GoPort!

Global Opportunities at the Port of Oakland

Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Initiative

APPLICANT:
Alameda County Transportation Commission (Alameda CTC)

TYPE OF ELIGIBLE APPLICANT:
Special District Government

ATCMTD GRANT REQUEST:
$9,720,000

LOCATION:
Alameda County, California

CONGRESSIONAL DISTRICTS:
13th – Barbara Lee
15th – Eric Swalwell
17th – Ro Khanna

NOFO NUMBER:
693JJ317NF0001

June 12, 2017

ALAMEDA County Transportation Commission

PORT OF OAKLAND SEAPORT

ATCMTD Grant Application

GoPort Freight Intelligent Transportation System

submitted to

U.S. Department of Transportation – Federal Highway Administration

submitted by

Alameda County Transportation Commission

with

Port of Oakland

Alameda CTC
1111 Broadway, Suite 800
Oakland, CA 94607-4006

June 12, 2016

The Honorable Elaine L. Chao
Secretary of the U.S. Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Secretary Chao:

The Alameda County Transportation Commission (Alameda CTC), with support from the Port of Oakland, appreciates the funding opportunity provided by the U.S. Department of Transportation's (USDOT) 2017 Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Grant Program and is pleased to submit the Global Opportunities at the Port of Oakland Freight Intelligent Transportation System (GoPort Freight ITS) project for funding consideration. Due to the national and regional significance of this project, we encourage the USDOT to award the $9.72 million in requested funds to support a portion of the implementation costs of the project.

The $24.3 million GoPort Freight ITS project will deploy our **nation's first integration of Freight Community System and advanced ITS technology**. This unique approach, which will also include a new port-specific Traffic Management Center, will allow for the fusion of traffic sensors, advanced traveler information, traffic messaging, trucking information web and mobile applications, rail grade traffic warning information, terminal queue information, and more. The GoPort Freight ITS is "deployment ready" –Alameda CTC and the Port of Oakland have already invested $2 million for planning, systems engineering, and preliminary design activities to plan for this deployment. Additionally, this system will lay the technology foundation to support future developments in truck automation and connected vehicle technologies.

Alameda CTC will serve as the lead applicant, project sponsor, and implementing agency, and fully commits to expeditiously implement project activities to ensure that all elements are completed within four years after grant award. GoPort Freight ITS users include Port of Oakland staff, trucking fleets (dispatchers and drivers), marine terminal operators, beneficial cargo owners, ocean carriers, chassis providers, and railroads. Public-sector stakeholders include the California Department of Transportation, California Highway Patrol, City of Oakland, Metropolitan Transportation Commission, and others. Alameda CTC and the Port of Oakland would welcome the opportunity to partner with the USDOT to fully implement the GoPort Freight ITS, and to establish this new technology paradigm for improving port efficiency for other U.S. ports to consider in the competition for global trade share.

Sincerely,

ARTHUR L. DAO
Executive Director

ATCMTD GRANT COVER PAGE

Project Name	Global Opportunities at the Port of Oakland Freight Intelligent Transportation System
Eligible Entity Applying to Receive Federal Funding	Alameda County Transportation Commission (Alameda CTC)
Total Project Cost (from all sources)	$ 24,300,000
ATCMTD Request	$ 9,720,000
Are matching funds restricted to a specific project component? If so, which one?	No
State(s) in which the project is located	California
Is the project currently programmed in the: • Transportation Improvement Program (TIP) • Statewide Transportation Improvement Program (STIP) • MPO Long-Range Transportation Plan • State Long-Range Transportation Plan	 Yes Yes Yes Yes
Technologies Proposed to Be Deployed (briefly list)	Freight Community System (Freight Community System) Advanced Traffic Management System (ATMS) Advanced Traveler Information System (ATIS) Infrastructure Maintenance, Monitoring, and Condition Assessment Transportation System Performance Data Collection, Analysis, and Dissemination Systems Advanced Safety Systems

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VOLUME I: PROJECT NARRATIVE

1. INTRODUCTION

The Alameda County Transportation Commission (Alameda CTC) and the Port of Oakland (Port) are pleased to submit this application for the Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant program. As partners, we have been working on a two-year systems engineering and preliminary design effort that we are finalizing in September 2017, which will result in the preliminary engineering design and detailed implementation plan of the first integrated Freight Community System and port Intelligent Transportation System (ITS) in the nation.

More specifically, Alameda CTC and the Port have developed a comprehensive transportation technology and congestion management concept called the Global Opportunities at the Port of Oakland Freight Intelligent Transportation System (GoPort Freight ITS). The GoPort Freight ITS is intended to improve traffic flow and goods movement to and within the Port, reduce congestion, improve safety, provide improved traveler information, reduce emissions – and collectively these benefits will significantly improve port operational efficiencies, thereby increasing the competitiveness of the Port in the global market. The GoPort Freight ITS will provide real-time critical information (e.g. congestion alerts, terminal queues, truck parking availability) to the Port's community of public and private stakeholders, and will also apply technology to key freight arterials and connecting freeways, including the Primary Highway Freight System (PHFS) roadways on the National Highway Freight Network (NHFN) in Alameda County.

This project has extensive support in the region, including from the Metropolitan Transportation Commission (MTC), California Department of Transportation (Caltrans), the City of Oakland, and a broad-based private-sector group of three marine terminals, trucking companies, two Class I railroads, and beneficial cargo owners (BCO) – is pleased to submit this application to partner with the United States Department of Transportation (USDOT) on this groundbreaking port technology deployment that integrates advanced ITS technologies, sensors, and data, with a new core system based on the principles of a Freight Community System.

The Need

The Port is one of the most export-intensive ports in the nation, helping to strengthen the national trade balance, and serves as a critical global gateway of the vast and diverse Northern California regional economy. The Port is a nexus for handling a variety of goods including agricultural, viticulture, biotechnology, pharmaceutical, and electronics to the rest of the world. It is one of the top 10 busiest container ports in the U.S. handling approximately 2.4 million twenty-foot equivalent units (TEUs) in 2016. The Port complex encompasses approximately 1,300 acres, including 770 acres of marine terminals, numerous transload/warehouse companies and is served by two Class I railroads. The Port's facilities include six major container terminals, 20 deep-water berths equipped with 35 container cranes, near-dock rail intermodal facilities operated by the Union Pacific (UP) Railroad and BNSF Railway, and a network of arterial roads on the PHFS that link to Interstate (I-) Highways I-80, I-880, I-580, and I-980 in the NHFN.

As highlighted in Figure 1, while the Port has available marine terminal and warehouse capacity, it has noticeable roadway access and internal circulation constraints, such as roadway queueing in advance of Port terminal gates, inefficient arterial traffic movement through intersections,

recurrent traffic congestion, and illegal parking violations. Additionally, trucks traveling to the Port from within the Greater San Francisco Bay Area, as well as significant agricultural truck traffic from California's Central Valley, face significant peak-period congestion and unpredictable traffic congestion that reduces truck travel time efficiency and reliability. Currently, Port operations staff has a limited set of tools and information systems to address traffic and incidents. Moreover, trucking company dispatchers, truck drivers, terminal operators, railroad operations personnel, and BCO logistics planners have no common information platform to receive key information on Port road conditions, queue lengths, and incident alerts.

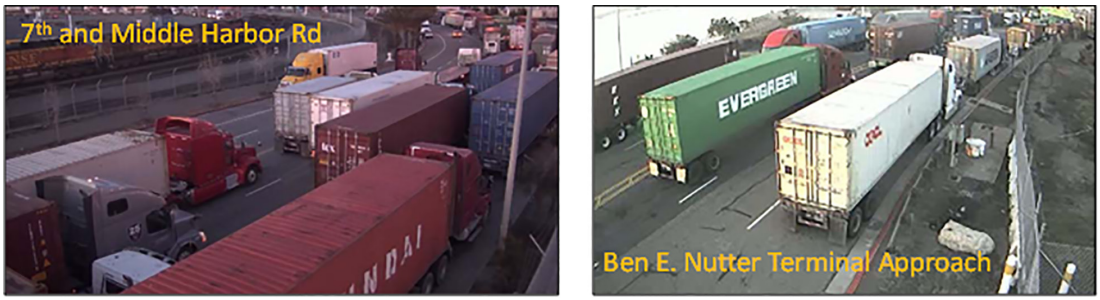


Figure 1: Examples of Truck Congestion Issues at the Port of Oakland

Collectively, these constraints act to reduce the efficiency of the Port, causing wasted time in truck traffic delays, unnecessary queuing/idling, inefficient responsiveness to traffic incidents, illegal truck parking, and missed appointment windows for container pickups and deliveries. These inefficiencies result in economic losses which reduce the competitiveness of the Port on the global market. Additionally, these conditions result in diminished air quality due to increases in greenhouse gases (GHG) and particulates from truck idling and traffic congestion delays.

Port efficiency on the West Coast has been determined to be a critical area of focus for the Federal government, as outlined in this excerpt from a recent report to congress from the U.S. Government Accountability Office:

> *U.S. West Coast ports are critical to the national transportation freight network and global supply chains. Changes in global shipping and disruptions at ports can create congestion and economic hardship for shippers with resulting effects throughout supply chains. The 2015 Fixing America's Surface Transportation Act provides freight policy goals, including increasing U.S. economic competitiveness; reducing freight congestion; and improving the safety, reliability, and efficiency of the freight network.*[1]

As described in the following subsections, the GoPort Freight ITS has been carefully conceptualized and designed to respond to these challenges, with its primary mission centered on increasing the freight transportation efficiency of the Port, which in turn, will lead to benefits in the areas of productivity, safety, mobility, energy and environmental.

Project Foundation

The GoPort Freight ITS has its origin as a part of the broader "GoPort Program" that is focused on improving truck and rail access to the Port of Oakland. The GoPort Program consists of three

[1] "West Coast Ports: Better Supply Chain Information Could Improve DOT's Freight Efforts," United States Government Accountability Office, October 2016.

components – two infrastructure improvements, and one ITS improvement. Appendix E provides a two-page GoPort Program Summary Sheet that outlines the program in more detail.

- The two major infrastructure projects are focused on construction of a new railroad grade separation (7th Street West Segment), and reconstruction of an existing railroad underpass (7th Street East Segment).[2] These projects will significantly improve port access for vehicles (trucks and automobiles), trains, pedestrians and bicyclists, and will minimize conflicts between each of these transportation modes.
- The third project is the development of an Intelligent Transportation Systems and Technology (ITST) Master Plan, and subsequent design and deployment of ITS elements detailed in the plan. The ITST Master Plan project, which will wrap up with a preliminary design in September 2017, was developed in partnership by Alameda CTC and the Port, and supported by a Systems Engineering Team consisting of Jacobs Engineering and Cambridge Systematics. The project has completed the development of a rigorous user needs assessment, an Institute of Electrical and Electronics Engineers (IEEE) compliant concept of operations, and ITS implementation master plan.

Based on the ITST Master Plan concept of operations, Alameda CTC and the Port identified an initial phase of development and implementation of a comprehensive freight transportation technology and congestion management concept called the GoPort Freight ITS, which is the focus of this application.

Additionally, the GoPort Freight ITS proposed in this grant application presents a unique opportunity to create a symbiotic relationship between the two infrastructure projects and the ITS implementation. It is intended that the GoPort Freight ITS will need to be implemented no later than 2021, before the construction of the major improvements associated with the two 7th Street infrastructure projects. Thus, the GoPort Freight ITS will be used in order to manage traffic and incidents to minimize disruption to the goods movements to the Port during this construction phase.

Project Description

Beginning in 2015 with an initial scoping study, and concluding in September 2017, through the ITST Master Plan project, Alameda CTC and the Port of Oakland have committed nearly $2 million for planning, systems engineering, and preliminary design activities to plan for the deployment of the GoPort Freight ITS. As shown in Table 1, the GoPort Freight ITS Implementation Plan consists of a suite of 14 carefully integrated technology deployments as part of an "Initial Deployment Phase," centered on advanced ITS and freight-centric information exchange among Port operators and users.

Alameda CTC and the Port would welcome the opportunity to partner with the USDOT to fully implement the "Initial Deployment Phase" in this plan, as highlighted in Table 1. These improvements represent a comprehensive list of deployments that support the collection, management, and dissemination of information designed to improve Port access, efficiency, and operations. Additionally, while not included as projects in this grant application, the entire plan, including elements identified under the "Future Elements" list in Table 1, will lay the foundation for the future deployment of multiple USDOT-defined Connected Vehicle applications and

[2] The location of these two infrastructure projects, the 7th Street Grade Separation (West Segment), and the 7th Street Grade Separation (East Segment), are shown on the GoPort Freight ITS Project Map in Figure 4 of this application, within the Geographic Scope section (Section 3).

advanced ITS and freight technologies. With these deployments, the ITS foundation will be ready to support expected developments in truck automation technologies as soon as 2020.

Table 1: GoPort Freight ITS

ATCMTD Grant Request (Initial Deployment Phase)		Future Elements Not Addressed in this Grant Request
• Communications (Wireless Fidelity (Wi-Fi), fiber) • Closed-Circuit Television (CCTV) upgrade to high definition (HD) • Queue detection • Advanced Traffic Management System (ATMS) • Centrally controlled and adaptive signal system • Radio-Frequency Identification (RFID) readers • Changeable Message Signs (CMS) • Joint Traffic Management Center (TMC)/ Emergency Operations Center (EOC)	• Supplemental vehicle detection (speed) • Center-to-center (C2C) communication • Advanced rail grade crossing system • Weigh-in-motion (WIM) scales • GoPort Freight ITS Information System/Application • Basic smart parking system	• Freight signal priority • Advanced GoPort Freight ITS information system/app • Dynamic lane control • Dedicated Short Range Communications (DSRC) Radios • Advanced smart parking system • Advanced ATMS • Connected and autonomous vehicles

There are two key synthesizing elements of these 14 technology deployments: a GoPort Traffic Management Center (TMC)/Emergency Operations Center (EOC); and the GoPort Freight ITS Information System/Application:

1. The GoPort TMC involves the expansion of the Port's EOC to include Port-specific TMC capability, consistent with staffing levels at the current EOC. The effectiveness of the TMC/ EOC can be enhanced by other technologies, including additional surveillance and detection equipment, integration of existing databases, improved data analytics, provision of detailed freight-specific information through mobile devices (e.g. predictive terminal wait times, container availability through an eModal (an online gateway that provides marine terminal operator (MTO) information on container availability) link, customized alerts, etc.), Internet applications, as well as roadside changeable message signs (CMSs). Regional data sharing through Center-to-Center (C2C) Communications with Caltrans District 4 can also be featured, as well as connectivity with MTC's existing 511 traveler information system.
2. The GoPort Freight ITS Information System/App consists of a database to integrate with the TMC synthesizing, both real-time and historical data, on Port traffic, truck access, major travel routes, incidents, terminal queues, parking conditions, rail crossing information, ship arrival, container availability, and other key information. Additionally, multiple user applications (web and mobile) will be developed on the platform for multiple user types – including trucking dispatchers and drivers, marine terminal operations staff, railroad operations staff, Port operations staff, and public-sector operations staff.

