rail crossing safety.
Crashes – Crossings	Yes	This metric evaluates the degree to which a program or policy improves infrastructure condition for bridges, including highway and rail facilities, as applicable. • A program or policy will receive an H rating if its main purpose is to upgrade bridge condition or otherwise maintain a state of good repair to extend asset life. • A program or policy will receive an M rating if it is not targeted at infrastructure maintenance, but is likely to result in improved bridge condition. • An L rating will be assigned if the program or policy has only a minor indirect benefit for bridge conditions.
Bridge Conditions	Yes	This metric evaluates the degree to which a program or policy improves infrastructure condition for highway and truck route pavements. • A program or policy will receive an H rating if its main purpose is to upgrade pavement condition or otherwise maintain a state of good repair to extend asset life. • A program or policy will receive an M rating if it is not targeted at infrastructure maintenance, but is likely to result in improved pavement condition. • An L rating will be assigned if the program or policy has only a minor indirect benefit for pavement conditions.
Pavement Condition	Yes	A program or policy improve resiliency if it helps strengthen the freight infrastructure in times of emergencies and disasters. • A program or policy will receive an H rating if its main purpose is resiliency. • A program or policy will receive an M rating if it can have significant resiliency benefits though its primary purpose is not to improve resiliency. • A program or policy receives an L (likely the case for projects in this category) when it has marginal resiliency benefits.
Resiliency	Yes	This measures the degree to which a program or policy reduces the incidence of crashes for at-grade rail crossings. • A program or policy will receive an H rating if its main purpose is to eliminate the road-rail conflict for at-grade crossings. • A program or policy will receive an M rating if it would have moderate impacts on crash reduction.

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		• An L rating will be assigned if the program or policy has only a minor indirect benefit for rail crossing safety.
Goal: Promote innovative technology strategies to improve the efficiency of the goods movement system.		
ITS/Technology	Yes	This metric evaluates the degree to which programs and policies leverage ITS and other innovative technologies to improve the performance of the freight transportation system. • A program or policy receives an H rating when its main purpose is to use or upgrade ITS/technology, or is very innovative by industry standards. • A program or policy receives an M rating when it employs ITS and/or new technologies, but this is not the primary purpose of the program. • A project receives an L rating when there are small elements of technology or innovation involved.
Goal: Increase economic growth and prosperity that supports communities and businesses.		
Jobs/Output/ Co-Benefits	Yes	This measure evaluates how well a program or policy will support job creation, economic output, and related community benefits. Note that all freight system improvements help the economy in general, so these ratings reflect the degree to which a strategy is specifically designed with economic benefits in mind. • A program or policy with an H rating means its primary purpose is to support jobs and the economy, such as job-training programs. • A program or policy with an M rating means the program or policy already has key features that support job creation and/or the economy, even where the primary purpose is to meet other system needs. • A program or policy with an L rating means it will probably benefit jobs and the economy, but the effect may be small or hard to determine.
Goal: Reduce environmental and community impacts from goods movement operations to create a healthy and clean environment, and support improved quality of life for those communities most burdened by goods movement.		
Emissions	Yes	This metric evaluates how each program or policy changes the levels of pollution (e.g., PM and NOx) that come from freight activities. • A program or policy with an H rating means its primary purpose is to remove or drastically reduce emissions, such as zero-emission trucks projects. • A program or policy with an M rating means the program or policy will lead to changes in freight activity that are likely to reduce emissions. • A program or policy with an L rating means it will probably reduce emissions, but the effect may be small or hard to determine. • In cases where freight traffic is actually increased, a program or policy may also worsen emissions. These strategies will receive a "-" rating.
Equity	Yes	This metric evaluates the degree to which a program or policy reduces noise, light, emissions, and other negative effects on communities that are most vulnerable and disproportionally affected by freight. This can happen either because the level of freight activity near vulnerable populations is reduced, or because freight activity becomes more evenly distributed in the County, thereby reducing the disproportionate impact

Measures	Used in this Section?	Guidelines for Rating Assignment for Improvement Effectiveness (for High (H), Medium (M), Low (L) Ratings)
		on a particular group of residents. • A program or policy receiving an H on equity means that its primary purpose is to reduce negative impacts on the most impacted neighborhoods. • An M is assigned when a program or policy either has moderate impact reductions for vulnerable populations, or in a case where the reduction in negative impacts is significant, but the exact location of impact reductions cannot be determined at this time. For example, rail quiet zones reduce noise impacts, but will only benefit sensitive populations in certain locations on the rail network. • A program or policy receiving an L means it is likely to have some small positive effect on equity, but where the benefits are indirect outcomes of other changes in the goods movement system. • Programs or policies that negatively affect equity are given a negative (-) rating.

9.1 Arterial Smart Corridor Program

This program, formerly called the Truck Route ITS and Signal Synchronization program, would cover implementation of Adaptive Signal Control on key truck corridors in Alameda County. As noted in the Needs Assessment, "Of Tier 2 truck routes, Hesperian Boulevard has the worst LOS along most of its length, but portions of San Pablo Avenue, International Boulevard, and Mission Boulevard also have poor LOS for at least part of the day." And, portions of some Tier 3 truck routes also experience high levels of congestion and delay during morning or evening peak periods, such as A Street in Hayward, Tassajara Road in Dublin, and High Street in Alameda and Oakland.

Specific improvements could include signal interconnect, incident management, traveler information, and intersection improvements. A similar Arterial Smart Corridor program has been developed for the Gateway Cities COG in Southern California. The program included prioritization of major corridors for improvements based on criteria such as truck volumes, volume/capacity ratios, safety, and freeway access; selection of several high-priority corridors for early implementation; a review of key issues along each corridor, including institutional concerns such as integration of corridor signals with those of multiple jurisdictions along the truck route; and conceptual design and cost estimates to help advance the highest priority projects.

Table 9.2 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Hwy	While this metric is defined as reducing highway travel time delay, intercity arterial truck routes also play a critical role in meeting the County's goods movement needs, and, as has been noted, several experience considerable congestion. In addition, improvements to the intercity arterial system can help address truck capacity needs throughout the truck route system by providing alternatives to congested freeways.	M	ITS and Signal Synchronization typically lead to improved traffic flows and increases in average speeds through congested segments. This program would help to plan, design, and implement improvements that can be expected to have a noticeable improvement on travel time outcomes. The rating also reflects the fact that the benefit-cost ratio of ITS strategies is often—though not always—higher than major infrastructure investments.	H	H
Crashes – Truck and Reliability	The volume of truck-involved crashes is not very high on Alameda County's arterial system, but crashes are concentrated on certain key arterial routes, including Hesperian Blvd and Mission Blvd.	M	Heavily congested traffic can sometimes lead to traffic collisions if drivers become inattentive or when they make sudden, unexpected movements in an attempt to gain position; this effect is often most pronounced in mixed traffic with many vehicles types. By smoothing overall traffic flows, ITS installations and signal synchronization can reduce congestion and the associated crashes. If the ITS features can be actively managed from a traffic management center, they can also divert traffic away from congested areas, reducing the probability of secondary collisions within the backup attributable to a primary incident. These benefits will vary depending on the extent of underlying congestion on the routes receiving ITS treatments.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Resiliency	Resiliency is not typically noted as a key issue in managing traffic corridors. The nexus with this metric is incidental to the particular solution proposed by this strategy.	L	In cases where traffic signal systems can be adjusted from a traffic management center, traffic flows can be managed and/or re-routed to help relieve congestion associated with major incidents, emergencies, and disasters.	M	M
ITS / Technology	While the use of ITS and innovative traffic signal technology is now a common approach for managing traffic on arterials, the needs assessment did not identify specific locations where the lack of technology was cited as a key concern.	L	This program is explicitly focused on the implementation of ITS technologies to help smooth traffic flows, manage traffic around incidents, and provide greater information to travelers. Because of the direct nexus with this measure, it is expected to provide significant technology benefits.	H	H
Emissions	Emissions concerns in Alameda County tend to be focused on the infrastructure elements with very high concentrations of goods movement activity such as the Port of Oakland, rail lines, and major highways, rather than truck routes and surface arterials that are addressed by this strategy. However, delays on local truck routes in the County do increase the associated emissions, and the impacts will continue to rise without interventions to manage traffic flows.	L	ITS implementations involving signal synchronization tend to smooth traffic flows and raise average travel speeds, which, in turn, would reduce emissions levels, even with the same overall vehicle throughput. The magnitude of benefits would depend both on the specific technologies selected and the number of locations able to be improved through this program. As a result, the program is assigned a somewhat modest rating.	L	L

9.2 At-Grade Crossing Safety and Grade Separation Policy and Program

A number of existing rail crossings in Alameda County are generally deficient in gate arms and warning lights, at grade cross-track sidewalk access and ADA access, paving, signage, and pavement markings. This program would help direct funding to grade crossing improvements to increase safety and reliability. Chapter 6.0 listed a number of grade crossing projects that would address known areas of deficiency, for example High Street and Davis Street in Oakland, Mowry Avenue in Newark, Tennyson Road in Hayward, and 65th/66th/67th Streets in Emeryville. Included in the program would be the development of a policy for prioritizing these and other locations for improvements, as well as selecting grade crossing improvements vs. closures vs. grade separations. The prioritization process could incorporate a variety of factors such as existing and

forecast vehicle delays, emissions, noise, safety, multimodal access, and project readiness. A model for this type of prioritization has been developed for Riverside County in Southern California and a similar approach should be adopted in Alameda County.

