GATEWAY CITIES
TECHNOLOGY PLAN
FOR GOODS MOVEMENT

Concept of Operations

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List of Resource Materials

This Concept of Operations is intended to give a comprehensive view of the recommended program. For individuals looking for greater detail on each project or the research findings that led up to the Concept of Operations, please refer to the following resources:

- Gateway Cities Goods Movement User Needs and Project Benefits, 2012 (Appendix A);
- Gateway Cities ITS Integration Plan for Goods Movement, 2008 (Appendix C);
- Gateway Cities Final Conceptual Goods Movement Project Descriptions Report, 2012 (Appendix D); and

Additionally, the following reports supported the content of this Concept of Operations.

- FRATIS Concept Information for FHWA, 2012 (Appendix E); and
1.0 The Program Overview

**Background**

The Port of Los Angeles and the adjoining Port of Long Beach were established in the early 1900s and are now the largest and second largest ports in the United States, with a combined cargo value of $293 billion in 2010. Together, they provide a vital link between the U.S. and its trading partners in Asia and the rest of the world. The cargo volumes at these ports, which are primarily containers, are projected to double or triple in the next 25 years. An increase in cargo volumes of this magnitude would result in a corresponding increase in the amount of freight hauled by trucks on the Gateway Cities roadway network. There would also be a significant increase in rail operations serving the ports. The growth at the ports would also result in increased terminal activities (more ships and container moves) and the need for additional rail yards and warehouses/distribution centers. The outcome would likely be additional traffic congestion, air pollution, noise, and freight delays that could adversely affect the environment, commerce, and quality of life in the Gateway Cities subregion, as well as the economic competitiveness of the Ports and intermodal freight industries, if the increased container moves cannot be handled (or moved) as efficiently as possible.

There are several initiatives underway to mitigate the effects of the increasing cargo volumes, including proposed infrastructure improvements. One of the most significant initiatives is the expansion of the I-710 freeway, which is the major truck route serving the two ports, to include new freight-only lanes. Initiatives are also being implemented to limit the environmental impact of growth in freight traffic. Two examples are California SB 375 regulations to restrict greenhouse gas (GHG) emissions and the Air Quality Management District’s (AQMD) restrictions on terminal queue idling.
To supplement these initiatives, the Los Angeles County Metropolitan Transportation Authority (Metro), Gateway Cities Council of Governments (GCCOG), and Federal Highway Administration (FHWA) have an opportunity to also improve goods movement and container movement efficiency and reduce congestion with the implementation of a relatively low-cost Intelligent Transportation System (ITS) technology program to improve freight-focused traffic information in the Gateway Cities subregion.

The initial work and analyses to evaluate the potential to use ITS to improve goods movement was completed in 2008. That effort was a joint effort of Caltrans, Gateway Cities and FHWA. It was also developed with input from an ITS Working Group of interested stakeholders. That effort resulted in the identification of 14 potential discrete ITS technology projects as follows:

1. Freeway Detection Infrastructure;
2. Arterial Infrastructure;
3. Arterial Travel Times;
4. Queue Detection and Terminal Turn Times;
5. Goods Movement Transportation Management;
6. Truck Fleet Communications Program;
7. Comprehensive Performance Monitoring System;
8. Existing Sources – Truck Fleet Data Collection and Agreements;
9. Port Reverse 911 Emergency Notification Call System;
10. Comprehensive Goods Movement Scheduling System (Container Tracking);
11. Truck Parking Coordination;
12. Vehicle Enforcement Strategies, Systems and Sites Study;
13. Congestion Pricing Initiatives; and

It further identified the need to prepare a future concept of operations to bring all these individual technology projects
together and a business plan. Appendix B contains a CD of that report and effort.

After completion of the initial ITS Integration plan, funding was obtained to proceed with a Goods Movement Technology Plan, expanding on the results of the ITS Integration Plan. This effort was begun in 2010. That effort was also developed with input from an expanded ITS Working Group. It resulted in a revised list of 13 individual technology projects as follows:

1. Freeway Information and Data;

2. Key Arterial Information and Data;

3. Terminal Queue Information and Data;

4. Goods Movement Transportation Management;

5. Truck Travel Information Integration;

6. Comprehensive Performance Monitoring Program;

7. Drayage Operations ITS;

8. Private Sector Fleet Management Information and Dynamic Mobility Applications;

9. Opportunities and Integration with Emerging Federal Programs;

10. I-710 Future Technology Infrastructure;

11. Advanced Fleet Platooning Concepts;

12. Truck Enforcement Strategies, Systems and Sites Study; and

13. Truck Parking Coordination.

The above list refines the original list of projects and provided new direction for next or subsequent steps.

The result of this refined list of technology projects is a recommended program of projects that draws on the latest innovations in traveler information and leverages wisdom gained from successful projects implemented across the U.S., where technologies were used to reduce traffic congestion and help move goods more efficiently. The goal of the Gateway Cities Technology Plan for Goods Movement is to integrate these technologies into a system to improve goods movement in the Gateway Cities subregion and throughout Southern California.
Each of the 13 final set of individual technology projects is included in the final report entitled “Final Conceptual Goods Movement Technology Projects Descriptions, Cambridge Systematics, Inc., 2012”. A CD of this report is included in Appendix C.

This Concept of Operations (ConOps) is the next step of that process. The identification and planning of the projects in the ConOps came through extensive research conducted by the project team with the ITS Working Group, Vendor Showcases highlighting the latest technology innovations, and meetings with key stakeholders in the region. Additional reports documenting the findings of these tasks are available that provide background research, a summary of user needs, and conceptual descriptions of the selected projects. A list of the resource material used to prepare this concept of operations is shown in the Table of Contents. The ultimate purpose of the previous studies, the resource material and the concept of operations is to provide “real-time” information (traveler or other freight focused information or data) in a timely and useful fashion to both private logistics companies and public agencies to make goods movement more efficient. Providing for the efficient transfer of useful real time information is the key objective of this Concept of Operations.

This report is the Concept of Operations for the projects and the recommended approaches. Typically, a Concept of Operations provides a view of how the projects are anticipated to operate and how the system meets user needs. Due to the unique nature of this project, this Concept of Operations describes a strategic program comprised of a number of discrete technology projects. More specifically, this Concept of Operations provides an overview (or outline) of how to integrate the individual technology projects of the Gateway Cities Technology Plan for Goods Movement to enhance the freight community’s operational efficiency and provide the needed real-time freight focused traveler information. However, it should be noted that the individual projects will be designed to operate independently or in phases as the program is implemented over time.

The document concludes with several scenarios that illustrate how various stakeholders would use the solutions of this effort to achieve the goals and objectives of the overall project. If supported by the ITS Working Group and the logistics community, Gateway Cities (in partnership with Metro, Caltrans, and FHWA) will continue to develop more detail and provide engineering working toward implementation of an initial set of technology projects. However, Gateway Cities is not in the logistics business and will not implement these technology
projects. This Concept of Operation (and subsequent Business Plan) establishes a framework for the logistics industry, with the support of federal, state and local government agencies, to use transportation technology to make goods movement more efficient. The ultimate implementation of the Concept of Operations (and subsequent Business Plan) will be the responsibility of the public and private sector members of the ITS Working Group, not Gateway Cities. Suggestions for implementation strategies will be outlined in the Business Plan for consideration of the ITS Working Groups.

### General Description of the Program

From the 13 individual technology projects described in detail in Appendix C, the Gateway Cities Technology Plan for Goods Movement Project has identified seven unique yet interrelated projects to initially improve the efficiency of goods movement in the Gateway Cities subregion:

1. Freight Transportation Information System and Data Fusion;
2. Freight Traveler Information Dissemination;
3. Arterial Smart Corridors for Freight;
4. Freeway Smart Corridors for Freight- Complete Freeway ITS Deployment;
5. Container Moves Productivity Improvements;
6. Automated Truck Research Project (I-710 Technology Plan);
and
7. Truck Enforcement Network System.

These are graphically represented in Figure 1: Technology Project Conceptual Diagram on the following page. It is felt that these initial seven technology projects fused as shown in Figure 1 will provide most of the information needed to achieve the initial goals and objectives established by the ITS Working Group. The Business Plan will establish incremental steps to implement the technology projects and the program shown in Figure 1.
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Drayage dispatchers will have access to freight-focused traveler information resources.

Freight Traveler Info Dissemination

Automated Truck Research

Radio traffic reporters will have access to more accurate information than ever before.

Freight TIS and Data Warehouse

Third party vendors can use the data from the data warehouse to create apps for their customers.

Freight Traveler Information Dissemination

Freeway Smart Corridors

Cargo Truck Enforcement Network System

An enhanced enforcement network creates a safer environment.

Arterial Smart Corridors

Planning can use the data archived in the data warehouse to better plan for goods movement.

Freeway Smart Corridors

Navagation and traffic data vendors will have access to more accurate and timely information.

Freight TIS and Data Warehouse

Drayage drivers will know of traffic conditions at the port before they start their trip via 511 in both English and Spanish.

Arterial Smart Corridors

Third party vendors can use the data from the data warehouse to create apps for their customers.

Freight Traveler Information Dissemination

Drayage drivers will know of traffic conditions at the port before they start their trip via 511 in both English and Spanish.

Freeway Smart Corridors

Navagation and traffic data vendors will have access to more accurate and timely information.

Freight TIS and Data Warehouse

An enhanced enforcement network creates a safer environment.

Arterial Smart Corridors

Planning can use the data archived in the data warehouse to better plan for goods movement.

Freeway Smart Corridors

Navigation and traffic data vendors will have access to more accurate and timely information.
See the Gateway Cities Technology Plan for Goods Movement Final Conceptual Project Descriptions report for detailed information on each of the seven projects (CD in Appendix C).

These projects will develop new technology systems, improve existing systems, and add ITS infrastructure in the region to specifically improve the efficiency of goods movement in the port areas, reduce traffic congestion, reduce air pollution, and improve the quality of life in the Gateway Cities subregion.

**Freight Traveler Information Dissemination**

The Gateway Cities Technology Plan for Goods Movement will enhance the public sector’s capacity to support the latest technology developments designed to broadly and safely share real-time traveler information across all modes of transportation, as well as goods movement processes. Local and state transportation agencies are the largest providers of accurate, real-time, comprehensive traveler information. Shippers and carriers benefit greatly from traveler information provided by these public entities, and frequently repackage and share this information through fleet management applications and the media. By filling in the gaps in traveler information and improving the reliability and timeliness of the data, including new sources of data particularly useful to the freight movement community, the public sector can work hand-in-hand with shippers and carriers towards the common goal of a safer, more efficient Gateway Cities freight community.

**Container Moves Productivity Improvements**

For example, in transporting goods to and from the ports, freight and drayage drivers contend with delays at the terminals caused by traffic congestion, long queue lines and closures. A *Goods Movement Efficiency Committee* composed of industry stakeholders was created as part of this project and is suggested to continue to guide and facilitate efforts to address these issues and identify solutions to improve the efficiency of the container handoff process at the ports. This Committee could expanded to add private companies that participate in the ITS projects.

Enhanced coordination between the marine terminal operators (MTO), rail companies, beneficial cargo owners (BCOs) and drayage operators and their dispatchers is one of the solutions. As traffic congestion incidents are identified, information and alternate routing could be distributed quickly and efficiently to all affected individuals allowing them to adjust their plans and minimize schedule disruptions.
A centralized and standardized scheduling system at the Ports could also be set up as a voluntary pilot project. Currently, dispatchers must utilize multiple information systems to perform the scheduling. With a potential centralized system, dispatchers at drayage companies could have the ability to view their appointment status and make updates, search for pickup opportunities after a drop-off to reduce bobtails, and obtain terminal operational information, including closures and container location, all from a single source.

Obtaining traffic information at the gates and within the gates of the terminal could involve technologies such as video cameras or detectors for queue detection; and PierPass RFID transponders, GPS devices, license place readers, and Bluetooth devices to measure queue times.

**Freeway Smart Corridors and Arterial Smart Corridors**

Improved real-time traveler information or operational information outside the terminal gates could relieve traffic congestion on the freeways and main arterials. Technology applications such as vehicle detection systems, probe data, CCTV cameras, traffic signal controllers, changeable message signs, and communications infrastructure are needed on some corridors in the Gateway Cities. Specifications for the construction and installation of new ITS infrastructure will be based on a gap analysis and implementation plan. Similar traveler information from the arterial highway system is also needed. This traveler information (for both freeways and arterial highways) could also be provided and distributed by private companies.