Figure 2 provides an illustrative overview of how the GoPort Freight ITS can be used by stakeholders in the region to improve their operations. For its freight industry stakeholders, the GoPort Freight ITS will improve the efficiency, safety, and reliability of truck access and circulation within the Port (e.g. terminals, rail yards, warehouses, parking). The use of the GoPort Freight ITS is projected to reduce shipping costs and improve the competitiveness of the Port, while also generating benefits that extend beyond the Port area, such as reductions in truck travel times, emissions, safety and job creation.

The study area for this project focuses on the Port of Oakland and PHFS roadways that provide access to Port facilities within Alameda County, and the NFHN including the I-80 segment from Carquinez Bridge to the I-80/I-580/I-880 junction, the I-238 segment from I-580 to the I-880

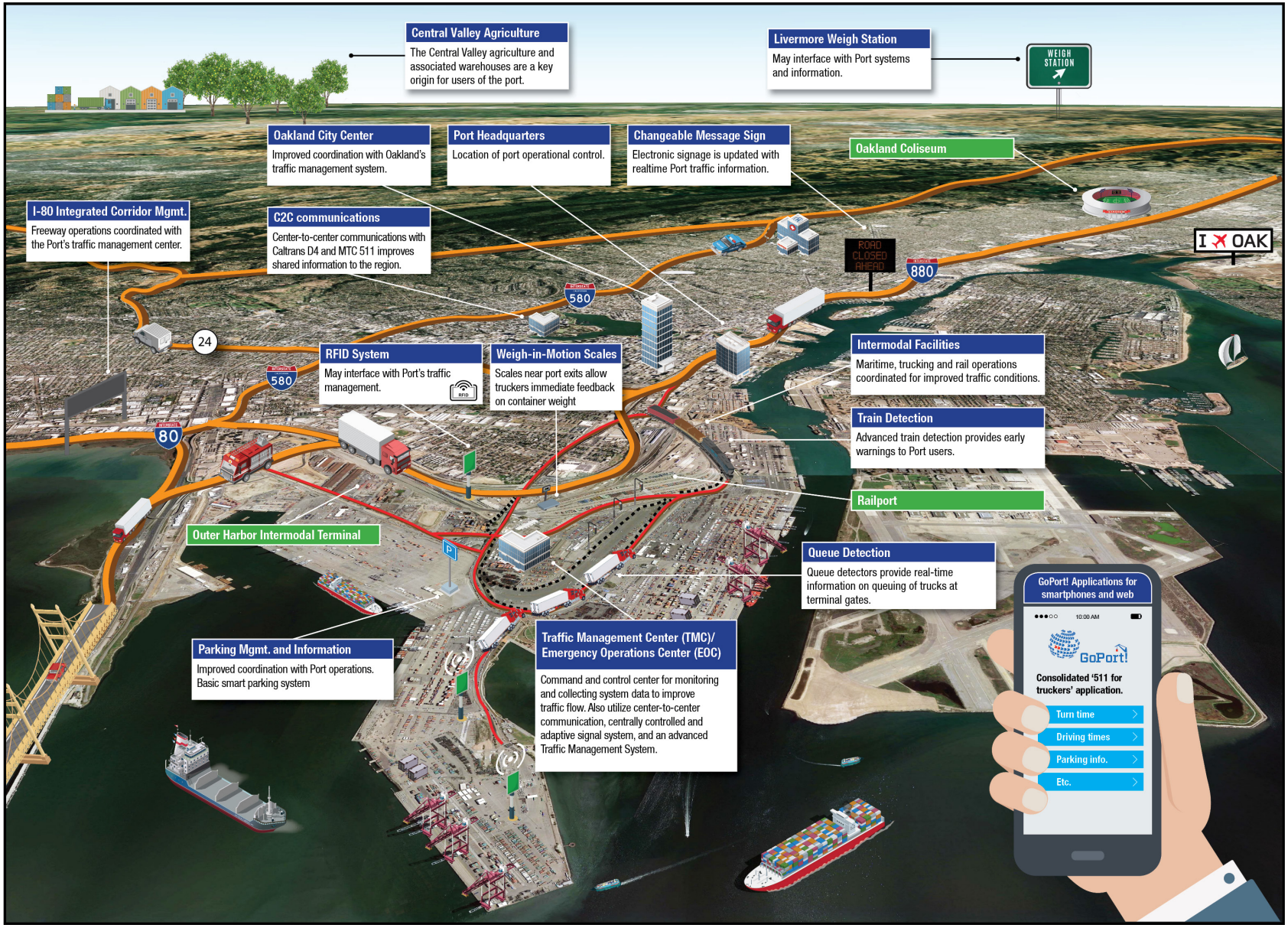


Figure 2: GoPort Freight ITS Overview

Interchange, the I-580 segment from I-238 to east of Crow Canyon Road Interchange, and the I-880 segment from the I-80/I-580/I-880 junction to the A Street Interchange. These facilities all experience significant congestion; and while this project will not significantly alter general regional congestion, it does provide freight-tailored traffic information, including predictive truck trip times to trucking fleets and drivers both within the study area, and beyond, extending to agricultural trucking fleets in California's Central Valley.

ATCMTD Elements Addressed in this Application

As detailed previously, Alameda CTC is proposing to partner with USDOT on this groundbreaking port technology deployment that integrates advanced ITS technologies, sensors, and data, with a new core system based on the principles of a Freight Community System.

The goal of a Freight Community System is to effectively link and integrate (including conversion of data to standardized formats) existing databases and management systems, and then to create web and mobile applications which can be accessed in a freight community (by both private and public sector users) such as a port. The Port of Oakland has the building blocks of a Freight Community System, already having a truck registration system with a corresponding Radio-Frequency Identification (RFID) network for trucks, and terminals which use a standard platform to communicate container availability (eModal).

For the GoPort Freight ITS, the Alameda CTC team is proposing to go well beyond the basic Freight Community System concept, and deploy the nation's first integration of Freight Community System and advanced ITS technology. This unique approach, which will also include a new port-specific TMC, will allow for the fusion of traffic sensors, advanced traveler information, traffic messaging, trucking information web and mobile apps, rail grade traffic warning information, terminal queue information, and more. This system would be an invaluable template for other U.S. ports to consider in the competition for global trade share.

A preliminary bluetooth-based travel time system that the Port is currently evaluating, called DrayQ as represented in Figure 3, provides an example output of the functionality of a GoPort Mobile Application for the trucking and Port private-sector stakeholders. This functionality includes Port and terminal wait times, entry-to-exit terminal turn times, street wait times, and wait time trends. More importantly, these components can be tracked and provided in real time to truckers, dispatchers, and terminal operations staff. Traffic camera images and travel time data can supplement this, providing truckers and dispatchers with real-time confirmation of traffic conditions both inside and outside of the Port. This allows users to select the most appropriate gateways into the Port to reduce travel time and distance and improve the coordination of their transactions. The GoPort Freight ITS Mobile App will also provide a platform that can be tailored to the operations and/or travel patterns of specific users across public and private stakeholder groups.

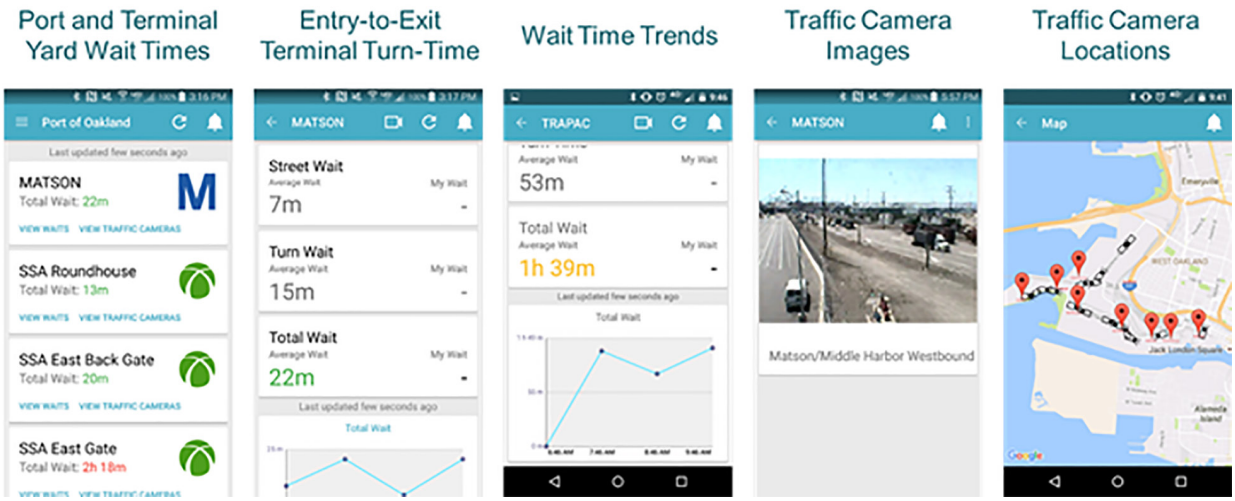


Figure 3: Potential Outputs from a GoPort Freight ITS Mobile App for Truck Drivers

Table 2 provides a comprehensive summary of the advanced congestion management technologies that will be deployed in this project, highlighting that many of the proposed project elements address the solutions identified in the Notice of Funding Opportunity (NOFO).

Table 2: ATCMTD Technologies Addressed in this Application

Congestion Technology Solutions	Projects
Freight Community System	GoPort Information System and Applications
Advanced Transportation Management Technologies	ATMS, Joint TMC/EOC, Communications (Wi-Fi, Fiber), CCTV Upgrade to HD, Adaptive Signal Systems, RFID readers, Vehicle Detection, Queue Detection
Advanced Traveler Information Systems	GoPort Information System and Applications, CMSs, C2C Communication, Advanced Rail Grade Crossing System, Basic Smart Parking System
Infrastructure Maintenance, Monitoring, and Condition Assessment	CCTV Upgrade to HD, WIM, Joint TMC/EOC
Transportation System Performance Data Collection, Analysis, and Dissemination Systems	ATMS, C2C Communication, Joint TMC/EOC, GoPort Information System and Applications
Advanced Safety Systems	Advanced Rail Grade Crossing System, WIM, Joint TMC/EOC

Grant Application Information and Commitments

The total project cost is estimated at $24,291,369. Alameda CTC is requesting $9,716,548 in Federal funds (40 percent) from the ATCMTD program to complement the $14,574,821 in committed local funds (60 percent), which will be provided through the local match. The source of the local match is Alameda County's Measure BB, as further elaborated in Section 2. The project's planned duration is four years, from October 2017 through September 2021.

Additionally, to enhance USDOT's confidence that Alameda CTC and the Port will continue to operate these technologies for the long term, the Port commits to fund operations of the GoPort ATCMTD technologies and applications for a minimum of five years beyond the completion of the ATCMTD grant.

Alameda CTC and the Port fully commit to expeditiously implement project activities to ensure completion within four years after grant award. Alameda CTC and the Port will be working with a range of stakeholders, who represent both users of the proposed system and agencies responsible for planning, designing, construction, operations and maintenance of the transportation system. Outside of Port staff, other goods movement system users include MTOs, motor carrier operators and dispatchers, nonvessel operating common carriers (NVOCC), BCOs, ocean carriers, chassis

providers, rail company operators, members of the Port sponsored Port Efficiency Task Force (PETF; an intermodal freight private sector stakeholder group – further defined in Section 2), and other travelers to the Port. Public-sector stakeholders include Caltrans, California Highway Patrol (CHP), Alameda CTC, City of Oakland, MTC, MTC Service Authority for Freeways and Expressways (SAFE), and other supporting entities (e.g. U.S. Coast Guard (USCG), U.S. Department of Homeland Security (DHS), and local utility providers).

Table 3 summarizes the performance of the project relative to the ATCMTD grant criteria. The results of the benefit-cost assessment of deployment of these technologies, which is presented later in Section 8, forecast a benefit-cost ratio in just the first year of operations in 2020 to be 10.6 to 1. The expected long-term outcomes outlined in Table 3 fully illustrate how the proposed GoPort Freight ITS as presented in this application meets the selection criteria for the ATCMTD Grant Program.