Table 9.3 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Hwy	Rail freight activity is projected to increase significantly in Alameda County, particularly on the Martinez subdivision and to a lesser degree on the Niles/Oakland subdivision. The increased rail traffic would likely increase road delays at crossings, so the benefit of this strategy becomes more compelling over time.	M	To the extent that any full grade separations are planned and funded through this program, travel time delay at those crossings would be significantly reduced due to the separation of traffic and the fact that vehicles would no longer have to wait behind crossing arms each time a train needed to pass. It should be noted that the program may also study, plan, and fund safety improvements that do not lead to grade separations; these projects would not improve travel time delay, but would have other benefits, as noted below. The lower evaluation rating also reflects the fact that grade separation projects are typically very expensive and complex, increasing the benefit-cost ratio of this strategy as compared to other alternatives for delay reduction.	M	M
Travel Time Delay – Air/Rail/Port	At-grade crossings themselves are not typically the cause of delays for airports, rail facilities or maritime ports.	L	Grade separations can have some minor benefits to rail traffic as well. Specifically, depending on the train signal blocking in nearby rail segments, the addition of new grade separations could provide enough distance between at-grade crossings that trains would be able to travel safely at higher speeds. Although speed improvements for rail can provide a large benefit, the rating assigned to this program is relatively low, because improved speeds are only likely to occur in a few select cases, or in locations where a very large capital investment is made to grade-separate an entire corridor at one time.	L	L
Freight/ Passenger Conflicts	At-grade rail crossings potentially create safety hazards for intersecting passenger traffic, as well as acting as a temporary obstacle to through	M	Investments in safety features or full grade separations should reduce these hazards and obstacles to improve multi-modal operations. However, specific projects and improvements have not yet been	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	movements of autos, bicycles, and pedestrians.		proposed, so the exact magnitude of benefits is difficult to quantify in advance.		
Crashes – Crossings	Most grade crossings in Alameda County do not have high crash rates, with the exception of a few locations including High Street and 29th Street in Oakland	M	While other programs & policies in the portfolio may have some indirect benefit to crash rates, this program is explicitly and directly targeted at crash reductions. The infrastructure improvements contemplated in this program serve to more clearly define the interactions between users of the rail network and users of the road network, either with improved grade-crossing treatments or through full grade-separations. Each of these treatments will have a different crash reduction outcome and benefit-cost ratio, but all of them will improve safety and streamline operations.	H	H
ITS / Technology	Although innovative technologies can provide benefits for at-grade crossings, the Needs Assessment does not identify specific technology needs related to grade crossings in Alameda County.	L	Depending on the improvements selected for implementation at specific grade crossings, this program could utilize innovative technologies. Crossings that cannot be grade separated would likely receive more complex safety treatments such as additional warning devices, more crossing gates, and potentially adjustments to train signaling systems in the vicinity. These investments would have a minor nexus with technology benefits.	L	L
Emissions	At-grade crossings cause some delays to autos that must wait for trains to pass. The amount of excess emissions attributable to crossing delays is likely small compared to countywide congestion on freeways and major arterials.	L	If this program funds the design and implementation of grade separations, cars will no longer have to wait for passing trains at that location. The associated emissions will be greatly reduced. The exact quantity of reductions would be determined after further planning and design has taken place to confirm which locations are appropriate for conversion to grade separated infrastructure.	M	M
Equity	Existing rail lines and the associated grade crossings create impacts on the communities they pass through in terms of safety, noise (from horns), and emissions (from waiting	M	Improved crossing treatments will enhance safety for people who travel through the area. And, grade crossings would reduce noise and emissions associated with idling vehicles waiting for trains to pass. These neighborhood impacts can be reduced through deployment of this	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
	vehicles).		program, though the exact benefits would depend on local conditions and the improvements proposed for each grade crossing.		

9.3 An Initial Demonstration Followed by Targeted Incentives to Promote Adoption of Zero And Near-Zero Emissions Truck Technology for Port Drayage

The upcoming MTC Freight Emission Reduction Study will evaluate feasible applications of zero and near-zero emission technology for port drayage. Initial applications are likely to focus on movement of cargo within the port complex and nearby shippers and 3PLs along the I-880 corridor. The program will provide funding to conduct an initial demonstration for feasible applications with the intent to identify incentives for market development. It is anticipated that funding for demonstrations can come largely from state programs managed by ARB and CEC that are associated with Cap and Trade money but could also be supplemented with local matching funds.

Table 9.4 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The concentration of environmental impacts related to activities at and near the Port of Oakland has a negative effect on nearby communities. This strategy addresses a known location of land use conflict.	M	Zero emission and near-zero emission trucks can nearly eliminate particulate emissions, significantly reducing one type of environmental impact from freight operations. The amount of emissions reduction will depend on how much of the drayage fleet can be converted to ZE/NZE with the available incentive funding.	M	M
ITS/Technology	The Needs Assessment called out air quality as a cross-cutting issue, and noted that advances in technology called for under the current regulatory framework would facilitate pollution reductions through at least 2020. Beyond that point, the impact of new technology on air quality is less certain, so additional efforts may be needed.	M	This program is explicitly designed to catalyze new ways to use innovative technologies, with the goal of demonstrating the feasibility of using cleaner engine technology on a wider scale.	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Jobs/Output/ Co-Benefits	The needs assessment focused on a shortage of truck drivers as the main jobs-related need in Alameda County. One of the factors contributing to the shortage in the local drayage market is the expense of upgrading owner-operated vehicles to the latest emissions standards, which can make driving a truck less financially viable for some workers.	M	Subsidizing conversion to cleaner engine technologies could help reduce financial burdens on truck drivers and may encourage a better balance in the goods movement labor market. Separately, the transition to zero-emission and near-zero emission vehicles may also create new jobs. ZE/NZE engines typically utilize alternative fuels that will require new or upgraded distribution infrastructure. In addition to the jobs created as part of to the transition to new energy sources, workers and training will be needed both to maintain the new energy sources and to maintain the vehicles themselves.	H	M
Emissions	The Needs Assessment identified the cross-cutting issue of air quality, including the extent of the environmental burden attributable to particulate matter pollution. Even with the significant progress made in recent years, the activities at the Port of Oakland contribute to a particularly strong localized concentration of emissions.	H	Zero emission and near-zero emission Trucks can nearly eliminate particulate emissions, and some technologies (e.g., electric) can substantially reduce GHGs.	H	H
Equity	As described in the Needs Assessment, the BAAAQMD has identified populations that may be at particular risk from air pollution, including the Western Alameda County CARE community	H	Zero emission and near-zero emission Trucks can nearly eliminate particulate emissions. Depending on how widely the technologies are adopted, and how the upgraded vehicles are deployed within Alameda County, this could greatly reduce air pollution impacts on vulnerable communities.	M	M

9.4 Targeted Programs to Encourage Use of Zero-Emission Trucks and Cargo Handling Equipment Particularly in the I-80, I-880, and I-580 Corridors

This program extends from the demonstration program and targets freight corridors and facilities in communities with greatest adverse impacts from freight emissions. It will provide incentives to encourage the use of zero-emission trucks in those places. A similar model has been

developed to subsidize clean diesel conversions in the Gateway Cities subregion of Southern California whereby vehicles receiving the subsidy needed to use GPS devices to track their activity in order to demonstrate that a specified fraction of their VMT (and thus, emissions reductions) were occurring in the Gateway Cities subregion. A similar approach could be used to target ZE emission reductions on particular corridors where equity impacts need to be addressed and where offsets to freight growth impacts are needed.