**Freight Transportation Information System**

The information obtained from the on-the-road infrastructure could be forwarded to a Traffic Information System (TIS) that will monitor and help manage traffic issues on key freeway and arterial corridors. The TIS could collect and integrate the traffic data to provide freight-focused traveler information and incident coordination for freight travelers that are not currently provided by other Traffic Management Centers (TMC). The TIS could enable faster detection of incidents and aid in the mobilization of resources from first response agencies, such as Caltrans, CHP, and local emergency and law enforcement, on the facilities that are focused on the freight industry. This could help mitigate traffic congestion on key freight freeway and arterial routes by reducing incident response times and could provide estimates for “real-time” arrival times at terminals.
Sharing this enhanced real-time traveler information with freight travelers could be a key benefit of this program. The TIS could provide freight focused information via a data dissemination system that could include a Freight 511 IVR, Freight 511 web pages and apps that could be accessed by smart phones, in addition to roadside changeable message signs on freeways and arterials in the Gateway Cities subarea. In addition to traffic information, the TIS could provide alternative route information for freight and travel times. Information from the TIS could be distributed directly to drayage companies, MTOs, public agencies such as Caltrans and the CHP, private enterprises such as Garmin and TomTom that operate their own traveler information systems, and existing radio broadcast traffic reporting outlets. Guidance for the development of these different freight focused traveler information systems is being developed and could be provided by the U.S. Department of Transportation’s (DOT) Concept of Operations for the Freight Advanced Traveler Information System (FRATIS).¹

**Truck Enforcement Network System**

The program could also include the advancement of strategies to improve the effectiveness and efficiency of the CHP truck enforcement operations as the truck traffic volume grows. Enforcement of truck safety and permitting regulations need to keep pace with the projected rise in the truck volume. The strategies will focus on developing permanent enforcement facilities and screening sites that utilize automated functions to safely and effectively process as many trucks as possible. Improved truck safety will result in fewer incidents and congestion.

**Automated Truck Research/I-710 Technology Plan**

To further reduce traffic congestion on freeway freight routes, the program could also include a project to demonstrate the feasibility of employing automated commercial vehicle and automation technologies to increase truck capacity on the truck-only lanes of the I-710 freeway. The project could demonstrate laboratory-proven technologies in a real-world heavily congested truck corridor through a staged test of a flow efficiency system for trucks. The results of the test could provide valuable inputs to the design approach for a related I-710 freeway development project that will safely increase truck throughput on the proposed I-710

freight corridor, reducing truck volumes and congestion on the adjacent I-710 general purpose lanes.

Program Stakeholders

To bring a complex group of technology projects like this from the drawing boards into reality will rely heavily on a large number of public and private sector stakeholders to be successful. The following is a list of the stakeholders and their potential roles for project implementation.

Public Stakeholders

**Federal Highway Administration**

The Federal Highway Administration (FHWA) is the agency within the U.S. DOT in charge of improving mobility on the nation’s highways.

**Role:** The FHWA (supported by the FHWA Los Angeles Field Office) is one of the sponsors of the Gateway Cities Technology Plan for Goods Movement project and is providing funding for the program. The FHWA could be involved and provide support for the Freight TIS/Data Fusion, Freight Traveler Information Dissemination, Arterial Smart Corridor, Freeway Smart Corridor, and Container Moves Productivity Improvement projects. The FHWA will also be involved in the FRATIS Concept project (a related demonstration project sponsored by the FHWA’s Office of Freight Management and Operations and U.S. DOT’s Research and Innovative Technology Administration (RITA) (see Appendix D).

**Los Angeles County Metropolitan Transportation Authority (LA Metro)**

**LA Metro: Highway Programs** - LA Metro is responsible for the continuous improvement of an efficient and effective transportation system for Los Angeles County. The Highway Programs department encompasses a wide range of High Occupancy Vehicle, High Occupancy Toll lanes, Express Lanes, interchange reconstruction, highway capacity enhancement and operational improvement projects throughout Los Angeles County.

**Role:** The Highway Programs department is one of the sponsors of the Gateway Cities Technology Plan for Goods Movement project. They provide administrative support services for managing the project. The Highway Programs department could
provide input, continuing oversight and some funding on all projects.

**LA Metro: LA SAFE** – LA Metro provides an independent service that is responsible for the continuous improvement of an efficient and effective transportation information system for Los Angeles County. LA SAFE sponsors the 511, #399, RIITS, and the Kenneth Hahn Callbox Systems in Los Angeles County. These programs improve mobility in the region, and provide drivers the information and tools needed to travel safely and efficiently throughout the County.

**Role:** LA SAFE could provide data to the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination Project; LA SAFE could also provide operational support for both projects.

**California Department of Transportation**

The California Department of Transportation (Caltrans) is tasked with improving the mobility across California. They are in charge of operating, maintaining and improving the 50,000 miles of highway and freeway lanes, as well as inter-city rail services, airports, and heliports within California.

**Role:** Caltrans is one of the sponsors of the Gateway Cities Technology Plan for Goods Movement project. Caltrans could provide data to the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project. Caltrans has responsibility for the freeway network in California. Caltrans could also provide input and support for the Arterial and Freeway Smart Corridor projects, the Automated Truck Research project, and the Truck Enforcement Network project.

**California Highway Patrol**

The mission of the California Highway Patrol (CHP) is to provide the highest level of safety, service, and security to the people of California. The CHP patrols and also responds to emergencies on state highways.

**Role:** The CHP could share data with the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project. The CHP could also provide review and comment on the Freeway Smart Corridor for Freight and actively participate in the Truck Enforcement Network projects.
LA County Department of Public Works: Traffic and Lighting Division

The Department of Public Works provides public infrastructure and municipal services to protect and enrich the daily lives of the people in Los Angeles County. The Traffic and Lighting Division’s responsibilities encompass traffic design, traffic investigations, traffic impact studies, traffic congestion relief, and street lighting in the unincorporated areas and contract cities within the County of Los Angeles.

Role: The Traffic and Lighting Division could provide data to the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project. The County will also be involved in the Arterial Smart Corridors for Freight project.

City of Los Angeles Department of Transportation

The City of Los Angeles Department of Transportation (LADOT) seeks to provide safe and optimal mobility of people and goods throughout the City of Los Angeles, in support of economic activity and a desirable quality of life. LADOT operates the Automated Traffic Surveillance and Control (ATSAC) System Traffic Management Center.

Role: LADOT could receive data from the Freight Traveler Information Dissemination project that will be used to manage traffic flows on arterials that are controlled by ATSAC. They could also provide inputs or supply information for the Arterial Smart Corridors for Freight project.

POLA/POLB

The Ports of Los Angeles (POLA) and Long Beach (POLB) are located at the southern terminus of I-710, with direct rail connections to downtown Los Angeles and the rest of the nation via the Alameda corridor. The Ports are the focal point of drayage truck movement in the Los Angeles area.

The Advanced Transportation Management Information System (ATMIS), a project developed by the Ports of Los Angeles and Long Beach, involves the installation and operation of cameras, detectors, and message signs, central management software, and data communications to better manage vehicle movement in and around the Ports.

Role: ATMIS could provide data to the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project.
Gateway Cities Council of Governments

The Gateway Cities Council of Governments is comprised of representatives from the 27 cities in Southeast Los Angeles County. Through various projects, they are improving the quality of life for all residents of Southeast Los Angeles County.

Role: GCCOG has been the key sponsor of the Gateway Cities Technology Plan for Goods Movement project. They could continue to be involved in the planning and design of the Freight TIS/Data Fusion, the Freight Traveler Information Dissemination project, the Arterial Smart Corridors for Freight project, and the Container Moves Productivity Improvement project. Through GCCOG’s member jurisdictions (local cities with TMCs), they can also provide operations and maintenance support for the Arterial Smart Corridors for Freight project.

Private Stakeholders

Drayage Operators

Drayage operators, such as those listed below, transfer goods between the Ports and inland distribution centers.

- Intermodal Express Inc., Commerce, California;
- Coast Bridge Logistics, Compton, California;
- Superior Intermodal Services, Inc., Ontario, California;
- Port Logistics Group, City of Industry, California; and
- Price Transfer Group, Carson, California.

Role: Review and comments from drayage operators participating on the Goods Movements Efficiency Committee can be used in the planning and design of the Freight TIS/Data Fusion project, the Freight Traveler Information Dissemination project, the Arterial and Freeway Smart Corridors for Freight projects, the Container Moves Productivity project, and the Automated Truck Research project. They could also provide data to the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project. These private companies could also provide review and comments through participation in the Goods Movement Efficiency Committee.
Marine Terminal Operators

Marine Terminal Operators (MTOs), such as those listed below, provide the link for goods between ocean carriers and drayage operators.

- West Basin Container Terminal LLC;
- Yusen Terminals Inc;
- Long Beach Container Terminal, Inc.; and
- Pacific Maritime Services.

Role: Marine terminal operators could have the option to share data with the Freight TIS/Data Fusion project and receive data from the Freight Traveler Information Dissemination project. They could also provide review and comments through participation in the Goods Movements Efficiency Committee. MTOs could also have an opportunity to be involved in the planning and design of the Container Moves Productivity project.

Beneficial Cargo Owners

Beneficial Cargo Owners (BCOs) or shippers are the clients for MTOs and the drayage companies. They determine when and where containers are moved, how long they are stored and who receives and moves them.

Role: BCOs could provide review and comments through participation in the Goods Movement efficiency Committee. BCOs could also have an opportunity in the planning and design of the Container Moves Productivity project.

Developers/Third Parties

Third-party developers, such as those listed below, will be creating applications and services that provide its customers with accessible and easy to use freight traveler information in the Gateway Cities region:

- Garmin,
- TomTom, and
- INRIX.

Role: Third-party developers could provide input on the planning and design of the Freight TIS/Data Fusion project. They could also provide and receive data to/from the Freight Traveler Information Dissemination project.
Stakeholder Implementation Plan

Implementation of the projects and programs shown in Figure 1 will have to be a collaboration amongst the previous stakeholders. Although the projects in this document are presented as a complete integrated program; in reality, due the competitive funding environment, they will most likely be developed incrementally. This program of projects has been designed to share information between projects to maximize the benefits; it should be noted that they all can be developed independently with interconnections done at a later date as other projects come on line. This will be detailed in the subsequent Business Plan. Goods movement is a decentralized process that is complex. Gateway Cities will not be the implementing agency. The previous stakeholders will need to forge an implementation partnership for this technology plan to succeed. See the Business Plan for ideas to do this. This implementation plan will need to include a performance evaluation and measurement process and method to be able to constantly monitor and determine the effectiveness of the technology projects and the program.

Benefits

Program Level

The Gateway Cities Technology Plan for Goods Movement projects has been designed to improve Goods Movement in the Gateway Cities subregion. It addresses many of the needs identified by freight stakeholders who participated in the working group meetings and survey research. The following is a summary of anticipated benefits from the Gateway Cities Goods Movement Projects. The benefits are divided into the following two groups: Goods Movement and Traffic/ITS.

Goods Movement

The goods movement system can benefit from improved processes and procedures that will result in increased efficiency. The Container Moves Productivity Improvement project is designed to provide real-time and predictive information to make gate processing and container moves more efficient. These efforts can reduce wait and queue times at terminals and transfer facilities, and can lead to reduced terminal and rail yard turn times. These efforts can also lead to fewer truck trips, less idling, improved air quality, fewer bob-tail trips, more turns for drayage truck drivers, increased container processing, truck automation, container appointment and scheduling system, etc.
The following is a detailed list of the benefits for the goods movement system improvements that can be expected from the Gateway Cities Technology Plan for Goods Movement Projects:

- Reduced queue and turn times;
- Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers;
- Improved terminal throughput from the use of real-time information on trucks approaching terminals, as well as terminal gate queues;
- Enhanced public/private leadership and coordination of regional development of goods movement efficiency projects;
- Enhanced collection of data on most effective container movement efficiency technologies;
- Increased throughput of trucks in the I-710 freight corridor;
- Improved MTO operations;
- Additional turns per day for trucks;
- Increased container throughput;
- Improved coordination between drayage operators and the MTOs;
- Improved communications between truck drivers and dispatchers;
- Improved operations at warehouses/distribution centers;
- Improved operations at rail yards;
- Less congestion within ports;
- Increased competitiveness for ports in San Pedro Bay; and
- Improved operational predictability for goods movement operations.

**Traffic/ITS**

Freight traffic, as well general traffic, in the Gateway Cities subregion will benefit from improvements to the ITS infrastructure for roadways and highways. The *Arterial Smart Corridor for Freight* and the *Freeway Smart Corridor for Freight*
projects will improve the infrastructure in the highways and roadways to detect congestion, improve the communication infrastructure between Transportation Management Centers (TMCs), detectors, and Congestion Management Systems (CMS), and improve the dissemination of the collected traffic data. In addition, freight traffic flow on the proposed freight-only lanes, to be constructed on the I-710, will be improved by information gathered and demonstrated during the Automated Truck Research project. Improvements in enforcement procedures and the construction of new enforcement projects as a part of the Truck Enforcement Project will result in less disruptions to the traffic flow and less damage to local highways and freeways.