Table 3: Summary of Grant Criteria

Criteria	Long-Term Outcomes
Technical Merit	
Alignment with vision, goals and focus areas	• Reduced costs for users of the Port of Oakland through time savings and improved operational efficiency. • Environmental benefits from reduced congestion and idling. • Improved safety through more efficient flow on the arterial and freeway system. • Improved safety through traffic system coordination with rail grade crossings. • Addressing Freight Community System focus area through use of the GoPort App to collect and disseminate high-quality traveler information of different elements to the freight community. • Economic benefits and improved Port competitiveness through reduced delays and more efficient operations for truckers, BCOs, and their customers – extending to manufacturers, consumers and the community. • Use of the GoPort Freight ITS App to integrate technologies into existing transportation management systems. • Collection of data to identify impacts of the project and allow transferability to other locations. • Project responds to Integrated Corridor Management focus area by improving coordination between arterial and freeway systems with traveler information and incident management. • Development of a project that will be prepared to incorporate Connected and Autonomous Vehicle technologies as they are introduced.
Readiness of Technologies to be deployed and likelihood of success	• By September 2017, Alameda CTC and the Port of Oakland will have completed a 2-year effort to plan, perform preliminary systems engineering, and complete preliminary design of the GoPort Freight ITS – this includes a robust Concept of Operations (ConOps) consistent with the USDOT-recommended IEEE 29148-2011 Standard. • On June 8, 2017, the Port of Oakland, the lead agency under California Environmental Quality Act (CEQA), determined overall GoPort ITST as categorically exempt from the requirements of CEQA pursuant to Section 15301 (Existing Facilities). • Through the stakeholder engagement activities and through the ConOps process, a rigorous User Needs Assessment was conducted to ensure that the technologies and applications deployed will meet actual Port user needs, and achieve the forecasted benefits. • The project is built upon proven ITS, ATMS, and information technologies that are readily available from technology vendors and system/software vendors in today's marketplace. • The ITS elements deployed take advantage of a robust existing fiber communications network and backbone.
Scalability and Portability to other jurisdictions	• The GoPort Freight ITS ConOps, deployment plans, and design documentation will be made available to other port regions interested in deploying similar technologies. • Given that the project is built upon proven ITS, ATMS, and information technologies, the project technologies will be scalable and transferable to other regions with Port facilities.
Commitment to evaluate the effectiveness of activities proposed	• As detailed in the resumes in Appendix A, the proposed project team includes experience with conducting ITS technology evaluations, performance monitoring, and brings to the table, data and analytical capabilities required for a rigorous analysis of impacts.
Staffing	
Program Management and Organizational Structure	• As detailed in the organizational chart in Section 15 and the attached resumes in Appendix A, the proposed organization led by Alameda CTC, with support from the Port of Oakland, is well-positioned to successfully implement this project. • The Alameda CTC Management Team collectively provides transportation program management, project delivery and quality control skills from two senior staff, who together have successfully delivered multiple projects of comparable size, scope and complexity to this proposed GoPort Freight ITS. • The proposed staffing is a continuation of the current staffing that is being utilized in the current plan development, environmental clearances, preliminary systems engineering, and the completion of the preliminary design.

Criteria	Long-Term Outcomes
Staffing (continued)	
Qualifications	• The team consists of experienced agency management and consultant staff expertise in port and intermodal operations, freight technology, traffic operations, ITS, and logistics – and who rigorously follow accepted ITS engineering standards/best practices.
Cost	
Cost Reasonableness and Conformance	• Costs were estimated using both engineering and analogy estimating techniques, supported by use of common cost categorization factors for ITS deployment, and incorporating known ITS equipment costs, as well as cost information contained in the USDOT's Tool for Operations Benefit Cost (TOPS-BC) Analysis model. • Costs are compared to ITS deployments already existing in the region, and have been subject to scrutiny of implementing agencies. • The Port of Oakland has committed to provide five additional years of operations and maintenance (O&M) support to this project following completion of the four-year grant.
Funding Availability	• Alameda CTC has already secured matching funding through its sales tax funding; Alameda CTC received sales tax voter reauthorization in 2014, which will generate more than $8 billion over 30 years. • Local match will be 60% of total project cost, significantly exceeding the USDOT requirement of 50%.

2. PROPOSING ENTITY

Alameda CTC is a joint powers agency which plans, funds and delivers a broad spectrum of transportation projects and programs to enhance mobility throughout Alameda County, providing benefits to the entire Bay Area region, and is the project sponsor and implementing agency for the project. Alameda CTC has distinguished itself as one of the premier transportation project delivery agencies in California and the nation, including being named Organization of the Year by the California Transportation Foundation in 2015, and receiving a "AAA" credit rating from Fitch and Standard and Poors for its financial management; the first such transportation authority in California to garner such a designation. Alameda CTC delivered more than $4.5 billion in transportation projects between 2000 and 2015.

As a sales tax authority and funding agency, Alameda CTC has the responsibility to manage and approve discretionary funding for projects and programs approved by Alameda County voters. Alameda CTC is acutely aware of the importance to adhere to funding requirements and accountability. This responsibility dates back to November 1986 with the first approved sales tax measure generating more than $1 billion over 15 years, followed by voter reauthorization in November 2000 generating more than $3 billion over 20 years, and most recently in November 2014 voter reauthorization generating more than $8 billion over 30 years (referenced as Measure BB funds).

As the county's congestion management agency (CMA), Alameda CTC is also responsible for the planning, programming and allocation of federal, state and other local funding for transportation improvements throughout Alameda County. This includes funding from federal, state and local fund sources such as the Surface Transportation Program (STP), Congestion Mitigation Air Quality Program (CMAQ), State Transportation Improvement Program (STIP) and Transportation Fund for Clean Air Program (TFCA).

Alameda CTC has already committed substantial local voter-approved funds to the GoPort ITS Master Plan and has completed a long-range goods movement plan that has identified the GoPort improvements as a high priority. In addition, Alameda CTC has convened a goods movement collaborative to advance priority investments in goods movement.

The primary partner for this project is the Port of Oakland, which owns and operates/leases the majority of land and infrastructure within the Port complex. Port of Oakland staff monitors traffic conditions at the Port using video feeds from their network of cameras. Staff is situated at

the existing EOC at the Harbor Facilities Center within the Port of Oakland. Wharfingers spend approximately 25 percent of their time in the field addressing traffic operational issues. In addition, Port staff manages several information systems, which store various aspects of truck activity, including a Drayage Truck Registry and a Truck Management System. A summary of the project's key agencies and stakeholders is provided in Table 4.

Table 4: Key Agencies and Stakeholders

Stakeholder	Description	Roles
Alameda County Transportation Commission	Alameda CTC plans, funds, and delivers transportation infrastructure projects in Alameda County	• Lead applicant and agency • Project Management and delivery of this project
Port of Oakland	Owner and operator of Port facilities	• Primary partner and implementing agency for Port deployments • Facilitates project engagement with freight industry stakeholder
California Department of Transportation	Owns and operates I-80, I-580, and I-880, which are critical Port access routes	• Engage in ITS architecture design to ensure integration with the Caltrans District 4 TMC
Metropolitan Transportation Commission	Metropolitan Planning Organization (MPO) for the San Francisco Bay Area	• Assist with integration of regional ITS and traveler information components
City of Oakland	Operates the near-port traffic signal communications network and local TMC	• Assist with the implementation of the ATMS and the C2C communications components
Marine Terminal Operators	Tenants within the Port, responsible for loading/unloading of the containers from ships, and for facilitating transfer of containers to rail and trucks	• Partners in support of GoPort Information Applications and Port ITS deployments
Trucking Fleets	Deliver and receive containers from MTOs, and typically are either locally based in the Bay Area, or are based in the Central Valley (approximately 6,000 trucks total)	• Key users of GoPort Information Applications
Beneficial Cargo Owners	Owners of cargo being shipped in and out of Port; BCOs typically control the information about empty container release, and may control terminal appointments	• Partners in GoPort Freight ITS development
Railroads	Owners and operators of lead tracks and intermodal Port facilities; the UP Yard at the Port is one of the major truck-to-rail transfer yards on the West Coast	• Partners in support of improvements in intermodal efficiency

In addition, Alameda CTC and the Port have organized two key GoPort Freight ITS stakeholder advisory groups which include membership from many of the stakeholders outlined in Table 4:

- Alameda CTC has already created the **Concept of Operations Advisory Committee (CAC)** to guide this project from cradle to grave. The CAC membership includes Alameda CTC, Port, MTC, Caltrans, City of Oakland, Jacobs Engineering, and Cambridge Systematics and is tasked with assuring that the proposed GoPort Freight ITS improvements align with stakeholder and other regional user needs. The CAC will also play a key role in expediting deployment of project technologies by coordinating efforts with other projects underway in the area.
- The Port organizes and supports a predominantly private sector intermodal freight stakeholder group called the **Port Efficiency Task Force (PETF)**. The PETF is made up of shipping lines, MTOs, trucking fleets, railroads, labor unions such as International Longshore and Warehouse Union (ILWU) and Port staff. The PETF is tasked with reviewing and developing efficiency measures that improve Port operations. The PETF has been engaged regularly in support of the overall GoPort Program, and was instrumental in supporting the development of user requirements that defined GoPort Freight ITS that is presented in this grant application.

3. GEOGRAPHIC SCOPE

The project focuses on the Port and roadways that provide access to Port facilities within Alameda County. Figure 4 illustrates the area in and around the Port, which is the focus of the project, while also showing in the insert the broader regional range of this project.

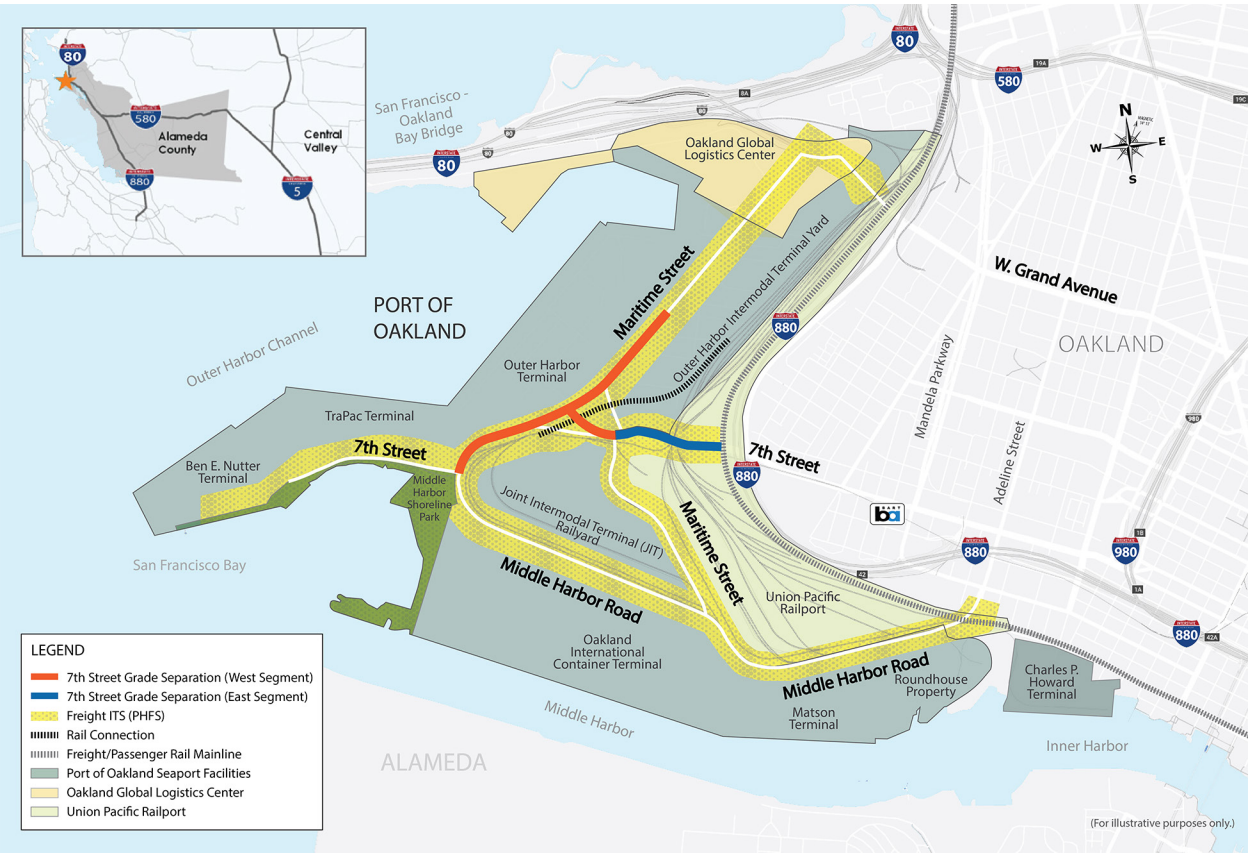


Figure 4: Project Location Map

The Port links the Northern California Mega-region (a population of 12.2 million), and the interior U.S. to the Pacific Rim and the broader world, providing access to global markets and opportunities for increased trade. A substantial share of cargo moving to and from the Port comes from the Central Valley, including agricultural exports and imports moving to inland regional distribution centers. The volume of rail container traffic to the mid-west and southwest regions of the U.S. is also increasing.

The Port is served by multiple PHFS routes on the NHFN that provides connections into and out of the Bay Area, including I-80, I-580 and I-880. Three last-mile gateway connector roadways along the two (Facility ID CA32P Port of Oakland and Facility ID CA62R Oakland Rail Yard)PHFS intermodal connectors link the interstate network to the Port: West Grand Avenue, 7th Street and Adeline Street/ Middle Harbor Road.

Figure 5 illustrates where the trucking fleet users of GoPort are based and highlights the regional origins from which trucking fleets access the Port on the regional roadway network. The largest number of truck origins (e.g. warehouses, distribution centers, factories, rail facilities) is found within the San Francisco East Bay Area near the Port making up 40 percent of trucking industry traffic. Additionally, 20 percent to 30 percent of the origins are generated in the Central Valley which consists largely of agricultural products.