Table 9.5 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The intensity of freight-related land use conflicts varies throughout Alameda County, but the impacts are particularly acute near the three major freeways.	M	Zero emission and near-zero emission trucks can nearly eliminate particulate emissions, significantly reducing one type of environmental impact from freight operations. The amount of emissions reduction will depend on how much of the active fleet can be converted to ZE/NZE with the available incentive funding.	M	M
ITS/Technology	The Needs Assessment called out air quality as a cross-cutting issue, and noted that advances in technology called for under the current regulatory framework would facilitate pollution reductions through at least 2020. Beyond that point, the impact of new technology on air quality is less certain, so additional efforts may be needed.	L	Given that many truck operators have recently upgraded or retrofit their vehicles to meet new diesel emissions standards, these additional incentives may be necessary to encourage conversion to zero-emission and near-zero-emission before the end of the useful life of the newly compliant trucks.	H	H
Jobs/Output/ Co-Benefits	The needs assessment highlighted the potential for a future shortage of truck drivers as the main jobs-related need in Alameda County. Driver turnover is increasing, due to labor concerns such as compensation and work rules.	M	Subsidizing conversion to cleaner engine technologies could help reduce financial burdens on carriers, which in turn may encourage a better balance in the goods movement labor market. Separately, the transition to zero-emission and near-zero emission vehicles may also create new jobs. ZE/NZE engines typically utilize alternative fuels that will require new or upgraded distribution infrastructure. In addition to the jobs created as part of to the transition to new energy sources, workers and training will be needed both to maintain the new energy sources and to maintain the vehicles themselves.	H	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Emissions	The Needs Assessment identified the cross-cutting issue of air quality, including the extent of the environmental burden attributable to particulate matter pollution. The geographic distribution of emissions impacts is more diffuse for this corridor-focused strategy than other needs listed in this chapter, leading to a somewhat lower rating.	L	Zero emission and near-zero emission Trucks can nearly eliminate particulate emissions, and some technologies (e.g., electric) can substantially reduce GHGs.	H	M
Equity	As described in the Needs Assessment, the BAAQMD has identified populations that may be at particular risk from air pollution, including the Western Alameda County CARE community	H	Zero emission and near-zero emission Trucks can nearly eliminate particulate emissions. Depending on how widely the technologies are adopted, and how the upgraded vehicles are deployed within Alameda County, this could greatly reduce air pollution impacts on vulnerable communities.	H	H

9.5 Near-Zero and Zero-Emission Goods Movement Technology Advancement Program

This new program would fund research and development (R&D) activities that promote development of emerging Near-Zero and Zero-Emission goods movement technologies. It could draw funding from an identified RTP program, and should be coordinated with CARB Sustainable Freight Strategy and BAAQMD programs. This would fund pre-commercial technology development and testing of systems or critical components (such as batteries) and would include partnerships with state and federal agencies. The goal of the program would be to engage local technology companies in the advancement of zero emission goods movement technology.

Table 9.6 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The intensity of freight-related land use conflicts varies throughout Alameda County, but the impacts of freight-related activities can be a concern anywhere there are sensitive land uses in close proximity.	L	This R&D-focused program has only a minor nexus with alleviating land use conflicts, particularly when compared to other strategies that address this need. As a result, a lower rating is assigned here	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
ITS/Technology	The Needs Assessment called out air quality as a cross-cutting issue, and noted that beyond the year 2020, it is not clear how engine technology will develop. Additional research and development may be needed.	M	By its very nature, an R&D program helps to advance the frontier of technology innovations. If the program were to successfully demonstrate the effectiveness of new engine technology, it could facilitate wider adoption throughout the industry.	H	H
Jobs/Output/ Co-Benefits	The Needs Assessment did not identify a jobs or output needs that is tied to research & development activities, so a low rating is assigned.	L	This strategy is focused on demonstration projects and identification of promising new technologies, rather than widespread deployment of a proven approach, so a significant benefit to jobs and output would not be a direct result of the program. However, the findings of projects funded by this program would likely point the way towards additional opportunities for improving economic prosperity.	M	M
Emissions	The Needs Assessment identified the cross-cutting issue of air quality, including the extent of the environmental burden attributable to particulate matter pollution. While significant progress has been made in developing zero-emission and near-zero emission technologies, more can be done to make these more cost-effective, and thus more likely to be deployed throughout the freight sector.	M	Zero Emission and Near-Zero Emission Trucks can nearly eliminate particulate emissions, and some technologies (e.g., electric) can substantially reduce GHGs.	H	M
Equity	As described in the Needs Assessment, the BAAAQMD has identified populations that may be at particular risk from air pollution, including the Western Alameda County CARE community	H	This strategy is focused on demonstration projects and identification of promising new technologies, rather than widespread deployment of a proven approach, so the scale of equity benefits may not be very large. However, the program description notes that investments could be targeted at the most impacted communities, helping to accelerate improvements in equity.	M	H

9.6 Truck Route Coordination Planning/Guidance, Technical Assistance, and Information to Address Truck Route Connectivity, Health and Community Impacts

Alameda CTC would provide planning and technical assistance on truck route planning based on principals of connectivity and separation of truck activity from sensitive receptors described in the Needs Assessment report. Alameda CTC would also facilitate discussion and actions by cities to adopt routes that address system gaps, as well as possible consideration for removing restrictions. Guidance would include model ordinances and polices for cities. The Program could also include making truck route information (including Countywide truck route map, city contacts for oversize/overweight permits, links to city truck services) available online.

Table 9.7 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Hwy	Truck route planning and guidance has only a limited and indirect impact on highway delays, although highway LOS is expected to worsen and create more truck delay over time as last-mile delivery increases.	L	This program is not targeted at reducing travel time delay. However, additional development and implementation of truck routes may lead to minor improvements due to reductions in unnecessary out-of-route miles or circling.	L	L
Connectivity – Hwy	Connectivity to major freight activity centers is generally good, but there are some locations where better options are needed. Better connectivity of truck routes via Santa Rita Rd to I 580 and Whipple Rd to Mission Blvd is needed. Also, freight users need designation of more East-West Tier 3 routes in Fremont and a continuous overweight corridor between Oakland and San Leandro.	M	This program would help facilitate highway connectivity by providing assistance to local jurisdiction to develop and implement truck routes more effectively and to disseminate information about truck routes more efficiently. To the extent that jurisdictions are encouraged to designate new truck routes and/or close gaps in the truck route network, this could increase physical connectivity for truck operations. Also, greater consistency in truck route implementation and information would improve the effective connectivity of truck routes across jurisdictional boundaries.	H	H

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Freight/ Passenger Conflicts	The greatest areas of conflict are on the major Tier 2 truck routes that also are high frequency bus routes. Some bike lanes are on truck routes (e.g., access to Shoreline Park in West Oakland).	M	To the extent that truck route guidance (and any resulting truck route development) helps freight users operate more safely and predictably on the road network, this program can help reduce negative interactions that would otherwise occur between freight and passenger uses. For example, bicycle lanes and truck routes can be planned in a coordinated way to minimize conflicts. Also, gap closures in the truck route network can reduce out-of-route miles and shift trucks to more appropriate locations, freeing up road capacity in other areas for passenger uses. The exact magnitude of the benefits is difficult to predict, as this program consists largely of guidance, policies, best practices, and information sharing, rather than direct investment in changing the current truck route network. However, the policy and guidelines developed under this program could include an explicit recommendation to consider the potential for freight-passenger conflicts in truck route planning activities.	M	M
Land Use Conflicts	There are many places where truck routes represent a boundary between industrial and residential land uses. Complaints about truck impacts in these cases. Land use conflicts are creating impacts on neighborhoods in West and East Oakland.	M	Similar to the Freight/Passenger Conflicts metric above, this program can help align freight uses with the facilities and locations that are best suited to goods movement. In certain cases, this might mean that freight movements are relocated away from sensitive areas currently experiencing negative impacts. The exact magnitude of the benefits is difficult to predict, as this program consists largely of guidance, policies, best practices, and information sharing, rather than direct investment in changing the current truck route network. However, the policy and guidelines developed under this program can incorporate an explicit recommendation to consider land use conflicts as part of truck route planning activities.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Crashes – Truck and Reliability	The volume of truck-involved crashes is not very high, but crashes are concentrated on certain routes, including Hesperian Blvd and Mission Blvd.	M	As noted above, improving truck route guidance and connectivity can encourage freight users to stay on designated routes, reducing incursion onto inappropriate facilities. Keeping truck operations on facilities designed to accommodate them reduces the chance of crashes due to a mis-match between vehicles and road design. Assuming jurisdictions proceed to implement the policy and guidance created under this program, a modest safety improvement may be expected.	L	L
Pavement Conditions	Pavement conditions of truck routes in Alameda County are generally better than other routes.	L	Generally speaking, this program is expected to encourage trucks to use designated routes. This should help reduce degradation of pavement on roads currently receiving inappropriately high levels of heavy truck traffic, improving their condition and prolonging their life closer to design standards. However, the removed trucks do not disappear completely. They would create increased wear and tear on designated truck routes as compared to the status quo, so these roads may need slightly more maintenance than present level of truck operations would require. The net effect is not expected to be significant in most locations.	L	L
ITS/Technology	Although innovative technologies can provide benefits for the development and use of truck routes, the Needs Assessment does not identify specific technology needs related to truck routes in Alameda County.	L	The program description references the idea of making truck route information more readily available online. If the program were to fund this activity, or others like it (e.g., app-based information, database features, etc.), it would have a minor nexus with this category of benefits.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Emissions	Planning, development, and driver compliance with truck routes can have a minor impact on emissions. However, the Needs Assessment does not identify specific emissions issues related to truck routes in Alameda County.	L	Reducing unnecessary out-of-route miles by helping truck operators to follow preferred routing would lead to an emissions reduction. However, truck operators may be cutting through neighborhoods now to save time & mileage, so forcing them onto truck routes could also have the unintended effect of increasing emissions. This program is assigned a neutral rating for emissions, because the net effect is difficult to determine in advance.	N	N

9.7 Overweight Truck Route Implementation and Maintenance

This program will address truck routes with heavy durability materials and to maintain overweight truck routes by providing guidance for implementation of an overweight truck route program. One such route as identified in the needs assessment is San Leandro Street in Oakland.