The **Freight Traveler Information System (TIS)/Data Fusion and Data Dissemination** projects will collect freight related traveler information and disseminate real-time traveler information that is particularly useful to the freight traveler, public agencies, and third-party information providers. The TIS will be staffed by personnel to monitor traffic incidents, and to provide information that will assist operating agencies to optimize and control the flow of traffic. The TIS staff will also maintain the data collection and communication infrastructure (including historical/archived data).

The following is a detailed list of the benefits related to traffic and traveler information dissemination that are expected from the Gateway Cities Technology Plan for Goods Movement Projects:

- Reduced traffic congestion;
- Improved availability of real-time and detailed freight-focused traveler information leading to more efficient goods movement operations;
- Improved freight mobility on designated freight arterial and freeway routes;
- Improved travel time reliability due to the availability of comprehensive arterial and freeway traveler information for freight traffic;
- Reduced traffic impacts from enforcement activities;
- More efficient truck enforcement processes and procedures;
- Better protection of local city streets and freeways from over height trucks;

*Navigation and traffic data vendors will have access to more accurate and timely information.*
Improved safety on local city streets and freeways in the subregion;

Improved arterial and freeway incident management through better detection and monitoring of traffic conditions, resulting in faster identification, response, and clearing of incidents;

Provision of freight-safe detours for arterial corridors;

Increased range of coverage area for full trip information available to freight operators from a single source;

Provision of traveler information to a wider audience by adding a Spanish language option for the TIS 511 IVR system;

Provision of new opportunities for private web and mobile freight traveler informational products and applications; and

Improved dissemination of static freight parking information for the port area.

These benefits will also result in the following overall changes in the Gateway Cities subregion:

Reduced number of truck trips and/or reduced bobtails;

Reduced congestion at the POLA and POLB gates, I-710 freeway, and the arterial corridors in the Gateway Cities subregion and within the ports;

Improved travel times due to reduced congestion;

Lower shipping costs for goods and improved commerce in the Los Angeles region; and

Reduced air and noise pollution in the Southern California region.

Appendix A provides a table that cross references the needs identified in the users’ survey and working group discussions with project benefit that meet the needs.

**Costs**

The projected costs for the Gateway Cities Technology Plan for Goods Movement Projects are based on cost data from related past projects, and projections of the resources required for the size and scale of the projects (see Appendix C for details on costs). The
projected costs have been divided in two parts: capital costs and operation/maintenance costs. The capital costs are the non-recurring expenses for the execution of the project, including project administration, research, design, development, or implementation of systems and/or services; procurement and installation of hardware equipment, software, and software licenses; acquisition and/or construction of facilities, environmental and traffic mitigation work required for construction, and the initial marketing and outreach activities that are necessary to implement the project. The Operation and Maintenance Costs are the recurring expenses for the ongoing operation and maintenance of the system, hardware, software, or service. These expenses include staffing costs, hardware and software maintenance costs, facility lease costs, technical support costs and other services necessary for the project to continue operations.

The total capital costs for the initial seven projects are estimated to be between $46 million and $67 million. The total annual operation and maintenance cost for the projects is estimated to be between $7 million and $10 million. These figures do not include the costs for the Trucking Enforcement Network System project since the implementation phases of that project have not been finalized. In addition, the capital costs and the operation and maintenance costs for the Automated Truck Research project were not included because they cannot be determined until the research is concluded. These costs by project are shown in Table 1.
### Table 1. Capital Costs and Annual Operation/Maintenance Costs in U.S. Dollars

<table>
<thead>
<tr>
<th>Project</th>
<th>Capital Cost</th>
<th>Annual Operations &amp; Maintenance</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Freight Traveler Information System (TIS) – Includes TIS/Data Warehouse and Integration/Dissemination</td>
<td>$4,500,000 - $6,500,000</td>
<td>$2,200,000 - $3,200,000</td>
<td>Cost assumes processing of existing data and new data generated as part of the projects below. Addition of new data sources estimated at $100,000 to $200,000 each.</td>
</tr>
<tr>
<td>Arterial Smart Corridor</td>
<td>$11,000,000 - $16,000,000</td>
<td>$1,600,000 - $2,300,000</td>
<td>Estimate based on approximately 170 miles of arterial coverage. Cost is dependent on the assessment of truck arterial routes and technology options.</td>
</tr>
<tr>
<td>Freeway Smart Corridor</td>
<td>$22,000,000 - $32,000,000</td>
<td>$3,000,000 - $4,300,000</td>
<td>Estimate based on approximately 38 miles of full ITS implementation and 11 miles of partial. Cost is dependent on Deployment Plan and is based on Caltrans current surveillance and detection systems.</td>
</tr>
<tr>
<td>Container Moves Productivity</td>
<td>$3,000,000 - $4,600,000</td>
<td>NA</td>
<td>Costs are for the initial 18-month phase for six-month support set-up and one-year initial implementation of project functions for three sites three terminals and up to six truck fleets, including O&amp;M for that initial year. Full build-out costs are not provided as it is dependent on the outcomes of the test bed deployment.</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>$4,700,000 - $7,300,000</td>
<td>TBD</td>
<td>This cost is for first phase planning and testing of automated truck technologies. It does not include additional research and testing that will be identified in this first phase, nor does it include any work on actual deployment of a system on I-710.</td>
</tr>
<tr>
<td>Truck Enforcement Network</td>
<td>TBD</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Program Total&lt;sup&gt;a&lt;/sup&gt;</td>
<td>$45,200,000 - $66,400,000</td>
<td>$6,800,000 - $9,800,000</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Excludes TBD items.
These cost estimates, in current 2012 dollars are based on the following assumptions:

- All prerequisites identified for the projects have been met prior to the inception of the projects.

- Caltrans current standards for surveillance, detection and changeable message signs are deployed. Costs may change if Caltrans decides to modify any standard, e.g. move to probe technology for detection.

- All of the projects remain on the schedules established for each project. Since the projects are highly intertwined and some require close coordination with other projects, delays on one project may have a significant impact on one or more of the other projects and compound the costs for schedule delays.

- Significant scope changes are avoided.

- There no major changes in regulations.

- Inflation rates that are not significantly higher than anticipated.

### Interdependencies

Although the projects in this document are presented as a complete integrated program; in reality, due the competitive funding environment, they will most likely be developed incrementally. And while this program of projects has been designed to share information between projects to gain the maximum benefit; it should be noted that they all can be developed independently with interconnections done at a later date as other projects come on line. Each project, has been designed to be implemented as stand-alone projects. Please refer to the Business Implementation Plan for more details on the recommended project implementation strategy. The TIS/Data Fusion and Traveler Information Dissemination diagram in Figure 2 shows how data is shared among the projects.
Figure 2. TIS/Data Fusion and Traveler Information Dissemination Diagram

Since the TIS/Data Fusion project will collect data from the other projects and the Traveler Information Dissemination project provides data to them, these two projects will require the greatest amount of coordination with the other projects. Figure 3 below depicts the coordination required between the seven projects.
The following provides a detailed description of each project, including the interdependencies of each project with other projects. These interdependencies are important in order to improve the efficiency of the project implementations. However, no project is critically dependent on another. All projects will have the capability to incorporate data from new data sources. Therefore, if one project is delayed, the data that is supplied to the other projects can be incorporated whenever it becomes available.

The following project listings also include the first steps required to implement each project and a brief statement of the major risks and challenges involved in the implementation.

**Implementation Strategies**

Next steps to implement each of the individual technology projects are outlined in this section. However, overall implementation of the program will require a commitment by the stakeholders and a long-term strategy.
The subsequent Business Plan will provide more details on implementation strategies and steps but in general implementation strategies will include:

1. Formation of an implementing agency or group for each project;
2. Stakeholder participation in that agency or group with long-term commitment;
3. Permanent O&M funding;
4. Detailed implementation steps to assure successful implementation;
5. Identification of an initial list of demonstration projects;
6. Clearly stated objectives and outcomes for each stakeholder;
7. Implementation schedules and timetables;
8. Identification of funding and information sharing commitments from each stakeholder and others;
9. Development of staffing requirements;
10. Development of performance measurement and monitoring programs; and
Freight Traveler Information System (TIS) and Data Fusion

**Project Summary**

The Freight Traveler Information System (TIS) and Data Fusion project will collect traffic and other data that is useful to the goods movement community from various sources and merge the data to create a database. The TIS staff will monitor traffic, manage traffic incidents, and maintain the data collection systems.

**Key Linkages**

There will be a high degree of connectivity between the Freight TIS and Data Fusion project and all the other Gateway Cities Technology Plan for Goods Movement technology projects. Since this project will collect data from the other projects, a high level of coordination with other projects will be needed to identify data to be collected, stored, used, and to establish data interfaces.

Primary projects supplying data will be the Arterial Smart Corridor and Freeway Smart Corridor for Freight projects. These projects will provide information from detectors, video feeds, and vehicles to the data fusion engine. The Container Moves Productivity Improvements project will provide information at the terminals, and rail yards including queue times and closures. The Automated Truck Research and TENS projects may also provide traffic flow data. External projects such as FRATIS, ATMIS, and the LA County IEN Improvement projects, and external systems such as LA SAFE and Caltrans, will also provide traffic flow data and roadway condition information (e.g., incidents, which may include crashes, work zones and weather).

Since the Freight TIS and Data Fusion project will utilize the Freight Traveler Information Dissemination project to distribute the data that is collected, stored and used close coordination will be necessary to establish the data interface between the Data Fusion server and the Data Dissemination server.

**First Steps**

The staff responsible for the systems that will provide data to the data fusion engine will need to be established. The purpose is to identify which data to import, and establish the processes to accomplish the transfer of data. Agencies involved in this meeting include LA Metro (RIITS, LA SAFE), Caltrans, and the Los Angeles County (IEN). The Stakeholders and Implementing Agency or groups will determine the operational parameters. This will include data to be received, data to be disseminated,
timing, usefulness, performance assessment parameters and metrics, data transfer methods, etc.

Coordination with the project staff for the Arterial Smart Corridor for Freight, Freeway Smart Corridor for Freight, and Container Moves Productivity Improvements projects will need to be established to identify the data that will be provided by these projects and to establish processes to import the data as it becomes available. One of the first major decisions for the project is to decide which agency will be responsible for the staffing of the TIS and where it will be located.

**Risks and Challenges**

- Achieving consensus and agreement on a preferred concept;

- Addressing technical issues related to interface development and data error correction methodologies; and

- Addressing concerns of private sector companies regarding the security of proprietary data.

- Identifying performance measures, outcomes, parameters and metrics.

- Establishing appropriate technologies (short-term and long-term)

- Determine staffing requirements and assigning staff.

- Preparing operational manuals and designing the system.

- Identifying funding for capital and O&M costs
Freight Traveler Information Dissemination

Project Summary
The Freight Traveler Information Dissemination project will share data collected and processed by the Freight TIS/Data Fusion project with public agencies and members of the goods movement community (e.g., drayage and trucking companies, and truck drivers and others). The project will also share data with private freight traffic information providers to encourage development of smartphone applications and other information services for freight users. Additional data sharing with the public will be accomplished through the development of a Freight Traveler Information Dissemination System, Freight 511 web pages, and Freight and Spanish language options for the 511 Interactive Voice Response (IVR) system.

Key Linkages
Ideally, there should be close coordination with the Freight TIS/Data Fusion project to establish data interfaces that receive data from the Data Fusion server. There should also be coordination with the Arterial Smart Corridor and Freeway Smart Corridor for Freight projects to establish data interfaces to provide traffic information to manage the smart corridors and with the Container Moves Productivity Improvements project and TENS projects to provide traffic information and other freight related data. However, the Freight Traveler Information Dissemination project could proceed independently of the other projects by disseminating data that is currently available, creating the 511 web pages for freight travelers, and developing the Spanish version of the 511 IVR.

First Steps
The project staff for Freight TIS/Data Fusion project will identify the data and establish the processes to import the data from the Data Fusion Warehouse. The architecture for the network to disseminate the data to the project’s recipients will also need to be established. An early decision will determine where the Data Dissemination server will be hosted and who will maintain the Data Dissemination System. Guidance for implementing this step will come from the FRATIS Concept of Operations along with the implementing agency and stakeholders. Providing predictability information for drayage truck drivers to terminals and rail yards will be important.