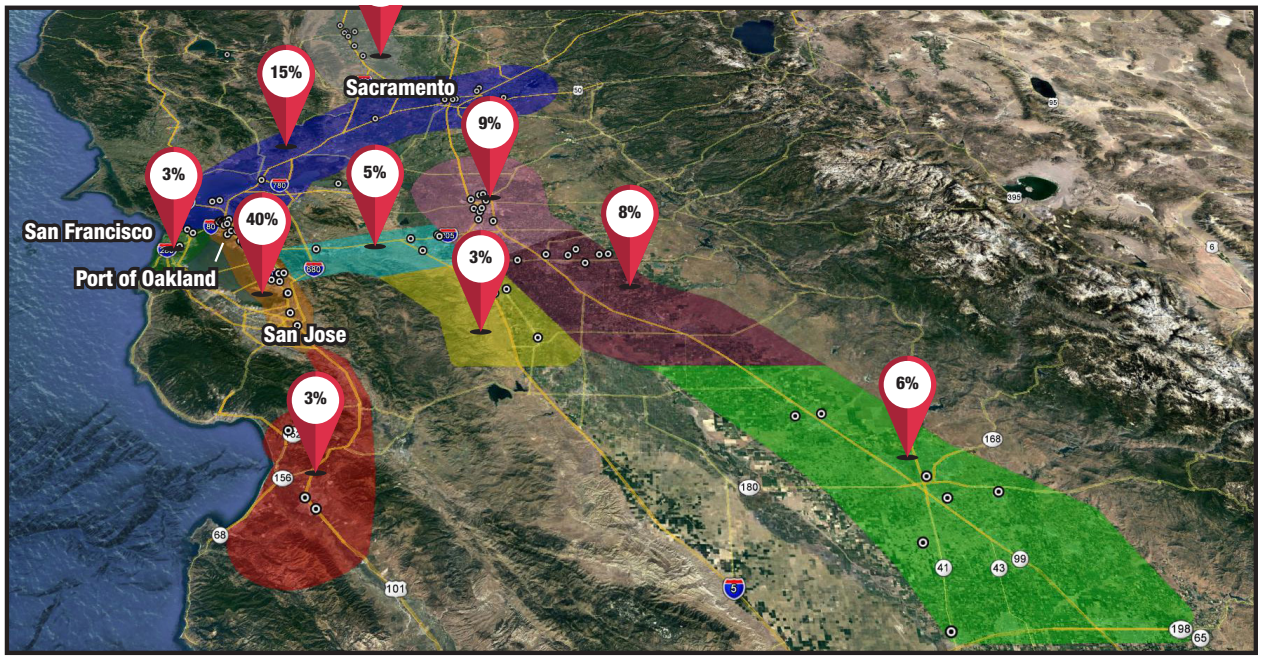


Figure 5: Trucking Industry Trip Origin Location Map (General Area)

4. ISSUES AND CHALLENGES ADDRESSED

Alameda CTC and the Port seek to improve the efficiency of freight transportation through the use of ITS and other technologies. The proposed improvements are targeted to provide benefits to the public and private sectors in terms of congestion relief, efficiency, sustainability, and economic stimulation. Issues and challenges were identified through an extensive stakeholder process, which encompassed the following:

- Surveys of 350 private sector truckers.
- Input from public agencies and private-sector parties that operate in and around the Port, including BCOs, chassis providers, consultants, ILWU, motor carriers, NVOCC, ocean carriers, Port staff, and railroads and terminal operators, who all participated in several PETF meetings to provide input on overall project goals, specific objectives, and focus areas.
- One-on-one phone interviews with several PETF members in the BCO, chassis provider, motor carrier, NVOCC, and terminal operator sectors.
- Input from the CAC, which was established as a forum to translate the user needs developed from the above sources to the ATCMTD technology solutions proposed in this application.

Based on this intensive stakeholder engagement effort, as outlined in both Section 1 and Section 5, this project addresses the following issues and challenges in the Port area:

- **Port and Traveler Information**. Signage on Port property for traveler information and traffic control is severely lacking. The stakeholders who do look on-line for information that can help them better coordinate trips have to go to multiple traveler information sources (e.g., 511, Port email newsletters, marine terminals' websites, Google Maps, etc.). While

the daily email newsletter from the Port provides information regarding vessels berthed, it does not give a good indication of real-time operational conditions at the Port. Truckers, dispatchers, and operations staff need to know if operations are slow at the Port, regardless if they are still at the distribution center, en-route to the Port, or already in queue. This allows them to better manage not only their pick-ups and deliveries, but also their customers' expectations. Google and most travel time apps do not list travel times for truckers nor take into account Port-specific activity. Performance metrics, currently available on a limited basis, have not been used for trending analysis. Additionally, there are time lags in getting container availability information. For example, on the terminal's website, a container may be listed as available, but it will take an additional 20 minutes for a BCO to be able to make an appointment through eModal for that same container. And, lastly, information on truck queues on the public roads in front of the terminals, as well as information on terminal turn times for trucks, generally are not accurate and are not in real time.

- **Traffic and Incident Management.** While increases in container volumes at the Port indicate economic growth, it also adds additional pressure to streamline freight operations wherever possible to maintain economic competitiveness. Several truck transportation challenges need to be addressed in order to maintain and improve operational efficiency:
  - » Delays caused by long gate queues were among the most cited inefficiencies reported by stakeholders. At some terminal gates, trucks have reported two-hour wait periods in many cases, and in extreme cases, four-hour wait periods.
  - » Chassis lot searches and at-grade rail crossings in the Port further slow down the turn times of trucks.
  - » Motor carriers do not have a reliable way to view closed-circuit television (CCTV) video streams of arterial conditions while in the Port. CCTV video streams currently do not capture train approaches, which can often block intersections for 30 minutes, causing truck queues that can last for an hour. Currently, only about 25 percent of the CCTV cameras are high definition (HD). This is not sufficient for effective traffic management and incident detection.
  - » Lack of signal coordination and street design features hinder the movement of goods on major truck arterial routes.
  - » Currently, Port staff uses ad-hoc methods for incident management and have rudimentary means of gaining situational awareness of Port activities. There are no common incident clearance protocols or information on detour options.
- **Regional Traffic Congestion.** In addition to the congestion noted above at Port gates, there is significant congestion on major freeways and arterials in the dense area around the Port. While real-time freeway travel times are provided through CMSs and other sources, there is no information on arterials. These CMS messages are focused on general traffic, and do not provide travel time for truckers (e.g. Port exit closures, Port incidents). The highly congested regional freeway system also can cause significant delays for freight traffic traveling to and from areas outside the region via I-80, I-238, I-580, and I-880. Trucks approaching from the Central Valley or other areas outside the region require frequent updates on traffic conditions, as congestion can emerge quickly on these interstates and result in unexpected delays.

- **Rail Traffic Interaction.** The at-grade railroad crossings in the Port, specifically on Maritime Street, where the at-grade crossings near 7th Street and Middle Harbor Road can occasionally be simultaneously blocked by one train, which in turn creates queues, modal conflict concerns, and can impact safety. A blockage of the at-grade crossing of Maritime Street near 7th Street also results in significant truck queues that can extend onto I-880.
- **Truck Safety/Roadway Conditions.** PETF members have indicated that there are occasions when the truck weight listed on shipping paperwork is inconsistent with the actual container or item. Overweight trucks pose safety risks to themselves and other vehicles on the road, and also result in damage to roadway surfaces and bridges.
- **Environment and Emissions.** Technology and operational strategies are included to reduce impacts of goods movement activity on the health, safety, and quality of life in neighboring communities; and also to reduce the creation of GHG. Addressing environmental justice issues while reducing GHG emissions is a major focus of the Alameda County Goods Movement Plan (2016).
- **Parking.** Illegally parked trucks are a common occurrence on Port property and are not efficiently enforced. Trucks parking on Adeline Street (among other illegal locations) add risk and liability to motor carriers, pedestrians and bicyclists. While monthly parking spots can be reserved in the privately owned Ampco Trucking Lot, many motor carriers will not do so if they do not access the Port on a daily basis. There are no overnight parking facilities.

As discussed previously, the problems identified combine to reduce the efficiency of freight movement in and out of the region, reduce the safety of the facilities and neighboring communities, and increase the emissions released. About 40 percent of Port traffic is local to the East Bay which is impacted by the heavy level of congestion experienced in the region. For those traveling longer distances, travel time uncertainty is even greater. Congestion issues have a domino effect that impact all major stakeholders, including BCOs and MTOs. The result is a negative impact on the regional economy and a reduction in the competitiveness of the Port and its stakeholders. The GoPort Freight ITS, outlined in this application, is designed to make a measurable difference in mitigating all of these issues and challenges.

5. TRANSPORTATION SYSTEMS AND SERVICES

The Alameda CTC team is proposing to leverage ITS and other information technologies to reduce emissions, fuel consumption, and environmental impacts, while improving mobility and relieving congestion in the Port and surrounding areas of Alameda County. This will be accomplished by the seamless integration of several proven technologies that have been developed through significant investments from the USDOT and other state and local agencies. These technologies represent a mix of established ITS technologies, such as CMSs and vehicle detection, as well as the development and enhancement of newer smart phone-based technologies. The integration and extension of these technologies will lead to an efficient and safer flow of freight, well-organized planning by trucking companies, coordination and communication among stakeholders, access to real-time data and information by the supply chain partners, and connectivity with roadway infrastructure; all of which result in benefits for all stakeholders, while meeting the overall goals and objectives of the USDOT.

The 14 GoPort Freight ITS elements are summarized in Table 5, and highlight the systems engineering traceability back to the needs of users and stakeholders. User needs were identified from a wide range of stakeholders with corresponding projects identified to address those needs. The Port

TMC/EOC will serve as a key focal point of information gathering and dissemination, and has been designed here to allow for eventual incorporation of connected and automated vehicle technology, which will support the collection and processing of Big Data that can support future real time Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS) and performance monitoring applications. The TMC/EOC's role has also been designed to facilitate Port operations management of Port recurring and non-recurring traffic incidents.

Table 5: Overview of GoPort Freight ITS ATCMTD Elements

Element Functionality	Description	User Needs Addressed
Communications (Wi-Fi, fiber) Use fiber to assure high-speed communications for Port's ITS and Wi-Fi for backup and expanded geographic coverage. *Essential Functions:* • Port and traveler information • Traffic and incident management	Complete the existing fiber network. This will set the foundation for connection and control of all other ITS elements. Add Wi-Fi capabilities as a backup communication system and a means for addressing cellular dead spots – a major issue in parts of the Port. Offers amenities to truckers within the Port. Enhances Port staff capabilities to transmit and receive "last mile" data.	• Need complete access and control of data sources and information dissemination. • Need improved real-time communication with users of the Port.
CCTV Upgrade to HD Fill-in surveillance gaps, deploy vehicle video detection software and integrate into traffic management system. *Essential Functions:* • Port and traveler information • Traffic and incident management • Safety	Upgrade the existing CCTVs to HD, fill-in surveillance gaps and deploy vehicle video detection software. Cameras can address surveillance and traffic needs simultaneously but HD imaging needed for appropriate traffic analysis. May need to install new poles for cameras focused on vehicle detection.	• Need to improve real-time situational awareness of the Port property and operations. • Need for enhanced and expanded traffic monitoring system near and in the Port.
Supplemental Vehicle Detection (speeds) Deploy "side fire" radar for midblock detection for integration into traffic management system. *Essential functions:* • Port and traveler information • Traffic and incident management	"Side fire" radar is useful for non-intrusive midblock detection and would not only fill in gaps from video detection, but also provide speed information.	• Need to refine identification of traffic queues and surges in and around the Port area. • Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to continue to identify and mitigate environmental and emissions related impacts.
Queue Detection Expand detection technology to key spots where queues tend to form and integrate into traffic management system. *Essential Functions:* • Port and traveler information • Traffic and incident management • Emissions reduction	Add automatic queue detection. Additional technology is needed to supplement video detection. Equipment will be located at known hot spots.	• Need to refine identification of traffic queues and surges in and around the Port area. • Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to continue to identify and mitigate environmental and emissions related impacts.
RFID readers Applying RFID technologies to infrastructure and ultimately other components of freight operations can improve efficiency. *Essential Functions:* • Port and traveler information	The existing RFID network will be expanded to allow the Port to improve the accuracy and reliability of the calculation of turn times and acquire refined information on truck movements. Allows growth into Freight Advanced Traveler Information System (FRATIS) or other technology deployments.	• Need to refine identification of traffic queues and surges in and around the Port area. • Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to continue to identify and mitigate environmental and emissions related impacts.

Element Functionality	Description	User Needs Addressed
ATMS (includes centrally controlled equipment) Upgrade of existing signals and implementation of traffic management software in TMC/EOC. *Essential Functions:* • Traffic and incident management • Safety	Upgrade existing traffic signal system to allow connectivity and control by the TMC/EOC. Equipment will be connected to the same fiber loop. Signal controllers with networking equipment will be installed. Will involve coordination with City of Oakland and potentially Caltrans. Set up software to receive traffic information, control messages, and control traffic signal systems. Software should be upgradeable to allow further automation and enhancements. Allows for potential connections/collaboration of operations with other public sector equipment and systems.	• Need to refine identification of traffic queues and surges in and around the Port area. • Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to continue to identify and mitigate environmental and emissions related impacts.
Adaptive Signal System Upgrade of ATMS to allow for adaptive signal system control. *Essential Functions:* • Traffic and Incident Management	Adaptive signal system modules to be added to signal system control and ATMS.	• Need to refine identification of traffic queues and surges in and around the Port area. • Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to continue to identify and mitigate environmental and emissions related impacts.
CMSs Real-time information will be provided to truckers entering/exiting the Port. *Essential Functions:* Port and traveler information Traffic and incident management	Informs truckers on regional conditions as they leave the Port, incidents or Port information as they enter. CMSs will be fiber connected and connectivity to the TMC/EOC will allow access and control by the traffic management system.	• Need for to provide useful real-time traffic, incident and access control information to users of the port.
TMC/EOC Physical center for emergency and transportation management within the Port that provides situational awareness of activities on the Port, access and control of ITS elements and coordination with other operating agencies. *Essential Functions*: • Port and traveler information • Traffic and incident management • Safety	New ITS elements will integrate with existing security equipment, functions, and emergency operations center. A "home" for control of the ATMS and where Standard Operating Procedures (SOPs) will be created and centered around. Provides basic communication/connection to other public agencies to coordinate transportation and incident management (e.g., Caltrans, CHP, City of Oakland, MTC, U.S. Coast Guard (USCG), and Department of Homeland Security (DHS)).	• Need for enhanced and expanded traffic monitoring system near and in the Port. • Need to establish coordinated incident management programs. • Need for TMC capabilities and equipment at the Port. • Need to interconnect with security network and functions. • Need for more traffic enforcement within the Port. • Better communications, cooperation, and collaboration is needed between stakeholders.
GoPort Freight ITS Information System/ App A multi-platform app that ties together existing information sources and accommodates new ones. Information disseminated via website and mobile app. *Essential functions:* • Port and traveler information • Traffic and incident management • Safety • Parking	The GoPort traveler information app will be a multi-platform system (e.g., web, mobile app, email, etc.). It will be a consolidated portal of useful truck information and web tools. It will disseminate static and real-time Port messages and information regarding travel times, parking, incidents, wait times, terminal turn times, terminal information, etc.	• Truck traveler information needs to be consolidated, timely, and easily available. • Need for a system to report performance indicators. • Need to refine identification of traffic queues and surges in and around the Port area. • Need to reduce environmental and emissions related impacts. • Better communications, cooperation, and collaboration is needed between stakeholders.