Table 9.8 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Connectivity – Hwy	Connectivity to major freight activity centers is generally good, but there are some locations where better options are needed. The Alameda County Needs Assessment specifically called out the lack of a continuous overweight corridor between Oakland and San Leandro.	M	Maintenance of overweight truck routes does not, in itself, change connectivity. However, it is important not to allow these routes to deteriorate, so their maintenance does provide an ongoing benefit to the connectivity of the truck network.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Pavement Conditions	Pavement conditions generally good on major truck routes. State routes such as International Blvd have poorer conditions.	M	The primary purpose of this program is to maintain infrastructure condition for certain truck routes. Preserving a network of overweight truck routes saves money in the long run, because it avoids unnecessary wear and tear on other roadways. And, maintaining a state of good repair for these roads reduces total life cycle costs. This program also calls for expanding the size and connectivity of the network of overweight truck routes, which would reduce maintenance costs even more.	H	H
Jobs/Output/Co-benefits	The program has some importance to ensure competitiveness of businesses that cluster around the corridor	L	The project will help facilitate the movement of overweight goods along the corridor, which prevents them from raised transportation costs and any subsequent loss in competitiveness.	L	L

9.8 Countywide Freight Signage Program

This program includes signage to encourage the use of designated truck routes and display route choices for specific destinations. It will also coordinate with services to minimize impacts on communities identified in the needs assessment as being impacted by unnecessary mileage and delay.

Table 9.9 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Highway	Truck delays are not typically caused by signage and traveler information issues.	L	This program is not targeted at reducing travel time delay. However, improved signage and information about available truck routes may lead to minor improvements due to reductions in unnecessary out-of-route miles or circling.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Freight/ Passenger Conflicts	The greatest areas of conflict are on the major Tier 2 truck routes that also are high frequency bus routes. Some bike lanes are on truck routes (access to Shoreline Park in West Oakland).	M	Improved signage helps freight users operate more safely and predictably on the road network, because trucks will be more likely to use properly-designed facilities that accommodate their needs. This program can help reduce negative interactions that might otherwise occur between freight and passenger uses. This can be especially helpful at jurisdictional boundaries, and in areas that are currently poorly signed. The magnitude of the benefit depends on the extent to which trucks are failing to follow designated routes today, and whether or not there are significant passenger uses in those areas that would benefit from relocation of truck activity back to designated routes.	M	M
Land Use Conflicts	There are many places where truck routes represent a boundary between industrial and residential land uses, leading to truck impacts on these neighbors. Specific land use conflicts have been identified in neighborhoods in West and East Oakland.	M	Improved signage helps freight users operate more safely and predictably on the road network, because trucks will be more likely to use designated facilities that are located away from the most sensitive areas. This program can help reduce negative impacts on land uses that are adjacent to ad hoc truck routes that are being used today. This can be especially helpful at jurisdictional boundaries, and in areas that are currently poorly signed. The magnitude of the benefit depends on the extent to which trucks are failing to follow designated routes today, and whether or not there are sensitive land uses that would benefit from relocation of truck activity back to designated routes.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Crashes – Truck and Reliability	Volume of truck-involved crashes is not very high, but is concentrated on certain routes, including Hesperian Blvd and Mission Blvd.	M	As noted above, improving truck route guidance and connectivity can encourage freight users to stay on designated routes, reducing incursion onto inappropriate facilities. Keeping truck operations on facilities designed to accommodate them reduces the chance of crashes due to a mis-match between vehicles and road design. Signage improvements funded through this program should lead to a minor safety improvement.	L	L
Pavement Conditions	Pavement conditions generally good on major truck routes. State routes such as International Blvd have poorer conditions.	M	Generally speaking, this program is expected to encourage trucks to use designated routes. This should help reduce degradation of pavement on roads currently receiving inappropriately high levels of heavy truck traffic, improving their condition and prolonging their life closer to design standards. However, the removed trucks do not disappear completely. They would create increased wear and tear on designated truck routes as compared to the status quo, so these roads may need slightly more maintenance than present level of truck operations would require. The net effect is not expected to be significant in most locations.	L	L
Emissions	Freight signage and driver compliance with truck routes can have a minor impact on emissions. However, the Needs Assessment does not identify specific emissions issues related to truck routes in Alameda County.	L	Reducing unnecessary out-of-route miles by helping truck operators to follow preferred routing would lead to an emissions reduction. However, truck operators may be cutting through now to save time and mileage, so forcing them onto truck routes could also have the unintended effect of increasing emissions. This program is assigned a neutral rating for emissions, because the net effect is difficult to determine in advance.	N	N

9.9 Truck Access and Speed Safety Projects on Rural Roads with Growing Commute Travel

This program will provide access and speed safety improvements on rural roads with growth in commute travel. Examples include: Vasco Road safety and operations improvements and Tesla Road truck access and safety west of Greenville Road. This program should be coordinated with other capital improvement programs such as bridge repair and maintenance and rehabilitation.

Table 9.10 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Freight/ Passenger Conflicts	As described in the Tesla Road Cast Study, there are multiple locations in rural areas which are seeing increasing interactions between freight and passenger users. Typically, freight users are related to agriculture and raw materials production, while passenger users are often commuters traveling between outlying residential areas and key job centers. In some cases, these rural routes also have high volumes of bicyclists.	M	The range of potential solutions includes road design, signage & other mechanisms to alert drivers, as well as options for time of day management. This program has a direct focus on how freight and passenger users can safely operate together on the same facility in order to reduce conflicts and improve safety and performance outcomes.	H	H
Crashes – Truck and Reliability	Trucks and commuter users have very different operational characteristics, in terms of vehicle weight, typical speed, acceleration profile, and stopping distance. This makes traffic interactions more challenging for drivers to negotiate, and the consequences of crashes are often more serious than other types of truck-related crashes.	H	The primary purpose of this program is to increase safety on roads that experience high crash risk due to the interaction of different user types (i.e., both freight & passenger). A variety of options are available including both design treatments and operations management practices, so it is expected that most roads receiving improvements from this program will see a direct reduction in truck-related crashes.	H	H

9.10 Development of Public or Public-Private Truck Parking and Full-Service Truck Service Facilities near Major Industrial Centers (Most Likely in the Hayward, Union City, Fremont Area)

This program (formerly called Update ALAMEDA CTC 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) will update findings from the 2008 study to account for 2013 driver hours of service regulations, changes in economic conditions, and changes in property availability. It will then implement measures to address illegal truck parking on local streets through providing trucking parking and service facilities in key industrial locations such as Hayward, Union City and Fremont.

Table 9.11 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Delay – Hwy	The 2008 Truck Parking Study noted that the absence of truck parking within Alameda County forces many truck drivers to leave the Bay Area at the end of the day, which means traveling on already-congested highways, often during peak commute periods.	M	If truck parking locations can be identified and developed through this program, it could reduce the pressure on truck drivers to be on the road at times that exacerbate congestion. The impact may be minor unless a large amount of truck parking becomes available	L	L
Freight/ Passenger Conflicts	The current lack of sufficient truck parking in Alameda County means that trucks sometimes park illegally in residential neighborhoods and on other local streets. This can result in truck interactions with passenger uses, including a potentially higher share of pedestrians and cyclists than would be expected on truck routes and major arterials.	M	This program includes both a study and implementation of measures to modify illegal parking activity. Assuming the study finds that feasible measures are available, their implementation would be expected to greatly reduce the freight-passenger conflicts associated with the practice of illegal truck parking.	M	M

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The 2008 Truck Parking Study found that there, "are no public locations in the immediate Bay Area where the primary purpose is to accommodate trucks stopping or parking. Hence, it is common to observe trucks parked in locations that may be inappropriate."[21] The only limited service truck stop in the Bay Area, "has so little parking area that often trucks must park on San Leandro Blvd."[22]	H	Trucks currently park in neighborhoods not designed for their use. This mis-match with local land uses could be relieved by the design and implementation of additional truck parking facilities in the county. It is expected this program would have significant benefits for this measure.	H	H
Equity	Truck parking issues are a frequently-cited problem in communities that are heavily impacted by freight activities, such as West Oakland neighborhoods adjacent to the Port of Oakland. In addition to unpleasant noise and emissions impacts, trucks in neighborhood areas degrade quality of life and can present a safety hazard to residents.	H	Providing improved designated parking facilities, and enforcing their use, would greatly reduce the burden on local communities.	H	H

9.11 Monitor Regulatory Proceedings on Crude by Rail

In partnership with city and regional agencies, this policy recommends monitoring and commenting on regulatory proceedings at the state and federal level that are related to crude by rail. This policy calls for participation in federal and state regulatory proceedings, rather than implementation of a specific capital project or investment program. Such participation does not necessarily result in regulations, guidelines, or policy that would change the underlying trends in crude by rail activity or the associated performance of the goods movement system. The effect of this policy on the evaluation measures will depend both on the particular position that Alameda CTC advocates and on how effective Alameda CTC is in achieving its desired objectives. Further, Alameda CTC is only one of many participants in a much larger process, so outcomes are extremely difficult to predict at this time. Most forecasts suggest that there will be continued

[21] *Truck Parking Facility Feasibility and Location Study: Final Report*, The Tioga Group, Inc. and Dowling Associates, Inc., December 10, 2008.