Objectives
- Increase availability, accuracy, and reliability of real-time freight data;
- Provide a platform for data collection and processing; and
- Enhance real-time freight data sharing opportunities.

Benefits
- Drayage drivers will know of traffic conditions at the port before they start their trip via 511 in both English and Spanish; and
- Third-party vendors can use the data from the data fusion engine to create Apps for their customers.
**Risks and Challenges**

- Ensuring private sector participation in the project, especially during the initial phases of the project;
- Addressing private sector concerns regarding the anonymity and privacy of their data;
- Securing consensus and agreement on the concept and requirements, developing the interfaces, and updating existing systems;
- Information sharing consensus and agreements for information dissemination;
- Developing safe interface (audio) for truck drivers to receive and send information;
- Establishing metrics to monitor performance and to receive feedback; and
- Determining technologies that can be operated in the short-term and be compatible with future technologies.
Arterial Smart Corridor for Freight

Project Summary
The Arterial Smart Corridor for Freight project will collect data from roadside equipment and vehicles to determine traffic conditions on key arterials within the Gateway City subregion. This data will be used to estimate arterial corridor travel times and will enable better freight traffic and incident management on arterials by generating data for real-time traffic information. In order to improve the quality of the data gathered, this project will also identify any gaps in detection and communication links, and will determine a method to obtain traveler information i.e. obtain probe data or install equipment to fill the gaps. The project will also involve the deployment or updating of signal coordination, improved signal systems, additional vehicle detection, closed-circuit television (CCTV) cameras, and changeable message signs (CMSs).

Key Linkages
- Freight TIS/Data Fusion project – Establish a data interface to send data collected from the arterials to the Data Fusion server.
- Traveler Information Dissemination project – Establish a data interface to receive data that could be used to manage the arterial smart corridors.
- Container Moves Productivity Improvements project – Identify data, such as traffic information in port areas, and establish procedures to send this data via the Data Dissemination project.

First Steps
The initial steps for this project are to identify the gaps in the arterial ITS devices and systems in the Gateway Cities subregion. Once the gaps are identified, the project will develop a plan to procure and install new hardware or determine methods to fill the gaps otherwise, and to replace malfunctioning equipment. Developing a close working relationship with the Data Fusion project in order to establish a data interface is another first step. The project staff will also review the results of the FRATIS project and incorporate its lesson learned into the project plans.

Risks and Challenges
- Addressing local agency staff and/or budget issues to operate and maintain the signal systems with additional detectors and other equipment;

Objectives
- Reduce delay on surface streets;
- Improve reliability and mobility;
- Reduce congestion
- Fill coverage gaps;
- Generate real-time data; and
- Improve incident management.

Benefits
- Navigation and traffic data vendors will have access to more accurate and timely information; and
- Real-time data on congested surface streets will be widely available, helping drivers reroute.
- Improve drayage operations.
Addressing operations and maintenance funding;

Addressing technical issues that arise in integrating the project with the Freight TIS and RIITS; and

Establishing permanent technology applications.
Freeway Smart Corridor for Freight

Project Summary

The Freeway Smart Corridor for Freight project will improve the quality of the ITS data collected from the freeways in the Gateway City subregion. In order to improve the quality of the data gathered, this project will also identify any gaps in detection, communication links, ramp metering traffic monitoring equipment, CCTV cameras, and changeable message signs; and will install equipment to fill the gaps and/or obtain probe data. Outdated equipment will be refurbished, upgraded or replaced.

Key Linkages

Coordination will be required with the Freight TIS and Data Fusion project to establish a data interface to send data collected from the freeways to the Data Fusion server.

Coordination will be required with the Freight Traveler Information Dissemination project to establish a data interface to receive data that could be used to manage the freeway smart corridors.

Coordination will also be required with the Container Moves Productivity Improvements project to identify data, such as freeway traffic information in and near the port areas, establish procedures to receive this data via the Data Dissemination project, and provide predictability for drayage truck drivers to arrive at terminal gates and rail yards.

Coordination with the Automated Truck Research project will center on sending data from detection devices, meters and signal issues that will be relevant to automated trucks via the Data Dissemination project.

Likewise, coordination with the Truck Enforcement Network Systems (TENS) project will be focused on sending data from the detection devices, cameras, and ramp meters near the TENS sites. In the future the Freeway Smart Corridors and the Arterial Smart Corridors should be coordinated so that Integrated Corridor Management techniques can be implemented.

First Steps

Identifying the gaps in the current freeway ITS devices and systems, including equipment that needs refurbishing in the Gateway Cities subregion is an essential first task. Once the needs are identified, then develop a plan to procure and install new hardware, obtain probe data and to refurbish malfunctioning

Objectives

- Reduce delay on key freeway routes;
- Increase freight mobility and reliability; and
- Improve traffic data, traffic management, and incident management.

Benefits

- Radio traffic reporters will have access to more accurate information than ever before; and
- More reliable real-time data will help truck drivers identify and avoid freeway bottlenecks.
- Improve drayage operations.
equipment. Developing a close working relationship with the Data Fusion project in order to establish a data interface will be an important initial step. The project staff will also review the results of the FRATIS project and incorporate its lessons learned into the project plans.

**Risks and Challenges**

- Securing funding for the maintenance of ITS;

- Ensuring the integrity of the ITS system on the I-710 during its construction phase; maintaining this integrity is crucial to ensure the traveler information is available for the corridor;

- Establishing technology guidelines and procedures; and

- Identifying funding for capital and O&M costs.
**Container Moves Productivity Improvements**

**Project Summary**

The Container Moves Productivity Improvements project will develop long term technology and operations programs that will improve the efficiency of the handoff of intermodal containers between drayage companies, marine terminal operators (MTOs), and railroads, while also improving the bottom line for the beneficial cargo owners (BCOs) (i.e., Home Depot, Wal-Mart). The project will also include development of the Performance Monitoring Project, to measure the performance improvements that result from the technology and operations programs. Included will be the development or incorporation of a container appointment and/or scheduling system particularly at the terminals.

**Key Linkages**

Coordination will be required with the Freight TIS and Data Fusion project to establish a data interface to send data collected at the terminals to the Data Fusion server.

Coordination will be required with the Freight Traveler Information Dissemination project to establish a data interface to receive traffic flow data that may be used to predict travel times for the drayage trucks.

Coordination with the Arterials Smart Corridor project will center on receiving data such as traffic information in areas that will significantly affect container moves productivity.

Coordination will also be required with the Freeway Smart Corridor project regarding receiving pertinent freeway traffic information.

Coordination with the Truck Enforcement Network Systems project will focus on sending vehicle identification and cargo information via the Data Dissemination project.

**First Steps**

An initial step for the project will be to establish the Goods Movement Efficiency Committee. One of the first tasks for the committee will be to assess the current appointment systems used by the Ports of Los Angeles and Long Beach and identify software that may be needed to improve them. Another task will be to work collaboratively over the next 18 months with FRATIS demonstration project team and incorporate the lessons learned from that project into this project as test development approaches

**Objectives**
- Reduce truck trip times, bobtails, and wasted trips for truck drivers;
- Improve the throughput of terminal operators; and
- Reduce congestion while improving air quality and economic competitiveness.

**Benefits**
- Technology systems within the ports improve efficiency through the Gateway Cities region; and
- Regular dialogue and coordination between terminal operators and carriers will help reduce problem areas.
- Reduce gate queue times.
- Improve turn times within terminals.
- Add additional turns.
and findings are developed. The implementing agency and stakeholders will have to decide on whether to establish a “universal” appointment and/or scheduling system or be able to integrate different ones. Assessing the performance of this system and establishing guidelines will also be a significant first step.

**Risks and Challenges**

- Securing voluntary cooperation from the stakeholders;
- Integrating proven technologies into one system (if possible) and achieving the desired goods movement benefits;
- Establishing cooperative framework with all stakeholders; and
- Assessing and determining beneficial impacts for all stakeholders.
Automated Truck Research (I-710 Technology Project)

**Project Summary**

The Automated Truck Research project will explore the feasibility of deploying automated commercial vehicles and automation technologies within the I-710 freight corridor. The project will establish institutional relationships between stakeholders, regional agencies, Caltrans, Federal entities, research organizations, truck equipment manufacturers, trucking companies and private shipping interests to promote a realistic operational vision for the I-710 that utilizes automated commercial vehicles. Staged testing of available technologies and operational concepts, including those being tested by the U.S. DOT Connected Vehicle Program, will be conducted to gauge the performance of an automated flow efficiency system for trucks in a real world environment.

**Key Linkages**

Coordination will be required with the Freight TIS and Data Fusion project to establish a data interface to send speed data collected from the automated commercial vehicles to the Data Fusion server.

Coordination with the Freeway Smart Corridor project will focus on receiving data from detection devices, meters and signals that will be important to an automated flow efficiency system for trucks.

Coordination with the Truck Enforcement Network Systems (TENS) project will primarily be in regards to inspection process accommodations for automated truck fleets.

**First Steps**

The first step for this project is to form a project team composed of members from public agencies and the trucking, shipping, and manufacturing industries to develop a concept of operations for an automated truck system. Another initial step is to establish a working relationship with the I-710 project. A key initial step will be to identify an agency to take the lead in submitting grant applications and to oversee the contracting efforts.

**Risks and Challenges**

- Ensuring cooperation and coordination among its stakeholders;
- The possibility that proven technologies may not work well when deployed in the current operational environment;

**Objectives**

- Support long-range growth of the Ports region;
- Advance intelligent vehicle technologies for trucks; and
- Promote research opportunities and partnerships.

**Benefits**

- The Gateway Cities region has the potential to attract a wide variety of freight-related research activities; and
- Some findings may support the region’s capacity to handle the growing volumes of freight in the region.
- Improve throughput of trucks on the I-710 freight corridor.
- Improve safety and air quality.
- Reduce travel times.
• Design complexity may hamper an implementation of an automated truck system;

• Determining variety of technologies that can be used for automation;

• Determining reliability of automated truck technologies;

• Determining acceptable costs to implement and whether subsidies are needed;

• Determine responsibilities for operation of such a system; and

• Develop a proof of concept for truck operators.
Truck Enforcement Network System (TENS)

Project Summary
The TENS project will develop strategies and concepts to improve truck enforcement efficiencies and effectiveness in the Gateway Cities subregion. Current truck enforcement processes and practices will need to be modified to improve the safety of trucking operations, reduce trucking incidents, and meet the demands of the projected truck volume growth.

Key Linkages
Coordination will be required with the Freight TIS and Data Fusion project to establish a data interface to send truck information collected from enforcement activities.

Coordination will be required with the Automated Truck Research project to establish procedures for enforcement inspections of vehicles that are in an automated flow efficiency system for trucks.

There may be coordination with the Freeway Smart Corridor project regarding receiving data from detection devices, cameras, and meters at or around the TENS sites.

First Steps
This project is currently awaiting a new source of funding to continue its planning activities.

Risks and Challenges
• Securing funding for the proposed access ramps and flyover bridges to the inspection sites and the need for additional right-of-way for permanent truck facility;
• Establishing technologies for automated truck inspection at freeway speeds;
• Determining and establishing new laws and regulations that will permit new procedures for automated enforcement of trucks;
• Securing support of CHP and Caltrans for new automated truck enforcement strategies; and
• Developing a proof of concept.
Operational Scenario Examples

A major feature of a Concept of Operations document is to illustrate how front-line users of a system will take advantage of system functionality to help them perform their daily work tasks. More specifically, Operational Scenarios are provided that describe how the technology approaches described in the ConOps interact with real-world stakeholder operations on a day-to-day basis. Thus, the Operational Scenarios illustrate how people use the information and the functionality derived from the ConOps to plan, make decisions on the fly, collect and analyze data, and use the tools to manage their business.

In this case, the interactions of dispatchers and truck drivers are being examined. Their business goals are to deliver goods in a timely and efficient manner, manage costs, and manage their resources and improve their “bottom-line” while complying with regulations and maintaining safety standards. In the larger scheme of things, they also want to participate in regional efforts to reduce and manage congestion, improve air quality, and support the economic goals of the Ports of Los Angeles and Long Beach.

The Gateway Cities Technology Plan for Goods Movement will enhance the public sector’s ability to support the latest in private sector technologies which broadly and safely share real-time traveler information for goods movement. Public transportation agencies are the largest providers of accurate, real-time, comprehensive traveler information. Shippers and carriers benefit greatly from the existing public traveler information, which is frequently repackaged and shared through private sector fleet management applications and the media. By filling in the gaps in traveler information for goods movement and improving the reliability and timeliness of the data, the public sector can work hand-in-hand with shippers and carriers towards the common goal of a safer, more efficient Gateway Cities freight community.