Element Functionality	Description	User Needs Addressed
C2C Communication *Essential functions:* • Port and Traveler Information • Traffic and incident Management	Deploy new communication interfaces among the public sector agencies. Establish C2C policies. Essential for signal control and messaging.	• Better communications, cooperation, and collaboration is needed between stakeholders. • Need complete and improved communications infrastructure within the Port.
WIM Technology Expand WIM technology to key areas within the Port *Essential functions:* • Traffic and incident management • Safety	This WIM would be located on Port property as a courtesy to trucks leaving the Port with new containers. This could initially start with a portable system. Can be done at slow speeds but smooth road surface is needed. Potential WIM information sharing and coordination with CHP.	• WIM stations are needed within the Port to allow improved truck operations on the region's freeways. • Provide ability for a trucker to get weighed at night, when other port static scales are closed.
Rail Grade Crossing System Train and queue detection equipment will work in tandem with traffic signal systems, CMS and phone apps. *Essential Functions:* • Port and traveler information • Traffic and incident management • Safety • Emissions reduction	Non-intrusive train detection can be used to provide warnings and traveler information on CMSs and the GoPort app. Eventually, rail detection can be integrated with traffic signal systems.	• Need to continue to reduce environmental and emissions related impacts. • At-grade crossings introduce safety concerns, traffic delay issues, and noise impacts.
Basic Smart Parking System Use of detection technology and information systems to provide information on parking availability. *Essential functions:* • Safety • Parking	Provide a system that monitors parking availability that can be shared via GoPort Freight ITS App and CMSs. Parking payment options would be available.	• Need to continue to reduce environmental and emissions related impacts. • Need for more traffic enforcement within the Port. • Need short- and long-term parking solution for trucks.

As detailed in Figure 6, deployment of these 14 technologies will allow collection and integration of data from sources within the Port and outside of the Port. Through the GoPort Freight ITS Information System/App integration approach, the data created by these 14 elements will be integrated and managed – and then fused into a defined set of GoPort Freight ITS user applications (e.g. real-time traffic alerts, CMS messages, terminal queue times, truck parking reservations, etc.). GoPort Freight ITS information delivery services include a mobile application, a website, CMS notifications, and C2C communications. Additionally, with the website targeted to trucking fleet dispatchers, it is expected that dispatchers will also relay information directly to truckers via cell phone, and that many truckers will also share information initiated from dispatchers with each other through Citizens Band (CB) radio, which is still an important communications method for today's Port truckers.

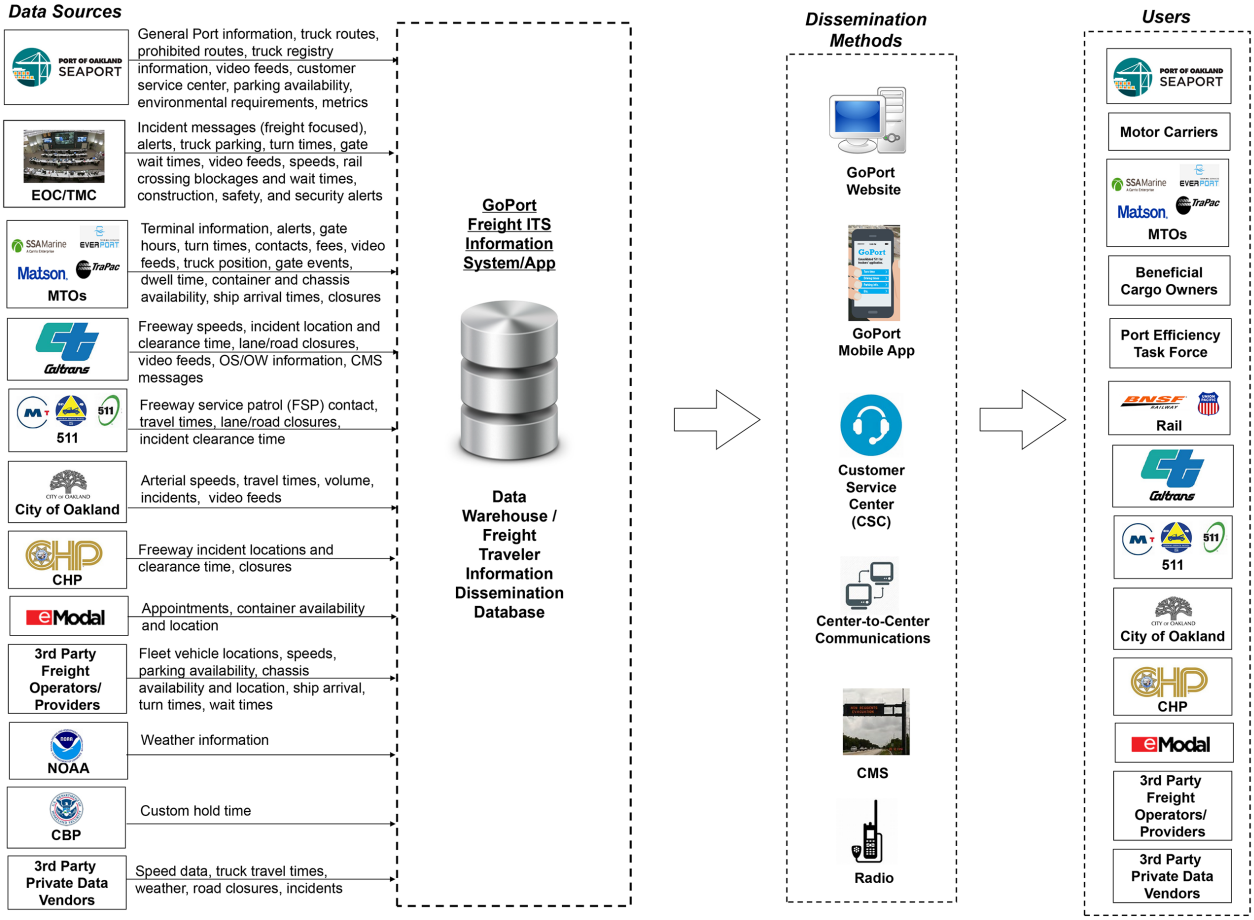


Figure 6: GoPort Freight ITS Information and ATMS Data Integration Approach

6. DEPLOYMENT WORK PLAN

The following summarizes the steps contained in the Deployment Work Plan:

- **Task 1. Program Management.** Alameda CTC will provide guidance and oversight of the overall project to assure adherence to budget, schedule, deliverables, procurement, construction, integration, and performance evaluation. Alameda CTC will collaborate with USDOT and provide required reporting information. It will manage communications with the Port and stakeholders (Caltrans, City of Oakland, and others) to allow interagency collaboration and to assure the needed operations at the Port and other agencies are realized per the guidance of the completed ConOps. The project team will engage the CAC (public-sector) and PETF (private-sector) groups to establish a working group for the project – successful deployment of the 14 elements will require working the data sources from multiple agencies. A stakeholder outreach plan will be developed with review cycles, webinars, and in-person meetings identified.
- **Task 2. Refine/Finalize GoPort Freight ITS Functional Requirements and Complete Final System Design.** The project engineering team (Jacobs Engineering and Cambridge Systematics) will refine and finalize feasible system requirements and design for the GoPort Freight ITS. This effort will carry the feasible primary system design through to 100% plans, specifications and estimates (PS&E) that are suitable for public procurement. The PS&E will be based on the ConOps, initial system requirements and preliminary systems design that will have been completed by September 2017. The design effort will be coordinated

by the appropriate CAC members or their consultants, to ensure that the system can share information with Caltrans, MTC, and City of Oakland systems, as intended.

- **Task 3. System Integration Team Procurement.** Alameda CTC and their partner, Port of Oakland, will issue the PS&E as developed under Task 2 for public bidding and procurement. The project engineering team will assist with post-design services including requests for information as submitted by interested bidders. Alameda CTC will establish a contractor construction management contract to oversee the successful building and implementation of the system.
- **Task 4. Complete Application Development.** The elements of the GoPort Freight ITS application, associated user interfaces and back-office elements will be developed, integrated, coded, and beta tested under this task. This effort will be completed by a to-be-determined application developer that will be procured under Task 3.
- **Task 5. ITS Element Construction.** All ITS elements will be deployed in this task. This task will construct and install all of the required field equipment and TMC/EOC upgrades. This effort will be completed by a to-be-determined contractor that will be procured under Task 3. This effort also includes construction management that will be completed by a to-be-determined contractor.
- **Task 6. TMC, ATMS and GoPort Information Systems Integration.** All hardware and software, and back-office elements of the GoPort Freight ITS shall be integrated under this task. The GoPort Information System will be prototyped, tested, and deployed. This task will also include system training. This effort will be completed by a to-be-determined systems integrator as part of the contractor team that will be procured under Task 3.
- **Task 7. Continuous System Performance Evaluation.** The project team, in collaboration with key stakeholders and users, will develop key performance goals (and supporting measurement metrics) for the system early on, and will continuously measure actual performance of the system during the deployment phase. The project team is also prepared to work closely with (and provide data to) an Independent Evaluator, if the Federal Highway Administration (FHWA) decides to provide one. This effort will be conducted by Alameda CTC and their partner, Port of Oakland.
- **Task 8. Long-Term Operations and Maintenance.** Following the completion of this four-year ATCMTD grant effort, the Port has committed to providing and funding five additional years of operations and maintenance (O&M) support to this project. If desired, the Port shall provide a brief annual report to the USDOT yearly that confirms the sustenance of this O&M commitment.

Systems Engineering Approach

Throughout the previously mentioned tasks, the project team will apply rigorous systems engineering principles consistent with IEEE and FHWA guidance, including, but not limited to, the following:

- FHWA Systems Engineering Guidance: https://ops.fhwa.dot.gov/publications/seitsguide/seguide.pdf; and
- IEEE Standard 29148-2011 – Systems and Software Engineering – Life-Cycle Processes – Requirements Engineering: http://standards.ieee.org/findstds/standard/29148-2011.html.

Risk Management

An initial Risk Management Plan has been prepared to identify and plan for risks associated with the GoPort Freight ITS project. This plan is provided in Appendix C.

7. REGULATORY, LEGISLATIVE, AND INSTITUTIONAL DEPLOYMENT CHALLENGES

While Alameda CTC does not anticipate significant regulatory, legislative, or institutional deployment challenges in implementing these technologies in the Port and surrounding areas, there are several areas that will be monitored carefully to ensure success:

- **Driver distraction with in-vehicle devices.** Navigation and traveler information tools have been successfully developed that provide audible alerts instead of visual alerts (e.g., smartphone screen). Audible alerts and other means of preventing driver distraction will be included in all mobile applications developed for this project.
- **Acceptance of technologies by private-sector trucking companies and Port terminal operators.** The PETF and previous work completed on the ConOps and the ITST Master Plan have involved extensive stakeholder participation by Port stakeholders, including private-sector trucking companies. Thus, a strong stakeholder base already is in place that can be utilized for testing and early adoption of the GoPort Freight ITS app. In working with the PETF, this base can be expanded as the project develops. We anticipate refining our outreach plan under this project.
- **Coordination between system owners in deploying technologies in the study area.** The City of Oakland ITS Strategic Plan states that it is more cost-effective to incorporate ITS elements into other capital improvement projects without substantial increase in cost; for example, communication links and signal improvements as part of roadway or interchange/intersection projects. The CAC can play a key role in expediting deployment of project technologies by coordinating efforts with other projects underway in the area. Coordinating field work can also help to minimize disruption to traffic inside and outside the Port during construction.
- **Commitment of agency funding match and continued operations and maintenance of investments.** Substantial local funds have already been programmed and allocated towards deployment projects under the GoPort ITST Master Plan. This includes Measure BB funds, a full-cent transportation sales tax approved by Alameda County voters in November 2014, one of the first examples of a local transportation funding measure with dedicated funds for goods movement. Furthermore, the Port is committed to sustaining the operations and maintenance of all GoPort Freight ITS deployments for a minimum of five years after the ATCMTD project ends.

8. QUANTIFIABLE SYSTEM PERFORMANCE IMPROVEMENTS

An analysis was conducted to provide estimates for the fuel savings, emission benefits, and time savings. Appendix D provides the Benefit-Cost Analysis report for the proposed GoPort Freight ITS Project and detailed calculations. The primary source used for ITS benefit and monetization parameters is the FHWA TOPS-BC tool with information supplemented, as necessary, from the Caltrans Cal-BC analysis tool and similar benefit/cost analyses for ITS projects in California. The Benefit-Cost Analysis was also informed by additional inputs from:

- Port truck data from the Port Traffic Counts and the Traffic Operations Analysis Report prepared for this project;
- Vendor cost estimates for equipment, installation and warranty of individual GoPort Freight ITS projects;

- Statistics on outcomes for past freight-related traveler information deployments and similar projects can be used to estimate benefits, such as time savings and reduced operating costs;
- Turn times for Port-specific trucks, as reported by DrayQ, a mobile application for the intermodal drayage industry, used to calculate potential economic benefits to the freight industry if increased operational efficiency can lead to an increase in turns per day; and
- Valuation of benefits (time, air pollutants, and collisions) from MTC, the transportation planning, financing and coordinating agency for the nine-county San Francisco Bay Area.

Benefit-Cost Assessment Results

Based on the benefit and cost analysis results, the estimated benefit-cost ratios corresponding to each scenario (future horizon years of 2020 and 2035) for the GoPort Freight ITS Project are shown in Table 6. The methodology and calculations that support these results are transparent and repeatable, and are detailed in Appendix D.

Table 6: Benefit-Cost Ratios

Scenario	Benefit-Cost Ratio
Year 2020	10.6 to 1
Year 2035	12.0 to 1

9. QUANTIFIABLE SAFETY, MOBILITY, AND ENVIRONMENTAL BENEFITS

Building on the benefit-cost assessment outlined in Section 8, Table 7 presents the expected benefits for the areas of mobility, safety, and environment.

Table 7: Summary of Key GoPort Freight ITS Benefits by USDOT Focus Area

ATCMTD Benefit	Anticipated Benefits
Mobility	The GoPort Freight ITS App and ITS improvements proposed would drive overall goods movement efficiencies for the private sector through shorter turn times, improved travel times to distribution centers and reduced incident-related delay, achieving annual benefits of 364,000 hours in travel time savings and approximately 245,000 gallons in fuel savings based on 2020 traffic forecasts. 2035 traffic forecasts show 412,000 hours in travel time savings, with 265,000 gallons in fuel savings.
Safety	By reducing congestion and increasing reliability, the GoPort Freight ITS App will enhance safety by lowering the number of primary and secondary incidents by smoothing traffic flow and reducing queue lengths. ITS improvements will result in an estimated savings of $1,244,000 annually from reduced crashes based on 2020 traffic forecasts and $1,347,000 based on 2035 traffic forecasts. Furthermore, these ITS safety improvements will augment the safety improvements that are expected from the broader GoPort Program 7th Street Grade Separation infrastructure improvements.
Environment	The GoPort Freight ITS App and proposed ITS improvements will reduce CO2 emissions by 21.7% based on 2020 traffic forecasts and 22.7% based on 2035 traffic forecasts, equating to $7.1 to $8.0 million saved annually.