[22] Ibid.

rapid growth in crude by rail movements over the next decade or two as larger volumes of North American petroleum products move from the Midwest and Canada to California refineries. As a result, this discussion weighs the trade-offs that can be expected from higher levels of shipments of crude by rail, rather than an evaluation of the benefits of taking an active role in the regulatory process.

Table 9.12 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air/Rail/Port	Given the existing and forecast rail traffic on the Martinez subdivision, increased freight operations due to growth in crude by rail may lead to even more congestion and delay for the overall rail network.	M	In some cases, industry representatives have agreed to use slower operating speeds for certain oil tanker trains as a voluntary safety measure; this could slow rail traffic waiting behind the crude oil trains. On the other hand, they have also adopted safety improvements designed to reduce the incidence and severity of derailments and crashes, which, in turn, would reduce overall rail network delays that might otherwise occur due to crash events. The net result of these changes is difficult to estimate at this time.	N	N
Freight/ Passenger Conflicts	To access the oil refineries in the Bay Area and in Central California, crude by rail movements are likely to use access to the same rail subdivisions that currently carry numerous passenger trains, including the Capitol Corridor, Amtrak San Joaquin service, ACE trains to the Central Valley, etc.	M	Given the forecast for increases in both passenger and freight traffic on the Martinez, Niles, and Coast subdivisions, any additional increase in freight traffic from crude by rail could degrade the operational performance and safety of passenger rail service. And, if crude-by-rail movements lead to increased crossing activity in areas with high levels of passenger users, there could be conflicts with other surface modes such as pedestrian, bicycle, and auto. This program would be an important opportunity to advocate for policies and guidelines that minimize conflicts between crude by rail and passenger users.	M	M
Land Use Conflicts	Crude by rail shipments could increase freight activity near sensitive land uses. The recent spate of derailments in North America has increased community concerns over land use compatibility for this type of freight.	M	Because of federal and state jurisdiction over rail transport, there are few opportunities to influence policies and guidelines that can minimize the adverse impacts of crude by rail shipments on more sensitive uses. Participation in regulatory proceedings is important, but is unlikely to eliminate all conflicts.	L	L

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Crashes – Crossings	Increased shipments of crude by rail means more rail activity overall. This increases the number of interactions with vehicular traffic using at-grade crossings, which is likely to increase the number of crossing-related crashes. This could be especially problematic in areas where auto drivers are unfamiliar with rail operations and at crossings that have only minimum levels of safety equipment.	M	In response to several high profile incidents, the American Association of Railroads (AAR) adopted voluntary measures designed, in part, to increase operational safety of transporting crude by rail. Examples include increased track inspections, enhanced braking systems, and slower travel speeds in some cases. These measures will help to reduce the rate of crashes involving oil tankers, but total crashes in the Bay Area may still increase overall.	N	N
ITS/Technology	Rail shipments of petroleum products have little direct relationship to ITS and innovative technologies.	L	The proposed safety measures adopted by the AAR include several key technology features, such as wayside detection of faulty wheel bearings that add to the risk of derailments. Although the measures are voluntary, the implementation of detection technology would have a direct nexus with this metric.	L	L
Emissions	The growth of a new market for rail transportation services—for example due to an emerging local industry or major changes in commodity flows—can have a minor impact on emissions. However, the Needs Assessment does not identify specific emissions issues related to crude by rail in Alameda County.	L	The emissions benefits of this policy are unclear at this time. Increased shipments of crude by rail would raise emissions from rail transport in the region. But, to the extent that rail movements off-set emissions from bringing in petroleum products via ship or truck, this could be a net benefit in emissions. Or, if the petroleum would have arrived via pipeline instead of rail, it might be a net negative impact on emissions. Also, it is not clear whether the ability to ship crude oil by rail is leading to a significant increase in the volume of product being refined at local facilities as compared to status quo trends; if it is, this might mean more emissions for the region overall. Oil companies and rail operators have been reluctant to release information on shipment volumes, making it difficult to analyze these trends.	N	N

9.12 Crude by Rail Safety

This strategy is a policy to support the implementation of the recommendations of California Interagency Working Group related to Crude by Rail (IWGCR). This policy calls for support of measures being implemented by others, rather than implementation of a project or program by an entity within Alameda County. Alameda CTC is only one of many participants in a much larger process, so outcomes are extremely difficult to predict at this time. This discussion discusses the trade-offs that can be expected if the IWGCR recommendations are implemented and key consequences of note if they are not successfully completed.

Table 9.13 Ratings Summary

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Air/Rail/Port	Given the forecast for increases in rail traffic on the Martinez, Niles, and Coast subdivisions, any additional increase in freight traffic from crude by rail could degrade the operational performance of the network. This issue is likely to become more severe over time than it is today.	M	The IWGCR recommendations would not, by themselves, lead to reductions in delays. If the recommendations facilitate continued growth in rail shipments, then delays attributable to increased freight activity can be expected. At the same time, many of the IWGCR recommendations improve state of good repair and safety on the rail network, which could reduce the incident and severity of derailments and crashes, potentially for all rail traffic, not just crude oil shipments. This, in turn, would have delay reducing effects for the rail network. The combined outcome is uncertain at this time.	N	N

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Freight/ Passenger Conflicts	To access the oil refineries in the Bay Area and in Central California, crude by rail movements are likely to use the same rail subdivisions that currently carry numerous passenger trains, including the Capitol Corridor, Amtrak San Joaquin service, ACE trains to the Central Valley, etc. Given the forecast for increases in both passenger and freight traffic on the Martinez, Niles, and Coast subdivisions, any additional increase in freight traffic from crude by rail could degrade the operational performance and safety of passenger rail service. And, where crude-by-rail movements lead to increased crossing activity in areas with high levels of passenger users, there could be conflicts with other surface modes such as pedestrian, bicycle, and auto.	M	This program advocates for the implementation of recommendations that are primarily designed to increase the safety of crude by rail operations and related emergency preparedness. These actions will have only a minor, indirect benefit to passenger users of the rail network and in crossing areas. One recommendation will have a more direct effect: implementation of accident prevention technology. This technology could reduce all kinds of accidents on the rail ROW, not just those involving oil tanker cars.	L	L
Crashes – Crossings	Several recent high-profile derailments in North America—and the subsequent explosions, fires, injuries, and property damage—have greatly increased public concern over the safety of shipping crude by rail. Although no local incidents have occurred in Alameda County, the consequences of even a single crash event could be very significant.	M	Several of the IWGCR recommendations would likely lead to reductions in crash rates at crossings that have increased crude by rail activity. Specifically, higher numbers of CPUC inspectors, implementation of accident prevention technology, reporting of accident and injury data, and providing more information to adjacent communities could help improve infrastructure condition and increase awareness. Whether these measures are enough to off-set the increased number of crashes that can be expected simply from higher overall levels of rail activity is unclear.	N	N

Metric	Importance of Problem	Rating	Improvement Effectiveness	Rating	Overall
Resiliency	A typical train derailment causes significant disruption to the rail network and the immediate neighbors of the rail line until the crash site can be investigated and subsequently cleared. Derailments of crude oil trains have the added complexity of the likely explosion and/or fire after a crash, due to the highly flammable nature of the cargo. Thus, crude by rail movements place extra pressure on disaster response capacity of the adjacent communities as compared to other types of freight rail traffic.	M	Several of the IWGCR recommendations pertain directly to first responder training, information sharing about freight movements, and other preparations that help communities respond to any crash event or emergency related to crude by rail activity. There is a direct nexus between the implementation of the recommendations and the metric, though the degree to which these voluntary measures will be adopted is unknown at this time.	N	N
ITS/Technology	Industry stakeholders are working to examine the technology issues that may be supportive of or challenging for the transport of crude by rail. However, the Needs Assessment does not identify specific technology issues related to crude by rail in Alameda County.	L	The IWGCR recommendations include several with a minor nexus to this measure. For example, the latest report recommends (and in some cases, proposing requiring) positive train control (PTC), pneumatic braking technology, rail traffic routing technology, and wayside train inspection technology. However, they are voluntary at this time, and the exact benefits are not yet clear, so this program is given a neutral rating.	N	N
Jobs/Output/ Co-benefits	As mentioned, a typical train derailment causes significant disruption to the rail network and cut off access to delivery of crude. This can have some impact on the economic competitiveness	L	The project will reduce the likelihood of derailment and crashes and also improve first respondent efficiency which can lessen economic loss in the event of any incidents.	L	L

9.13 Rail and Terminal Emission Reduction Program

This program would address rail and terminal emissions from cranes, cargo handling equipment, switching engines, and short-haul locomotives. Measures could include transition to zero- or near-zero emission equipment at publicly funded rail terminals, incentives for early adoption of low emission switching locomotives, and potential voluntary adoption of Tier 4 standards for locomotives in Bay Area service. Tier 4 locomotives produce lower levels of hydrocarbons, oxides

of nitrogen, and particulate matter as compared to older generations of equipment, but they are currently mandated only for newly built locomotives; railroads are not required to upgrade their existing equipment. This program would encourage railroads to transition to the cleanest engine technology currently available, thereby accelerating reductions in freight-related pollution. The program would also support development of additional initiatives aimed at reducing rail-related emissions, particularly targeted to areas with high public health impacts from rail operations.