While the public sector will provide enhanced data and information, participation in the Gateway Cities Technology Plan for Goods Movement projects is likely to be voluntary. The freight community (trucking firms, MTOs, logistics firms) may opt in or choose not to participate. The systems proposed in the Plan will succeed as long as private sector companies see benefit to their participation. See the Business Plan for more details. However, the implementing agency or group that sponsors the implementation of the concept of operations will likely include the logistics industry (or the logistics industry may be a significant, contributing partner). In that case the freight community’s
participation will not be voluntary but as an implementation partner. If the freight community is a full partner they would have the most control to make sure their individual benefits from implementation are assured.

As reported in the Benefits section of this Concept report, the benefits of these projects are expected to be significant. The proposed projects will provide trucking company dispatchers and truck drivers with the tools to support an integrated, automated routing system that can adjusted in real time based on information on port operations (gate queues, container readiness), truck enforcement activities (allowing compliant trucks to bypass inspection) and traffic incidents (crashes, construction, special events, congestion). In surveys conducted for this project, 77 percent of trucking companies reported that they currently route or adjust truck trips manually. The survey also noted that trucking companies place high value on all this information, but it currently is obtained from separate systems, not one integrated information system.

Appendix A lists the user needs and project benefits of implementing this concept of operations for goods movement.

The following scenarios describe how two different fictional companies could use the technologies proposed in the Gateway Cities Technology Plan for Goods Movement to improve the efficiency of their local freight hauling businesses. One company relies heavily on their dispatcher to manage operations (Dispatcher-Managed operations), while the other company allows drivers with some flexibility (Driver-Managed operations). In both cases, it is assumed that companies have opted to participate in the systems proposed by this Concept and to share data with these systems. It is important to note that in those examples the companies have developed their own software tools that leverage the travel time and drayage information created as part of the Gateway Cities Technology Plan for Goods Movement project. Their illustrative software relies on the enhanced real-time data from the freight information system to schedule and plan the work assignments, and to dynamically make changes to assignments, appointment times, and routing.

For each example, the fictional company steps through a series of scenarios, such as:

- Planning daily operations;
- Reacting to incidents (both planned and unplanned); and
Reactive Operations

Gateway Cities Concept of Operations

- Reacting to changes in traffic conditions approaching a marine terminal.

**Dispatcher-Managed Operations**

**EZ Cartage Company**

Bob, Sam, and Max are three of the several drivers for EZ Cartage, a Carson-based company specializing in local and regional freight movement into and out of the Port of Long Beach and the Port of Los Angeles. Bob and Sam are 20+ year employees, while Max is newer and still learning the finer points of doing the job.

Joyce is the lead scheduler/dispatcher. It is her job to manage the company’s resources as efficiently and productively as possible, and to help the drivers get through the day safely. Company policies require that Joyce interact with the drivers often during the day. For example, if something happens and they need to deviate from the planned routing for some reason, Joyce is the one who makes that decision.

**The Tractor Suite**

The tractors’ cabs all have modern equipment and systems that provide hands-free, voice activated technologies for drivers to communicate with Joyce. The equipment provides audio-based navigation assistance, traffic information, and itinerary information. Drivers can verbally request an itinerary repeat, an appointment update, traffic information, incident information, construction information, weather information, or port terminal (i.e., MTO) information. What they get back in response is provided by Joyce’s dispatching system, where all the information has been centralized from a variety of sources, most prominently the new Data Fusion Engine, which collects and shares real-time freight-focused traveler information. The information that drivers receive is location-sensitive, based on the last-recorded location of the truck using GPS, and based on the planned routing. The technology suites also include vehicle tracking capabilities that send time-and-place information back to Joyce’s desktop for archiving, evaluation and planning purposes; this includes information on whether they are stopped or on the move so different states are captured routinely.

**The Dispatcher Suite**

Joyce’s dispatching “cockpit” gives her information on each tractor/driver/load/status and location, terminal operations and

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2 This will be different in a situation in which the driver, not the dispatcher, is making some, or all, of the decisions.
container data, queue data, terminal area closures, freeway and arterial truck route data, and enforcement action/inspection facility data. Several of these data items have been greatly enhanced by the implementation of the Gateway Cities Technology Plan, which has addressed gaps in data coverage and improved the reliability and latency of the data. Joyce’s desktop suite, developed for EZ Cartage Company, includes state-of-the-art scheduling and routing software. Joyce’s dispatcher suite is also automatically linked to the relevant terminal(s) or rail yard(s) appointment and/or scheduling systems so she can constantly coordinate with truck arrivals, pick-ups or deliveries, updated as needed. Joyce’s dispatching system and the in-vehicle truck technology suite includes text-to-speech capabilities which provide drivers with hands-free audio information. Even information that is sourced from third parties or the 511 system is routed through the dispatch system for archiving, and is routed to drivers through the in-vehicle audio system. Joyce’s desktop software is programmed to send certain information to all trucks, and other information only to trucks that are affected by virtue of their location or status. Joyce also has the ability to do a live-voice audio broadcast to drivers through the system. Her dispatching system will periodically push audio updates to drivers, telling them about gate queues, scheduled appointments for deliveries or pick-ups, traffic delays, and other significant information, relying on up-to-date data from the Data Fusion Engine. She receives alerts and rerouting suggestions automatically based on planned routes and real-time traffic updates, and uses that information to make decisions and take actions that use company resources more efficiently. Joyce is the person who approves reroutes and notifies drivers, reassigns pick-ups and drop-offs dynamically, and monitors operations.

**Daily Operations Planning**

It is late in the afternoon and Joyce just received tomorrow’s drayage orders through the MTOs’ freight information management or appointment or scheduling system.

- When Joyce opens the “New Orders” screen, the freight information system receives an automatic message that the orders have been received and opened. (If the delay is too long, the freight information system operators will get a different alert to let them know they need to follow up because the orders have not been received or opened).

- The orders presented on Joyce’s desktop include container data, chassis data, origin/pick up information, destination/drop off information, and preferred scheduling for each load based on customer needs and terminal operator scheduling.
needs (planned or actual container readiness). She can see the status of the various containers; while she cannot see the dock-workers work assignments, the system shows her which containers are expected to be ready during each operating hour, and Joyce can use this to anticipate peak work load times for the day to schedule trucks.

- Joyce selected and accepted orders based on EZ Cartage operational parameters and customer contracts.

- The MTOs’ freight management system receives automatic notification that Joyce has accepted the orders; and if there are any that she did not accept, they are flagged in the MTOs’ freight information management system.

- Joyce downloaded the data from the accepted orders into her company’s customized scheduling and management software, and scheduled the day’s work assignments for each driver. Her software uses historic travel times along established, approved and planned truck routes to predict travel times by time of day and build them into the schedules. Historic average queue times and processing times for loading and unloading are used to optimize the drivers’ planned schedules, and then real-time data from the MTOs will be used to make adjustments dynamically. Her scheduling software has access to data that has been broken down by time of day and day of week so schedules automatically reflect nuances of the patterns in local operating conditions. Prior to implementation of the Gateway Cities Technology Plan, Joyce had to collect this data manually and use several different sources to obtain the data.

- Once Joyce has completed the scheduling process, she uploads it back to the MTOs’ information management system, which then confirms pick-up and drop-off appointments that are in sync with the orders and the drivers’ schedules.

- The MTO now also has the information on EZ Cartage resources that will be assigned to each container movement order, including tractor data and driver information.

- As Joyce updates or modifies times or assignments during the day, the freight management information system will be automatically updated so marine terminal operators and gate staff will have current and accurate information.

- Joyce’s system also automatically transmits the planned itinerary for each truck to the in-vehicle system suites. The in-vehicle system will throughout the day collect and report
information back to the databases that drive Joyce’s desktop system. Data includes elements such as data on origin-destination pairs, planned versus actual travel times, idle times, queue times, enforcement time, and processing times in the terminals. Drivers do not need to constantly engage in conversation to report their locations, delays, or other information that causes deviation in schedules or routes. Constantly adding data to the system will help Joyce’s management team identify emerging trends over time and plan operations accordingly.

- The operating data is also provided to the regional data fusion system, without company and individual truck identifiers, for long range planning and capital improvement programs that will benefit freight operations and the traveling public in general. Regional planners can find, model and evaluate Origin-Destination pairs, truck traffic volumes, travel time delays, and other factors that contribute to systemic productivity and efficiency.

While the drivers are doing their preoperations inspections, Joyce checks for the latest information on queues at the gates, traffic, incidents, and construction projects. Again, Joyce appreciates the fact that all the data is available through one system. The software has used the data to generate optimal itineraries for each driver so they can get as many turns as possible and reasonable under normal operating conditions. Seeing no new or unusual information that will impact her drivers, there are no changes to their itineraries as they go to work.

**Incident Management**

About five minutes after the trucks have pulled out, Joyce receives a new alert regarding an accident along the route that Bob and Sam were going to take. All systems are in place to help Joyce manage this kind of situation and the Gateway Cities Technology Plan added ITS coverage on the regional freeway and arterial networks to enable real-time incident information.

- Joyce’s desktop dispatching and routing system uses 511-provided traffic information and suggests an alternate routing based on approved truck routes and predicted travel times. The information she received also indicated that the accident is expected to take about an hour to clear.

- Joyce approves the suggested alternate routing for all of her trucks that had planned to use the impacted stretch of roadway within the next hour and a half.
The new routing is sent through the company’s in-vehicle system suite giving audio rerouting instructions to every driver who needs to know, based on their planned itinerary and current location.

At the same time, the new routing instructions are sent to the in-vehicle navigation systems which will audibly give drivers navigation assistance should they take a wrong turn and get off track.

Routing instructions are updated for all impacted vehicles for the expected duration of the accident clearing, based on 511 information.

All of the vehicle logs and assignment data in Joyce’s system are updated to reflect the route change for archiving actual travel time with arrival time at their destination.

Bob and Sam are able to make changes in their route and stay on schedule for their assignments. Their in-vehicle suite notifies Joyce that they have arrived at the gates on schedule, and again when they are at the pick-up point as well as when they are leaving the terminal or rail yards.

As Bob and Sam leave the terminal, their truck, chassis and containers are scanned, time-stamped, and data transmitted to the freight information system. The MTOs’ management system receives the data to update container status and notify customer of progress and status.

If this had been a MAJOR incident with sustained duration and significant impact, such as a freeway segment collapse due to an earthquake, EZ Cartage Company’s Business Continuation/Disaster Recovery Plan has been constructed to handle it using all of the available technology and data. Many freight companies have worked closely with the ports and with Caltrans, CHP and local law enforcement agencies to devise business continuation plans for rerouting trucks, redistributing activity times, and planning other actions to ensure resumed and continued freight movement activity and recovery as soon as possible after a major disruption.

**Vehicle Code Enforcement**

Max’s assignment is to pick up a full container and transport it to one of the MTO terminals. The best route suggested by the routing software and assigned by Joyce, has him taking the I-710 to the terminal after he picks up the load. A few miles before he arrives at the terminal, Max’s vehicle is subjected to a virtual
inspection. If the vehicle passes the inspection, Max will not have to stop. The TENS project has enabled the virtual inspection capability.

- Before Max gets to the enforcement facility, his tractor, chassis and container are automatically scanned for weight, length, width, and height. Detectors check the brakes, emissions and tires. The licensing, permit, and credential information for the tractor, container and chassis are scanned.

- Max gets the “all clear” to bypass the enforcement facility two miles up ahead, so he will not have to pull off the road for additional inspections. Back at the office, Joyce has received notice that Max and his truck passed the inspection and will not need to stop. The law enforcement database is updated to reflect the virtual inspection and log the place and time, as well as the findings. Joyce’s system also archives the scanned data.

- The regional planning database receives data that will help analyze the amount of time, fuel, and emissions saved by eliminating the queued stop at the enforcement facility.

Every time Bob, Sam, and Max leave or approach either port, their tractors, chassis and containers are scanned by various technologies in or alongside the roadways at key points. Weight, length, height, licensing, permitting, and safety inspection data are all collected passively, and none of them are told to pull into one of the inspection facilities. After Max does his third pick-up and leaves the port, he receives an alert to pull into the inspection/enforcement facility just ahead.

- Joyce has already received the alert and will monitor for the delay time in order to make schedule adjustments if necessary.

- The equipment at the enforcement facility is pinging Max’s truck periodically. This is providing information to planners which will be used to measure elapsed time, queue time, emissions, and other data for making inspection operations efficient. The data helps analysts determine whether pull-overs are more frequently attributed to issues with the tractor, the chassis, the container, the driver, or other factors.