It is important to note that the expected environmental benefit of a 21.7-22.7 percent of emission reductions also will directly benefit the ***Quality of Life*** of nearby disadvantaged neighborhoods in Oakland. High levels of truck particulate emissions near neighborhoods, schools, and public facilities is a major issue in parts of the East Bay. For example, the community of West Oakland near the Port, experiences higher than normal asthma rates according to the *East and West Oakland Health Data Existing Cumulative Health Impacts* study.[3]

[3] Alameda County Public Health Department. *East and West Oakland Health Data Existing Cumulative Health Impacts*. September 3, 2015. http://www.acphd.org/media/401560/cumulative-health-impacts-east-west-oakland.pdf.

Also, there are ***Economic Development*** benefits that would occur with a full deployment of the GoPort Freight ITS App in the region. Significant economic returns to the region results from quicker turn times at terminals, improved travel times to distribution centers, and associated cost savings to drivers and operators associated with those direct benefits. By optimizing efficiencies in Port operations, there is a potential to increase the number of turns per day for trucks coming from the Central Valley or local areas, ultimately making the Port more competitive on the global market. Additional annual revenue gained from more turns is estimated to amount to $1.97 million based on 2020 traffic forecasts and $2.13 million based on 2035 traffic forecasts. In an industry where cutting even pennies off of delivery costs can result in high-volume returns on a quarterly scale, the GoPort Freight ITS App and ITS improvements have the potential to make a significant impact on the productivity and competitiveness of the local drayage community and associated industries, as well as the broader economic development of both the project area and the region as a whole. These factors will help the Port to compete more effectively for new customers, thus, increasing jobs and economic activity in the region. There also would be secondary public economic benefits from improved automobile mobility and travel time reliability resulting from more efficient utilization of the freeway and arterial network by trucks.

10. DEPLOYMENT VISION, GOALS, AND OBJECTIVES

This project is an opportunity for Alameda CTC and the Port, in partnership with USDOT, to deploy the first-of-its-kind, fully integrated Freight Community System and advanced ITS which can serve as a model deployment for other port regions throughout the nation. Given the continually increasing volumes of international trade at U.S. ports – and in the face of severely constrained future infrastructure options – the ability to implement new systems that can improve port and truck efficiency and reduce congestion provides for a compelling deployment concept of national significance.

The Freight Community System element is an electronic platform that connects multiple systems operated by freight-related organizations. This GoPort Freight ITS application speaks directly to the NOFO's defined need for a "neutral and open electronic platform, enabling an intelligent and secure exchange of information between public and private stakeholders in order to improve the efficiency and competitiveness positions of the Port communities." This concept includes collection of data from various sources, including both public and private, to establish real-time conditions both inside and outside of the Port. Then, through integration with ITS field elements and ATMS, information can be used for management of freeways, arterials, and Port facilities, as well as coordination between the multiple operating agencies in the Port and around the Port.

Back in Section 1, in the "Project Foundation" subsection, the broader project that the GoPort Freight ITS was derived from, ITST Master Plan (the ITS element of the broader GoPort Program), was described. As presented in Figure 7, the GoPort Program ITST Master Plan outlines the vision that has guided the development of the GoPort Freight ITS that is provided in this grant application.

This vision is centered on an integrated system approach, with the Port's TMC/EOC as the focal point of activity. Data on traffic conditions, incidents, and Port operations will come into the TMC/EOC, and be managed and integrated to provide real-time situational awareness to operators. The effectiveness of the TMC/EOC will be enhanced by other technologies proposed for project deployment, including additional surveillance and detection equipment, integration of databases, provision of detailed freight-

specific information, as well as CMSs. Communication and collaboration with both Port operations entities and regional transportation system operators will expedite verification and, where needed, respond to events. Historical data, for example, can be archived and used to better understand the relationship of incidents occurring on nearby freeways to delays within the Port and implement continuous improvements in Port operations, incident management, and traffic management strategies.

The goals of this vision are focused on improving traffic flow and goods movement, reducing congestion, improving safety, providing improved traveler information, and reducing emissions. The comprehensive list of specific goals (defined as "Long-Term Outcomes") for the GoPort Freight ITS is presented in detail in Table 3 in Section 1.

Figure 7: GoPort Vision of Connectivity and Integration

11. PUBLIC/PRIVATE PARTNERSHIP PLAN

The Alameda County Goods Movement Plan (2016)[4] recommends creating a technology development collaborative that integrates key partners in the public and private sectors to define and deploy transportation technology application opportunities in response to public-sector demonstrations and procurements.

Consistent with this recommendation, the GoPort Freight ITS CAC, which includes the Alameda CTC, Port of Oakland, MTC, City of Oakland, and Caltrans, will form the transportation agency partnership for this program. And similarly, the Port of Oakland's existing PETF will be the key private-sector partnership component of this program.

[4] See: http://www.alamedactc.org/app_pages/view/13783.

With guidance from the Alameda CTC management team, the CAC and PETF involvement will facilitate continuous stakeholder engagement and input, and in particular, will ensure that the deployed system fully meets the needs of both public- and private-sector users. This coordination will also ensure that legal, institutional, and private-sector challenges are identified quickly and addressed; and that they are implemented efficiently and in a way that reflects the goals and objectives of the project. Letters of support from key members of this partnership are included in Appendix B.

12. LEVERAGING REGIONAL TRANSPORTATION TECHNOLOGY INVESTMENTS

Four key regional transportation technology investments that will be leveraged are the Caltrans District 4 TMC, the City of Oakland TMC, the MTC 511 SF Bay traveler information system, and the regional integrated corridor management (ICM) deployments. GoPort Freight ITS connectivity with the Caltrans District 4 TMC will be achieved through redundant C2C communications, and connectivity with the MTC 511 system will be achieved through web services or an application program interface (API) approach.

The system will collect Port traveler conditions and share them with the City of Oakland TMC and Caltrans District 4 TMC. The transportation infrastructure on the I-80, I-580, and I-880 includes a dense deployment of ITS field elements, which enable real-time traffic monitoring and management at the Caltrans District 4 TMC. The TMC is located in Caltrans' District 4 main office in downtown Oakland and is co-staffed by Caltrans Maintenance and Operations workers, CHP officers, and operators for the 511 traveler information system. Using C2C, under agreed-to-conditions and procedures, Port TMC staff will be able to monitor local traffic and adjust Port area signal timing and messaging accordingly.

MTC's 511 SF Bay traveler information system provides a key capability of interest – the ability to share and enhance real time traveler information of specific interest to freight. For example, the 511 system could be expanded to include traveler information for freight (e.g., freight could be a category of services available including information such as incidents on arterials near or within the Port, gate queue times, video feeds from the Port, travel times, parking availability, etc.). Additionally, data and information from the 511 system could be utilized within other new port systems.

Moreover, as illustrated in Figure 8, the potential exists for even more robust connections between the GoPort Freight ITS and MTC's array of operational programs and data resources. Connectivity with some of these systems can enhance future applications for the GoPort Freight ITS.

Figure 8. San Francisco Bay Area Operational Programs and Data Resources

Traveler information posted on 511 San Francisco Bay can be used to enhance the comprehensiveness of the GoPort Freight ITS application. General information, such as contact information for Freeway Service Patrol (FSP), a congestion management program implemented by MTC SAFE, is available on the 511 website. Data feeds for lane closures, road closures, incident locations, and estimated incident clearance times can be utilized in the GoPort Freight ITS app, but also can be used to coordinate operations within the Port's TMC. This type of information can be used to update CMS alerts and inform the Port's ATMS.

The I-880 ICM, I-80 Safety, Mobility, Automated Real-Time Traffic Management System (SMART) Corridor, and Bay Area Express Lane projects are beneficial to closing ITS gaps on major truck routes heading into and out of the Port. To manage traffic that naturally diverts from the freeway due to major incidents on I-880, the I-880 ICM arterial incident management project installed ITS equipment on arterial streets along the I-880 corridor in the cities of San Leandro and Oakland. Project components include trailblazer signs, cameras, detection stations, signal coordination, and communications improvements.[5]

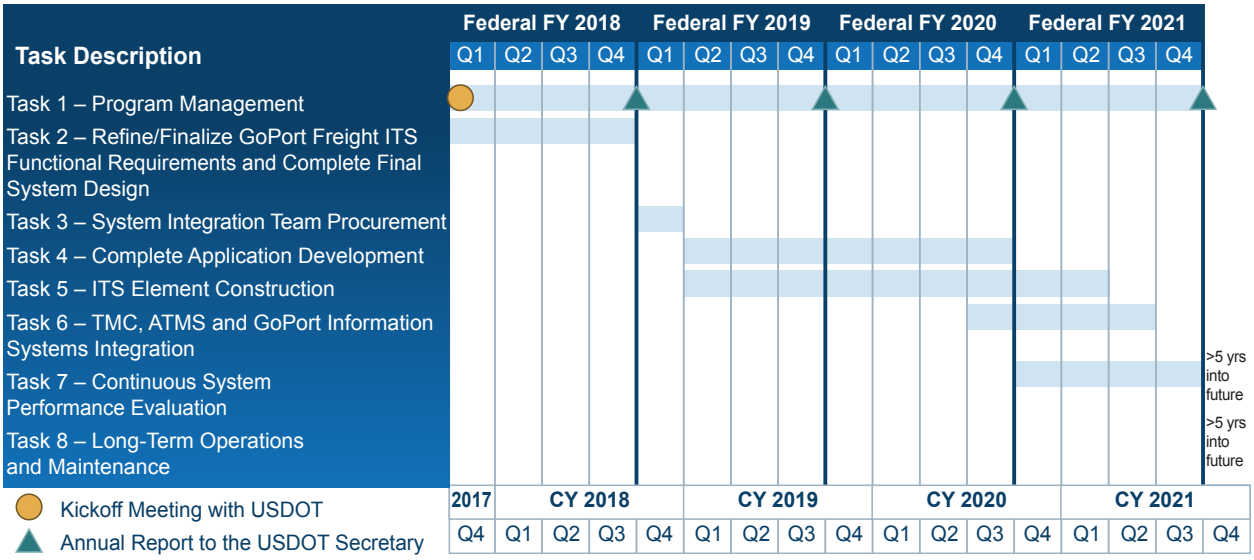
Alameda CTC is aware of the corresponding regional "Innovate 680" ATCMTD grant submittal this year by the Contra Costa Transportation Agency and GoMentum Station, which will be focused on the I-680 corridor in Contra Costa County, centered approximately 15 miles northeast of the Port of Oakland. If USDOT were to award both Innovate 680 and GoPort Freight ITS, the two project teams have discussed potentially sharing information and integrating certain applications. As an example, a Port trucking based in Concord, California, would access both I-680 and the Port road network in their daily operations. Seamless to the truck driver from this company, through information exchange, the GoPort Freight ITS mobile application for truckers could be enhanced to include ATIS information provided in the Innovate I-680 redesigned 511 application, and vice versa.

[5] http://mtc.ca.gov/sites/default/files/I880_ICM_FACT_SHEET_FEB20-2015.pdf.

13. PROJECT SCHEDULE

The proposed GoPort Freight ITS project can be completed within four years from the Notice-to-Proceed. Since the proposed project is an ITS project, it will follow the Systems Engineering process. In addition, the proposed project is categorized as Categorically Exempt from the California Environmental Quality Act and pursuing Categorical Exclusion from the National Environmental Policy Act, eliminating any environmental reviews and approvals. Once the software development is completed and equipment has been purchased, construction of the proposed project can begin. No Right-of-Way (ROW) acquisition is required for this project. The project schedule is provided in Table 8.

Table 8: Project Schedule



14. LEVERAGING USDOT ITS AND TECHNOLOGY PROGRAMS

There are a number of USDOT programs that can be leveraged to support the proposed deployments on this project. Correspondingly, the results of this project can also be used as a model for these USDOT programs. Table 9 shows the relationship of GoPort ITST Master Plan vision elements as discussed in Section 10 – and the associated specific GoPort Freight ITS technology elements – to key USDOT technology, research and other programs.

Table 9: Relationship of GoPort Vision and GoPort Freight ITS Technologies to USDOT Programs

GoPort ITST Master Plan Vision	GoPort Freight ITS Technology Elements	USDOT Programs
GoPort Traveler Information Dissemination	• GoPort information system/app • CMSs	• US Maritime Administration (MARAD) Port Infrastructure Development and Congestion Mitigation • USDOT ITS Joint Programs Office (ITS-JPO) Enterprise Data • ITS-JPO Emerging Capabilities (Private Sector Coordination)
Communications and Collaboration	• Traffic Management Center • Communications (Wi-Fi) • Communications (Fiber) • C2C Communications	• ITS-JPO Interoperability • MARAD Intermodal Transport Networks

GoPort ITST Master Plan Vision	GoPort Freight ITS Technology Elements	USDOT Programs
Observation and Detection	• CCTV upgrade to HD • RFID readers • Supplemental vehicle detection (speed) • Queue detection	• ITS-JPO Accelerating Deployment • USDOT JPO Enterprise Data
Traffic and Incident Management	• Adaptive signal system • Advanced rail grade crossing system • ATMS (includes centrally controlled signal equipment upgrades)	• ITS-JPO Interoperability • Federal Railroad Administration (FRA) Railroad Crossing and Trespass Prevention • MARAD Port Infrastructure Development and Congestion Mitigation
Goods Movement Support Systems & Technology	• WIM • Basic smart parking system	• Federal Motor Carrier Safety Administration (FMCSA) Smart Roadside Program • FMCSA/FHWA SmartPark program

15. PROJECT ORGANIZATION & STAFFING

Figure 9 provides the organizational chart for this project, and is followed by descriptions of each organizational role, and a summary of the proposed staff (including qualifications) for the role. Full resumes for each of these staff are provided in Appendix A. This organizational approach has been developed based on best practices derived from Alameda CTC's history of successfully delivering hundreds of millions of dollars of ITS and operations projects within the San Francisco East Bay region. Unique features of this approach include continuous stakeholder involvement, and use of a project delivery approach where supporting agencies and contractors provide key technology design, implementation and deployment advice to Alameda CTC during project execution.