Table 9.14 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	Older generations of rail locomotives and terminal equipment produce emissions that create negative impacts for sensitive land uses adjacent to rail lines and terminals.	H	This program is primarily targeted at emissions reductions, which is a topic discussed in more detail below. Because the program acknowledges the need to target improvements to areas with the greatest public health needs, implementation of the program would be expected to significantly reduce one of the negative impacts associated with current land use conflicts between freight facilities and sensitive adjacent uses.	H	H
Emissions	Emissions from locomotives and rail terminal equipment are a significant impact on local air quality.	H	This program is specifically targeted at emissions reductions, so there is a primary nexus with this particular measure. While program recommendations are likely to be voluntary instead of mandated, there is a direct relationship between program funding and achieving emissions reduction outcomes.	H	H
Equity	Vulnerable populations near rail lines and terminals currently experience multiple types of negative impacts from freight activities, including emissions.	H	Rail terminal emissions are currently one of the more significant negative impacts on neighboring communities. If emissions can be reduced through the implementation of higher standards and improved technology, this would be expected to be a large benefit to the affected communities. Also, the program description specifically mentions targeting the program at areas experiencing high overall public health burdens, so this would help improve regional equity.	H	H

9.14 Rail Quiet Zone Program

This program would assess the suitability of locations, prioritize those locations, and design improvements to address the implementation of quiet zones along rail lines. Multiple locations in Alameda County would be candidates for this program. For example, studies of the feasibility of quiet zone locations have already been completed for the City of Berkeley and the City of Emeryville. The City of Fremont and the City of Pleasanton have also investigated quiet zones. Residents and businesses in the Jack London Square area are trying to raise funds to have a study completed for their neighborhood. This program would collect the results of efforts to date, and help to organize additional studies and analysis necessary to advance one or more quiet zone projects to construction.

Table 9.15 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The noise from train warning horns at grade crossings can negatively impact adjacent communities, particularly for high volume corridors and locations where trains pass through overnight.	H	Noise impacts are one of the most difficult areas of conflict between freight uses and more sensitive land uses such as residential, schools, and recreational facilities. A Quiet Zone program would greatly reduce the scale of impacts to adjacent land uses, so this program is expected to have significant benefits for this measure. Reduction in land use conflicts could be used as a formal criterion to determine which areas are the best candidates for a quiet zone under this program.	H	H
ITS/Technology	This strategy does not correlate directly with an identified need related to ITS or technology.	L	This program could have a minor nexus with technology. For example, quiet zones often use wayside horns in lieu of locomotive horns, or they may be implemented in conjunction with more sophisticated signaling & braking systems. The exact benefits would have to be determined based on design requirements in proposed quiet zone locations	L	L
Equity	Some vulnerable populations in Alameda County are located adjacent to rail lines with at-grade crossings that require the use of warning horns, creating a noise impact for those communities.	M	A Quiet Zone program can reduce the negative impacts associated with train noise in a community. A net reduction in noise impacts can improve the fairness of the distribution of total environmental burdens in the County, thereby improving horizontal equity.	M	M

9.15 Clean Truck Policy and Program Collaborative (Joint Working Group with Regulatory Agencies, Freight Industry Representatives, and Public Agencies)

This strategy is intended to help expand the use of cleaner trucks in Alameda County. Complementing the targeted funding programs for zero-emission and near-zero-emission technology deployment described earlier in this chapter, this program would convene a working group to overcome barriers to commercialization and widespread utilization of clean trucks within the goods movement industry. Activities of the working group could include: identifying grant and procurement opportunities for both public and private entities; ensuring consistency for local or state policy initiatives such as fleet emission standards and emission trading programs; and developing other incentives to encourage adoption of clean truck technologies and alternative fuels. It is a collaborative program, including participation from all relevant stakeholders. Incentives and collaborative activities could potentially be funded from existing RTP programs. An example is the Countywide Zero-Emission Trucks Collaborative in the Los Angeles County which brings together the Ports of Los Angeles and Long Beach, public stakeholders such as Caltrans, the air district and other partners.[23]

Table 9.16 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The Needs Assessment identified air quality and public health as a key cross-cutting issue that affects sensitive land uses located near high concentrations of truck activity.	H	This program is primarily targeted at emissions reductions, which is a topic discussed in more detail below. Some areas of Alameda County have concentrated levels of truck activity very close to residential communities, for example parts of West Oakland near the Port and its rail terminals. To the extent that emissions can be reduced, this can also decrease the degree of land use conflict between freight facilities and sensitive adjacent uses.	M	M

[23] http://www.metro.net/projects/countywide-zero-emission-trucks-collaborative/

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
ITS/Technology	In recent years, a variety of grant and incentive programs have encouraged truck operators to adopt innovative engine technologies to reduce freight-related emissions. However, there may be other opportunities to expand the use of technology to improve truck emissions.	M	This program could have technology benefits if it supports or indirectly encourages the adoption of alternative fuel vehicles and other emissions-reduction equipment. It is described as using incentives and a potential emissions trading scheme, which leaves participants free to choose how to comply, so the technology benefit is uncertain and could be relatively minor. But, the program could be designed to ensure that innovative technologies are recognized as more desirable solutions.	M	M
Emissions	In recent years, a variety of grant and incentive programs have encouraged truck operators to upgrade engines and add engine filters to reduce freight-related emissions. However, there is still more that could be done to advance the use of cleaner trucks in the Bay Area fleet.	M	A Clean Truck program would specifically target emissions reductions, and would be expected to have a strong positive effect on this measure.	H	H
Equity	Although truck activity is present throughout the region, it is particularly concentrated near terminals and along certain key freeway routes.	M	Cleaner trucks can reduce the negative impacts associated with freight emissions in the community. A net reduction in emissions impacts can improve the fairness of the distribution of burdens in the County, thereby improving horizontal equity	H	H

9.16 Freight Corridors Community Enhancement and Impact Mitigation Initiative

This new program would help to fund impact mitigation in neighborhoods immediately adjacent to freight facilities where buffers and freight hub relocation are not possible, as discussed in the needs assessment. Rather than being tied to a particular source of pollution or treated as mitigation for a specific development project, these improvements would be independently designed and funded, to reduce the overall impacts on sensitive land uses. Although the program criteria have not yet been worked out in detail, examples of eligible projects might include air filtration systems for schools and senior centers and noise reduction improvements such as double-paned windows or soundwalls. Such a program could be focused on mitigating impacts from existing freight activities as opposed to new freight activity.

Table 9.17 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The Needs Assessment identified land use conflicts and parking issues throughout Alameda County in locations with high levels of industrial activity.	H	This program is specifically targeted at mitigations for areas of high land use conflict that cannot otherwise be resolved. As a result, it is expected to have a very high level of benefit on this particular measure.	H	H
Equity	The Needs Assessment identified locations where freight operations contribute significantly to pollution in specific neighborhoods, and create other health risks.	H	This program recognizes that the physical location of most goods movement activities is unlikely to change, and so the adjacent communities are likely to continue to experience some level of environmental burden from their relative proximity to freight facilities. This program specifically provides for mitigations to help relieve the inequitable distribution of freight-related environmental burdens across the County, providing a strong benefit to the equity measure, particularly relative to other proposed strategies.	H	H

9.17 Develop/Support Workforce Training Programs for Goods-Movement Related Jobs

This is a program to support workforce training for goods movement related jobs, including for residents of areas most affected by goods movement projects. These jobs would be in addition to those agreed as part of existing planned projects, such as those that are part of the Maritime and Aviation Project Labor Agreement.

Table 9.18 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
ITS/Technology	The Needs Assessment identified a workforce need related to driver shortages in the area. Innovative technologies are being more widely used in goods movement areas such as logistics, fleet management, and alternative fuels, so there is a modest need for technology-related skills as part of workforce development.	L	Depending on the nature of the training programs offered, it is possible that this program would have a minor nexus with innovative technology. For example, mechanics will need training on repair of alternative fuel engines and the maintenance needs of related fueling infrastructure in order to remain competitive as the industry changes.	L	L
Jobs/Output/ Co-Benefits	The trucking industry faces a driver shortage due to the difficult of hiring and retaining workers. At the same time, workers in other parts of the goods movement sector and related freight-intensive industries (e.g. high-tech manufacturing) need a variety of more sophisticated job skills in order to remain competitive.	H	The primary purpose of this program is to provide workforce training and development that should improve job opportunities and economic output. Exact benefits will depend on the program elements that are ultimately implemented.	H	H

9.18 Freight Guidelines for Complete Streets Initiative

This program will develop policies, funding, and recommended guidelines and standards that support the design of especially complicated projects. The program could provide examples of model street treatments (such as curb pullouts for trucks in delivery zones), geometric guidance, separations of modal users in street design, time of day management of right of way, etc. The program can also consider advocacy for a federal program to conduct research on delivery vehicles suitable for urban delivery conditions (e.g., adjusted turning radii).