- Joyce will be able to aggregate the data for her management so they can determine the total cost of inspection compliance and make changes if necessary in order to reduce the impacts.
**Longer-than-Expected Queue**

As he approaches the port, Max receives information for freight operations that the queue is a bit longer than he had expected. Joyce has also received that information and her system has checked his itinerary and determined that this will have an impact on Max’s next assignment. Joyce and Max both remember that radio driver reports were the only method of receiving gate queue information prior to implementing the Gateway Cities Technology Plan; now that information is available in real time electronically.

- Max probably will not make the next pick-up assignment in time, so Joyce reassigns it. Bob will do the pick-up instead, and Max is reassigned to a slightly later pick-up assignment in the same terminal as his original assignment.

- By making the reassignments, Joyce has minimized the amount of time that the trucks will be spending inside the terminals.

- Joyce has also archived the assignment changes to update her dispatching system data.

- The system has provided updated information to the MTO regarding truck assignments. This will help ensure that they will clear the gates as efficiently as possible.

- The system has provided data for subregional planning purposes, sans specifics such as company name.

**Shorter-than-Expected Queue**

On his second assignment of the day, Bob receives information that the queue is significantly shorter than the amount of time that was built into his itinerary. Joyce has received notification by the queue-monitoring system and can see that he will clear in a matter of minutes. Her optimization software has also alerted her to an earlier pick-up assignment.

- Joyce reassigns Bob to an earlier pickup assignment, swapping assignments with Max.

- The dispatch system has relayed the information to both of their vehicles’ audio systems, and it is also available for them to look at when they are not on the move.

- The freight management information system at the MTO terminal has been updated with the reassignments. This will expedite clearing the trucks as they pick-up the new loads and exit the terminal.
• Data available to TENS is also updated to reflect the new pairings of tractor/chassis/container.

• The information is archived so that the TIS management staff can analyze the impacts of providing real-time queue data on throughput and productivity.

• As it turns out at the end of the day, this savings in queue time and the assignment swap concludes with Bob making an extra turn, carrying one more load than his original daily itinerary had indicated. Joyce’s system has captured and archived the data so that her management can measure the impacts of making the swap, reductions in queue time, and update scheduling software parameters.

• “Planned versus actual” data is available to regional planners so they can measure the reductions in idle time, emissions, and changes in truck traffic volumes caused by reoptimization opportunities.

Construction Zone Management – Planned

Three days ago, Joyce received notification of an impending construction project that will impact a critical section of the freeway. Joyce can click for project details to learn more. The expected duration is two weeks and it is a paving/striping project. It appears that it will affect a relatively short section of the roadway, one lane at a time, and primarily at night. Joyce needs to decide if, and how, they will want to plan itineraries and routes during the construction. Her software includes a set of planning tools that allow her to test some different scenarios.

• Joyce goes into “Plan Mode”.

• She selects the segment of road impacted, the duration, and “single lane closure” option.

• Next Joyce selects a typical truck trip from the modeling menu, at a specific time of day, for the software to model. It will tell her, for example, the normal expected travel time versus the estimated travel time using the construction information, so that she can evaluate the potential travel time impact.

• Then Joyce requests “Alternate Route” modeling, to confirm travel time options. In this screen, Joyce can select alternate freeways or arterials that allow truck traffic to determine the viability of a short-term detour for a few of her trucks.

It is easier to access pending construction project updates.
After evaluating the options and looking at similar modeling for other times of the day and days of the week, Joyce selects a temporary set of rules to be used by her scheduling software for the duration of the construction. These rules will temporarily override the program only for itineraries that use the stretch of road being impacted by the construction.

The system archives the temporary rules. All data collected in the affected area during the time of construction will be automatically flagged as “construction zone” category information and forwarded to planning agencies, sans identifiers, for evaluation, impact assessment and modeling.

Once the construction project begins, Joyce will closely monitor truck operations to determine whether any changes need to be made to the routing and dispatching software for managing during the construction.

**Construction Zone Management – Unplanned**

Bob has picked up his first load and is on his way to drop it off and pick up another. As he drives along Pacific Coast Highway (PCH), he sees a traffic back-up just ahead, and determines that there is some unexpected construction underway.

Bob says “Dispatch” and is connected to Joyce.

Joyce has not yet received an alert from the truck. If Bob had not contacted her right away, her system would have very soon alerted her to his lack of movement. The amount of time Bob is not moving would be compared automatically to historical databases to determine if this is an unusual situation and not normal congestion. This helps to avoid overwhelming Joyce with false alarms.

Bob tells Joyce what he sees and indicates that it is slowing him down, but it appears that the delay will only be momentary.

Joyce calls up the construction project screen to see if there is anything noted for that stretch of PCH. There isn’t anything showing as planned.

Joyce then contacts the City public works department to request information about the construction. She notes in her system that it is scheduled to be a three-hour job, and her system notifies all drivers who have itineraries taking them that way.
Joyce then queries her system to assess the impact of adding 10 minutes of travel time to each truck scheduled to travel that way for the next three hours.

The system confirms that two of her trucks are at risk of being late for appointments. Rather than reassign them, Joyce chooses to alert the ports’ freight information management system that the two assigned trucks will be about 10 minutes late for their appointments. This will help them adjust container management and gate clearances, minimizing delays at the terminals and maintaining throughput.

**Early-Ready Container Alert**

Things are really humming along at the port this morning. Joyce both receives alerts that some of the containers that they are scheduled to pick up are ready earlier than expected. Before the Gateway Cities Technology Plan was initiated, this information was only available from the MTOs daily; now it is available in real time at any time.

Joyce selects “Bobtails”, and can see the list of bobtails that are in the current day’s schedule. She selects “Insert Pick-up” and the system presents her with a short-list of trucks which could be available for assignment to do the early pick-up.

Joyce selects the truck that she thinks would be the best choice, runs the optimization routing to verify impacts, approves the final result, and transmits the information to the driver(s) who are impacted by the change. Not only has Joyce eliminated a bobtail, but by reassigning a different truck to that pick-up, she has been able to reoptimize and two of her trucks should be able to do an extra turn each.

The terminal or rail yard management information system receives updated appointment and truck assignment information, TENS receives updated information, and the archives receive information for planning and evaluation purposes.

Interested MTOs receive advanced notification of trucks headed to their terminal, anticipated arrival times, and scheduled load pick-up/drop-off. This can support their advanced planning for efficient load transfer and help them assign staff to prevent gate queuing.
Driver-Managed Operations

Freight Haulers, Inc. (FH)

Freight Haulers Inc. (FH) is a local company with a fleet of 40 trucks, serving the Ports of Los Angeles and Long Beach. Like EZ Cartage, they have installed technology in the trucks and at the home office to help manage the fleet during business hours, keep everyone safe, and gather information that can be used for a wide range of management and planning purposes.

Under their business model, experienced drivers are given some latitude to make decisions during the day, such as selecting an alternate route in order to save time, reduce idling, and stay on schedule. This reduces direct interaction with the dispatcher, but the technology still supports the dispatcher's job to manage the resources and meet the customer needs. Experienced drivers also have access to some terminal information, such as confirmation that their next scheduled container pick-up assignment is ready, and gate queue information. This enables them to work closely with dispatch to report field conditions and make operational changes. Newer drivers do not necessarily have the latitude to make decisions on rerouting, for example, so they interact more with dispatchers.

The Tractor Suite

The tractors’ cabs all have modern equipment and systems that provide hands-free, voice activated technologies for drivers to communicate with Joyce. The equipment provides audio-based navigation assistance, traffic information, and itinerary information. Drivers can verbally request an itinerary repeat, traffic information, incident information, construction information, weather information, or terminal or rail yard information. All drivers can, by voice, request “511 Mode” to receive information pertinent to their trip. Some of the information will come from the TIS, and other information will come from their dispatcher. Less experienced drivers, also by voice, may be required by the company to request “Dispatch Mode” before taking any actions based on the information they have received.

Mike and Steve are long-time drivers for FH, while Dave is just out of training.

The Dispatcher Suite

Tom is the lead dispatcher. His software suite, which was developed for FH use, is similar to Joyce’s, and his company operating rules allow him to customize how much and what type
of interaction he has with his drivers and trucks. For example, when an experienced driver has received Freight 511 information which suggests the need to reroute in order to maintain the schedule, the driver can select and state the new planned route and the system will inform Tom of the change in plans. When a less experienced driver like Dave hears the same information, company policy is that Dave request a reroute, and Tom will use the system to issue directions. In either case, Tom, like Joyce, has the tools to ascertain the effects on other trucks with similar itineraries and issue reroute instructions to all who may be impacted. “All who may be impacted” is determined by the system’s ability to compare planned versus actual travel time, appointment time, container information, queue information, and specific locations in real time. Tom can accept the reroute suggested by the Freight 511 system, or he can develop one of his own based on company policies, and push the information to drivers. He can also see the impacts of a reroute on maintaining the schedule. If the system identifies trucks that will then arrive early or late to their destinations, Tom can ask the system to reoptimize the assignments for the day. As a result, he can reduce bobtailing, dwell time, and idle time. With these tools at his disposal he can even pick up a few extra turns here and there, improving the company’s bottom line. As with EZ Cartage, the FH software suite has been greatly enhanced by the integrated data delivered through one data stream to the dispatcher, the automated alerts and updates provided, the container location and availability, the virtual inspection capabilities and the additional coverage of traffic information for the gates, inside the terminals and on the roadways all provided by the Gateway Cities Technology Plan.

**Daily Operations Planning**

Like Joyce, Tom has received a list of orders and prepared the schedule for the day (this information is likely to be available in the afternoon of the previous day). His preoperational protocols are similar to Joyce’s, in that he does a final check on current conditions, looks for alerts, and makes sure that are no existing conditions for which he needs to make adjustments.

Unlike Joyce, Tom has also double checked to verify which of his drivers are assigned to which trucks and made sure that those who are supposed to operate in “Dispatcher Mode” are properly flagged, and those who are allowed to operate in “511 Mode” are permitted accordingly. This will allow more experienced drivers to be more autonomous in managing their work for the day, but Tom’s system will still be receiving updates and information for review and archiving purposes.
Incident Management

A few minutes after his trucks have pulled out, Tom receives the same incident advisory that Joyce received.

- Tom’s experienced drivers who operate in “511 Mode” have already received an audio advisory directly from the Freight 511 system.

  - Mike and Steve both say “Incident Details” and get audio information about the nature and expected duration of the incident. With this information, they can decide if they need to stick with the plan or make adjustments.

- Tom does a quick check on drivers who are in “Dispatch Mode,” including Dave. He decides that they should all stick with the plan and sends an audio to all of them advising them of the incident and potential delays.

- Tom can then take a few moments to assess impacts, change appointment times, and evaluate rerouting needs or alternatives for all drivers who may be impacted by the incident for the expected duration.

- Tom has two trucks that are currently picking up containers at remote facilities. He advises them to sit there and wait for 20 minutes before departing, engines off. This keeps them from getting stuck in traffic. The MTOs are advised of revised appointments for these containers.

- When Tom prepares the appointment time revisions, he checks a box for “freeway incident”. All of the updated appointment information including identifiers is available to the MTOs. All of the original AND updated appointment information, sans identifiers, is available for regional planning and evaluation purposes.

Vehicle Code Enforcement

Throughout the day, Tom will be receiving advisories as his trucks pass through inspection points. Most of the inspections will be virtual; meaning that roadside detectors and sensors will be collecting, verifying, and sending/storing information, as well as notifying trucks that they are free to pass without having to stop for a physical inspection. His fleet management suite, as well as in-vehicle technology, is intended to minimize the number of trucks that have to stop for physical inspections. Virtual inspections save lots of time and money, help keep operations running on schedule, and help him make the most efficient use of company resources. Tom is receiving a steady flow of information
from the TIS information management system, allowing him to query and manage container weights, for example, so he can manage physical inspections.

However, there will still usually be a few physical checks done every day.

- Tom and his drivers simultaneously receive notification when a truck will be required to pull over for a physical inspection.

- Information from the inspection facility will tell both Tom and the driver how long the inspection is expected to take.

- Based on what the drivers observe when they pull into the inspection station, they can trigger a query to the dispatch system to check the schedule for the impacts of the time required to do the inspection.

- Drivers can also notify Tom if it appears that the inspection will take more or less time than anticipated.

- Tom can then do a full impact assessment and determine if any schedule delays are anticipated, or if he needs to adjust any driver assignments.

- Tom can then send audible alerts to impacted drivers to notify them of any changes.

- Tom’s system keeps track of the number of physical inspections per day and he can analyze by time of day, day of week, month, or other customized period. This is used by his planning and scheduling software to build in a certain amount of time for physical inspections based on historic activity.