Figure 9: Project Organizational Structure

Project Director

The Project Director will serve as the responsible charge for Alameda CTC. The Project Director will assure the commitment of the proposed team and support staff, and will be responsible for implementing quality control procedures that will encompass Alameda CTC, Port and contractor activities over the course of the project. The Project Director shall also manage the necessary contractor procurement activities, including Alameda CTC selection of a System Integration Team early in year two of the project. This key position

[redacted]

Project Manager

The Project Manager (PM) is responsible for the day-to-day complete technical management of the design, engineering and deployment of the GoPort Freight ITS. The PM is responsible for managing all contractors involved in deploying GoPort Freight ITS , and is also responsible for overseeing the Port's implementation of GoPort. Additionally, the PM ensures continuous stakeholder engagement through involvement of the PETF and the CAC. [redacted]

Port Implementation Lead

The Port Implementation Lead is responsible for managing and coordinating all necessary Port property coordination, Port staff activities and Port information/technology systems connectivity that will be necessary in deploying the GoPort Freight ITS. [redacted]

[redacted]

ITS Technology Lead

The ITS Technology Lead will serve as the technical lead responsible for directing contractor engineering and deployment activities associated with deploying the advanced ITS elements of the GoPort Freight ITS. [redacted]

Freight Technology Lead

The Freight Technology Lead will serve as the technical lead responsible for directing contractor engineering and deployment activities associated with deploying the freight technology elements of the GoPort Freight ITS. [redacted]

[redacted]

Public-Private Stakeholder Advisory Groups

As detailed in Section 2, the PETF is the Port operational stakeholder group, made up of Port staff, shipping lines, MTOs, trucking fleets, railroads, and labor unions (ILWU). For this project, the PETF will provide guidance and review of key project elements, including GoPort Freight ITS applications and Port ITS deployments. In addition, as also covered in Section 2, Alameda CTC has already convened the public sector CAC collaborative – which brings MTC, Caltrans and the City of Oakland to the table – to guide this project from cradle to grave.

Systems Engineering Team

[redacted]

System Integration Team Procurement

Assuming an October 2017 award, the broader technology system implementation and vendor procurement activity will begin exactly one year later in October 2018, and will take no longer than three months to complete. This will result in the selection of a System Integration Team contractor who will finalize and deploy the integrated system of 14 GoPort Freight ITS project technologies, with completions of all deployments and integration activities by Quarter 4 of Federal Fiscal Year 2020, as outlined previously in the Project Schedule in Table 8. The System Integration Team will include all necessary subcontractors and vendors to deploy all of the 14 technologies.

16. PRIMARY POINT-OF-CONTACT

As the Director of Programming and Project Controls for Alameda CTC, Mr. Vivek Bhat ensures the compliance of grants funded by local, regional, state, and federal funds. He is the primary point of contact for this grant application and compliance if awarded. He will continue supporting the project team for all matters related to grant administration.

Vivek Bhat, P.E.
Director of Programming and Project Controls
Alameda County Transportation Commission
1111 Broadway, Suite 800
Oakland, CA 94607
510-208-7430
VBhat@alamedactc.org

APPENDIX A. RÉSUMÉS

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GoPort!

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APPENDIX B. LETTERS OF SUPPORT

PORT OF OAKLAND

J. Christopher Lytle
Executive Director

June 9, 2017

The Honorable Elaine Chao
Secretary
U.S. Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Secretary Chao:

The Port of Oakland (Port) has partnered with the Alameda County Transportation Commission (Alameda CTC) to respond to a Notice of Funding Opportunity from the U.S. Department of Transportation (USDOT) for the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD). We are pleased to support Alameda CTC in this application on the Port's behalf. This grant application requests funding for the final design and full implementation of various Intelligent Transportation System (ITS) initiatives that are to be used in the Port's Seaport Area for the improvement of maritime and freight operations.

The Port of Oakland is the preeminent container port located in the San Francisco Bay region and handles 99% of Northern California's containerized ocean freight goods movement. We have a strong interest in the development of freight technologies and ITS applications to support the improvement of efficiencies at the Port of Oakland and throughout the goods movement supply chain, which connects to the entire country.

If grant funds are awarded for these initiatives, the Port is committed to the operations and maintenance costs associated with the implementation of these projects subject to the terms and conditions of the Resolution the Port's Board approved regarding this matter on June 8, 2017. The Port supports Alameda CTC's bid to deploy ITS-related projects in order to enhance user efficiencies and the overall transportation management system at the Port. We greatly appreciate your full consideration and support for this grant initiative.

Sincerely,

J. Christopher Lytle
Executive Director

530 Water Street ■ Jack London Square ■ P.O. Box 2064 ■ Oakland, California 94604-2064
Telephone: (510) 627-1100 ■ Facsimile: (510) 627-1826 ■ Web page: www.portofoakland.com

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
P.O. BOX 23660, MS–1A
OAKLAND, CA 94623-0660
PHONE (510) 286-5900
FAX (510) 286-5903
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

June 9, 2017

Mr. Arthur L. Dao
Executive Director
Alameda County Transportation Commission
1111 Broadway, Suite 800
Oakland, CA 94607

Dear Mr. Dao:

The California Department of Transportation (Department) supports the application submitted by the Alameda County Transportation Commission (Alameda CTC) for the United States Department of Transportation's (USDOT) Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Initiative for the Global Opportunities at the Port of Oakland (GoPort) Freight Intelligent Transportation System Project.

This project will deploy Intelligent Transportation System (ITS) and freight management technologies to help reduce truck congestion and improve access at the Port of Oakland, the fifth busiest container shipping port in the United States. The project addresses the ATCMTD technology areas of Freight Community Systems, Advanced Traveler Information Systems, and Advanced Transportation Management Technologies. The estimated project cost is $25 million, and the ATCMTD grant request is $10 million.

The Department has an interest in the development of freight technologies and ITS applications to support improved efficiencies in goods movement at the Port of Oakland, the greater San Francisco Bay Area, and throughout the State of California. The GoPort Freight Intelligent Transportation System Project is of great national and regional significance, and highly recommended for ATCMTD Initiative consideration.

Sincerely,

BIJAN SARTIPI
District Director

c: Chwen Siripocanont, Alameda County Transportation Commission

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

City of
Oakland

DALZIEL BUILDING • 250 FRANK H. OGAWA PLAZA • SUITE 4344 • OAKLAND, CALIFORNIA 94612-2033

Oakland Department of Transportation

(510) 238-3466
FAX (510) 238-7415
TDD (510) 238-3254

June 8, 2017

Arthur L. Dao
Executive Director
Alameda County Transportation Commission
1111 Broadway, Suite 800
Oakland, CA 94607

Subject: City of Oakland Support for the GoPort Freight ITS System

Dear Mr. Dao:

We are providing this letter of support for the Alameda County Transportation Commission's proposal for the 2017 Notice of Funding Opportunity from the U.S. Department of Transportation (USDOT) under the Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) initiative for the final design and full implementation of the Global Opportunities at the Port of Oakland Freight Intelligent Transportation System (GoPort Freight ITS).

As you know, the City of Oakland is the location for the freight and distribution network for the Port of Oakland, which is the key operator in the movement of good throughout the entire East Bay, Central Valley, and the extended transportation distribution network to the South Bay/ Silicon Valley of California. Oakland participates in the planning, installation, maintenance and operation of the intelligent transportation system (ITS) of the City of Oakland and its interface with the Port of Oakland ITS. Together, when both ITS systems are fully developed, an innovative, efficient, and interconnected system will provide a significant reduction in the congestion that results from the movement of freights, trucks and containers within these areas.

Oakland Department of Transportation June 8, 2017

Subject: City of Oakland Support for the GoPort Freight ITS Page 2

Oakland has a strong interest in the development of freight technologies and ITS applications that can support greater efficiencies in goods movement at the Port of Oakland. The City supports Alameda CTC's bid to deploy the GoPort Freight ITS, and stands ready to assist Alameda CTC and USDOT in steering the project and in providing access to relevant agency personnel and data sources, as appropriate.

Sincerely,

Ryan Russo

Director
Oakland Department of Transportation

June 12, 2017

The Honorable Elaine Chao
Secretary
U.S. Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Secretary Chao,

Contra Costa Transportation Authority (CCTA), Metropolitan Transportation Commission (MTC) and California Department of Transportation (Caltrans) support the 2017 Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) submitted by the Alameda County Transportation Commission (Alameda CTC) and the Port of Oakland to fund implementation of the GoPort ITS system at the Port of Oakland.

The Port of Oakland is a critical economic engine in the Bay Area and Northern California with goods movement related industries supporting over a third of all jobs in the region. We support the development of freight technologies and ITS applications to improve efficiencies in goods movement at the Port of Oakland and throughout the San Francisco Bay Area. The safe and efficient flow of freight to and from the Port of Oakland is critical to ensuring the continued health and diversity of the region's economy.

Through our 2017 ATCMTD grant application for *Innovate 680*, advanced technologies will be integrated and deployed improving mobility, reliability, safety, and efficiency within the I-680 corridor. *Innovate 680* will improve interregional good movements and freight traffic to and from the Port of Oakland. The GoPort project will provide regional benefits through improvement to the freight traveler information systems providing benefit to traffic flow in the region. The goals of *Innovate 680* and GoPort initiatives will advance regional mobility, goods movement, and economic vitality in the Bay Area.

We look forward to this project's success and expect to see it serve as a model for additional deployments that can address mobility and goods movement in California and throughout the United States. Thank you in advance for your consideration of this application. If you have any questions, or require additional information, please do not hesitate to contact us.

Steve Heminger	Randell H. Iwasaki	Bijan Sartipi
Executive Director	Executive Director	District 4 Director
MTC	CCTA	Caltrans

SSATerminals
1795 Middle Harbor Road
Oakland, CA 94602

June 5, 2017

Arthur L. Dao
Executive Director
Alameda County Transportation Commission
1111 Broadway, Suite 800
Oakland, CA 94607

Dear Mr. Dao:

I understand that the Alameda County Transportation Commission (Alameda CTC) is responding to a Notice of Funding Opportunity from the U.S. Department of Transportation (USDOT) and will be applying for a grant from the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD) program on behalf of the Port of Oakland (Port). Further, I understand that the application requests funding for the final design and full implementation of various Intelligent Transportation System (ITS) initiatives for utilization in the Port's Maritime Area.

SSA Terminal Oakland currently operates the largest stevedoring terminal in the Port of Oakland with 70% of the throughput, averaging 4,500 – 5,000 gate moves daily. We have a strong interest in the development and promotion of the Port's ITS technology-based improvements which will also be leveraged by other members of the supply chain resulting in optimization of goods movement through the Port and beyond.

SSA Terminal Oakland supports Alameda CTC's bid to deploy ITS-related projects in order to enhance user efficiencies and experience at the Port. If Alameda CTC is successful in obtaining funding from the USDOT, we look forward to the potential opportunity to participate in ITS system testing and deployment where practicable.

Sincerely,

Jim Rice

Jim Rice
General Manager
SSAT Oakland

PORT OF OAKLAND
SEAPORT

June 9, 2017

Arthur L. Dao
Executive Director
Alameda County Transportation Commission
1111 Broadway, Suite 800
Oakland, CA 94607

Dear Mr. Dao:

We understand that the Alameda County Transportation Commission (Alameda CTC) is responding to a Notice of Funding Opportunity from the U.S. Department of Transportation (USDOT) and will be applying for a grant from the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD) program on behalf of the Port of Oakland (Port). Further, we understand that the application requests funding for the final design and full implementation of various Intelligent Transportation System (ITS) initiatives for utilization in the Port's Maritime Area.

The Port of Oakland's Port Efficiency Task Force, including the members signed below, is a multi-industry group formed to evaluate and recommend solutions to improve cargo flow through the Oakland gateway. The Task Force first convened in August 2015, meets quarterly, and is comprised of Cargo Owners, Third Party Logistics Companies (3PL's), Motor Carriers, Ocean Carriers, Rail Carriers, Labor, Marine Terminal Operators, Chassis Providers and representatives from the Port of Oakland. We have a strong interest in the development and promotion of the Port's ITS technology-based improvements, which will also be leveraged by other members of the supply chain resulting in optimization of goods movement through the Port and beyond.

We support Alameda CTC's bid to deploy ITS-related projects in order to enhance user efficiencies and experience at the Port. If Alameda CTC is successful in obtaining funding from the USDOT, we look forward to the potential opportunity to participate in ITS system testing and deployment where practicable.

Sincerely,

Port Efficiency Task Force Members

Port of Oakland
John Driscoll, Director of Maritime
530 Water Street
Oakland, CA 94607

California Trucking Association
4148 E. Commerce Way
Sacramento, CA 95834

Devine Intermodal
Richard R. Coyle, President
3870 Channel Drive
West Sacramento, CA 95691

GSC Logistics
Scott Taylor, CEO & President
530 Water Street, 5th Floor
Oakland, CA 94607

Impact Transportation, LLC
Ron Cancilla, Partner
2498 West 19th Street, Oakland, CA 94607
Impact Transportation

Rodgers Trucking Company
Alan Osofsky
PO Box 923
San Leandro, CA 94577-0445

Walgreen Company
Karl Waldschmidt, Import Operations & Admin
304 Wilmot Road, MS #3163, Deerfield, IL 60015
Walgreen

APPENDIX C. RISK MANAGEMENT PLAN

APPENDIX C. RISK MANAGEMENT PLAN

The GoPort Freight ITS Engineering Team already has assessed project risks, and has developed approaches to mitigate those risks. An initial set of potential technical, organizational, schedule, and cost risks, along with corresponding risk mitigation strategies, are identified in Table C-1. New risks identified during the project delivery will be updated in a formal Risk Register and addressed proactively during the life of the project.