Table 9.19 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Travel Time Delay – Hwy	Complete Streets initiatives can help to smooth traffic flow and thus have a beneficial impact on travel delay. However, the Needs Assessment did not identify any specific congestion concerns related to Complete Streets issues.	L	This program is not targeted at reducing travel time delay. However, improved roadway designs and designation of appropriate loading areas and truck parking may lead to minor improvements in traffic flow due to reductions in unnecessary out-of-route miles, circling, and/or double-parking.	L	L
Connectivity – Hwy	The Needs Assessment did not identify the lack of Complete Streets treatments as a specific obstacle to truck route connectivity in Alameda County	L	Incorporating freight guidelines into Complete Streets policies could make it possible to have a more dense and connected freight network. Specifically, it may be possible to design more streets in ways that can accommodate the needs of all user types, allowing more streets to be designated as truck routes without compromising safety or performance. If freight-compatible complete streets become more widely implemented, the network of routing options would increase, and negative impacts would be mitigated. The rating for this program is modest, because truck route designation would remain a local control issue, requiring action by multiple jurisdictions and coordination at jurisdictional boundaries in order to lead to this outcome.	L	L
Freight/ Passenger Conflicts	The Needs Assessment and several case studies identified locations in which street design issues may be contributing to safety concerns when different user groups interact. For example, there is a bicycle route on a key truck route near the Port of Oakland.	M	The purpose of Complete Streets guidelines is to explicitly focus on designing for all system users by reducing modal conflicts, increasing situational awareness, and providing street treatments that are appropriate to each user group. Unfortunately, many times Complete Streets policies neglect to consider freight users as a separate category. This program will improve complete streets guidance and make it more likely that future design and implementation reduces conflicts between passenger and freight users.	H	H

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The Needs Assessment identified land use conflicts and parking issues throughout Alameda County in locations with high levels of industrial activity. In cases where neighborhood residents need to use freight routes to access jobs, schools, and services, the street design of those routes can exacerbate land use conflicts. Similarly, truck incursion into residential neighborhoods is also a more significant impact in locations where streets are not designed for freight uses.	M	To the extent that Complete Streets guidelines make freight movements safer and more predictable, it could reduce the conflicts that exist between freight activities and any adjacent sensitive land uses. For example, street treatments that make sufficient provisions for both bicyclists and trucks to operate safely would make it less onerous to travel by bicycle near freight facilities. As noted above, implementation will still depend on local jurisdictions, but this program could be an important part of the set of improvements designed to minimize the negative consequences of land use conflicts around major facilities.	L	L
Crashes – Truck and Reliability	The Needs Assessment and several case studies identified locations in which street design issues may be contributing to safety concerns when different user groups interact. For example, increasing commuter traffic on farm-to-market truck routes increases the incidence and severity of truck-related crashes.	M	As noted above, streets designed to safely and appropriately accommodate all user types are less likely to have problematic interactions between different users. To the extent that the complete streets guidance is implemented, the resulting street designs should provide for safer truck movements and reduced truck-related crashes.	M	M
Emissions	Complete Streets initiatives can help to smooth traffic flow and thus have a beneficial impact on emissions. However, the Needs Assessment did not identify any specific congestion or emissions concerns related to Complete Streets issues.	L	To the extent that Complete Streets projects make travel by walking, bicycling, or transit more appealing than prior to the street treatments, emissions might be indirectly reduced for persons who would have previously chosen a SOV automobile for their trip. This effect is expected to be minor when viewed on a system-wide basis.	L	L

9.19 Land Use Guidelines and Policies to Support Industrial Land Use Planning and Preservation

This program will coordinate with regional and state efforts to address industrial land use planning and preservation and could include any or all of the following approaches: technical assistance to update zoning, guidance on setting up buffer zones including vegetated buffers, incentives to preserve buffers, identification of funding for assembly of fragmented parcels, and reduction of negative impacts on communities from freight operations.

Table 9.20 Ratings Summary

Metric	Severity of Problem	Rating	Improvement Effectiveness	Rating	Overall
Land Use Conflicts	The Needs Assessment identified land use conflicts and parking issues throughout Alameda County in locations with high levels of industrial activity.	H	This program is specifically targeted at land use issues. Preserving existing industrial land uses and developing appropriate zoning will reduce the chance of sensitive land uses moving into industrial areas and creating new land use conflicts. Assembly of fragmented parcels can reduce development pressure in an industrial zone, and implementation of buffer areas further protects existing and future residential uses from conflicts with freight uses.	H	H
Equity	The Needs Assessment identified locations where freight operations contribute significantly to pollution in specific neighborhoods, and create other health risks.	H	Land use guidelines can have an equity benefit in that they support advance planning as to where freight activity should be located in a community, instead of allowing for haphazard development. It provides the opportunity to anticipate trends, require mitigations, and provide enhancements for local communities that would be affected by goods movement. If done well, this planning can make goods movement less burdensome than it is today.	M	M

9.20 Summary of Findings

Table 9.21 summarizes the evaluation results presented above and prioritizes the policies and programs. Reasons for why a particular level of priority is assigned for a strategy is included in the explanations column.

Given that most of the programs and policies are created to address a specific gap for the goods movement system, they usually are rated only highly on a few metrics and thus can have overall low ratings. However given that there are the only programs of their kind to address a certain gap, they should be included as first priority programs and policies. These first priority programs and policies are included in the opportunity packages discussed in Section 2.0.

Table 9.21 Summary of Evaluations of Programs and Policies

Programs and Policies	Priority	Explanation
At-Grade Crossing Safety and Grade Separation Policy and Program	First	This program has a high rating and multiple medium and low ratings.
An Initial Demonstration Followed by Targeted Incentives to Promote Adoption of Zero And Near-Zero Emissions Truck Technology for Port Drayage	First	This program has multiple high, medium and low ratings.
Targeted Programs to Encourage Use of Zero-Emission Trucks and Cargo Handling Equipment Particularly in the I-80, I-880, and I-580 Corridors	First	This program has multiple high and medium ratings.
Near-Zero and Zero-Emission Goods Movement Technology Advancement Program	First	This program has multiple high, medium and low ratings.
Truck Route Coordination Planning/Guidance, Technical Assistance, and Information to Address Truck Route Connectivity, Health and Community Impacts	First	This program has a high rating and multiple medium and low ratings.
Arterial Smart Corridor Program	First	This program has multiple high, medium and low ratings.
Clean Truck Policy & Program Collaborative (Joint Working Group with Regulatory Agencies, Freight Industry Representatives, and Public Agencies)	First	This program has two high and two medium ratings.
Development of Public or Public-Private Truck Parking and Full-Service Truck Service Facilities Near Major Industrial Centers (Most Likely In The Hayward, Union City, Fremont Area)	First	This programs has two high ratings and medium and low ratings.
Rail and Terminal Emission Reduction Program	First	This program has three high ratings.
Freight Guidelines for Complete Streets Initiative	First	This is a highly rated program
Countywide Freight Signage Program	First	This program has high, medium and low ratings.
Rail Quiet Zone Program	First	This program has a high, medium and low rating. It is the only program of its kind that addresses a specific need for the community. Thus it is included as a top priority program
Freight Corridors Community Enhancement and Impact Mitigation Initiative	First	This program has two high ratings. However, it is the only initiative of its kind that addresses r specific need for the community. Thus it is included as a top priority initiative
Land Use Guidelines and Policies to Support Industrial Land Use Planning and Preservation	First	This program has one high and one medium rating. Given it is the only program that addresses a significant need of supporting industrial land use planning and reservation, it is included as a first priority program.
Develop / Support Workforce Training Programs for Goods-Movement Related Jobs	First	This program has a low rating and a high rating. However since it is a only program that addresses a significant need (of worker shortage) in the County, it is included as a high priority program. It is also split between

Programs and Policies	Priority	Explanation
		logistics based jobs, or other goods movement dependent industry jobs.
Truck Access and Speed Safety Projects on Rural Roads with Growing Commute Travel	Second	This project has two high ratings.
Overweight Truck Route Implementation and Maintenance	Second	This project has one high rating and several low ratings.
Monitor Regulatory Proceedings on Crude by Rail	Second	This project has one medium and multiple low ratings.
Crude by Rail Safety	Second	This program has only low ratings.

Appendix A. METHODOLOGY USED FOR REMI MODELING

The purpose of this memorandum is to describe the methodology used for Economic Impact Analysis of proposed transportation investments under 3 scenarios using Regional Economic Model Incorporated (REMI).

A.1 Overview of Methodology

The tool used to model the economic impact of highway improvement projects and to calculate the return on investment is the REMI Transight Macroeconomic Simulation Model. The fundamental structure of the REMI model incorporates detailed inter-industry transactions of intermediate goods in the production process, and interrelated final demand feedbacks that captures the dynamic relationship between income and spending. The REMI model is appropriate for analyzing the regional economic impacts of the investment packages because the model accounts for how relationships between prices, costs of doing business, and demographic variables interact with other important economic variables such as employment, gross regional product, and personal income to influence economic performance.