**Longer-than-Expected Queue**

Mike is a couple hours into his shift, and has his in-vehicle system set for “Freight 511 Mode”. The GPS in his vehicle has been sending periodic location information back to dispatch where it is available for Tom and for archives that track planned versus actual time for various aspects of Mike’s assignments for the day.

The TIS has just sent an audible update of terminal information to Mike, and simultaneously sent data to Tom, indicating that the queue at the gates through which Mike must go has increased by a few minutes.

- Mike then receives an audible “no impact, no change” alert. This tells him, and Tom, that the queue time is still within the allowable margin of error, and that the container drop-off...
appointment will also be within the acceptable timeframe. The dispatch system is not recommending any reassignments, and based on current information the subsequent pick-up will also be on time or even a few minutes earlier than planned.

- Dave, since he is new, has his in-vehicle system set for “Dispatcher Mode”. He is receiving information through Tom and the dispatch system. He has just received an audible advisory that the queue is a few minutes longer than expected and that there are no changes to his assignment.

- Steve’s situation is a bit different. He is operating in “Freight 511 Mode” and receives the same information that Mike received. However, he has a feeling that his subsequent appointment might be in jeopardy.
  - He says “Appointment”, and the system states his next three assignments. Based on his experience and the way traffic seems to be flowing, he wants to be sure about meeting the schedule.
  - Steve then says “Reschedule”. Tom receives an alert that Steve has triggered the scheduling function to reevaluate his assignments.
  - The dispatch software presents Tom with a revised itinerary for Steve, based on using MTOs’ information to reschedule the remainder of Steve’s assignments. No other trucks are affected; no assignments are swapped or eliminated. Tom approves the new itinerary.
  - The MTOs’ information system receives the updated information, Steve gets an audible “itinerary revised” notification, and all the changes are archived.
  - Steve will now receive audible and text information with his revised assignment/appointment itinerary for the day. It will be updated via the dispatch system as assignments are completed.

 shorter-than-expected Queue

Mike has just picked up a container and is headed towards an MTO’s terminal at the Port of Long Beach to drop it off. Before he starts the trip, he verifies that he is still in “Freight 511” mode.

- When Mike says “travel time,” he triggers the information system to calculate that the current real-time travel time for his trip route falls with the range of what was used by Tom to create his schedule. He should be on time.
Then Mike says “Queue.” The freight information system “knows” from Mike’s itinerary and assignment exactly where he will be going, and provides audible queue information for the specific gate through which he will pass.

This time, Mike receives an audible message that the queue is short. This means that, based on historic data, the time to get through the gates is less than the amount of time used to write Mike’s schedule for the day. If this holds, he will be early for his drop-off and subsequent pick-up appointment.

Tom has received an alert that Mike will be running hot based on the short queue, and that Mike has also recognized this and requested a possible revised schedule.

When Mike said “Reschedule,” Tom was presented with details of the situation. He can see the planned versus actual expected arrival time for the drop-off. The system has asked Tom if he would like to preview the impacts of a revision to Mike’s schedule, and Tom clicks “yes”.

Mike receives an audible message “checking schedule”. Mike starts his trip, knowing that by the time he gets into the queue line at the port terminal, he might be receiving different instructions for his next pick-up assignment.

Tom is presented with a couple options for rescheduling Mike, as well as for reassigning trips to take advantage of the time savings created by the shorter-than-expected queue. He can see that there are actually 11 of his trucks that will benefit from the shortened queue, even if that situation only lasts for a short period of time.

Tom reoptimizes his lists of assignments for several of the trucks. This will “convert” the time saved in the queue into shorter turn times, and by the time all is said and done he expects a few of his trucks to get one extra turn in before their shifts are done. By reoptimizing, Tom has reduced idle time and moved up several assignments to a time period in which there is less traffic and less congestion.

Tom can see that the reoptimization and reassignment process has included Dave, the new driver. Although Dave has been trained, this is his first day alone, and Tom wants to make sure he understands the situation and how his assignment has changed.

Tom can see that Dave is just a few minutes away from his destination and will be stopping shortly so he triggers an audible “Call Dispatcher When Stopped” to Dave.

Real-time information supports more intelligent routing.
- Tom sets an alert; if he does not take an action to show that Dave has called in within a certain number of minutes, Tom will get an audible reminder so he can check up on Dave’s location and talk to him if he is stopped.

### Construction Zone Management – Planned

Three days ago, Tom received the same construction project notification that Joyce received. Like Joyce, Tom goes into “Plan Mode” to run scenarios using some of his most standard trips, decides on what he wants to select as the standard “Alternate Route.” This will be used by every Origin-Destination pair and trip that would normally travel the affected freeway section. Tom’s system, like Joyce’s, will automatically flag all of the data collected and archived as “construction zone” data to analyze separately by his management. Individual truck and company identifiers will be removed from data that will be available to the data fusion engine used by regional planners and data analysts.

Since FH, Inc.’s more experienced drivers are given a little more latitude for selecting routing, those drivers will be able to choose whether they operate in “Dispatcher” mode or “Freight 511” mode. As there are small daily fluctuations in the construction project, these drivers will be able to verbally request travel time information for the segment affected by the construction and if it will be faster or help them keep appointments, they will be able to say “Regular Routing” or “Detour Routing” to select the route they will take. This can vary throughout the day, and experienced drivers can switch back and forth as they see fit. However, Tom’s management tools are tracking the on-time performance of drivers who select their own routing, and if there are too many subsequent changes to appointments, the drivers can be forced back into “Dispatch Mode” and prohibited from selecting their own routing.

### Construction – Unplanned

Before Dave, the new driver, began his work assignment this morning, he reviewed each of his assignments including Origin-Destination pairs. Everything was set by Tom for “standard routing” designations. This means that Dave’s in-vehicle suite has been programmed with the itinerary for the day, and if he needs any navigational assistance, all he needs to do is say “Directions” in order to receive travel aid. Since it is all preprogrammed into his on-board system, he will not have to select freeways or freeway segments in order to get the navigational assistance he needs. As Dave approaches an interchange, there is construction in progress. So far there is no traffic back-up, but things are slowing down.
Dave, being in “Dispatcher Assistance” mode, says “Delay – Construction.”

Tom, in dispatch, gets the notification that Dave has issued a delay/construction alert.

Tom issues an audible “No Change” message to Dave. This lets Dave know to stay on his planned routing.

Mike and Steve, the more experienced drivers, also see the construction and since they are in “Freight 511” mode, they say “construction information.” Their locations are provided to the 511 system, and they receive audible and text information about the nature and expected duration of the construction, as well as the impact on expected travel times. This enables them to assess their ability to keep their appointments, as well as help them to determine whether they should consider an alternate route.

Tom is using the same Freight 511 information to assess the impacts fleet-wide. Based on the current travel time impacts of the construction and historic travel times on that stretch of roadway, Tom can see that in a little while it will make sense to reroute some trucks so they can keep their appointments.

Tom creates a detour routing using approved truck routes, and sends the detour information to all of the drivers who are scheduled to travel that part of the roadway for the time during which the delays are expected to be significant to FH operations.

Drivers receive information audibly and via text, and their trip by trip data is updated.

Being a new driver, if Dave requests navigation assistance, he will receive it for the new routing.

Experienced drivers, if they request navigation, will request it directly from the Freight 511 system and may receive more than one alternative. The Freight 511 system, for each alternative, will present the information audibly to include estimated and expected arrival time at the destination. Drivers will then be able to select a reroute option by stating “Option 1”, “Option 2”, etc.

Once an option is selected by an experienced driver, Tom’s system will be updated. If necessary, MTOs will also receive updated information regarding the expected arrival time of the truck relative to the scheduled appointment time.
As Tom sees the cumulative impacts of several trucks being rerouted, he can test for several actions to take. If necessary, he can override the experienced drivers’ ability to use Freight 511 to select an alternate routing. Instead, he can select one that will be used by all drivers whether they are in “Freight 511” mode or “Dispatcher” mode. Other actions Tom can test for are reassigning pick-ups and drop-offs, changing appointment times, or changing the alternate routing.

**Early-Ready Container Alert**

Things are really humming along at the MTO this morning. Tom receives alerts that some of the containers’ scheduled pick-up is ready earlier than expected.

Tom selects “Bobtails”, and can see his list of bobtails that are in the current day’s schedule. He selects “Insert Pick-up” and the system presents him with a short-list of trucks which could be available for assignment to do the early pick-up.

- Tom, on the other hand, does not have any bobtail trips available to plug into the schedule to do the early pick-up, so he cannot make reassignments in the same way that Joyce did.

- Tom’s drivers DO receive notices that their assigned containers are ready ahead of schedule. Depending on traffic conditions, when drivers receive notification that their planned pick-ups are ready early, they can request “Appointment” or “Schedule” to revise their appointment schedule, or they can request “Dispatch” to have Tom check for them. Since containers are ready early, and FH operations people have that information, and depending on how the gate queue is running, there are opportunities here to reduce idle time and wait time, minimize turn time, schedule breaks efficiently, and reoptimize assignments to reduce bobtails.

  - Mike was going to take an early lunch break, but decides instead to pick up his early-ready container and make the delivery as soon as possible in order to avoid heavier traffic later on.
  - While Mike is at the port terminal picking up the early-ready container, he advises Tom by voice or text.
  - The early pick-up is archived.
  - The port terminal can accelerate another container into the spot vacated by the one that Mike just picked up early.
- The early-ready information is converted to ‘early arrival’ information for the recipient of the container so they will have a way to know it is coming early.

**Arterial Smart Corridor Information**

Some portions of critical arterials have been equipped with a variety of technologies that help the cities in the Gateway Cities subregion collect information and manage traffic flows. Signals are synchronized, and cycles can be adapted in real time to adjust to traffic volumes or manage incidents. This information is provided to Tom’s drivers in “511 Mode”, and is available to him on his desktop. It is also available to Joyce, but not to her drivers because her company policies do not give drivers latitude to change routing. Prior to implementation of the Gateway Cities Technology Plan information on arterial operations was not available.

Both of their companies’ policies are to keep trucks on the freeways as much as possible. Modeling and planning tools, using historic data, put highest priority on selecting routings that maximize the use of freeways. The algorithm for making real-time adjustments during the day also prioritizes using freeways where possible, and gives Smart Corridors second priority, followed by all other approved truck routing alternatives.

Both Tom and Joyce have noticed that as Arterial Smart Corridors come online the truck travel time becomes more regular and more predictable for use by their scheduling software. They use the data in several significant ways:

- Tom’s drivers, when in “511 Mode,” can use real-time speed data to make decisions between selecting two arterials for the non-freeway portion of a trip. This will help them keep their appointments on time.

- Joyce’s system will alert her if arterial speeds drop below a certain threshold. She can then determine if she wants to take an action and direct her drivers to use an alternate arterial for the non-freeway portions of their trips.

- Both Joyce and Tom have noticed that as Smart Corridors add data to the system it is useful for more accurately predicting travel times and setting appointment schedules. Since the travel times as planned are more accurate, there are fewer cushions in their schedules so operations are more efficient.

- They know that in the event of major incidents, the signals on Smart Corridors will be managed to keep traffic flowing, which will help with smooth truck operations as well.
Any proprietary information shared with public agencies will be “scrubbed” to keep it proprietary but so it can be used for public purposes or historical data for public agency use and planning.

There examples are used to “highlight” how the technology projects outlined in this concept of operations can be used and be beneficial. The next steps to implement are outlined and detailed in the Business Plan, which show the decision steps to begin to implement technology projects.
## Appendix A. Goods Movement
### User Needs and Project Benefits

Source: GCTPGM User Needs Summary.