Table C-1: Project Risks and Mitigation Strategies

Category	Risk Identification	Risk Level	Risk Mitigation
Technical	The first-of-its kind integration of a freight community system with a port ITS	Med	The development of sound system requirements for software and applications. Needs based development of requirements. Early coordination between developers. Close agency coordination to develop procedures for C2C communication access/protocols.
Organiza-tional	Concerns regarding participation of trucking companies.	Low	Continue to involve the extensive trucking industry stakeholder groups that were involved in the ConOps development, as well as continually involving the Port's PETF.
Schedule	Period identified for design is short in duration.	Low	The ConOps is complete and the preliminary design effort has already begun. The Systems Engineering Team will not change and is already under contract – no "learning curve."
Cost	Cost estimates may change as the design is further refined between now and award.	Med	Proposed deployments can be refined to allow a tiered phasing of deployment – prioritizing more critical infrastructure and needs first.

A key feature of this initial risk assessment is that Schedule Risk has been rated "low." As described in Section 1, the overall technical planning effort that has preceded the development of this grant application represents a two-year, nearly $2 million intensive technical effort that the Alameda CTC has implemented to achieve the level of technical maturity of the GoPort Freight ITS that this grant application illustrates. Additionally, the Systems Engineering Team is already under contract. Therefore, Alameda CTC, the Port and the Systems Engineering Team will be ready to immediately begin this project, in partnership with USDOT, on October 1, 2017.

For the cost category, the level of "medium" risk has been mitigated by the planned phased deployment on the 14 technology applications across years two through four. For the technical risk category, in which risk is also rated as "medium," although this is a first-of-its-kind type of system, the elements of the system are mature ITS and information technologies, and the deployment will be guided by the multi-agency CAC, which will ensure inter-agency coordination to support implementation.

Organizational risks in terms of trucking industry support are rated "low," as the GoPort ITST Master Plan process has developed a Concept of Operations that is fully traceable to user requirements of trucking companies (dispatchers and drivers), and during the final design phase in year one of this project, the Systems Engineering Team will continue to involve trucking users and the PETF private sector advisory group – further assuring that this project will deploy applications that will be successfully utilized by trucking companies in their daily operations.

APPENDIX D. BENEFIT-COST ANALYSIS

APPENDIX D. BENEFIT-COST ANALYSIS

BACKGROUND

The Alameda CTC GoPort Freight ITS Implementation Plan consisting of 14 carefully integrated technology deployments, centered on advanced ITS and freight-centric information exchange among Port operators and users is planned for the Port of Oakland to help improve Port operational efficiencies. The 14 technology deployments can be categorized into the following key ITS strategies:

- GoPort traveler information dissemination.
- Communications and collaboration.
- Observation and detection.
- Traffic and incident management.
- Goods movement support system and technology.

BENEFIT ANALYSIS

Benefits for the GoPort Freight ITS were estimated using:

1. Port truck data from the Port Traffic Counts and the Traffic Operations Analysis Report prepared for this project;
2. Statistics on outcomes for past freight-related traveler information deployments and similar projects can be used to estimate benefits, such as time savings and reduced operating costs[6];
3. Turn times for Port of Oakland-specific trucks, as reported by DrayQ[7], a mobile application for the intermodal drayage industry, used to calculate potential economic benefits to the freight industry if increased operational efficiency can lead to an increase in turns per day; and
4. Valuation of benefits (time, crashes, non-fuel operating costs, and air pollutants) from Draft Plan Bay Area 2040.[8]

The annual estimated benefit associated with the GoPort Freight ITS Project over the life of the project is $24.71 million for a discount rate of 7% using 2020 traffic forecasts, and $27.91 million for a discount rate of 7% using 2035 traffic forecasts. Detailed results are shown in Table D-1.

---

6 Cambridge Systematics. *Caltrans District 12 ITS Master Plan Final Report.* Caltrans District 12, March 2015.
7 http://www.drayq.com (accessed 5-18-17).
8 http://mtc.ca.gov/our-work/plans-projects/plan-bay-area-2040.

Table D-1: Overall Estimated Benefits for GoPort Freight ITS Over Project Life

Benefit Category	Year 2020 Quantitative benefit	Year 2020 Monetized Benefit (7% discount rate)	Year 2035 Quantitative benefit	Year 2035 Monetized Benefit (7% discount rate)
Time Savings	364,000 hours	$13,707,000	412,000 hours	$15,638,000
Fuel Savings	245,000 gallons	$735,000	265,000 gallons	$796,000
Safety		$1,244,000		$1,347,000
Emissions Reductions	71,000 tons	$7,058,000	80,000 tons	$7,994,000
Economic Benefits	6,300 turns	$1,966,000	6,800 turns	$2,130,000
Total		$24,710,000		$27,905,000

The following additional considerations and notes apply to the above estimated benefits:

- One work-year is assumed to span 250 analysis days, spread evenly across all 12 months.
- Non-transport-related benefits are not included (e.g., lower fleet size requirements, reduced administrative costs, improved shipment integrity, improved service quality, reduced inventory costs, reduced safety stock costs, additional profit from increased number of orders processed).

COST ANALYSIS

Costs for this deployment of the GoPort Freight ITS Project were estimated using data from:

- Vendor cost estimates for equipment, installation and warranty of individual GoPort Freight ITS projects.
- The Los Angeles Gateway Cities FRATIS Pilot.
- Caltrans District 12 ITS Master Plan.[9]
- TOPS-BC nationwide average costs.[10]

The full programmatic costs associated with the GoPort Freight ITS Project is $24,291,369, which includes PS&E; procurement, construction and integration; construction management; and agency costs. The overall estimated annual cost over a 20 year analysis time horizon is approximately $2.32 million for a discount rate of 7%. Cost breakdown per project element is detailed in Table D-2.

[9] Cambridge Systematics. *Caltrans District 12 ITS Master Plan Final Report.* Caltrans District 12, March 2015.
[10] https://ops.fhwa.dot.gov/plan4ops/topsbctool/ (accessed 5-18-17).

Table D-2: Cost Estimates for GoPort Freight ITS Project Elements

ITS Strategy Category	Project Elements	Full Programmatic Costs	Annual O&M Costs	Average Annual Costs Over 20 Years[1]
GoPort Traveler Information Dissemination	GoPort information system/app	$1,334,550	$105,000	$379,541
	CMSs	$2,493,061	$8,000	
Communications and Collaboration	Traffic Management Center	$1,152,995	$325,000	$736,970
	Communications (Wi-Fi)	$1,775,863	$100,000	
	Communications (Fiber)	$3,571,637	$5,000	
	C2C communication	$635,500	$10,000	
Observation and Detection	CCTV upgrade to HD	$3,028,744	$10,000	$635,046
	RFID readers	$1,306,969	$10,000	
	Queue detection	$661,500	$5,000	
	Supplemental vehicle detection (speed)	$953,250	$15,000	
Traffic and Incident Management	Adaptive signal system	$1,334,550	$15,000	$404,098
	Rail grade crossing system	$529,200	$9,000	
	ATMS (includes centrally controlled signal equipment)	$2,669,100	$20,000	
Goods Movement Support Systems and Technology	WIM	$1,653,750	$20,000	$168,838
	Basic smart parking system	$1,190,700	$20,000	
Total		$24,291,369	$677,000	$2,324,493

[1] 20 years indicates the analysis time horizon. The beginning year of analysis was set to 2016.

BENEFIT-COST SPREADSHEET

The detailed Excel Worksheet that contains the benefit-cost estimated calculations provided above can be provided to FHWA by Alameda CTC upon request.

APPENDIX E. GOPORT PROGRAM SUMMARY SHEET

APPENDIX E. GOPORT PROGRAM SUMMARY SHEET

Global Opportunities at the Port of Oakland (GoPort)

JUNE 2017

PROJECT OVERVIEW

GoPort is a program of projects to improve truck and rail access to the Port of Oakland, one of the nation's most vital seaports. It consists of three components:

- **7th Street Grade Separation (West Segment):** Replace the existing triangle area (Maritime Street, 7th Street, and Navy Road) with an elevated intersection at 7th Street and Maritime Street to improve the access and minimize conflicts between rail, vehicles, pedestrians and bicyclists.
- **7th Street Grade Separation (East Segment):** Reconstruct existing railroad underpass between I-880 and Maritime Street to increase clearance for trucks and improve shared pedestrian/ bicycle pathway.
- **Intelligent Transportation Systems (ITS) and Technology Master Plan:** Apply ITS, signal systems along W. Grand Avenue, Maritime Street, 7th Street, and Middle Harbor Road, and other technologies to cost-effectively manage truck arrivals and improve incident response.

PROJECT NEED

- The Port of Oakland (Port) is one of the top 10 busiest container ports in the U.S., handling 99% of regional containerized goods in Northern California.
- The Port has capacity to support increased freight demands, but severe landside access inefficiencies constrain growth potential.
- Significant traffic congestion occurs within the Port, particularly along Maritime Street, 7th Street, and Middle Harbor Road, due to substantial gate downtime required for train crossings at major intersections. Truck queues can take more than 45 minutes to clear.
- Lengthy queues on the streets with as many as 50 trucks have wait times of up to three hours to enter into marine terminals.
- Idling trucks in long queues cause growing local and regional concerns regarding air quality and greenhouse gas emissions.
- There is limited multimodal access to commercial developments and recreational facilities adjacent to the San Francisco Bay.

PROJECT BENEFITS

- **Congestion relief:** Upgrade technology and infrastructure to improve truck travel and street wait time, reduce traffic congestion and reduce truck vehicle miles traveled
- **Efficiency:** Improve Port and Rail Yard efficiencies, intermodal yard connectivity, and expand near-dock use of rail and intermodal facilities
- **Sustainability:** Reconstruct Bay Trail segment on 7th Street, and reduce emissions/ carbon footprint
- **Economic stimulation:** Reduce shipping costs, improve Port competitiveness and create jobs

CAPITAL PROJECT FACT SHEET

PN: 1442000

GLOBAL OPPORTUNITIES AT THE PORT OF OAKLAND (GOPORT)

Maritime Street at-grade rail crossing south of 7th Street, March 2016.

Aerial view of the Port of Oakland, March 2016.

COST ESTIMATE BY PHASE ($ X 1,000)

PE/Environmental	$ 15,000
Final Design (PS&E)	$ 41,000
Right-of-Way	$ 25,000
Utility Relocation	52,000
Construction	$ 361,000
Total Expenditures Estimate	**$ 494,000**

Note: Estimate basis in 2016 dollars.

FUNDING SOURCES ($ X 1,000)

Measure BB	$ 33,000
Measure B	$ 0
State	$ 0
TBD	$ 461,000
Total Revenues To Date	**$ 494,000**

STATUS

Implementing Agency: Alameda CTC

Current Phase: Environmental

- $33 million has been allocated from the Measure BB funds for the environmental and partial final design phase of the project.
- Environmental clearance for California Environmental Quality Act (CEQA) by June 2017. The project is currently pursuing a Categorical Exclusion (CE) as part of the National Environmental Policy Act (NEPA) clearance.

PARTNERS AND STAKEHOLDERS

Port of Oakland, California Department of Transportation, City of Oakland, Union Pacific Railroad, BNSF Railway, San Francisco Bay Area Rapid Transit, Metropolitan Transportation Commission and several utility entities.

SCHEDULE BY PHASE

	Begin	End
PE/Environmental	Fall 2016	2018
CEQA Clearance	Fall 2016	June 2017
NEPA Clearance	TBD	TBD
Final Design	Summer 2017[1]	Summer 2019
Construction	Summer 2020[2]	TBD

[1] All segments begin at this time except for the East segment, which begins in winter 2018.

[2] All segments begin summer 2020 except for the ITS, which begins in summer 2018 and West: Utility Relocation, which begins in summer 2019.

Note: Information on this fact sheet is subject to periodic updates.

APPENDIX F: LIST OF ACRONYMS

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Term	Definition
AASHTO	American Association of State Highway and Transportation Officials
Alameda CTC	Alameda County Transportation Commission
API	Application program interface
App	Application
ATCMTD	Advanced Transportation and Congestion Management Technologies Deployment
ATIS	Advanced Traveler Information Systems
ATMS	Advanced transportation management system
BCO	Beneficial cargo owner
C2C	Center-to-center
CAC	Concept of Operations Advisory Committee
Caltrans	California Department of Transportation
CB	Citizens Band
CCTV	Closed circuit television
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CMA	Congestion management agency
CMAQ	Congestion Mitigation Air Quality Program
CMS	Changeable message sign (may also be referred as dynamic message signs)
ConOps	Concept of Operations
DHS	Department of Homeland Security
DSRC	Dedicated short-range communication
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
FIRST	Freight Information Real-Time System for Transport
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FRATIS	Freight Advanced Traveler Information System
FSP	Freeway Service Patrol
GHG	Greenhouse gases
GIS	Geospatial Information System
GoPort Freight ITS	Global Opportunities at the Port of Oakland Freight Intelligent Transportation System
HD	High definition
I-	Interstate
ICM	Integrated corridor management (or for I-80 ICM, integrated corridor mobility)
IEEE	Institute of Electrical & Electronics Engineers
ILWU	International Longshore and Warehouse Union
ITS	Intelligent Transportation Systems
ITST	Intelligent Transportation System and Technologies

Term	Definition
JPO	Joint Program Office
MARAD	United States Maritime Administration
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MTC SAFE	Metropolitan Transportation Commission Service Authority for Freeways and Expressways
MTO	Marine Terminal Operator
NHFN	National Highway Freight Network
NOFO	Notice of Funding Opportunity
NVOCC	Non-vessel operating common carrier
O&M	Operations and maintenance
PETF	Port Efficiency Task Force
PHFS	Primary Highway Freight System
PM	Project Manager
Port	Port of Oakland
PS&E	Plans, specifications, and estimates
RFID	Radio-Frequency Identification
ROW	Right-Of-Way
SEP	System Engineering Plan
SMART	Safety, Mobility and Automated Real-Time Traffic Management
SOP	Standard operating procedure
SR	State Route
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
TCFA	Transportation Fund for Clean Air Program
TEU	Twenty-foot-equivalent unit
TMC	Traffic management center
TOPS-BC	Tool for Operational Benefit / Cost
TOS	Traffic Operations System
TRB	Transportation Research Board
TWIC	Transportation Worker Identification Credential
UPRR (or UP)	Union Pacific Railroad
USCG	United States Coast Guard
USDOT	United States Department of Transportation
WiFi	Wireless fidelity
WIM	Weigh-In-Motion