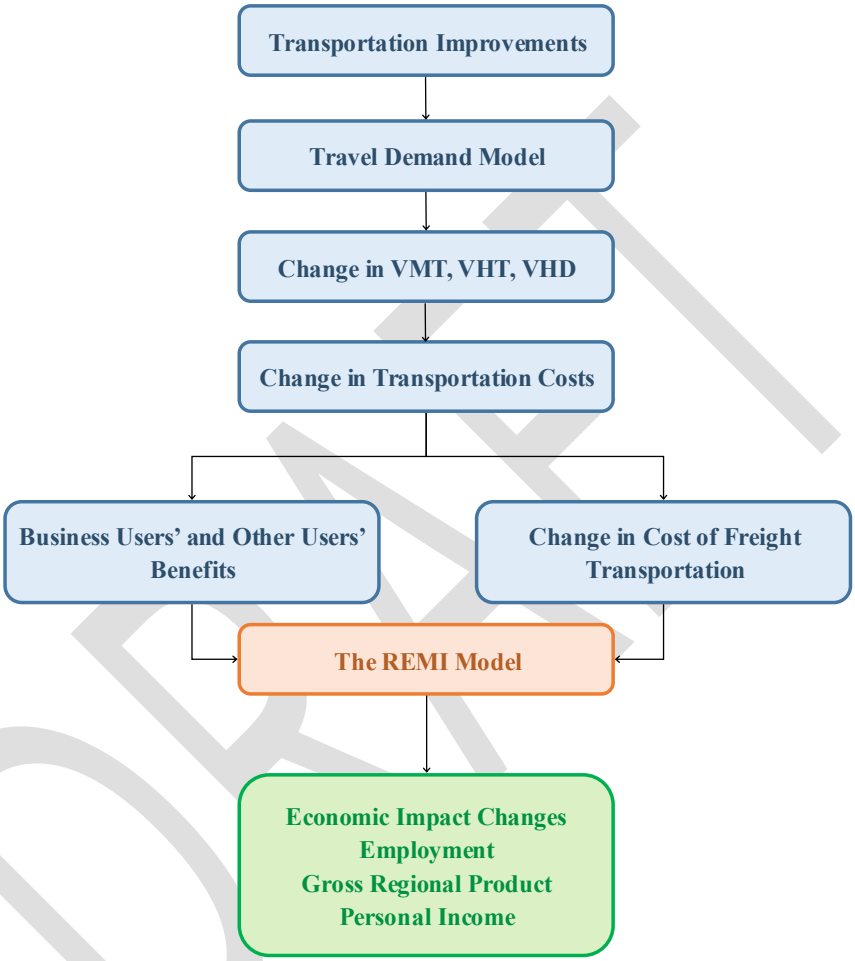
To estimate the economic impact of the investments, travel efficiency gains are mapped to households and businesses, depending on the beneficiary. Travel efficiency gains arising from personal travels (commute and non-work related trips) are disaggregated into explicit (out-of-pocket) and implicit gains (savings). Explicit gains associated with vehicle operating costs and travel time are mapped to households. In accordance with U.S. Department of Transportation guidelines, only half of the travel time gains are mapped to households. These gains serve as input into REMI as changes in consumer spending in order to estimate total impact due to households.

Similarly, travel efficiency gains arising from business related trips (trucks and business related auto trips) are mapped to industry. The gains or savings mapped to industry are further distributed across various industries in the East Bay Region based on each industry's dependency on transportation usage. Each industry's dependency on transportation usage is equivalent to its transport cost relative to output, and it is estimated as the product of transportation cost per dollar of output and the industry's output. For this study, transportation cost per dollar of output provided by the Transportation Satellite Accounts (TSA) in conjunction with 2009 output provided by REMI are utilized to estimate the relative cost of transportation across industry. Industry related savings serve as input into REMI as changes in business cost. The resulting total impacts are expressed as changes in employment, gross domestic product (GDP), and personal income.

Economic impact is measured as changes in economic activity in a given region, arising from a project or a change in policy. It can be expressed in various economic variables including sales (output), employment, and personal income (earnings). Reduction in transportation cost and improved connectivity to domestic and international markets arising from roadway capacity expansion increases output of firms (especially export oriented manufacturing industries) and increases demand for key factors of production including labor, materials, equipment, and supporting downstream activities which are supplied by other local and non-local firms. This chain of activities leads to local economic contraction through increased employment, personal

income, and business profits. Generally, total assessment of economic impacts comprises estimation of three impact types, namely direct, indirect and induced. The relationship between the Travel demand model, REMI and the various input and output variables are shown in Figure A.1.

Figure A.1 Analytical Framework for Benefit-Cost and Total Economic Impact
Analyses for Proposed Corridor Investments



A.2 Economic Impacts

The impacts associated with proposed investments are direct effects of changes in output (sales) or production cost, and spending in key economic industries including wholesale and retail trades, manufacturing, and transportation and logistics. For instance, the direct effect of improved roadway to a manufacturing firm is the reduction in crew and inventory costs. To estimate the economic impact of the proposed study, the user benefits are disaggregated into explicit and implicit benefits. The explicit benefits are mapped to the beneficiaries. This implies that explicit benefits accruing to commute and non-work related personal travels are mapped to

households, while those associated with truck and business related personal travels (changes vehicle operating costs, safety cost, and travel time) are mapped to each industry.

Explicit cost mapped to industry is further distributed across industry based on each industry's transportation usage, determined by transport cost relative to output. This is estimated as the product of transportation cost per dollar of output and the industry's output. For this study, transportation cost per dollar of output provided by the Transportation Satellite Accounts (TSA) in conjunction with 2009 output for the East Bay Region provided by REMI are utilized to estimate the relative cost of transportation across industry. The 2009 outputs are inflated to 2013 year of expenditure (YOE) using the consumer price index data provided by the bureau of labor statics. The equation below provides the basis for distributing the explicit benefits across industry. Each industry's share of benefit represents change in cost of doing business (or production cost).

$$\Delta V_i = \Delta V^{Total} x \frac{C_i Q_i}{\sum_i^n C_n Q_n}$$

Where,

ΔV_i = Cost change associated with industry "*i*"

ΔV^{Total} = Industry cost change (aggregate)

C_i = Transportation cost per dollar of output, reported by the Transportation Satellite Account

Q_i = Output of industry "*i*" (2009 output reported by REMI inflated to 2013 YOE)

The explicit cost savings across industry serves as input into as a reduction in production cost for economic simulation and estimation of economic impacts. Similarly, changes in explicit benefits associated with personal travels (except business) are mapped to households. These changes are entered in REMI as changes in consumer spending for simulation and estimating economic impacts.

A.3 Change in Transportation Costs

The change in transportation costs is divided in two parts: (1) Benefits to users (Auto and private businesses); and (2) Cost of freight transportation. The benefits to users are accrued through reduction in vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD). Reduction in VMT results in reduced operating and maintenance costs for auto owners and truck owners. Reduction in VHT results in less travel time for business owners and similarly reduced wasted hours for truck drivers. Finally, reduced VHD, same as VHT means less delay time for businesses, travelers, and truck drivers. To calculate these costs we use the

American Transportation Research Institute[24] (ATRI) west region data for driver based and non-driver based costs (per mile and per hour), the American Automobile Association[25] (AAA) input data for average operations and maintenance costs of automobiles, and the Federal Highway Administration[26] (FHWA) data for dollar value of time. The change in transportation costs are then calculated for each scenario using the input data presented in Table 1:

Table A.2 Truck and Auto Operating Costs Input Data

Cost Category	Cost Item	Cost
Truck Driver-Based Costs	Wages	0.423 (dollars per hour)
	Benefits	0.122 (dollars per hour)
Truck Nondriver-Based Costs	Truck Lease/Purchase	0.190 (dollars per mile)
	Tires	0.034 (dollars per mile)
	Tolls	0.011 (dollars per mile)
	Insurance	0.081 (dollars per mile)
	Permits	0.034 (dollars per mile)
	Repairs	0.183 (dollars per mile)
	Fuel	0.608 (dollars per mile)
Auto Operating Cost	Fuel, O&M, Tire, etc.	0.607 (dollars per mile)
Value of Time	Business Travel	24.4 (dollars per hour)
	Personal Travel	15.0 (dollars per hour)

[24] ATRI. (2014). An Analysis of the Operational Costs of Trucking: A 2014 Update, http://atri-online.org/atri-research/economic-analysis/

[25] AAA. (2015). Your Driving Costs, Annual Cost to Own and Operate a Vehicle, http://newsroom.aaa.com/2015/04/annual-cost-operate-vehicle-falls-8698-finds-aaa/

[26] FHWA. (2013). Tiger Benefit-Cost Analysis (BCA) Resource Guide, http://www.transportation.gov/sites/dot.dev/files/docs/tiger-12_bca-resourceGuide.pdf