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<thead>
<tr>
<th>Need</th>
<th>Addressed by Project</th>
<th>Project Benefit</th>
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</thead>
<tbody>
<tr>
<td>Need for LA Safe 511 to be in Spanish as well as English</td>
<td>Freight TIS/Data Fusion</td>
<td>Enhance the range of coverage for full trip information available to freight operators</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Increased availability of freight traveler information</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Improved efficiency in drayage dispatching and trucking operations</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td></td>
<td>Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers</td>
</tr>
<tr>
<td>Need for a greater detail of real-time traffic information around both ports (specifically wait times at the terminal gates)</td>
<td>Freight TIS/Data Fusion</td>
<td>Better management of congestion at the Ports of LA and Long Beach, I-710 freeway and the arterial corridors</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Reduced congestion at the POLA and POLB, I-710 freeway, and the arterial corridors</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td></td>
<td>Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td></td>
<td>Improved terminal throughput through the use of real-time information on terminal gate queues</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td></td>
<td>Improved terminal throughput through the use of real-time information on trucks approaching terminals</td>
</tr>
<tr>
<td>Need</td>
<td>Addressed by Project</td>
<td>Project Benefit</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>There is a need to identify an ongoing operator and maintainer for</td>
<td>None</td>
<td>POLA/POLB will be addressing this issue independently</td>
</tr>
<tr>
<td>ATMIS system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need for high quality real-time traffic condition data on major</td>
<td>Arterial Smart</td>
<td>Complete and upgraded ITS infrastructure coverage on key freight route arterials</td>
</tr>
<tr>
<td>arterials used for goods movement</td>
<td>Corridor</td>
<td></td>
</tr>
<tr>
<td>Need for better signal coordination along major arterials used for</td>
<td>Arterial Smart</td>
<td>Improved freight mobility on designated freight route arterials</td>
</tr>
<tr>
<td>goods movement</td>
<td>Corridor</td>
<td></td>
</tr>
<tr>
<td>No TMC in the region is currently focusing on freight transportation</td>
<td>Freight TIS/Data</td>
<td>Provides freight operators with a one stop source for full trip information</td>
</tr>
<tr>
<td>operations or archiving goods movement related data for performance</td>
<td>Fusion</td>
<td></td>
</tr>
<tr>
<td>measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeway TIS/Data Fusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance the range of coverage for full trip information available to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>freight operators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeway TIS/Data Fusion</td>
<td></td>
<td>The ability to detect, respond to, and alert others of, freight-impacting incidents</td>
</tr>
<tr>
<td>Freeway Smart Corridor for Freight</td>
<td></td>
<td>Increased traffic management capabilities for the Freight TIS and Caltrans for all the freeway corridors</td>
</tr>
<tr>
<td>Need</td>
<td>Addressed by Project</td>
<td>Project Benefit</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Improved travel time reliability due to the availability of freeway</td>
<td>Freeway Smart Corridor for Freight</td>
<td>Traveler Information for Freight Traffic</td>
</tr>
<tr>
<td>En-route information for freight alternative routes and travel times</td>
<td>Freeway Smart Corridor for Freight</td>
<td>Truck classification and lane-by-lane information</td>
</tr>
<tr>
<td>Complete and upgraded ITS infrastructure coverage on key freight</td>
<td>Arterial Smart Corridor</td>
<td>The ability to detect, respond to, and alert others of, freight-impacting incidents</td>
</tr>
<tr>
<td>Route arterials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete and upgraded ITS infrastructure coverage on key freight</td>
<td>Arterial Smart Corridor</td>
<td>The ability to detect, respond to, and alert others of, freight-impacting incidents</td>
</tr>
<tr>
<td>The ability to detect, respond to, and alert others of, freight-impacting incidents</td>
<td>Arterial Smart Corridor</td>
<td>Faster identification, response, and clearing of incidents</td>
</tr>
<tr>
<td>Improved ability to monitor and disseminate queue information to</td>
<td>Container Moves Productivity Improvements</td>
<td>Improved terminal throughput through the use of real-time information on terminal gate queues</td>
</tr>
<tr>
<td>Improved Ability to Monitor and Disseminate Queue Information to</td>
<td>Container Moves Productivity Improvements</td>
<td></td>
</tr>
<tr>
<td>The use of real-time information on terminal gate queues</td>
<td>Container Moves Productivity Improvements</td>
<td></td>
</tr>
<tr>
<td>The use of real-time information on terminal gate queues</td>
<td>Container Moves Productivity Improvements</td>
<td></td>
</tr>
<tr>
<td>Lower shipping costs for goods that will benefit the commerce of the</td>
<td>Data Dissemination</td>
<td>Reduced pollution in the Southern California region</td>
</tr>
<tr>
<td>Overall economy of the nation and jobs for the region</td>
<td>Data Dissemination</td>
<td></td>
</tr>
<tr>
<td>Reduced pollution in the Southern California region</td>
<td>Data Dissemination</td>
<td></td>
</tr>
<tr>
<td>Reduced queue and turn times</td>
<td>Data Dissemination</td>
<td></td>
</tr>
<tr>
<td>Need</td>
<td>Addressed by Project</td>
<td>Project Benefit</td>
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<tr>
<td>Container Moves Productivity Improvements</td>
<td>Improved terminal throughput through the use of real-time information on terminal gate queues</td>
<td></td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>Improved terminal throughput through the use of real-time information on trucks approaching terminals</td>
<td></td>
</tr>
<tr>
<td>Improve quality and dissemination of marine terminal gate queue data to drayage truck fleets</td>
<td>Container Moves Productivity Improvements</td>
<td>Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers</td>
</tr>
<tr>
<td>Congestion within marine terminals</td>
<td>Data Dissemination</td>
<td>Improved MTO operations</td>
</tr>
<tr>
<td>Extra drayage trips</td>
<td>Container Moves Productivity Improvements</td>
<td>Reduced number of truck trips and/or reduced bobtails</td>
</tr>
<tr>
<td>Need better communication of issues/closures at terminals to truck fleets</td>
<td>Freight TIS/Data Fusion</td>
<td>Provides freight operators with a one stop source for full trip information</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td>Improved efficiency in drayage dispatching and trucking operations</td>
<td></td>
</tr>
<tr>
<td>Need better sharing of information between MTOs and drayage truck fleet drivers</td>
<td>Freight TIS/Data Fusion</td>
<td>Provides freight operators with a one stop source for full trip information</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers</td>
<td></td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>Improved ability to monitor and disseminate queue information to support drayage dispatchers and drivers</td>
<td></td>
</tr>
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<td>Need</td>
<td>Addressed by Project</td>
<td>Project Benefit</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Improved and expanded goods movement scheduling system to help reduce delay inside and outside the terminals</td>
<td>Freight TIS/Data Fusion</td>
<td>Goods movement (container) productivity improvements</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Improved efficiency in drayage dispatching and trucking operations</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>Freight TIS/Data Fusion</td>
<td>Develop public-private long-term program to lead the regional development of goods movement efficiency projects</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>Data Dissemination</td>
<td>Data on most effective container movement efficiency technologies</td>
</tr>
<tr>
<td>Provide rail yards and customers with more timely container arrival information</td>
<td>Freight TIS/Data Fusion</td>
<td>Goods movement (container) productivity improvements</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Improved efficiency in drayage dispatching and trucking operations</td>
</tr>
<tr>
<td>Truck congestion on key Gateway Cities roadways</td>
<td>Freight TIS/Data Fusion</td>
<td>Better management of congestion at the Ports of LA and Long Beach, I-710 freeway and the arterial corridors</td>
</tr>
<tr>
<td>Data Dissemination</td>
<td></td>
<td>Reduced congestion at the POLA and POLB, I-710 freeway, and the arterial corridors</td>
</tr>
<tr>
<td>Freeway Smart Corridor for Freight</td>
<td></td>
<td>Reduction in congestion</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td></td>
<td>Reduced freight congestion and emissions in the Gateway Cities subregion</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td></td>
<td>Development of a system to increase throughput of trucks in the I-710 freight corridor and improve safety as well</td>
</tr>
<tr>
<td>Other data issues that negatively impact drayage productivity</td>
<td>Freight TIS/Data Fusion</td>
<td>Enforcement coordination</td>
</tr>
<tr>
<td>Need</td>
<td>Addressed by Project</td>
<td>Project Benefit</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Need for public-sector to obtain better freight travel data</td>
<td>Freight TIS/Data Fusion</td>
<td>Enhance the range of coverage for full trip information available to freight operators</td>
</tr>
<tr>
<td>Need for capacity expansion for truck parking</td>
<td>Truck Enforcement Network System</td>
<td>Improve Truck Enforcement Facility design, through the use of automation, to maximize the effectiveness and efficiency of enforcement operations</td>
</tr>
<tr>
<td>Private-sector need for better regional freight ATIS</td>
<td>Data Dissemination</td>
<td>Enable and encourage the gradual creation of a vibrant market of private web and mobile freight travel informational products</td>
</tr>
<tr>
<td>I-710 ITS Infrastructure Improvements</td>
<td>Freeway Smart Corridor for Freight</td>
<td>Complete and upgraded ITS infrastructure coverage on key freight freeway corridors</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Proven operational and technical concepts to act as inputs to the design and operations for the I-710 corridor, and in particular the truck-only lanes on the I-710 corridor</td>
<td></td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Direct input to the I-710 design based on test results and lessons learned</td>
<td></td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Established research group and partnership that would allow for continued testing and development leading up to the ultimate construction and opening of truck-only lanes on I-710</td>
<td></td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Development of a system to increase through put of trucks in the I-710 freight corridor and improve safety as well</td>
<td></td>
</tr>
</tbody>
</table>
### Need Addressed by Project

<table>
<thead>
<tr>
<th>Need</th>
<th>Addressed by Project</th>
<th>Project Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for greater information exchange regarding existing parking</td>
<td>Data Dissemination</td>
<td>Freight 511 will provide static parking information for the port area.</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>Drayage operators are required to provide their own parking resources</td>
</tr>
<tr>
<td>Truck Enforcement Network System</td>
<td>Identifying potential additional sites for Truck Enforcement Facilities to meet the large number of truck movements per day in the Gateway Cities subregion</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B. Definition of Terms

3PL Third-Party Logistics
ACC Adaptive Cruise Control
ADMS Archived Data Management System
ADS Agency Data Server
ADT Average Daily Traffic
AERIS Applications for the Environment: Real-Time Information Synthesis
AI Artificial Intelligence
AMS Analysis Modeling and Simulation
ASV Advanced Safety Vehicle
ATA American Trucking Associations
ATCS Adaptive Traffic Control System
ATDM Active Transportation and Demand Management
ATIS Advanced Traveler Information Systems
ATMIS Advanced Transportation, Management, Information, and Security
ATMS Advanced Transportation Management System
ATSAC Advanced Traffic Surveillance and Control
AVL Automatic Vehicle Location
BCO Beneficial Cargo Owners
BNSF Burlington Northern Santa Fe
BOC Bus Operations Center
Gateway Cities Concept of Operations

BRT Bus Rapid Transit
BUC Back Office Use Case
C-TIP Cross Town Improvement Program
Caltrans California Department of Transportation
CAD Computer-Aided Dispatch
CAMP Crash Avoidance Metrics Partnership
CATI Computer-Aided Telephone Interviewing
CCTV Closed-Caption Television
CDI Command Data Interface
CHP California Highway Patrol
CMS Changeable Message Signs
CO₂ Carbon Dioxide
ConOps Concept of Operations
CPU Central Processing Unit
CTA California Trucking Association
CUT Chassis Utilization Tracking
CVEF Commercial Vehicle Enforcement Facilities
CVEN Commercial Vehicle Enforcement Network
CVHAS Cooperative Vehicle-Highway Automation Systems
CVHS Cooperative Vehicle Highway Systems
CVII Commercial Vehicle Infrastructure Integration
CVIS Cooperative Vehicle-Infrastructure Systems
CVO Commercial vehicle Operations
CVTA Connected Vehicle Trade Association
CWWP Commercial Wholesale Web Portal
Gateway Cities Concept of Operations

DARPA Defense Advanced Research Projects Agency
DHS Department of Homeland Security
DMA Dynamic Mobility Applications
DMV Department of Motor Vehicles
DOT Department of Transportation
DRG Dynamic Route Guidance
DSRC Dedicated Short-Range Communications
DTL Dedicated Truck Lane
DVIR Driver Vehicle Inspection Report
E-seal Electronic Tag Seal
EDO Equipment Delivery Order
EIR Environmental Impact Report
EIS Environmental Impact Statement
EOBR Electronic On-Board Recorder
EOC Emergency Operations Center
EPA Environmental Protection Agency
ERS Event Reporting Subsystem
ESCM Electronic Supply Chain Manifest
ESGV East San Gabriel Valley
ETA Estimated Time of Arrival
ETC Electronic Toll Collection
FCC Federal Communications Commission
FEC Florida East Coast
FEU Forty-foot equivalent unit
FHT Foothill Transit
Gateway Cities Concept of Operations

FHWA Federal Highway Administration
FMCSA Federal Motor Carrier Safety Administration
FMR Fleet Monitoring and Reporting
FMVSS Federal Motor Vehicle Safety Standards
FOT Field Operational Test
FRATIS Freight Advanced Traveler Information System
FSP Freeway Service Patrol
FV Following Vehicle
GCCOG Gateway Cities Council of Governments
GMTMC Goods Movement Transportation Management Center
GPS Global Positioning System
GTC Genesee Transportation Council
HAR Highway Advisory Radio
Hazmat Hazardous Materials
HDT Heavy-Duty Truck
HOS Hours-of-Service
HOT High-Occupancy Toll
HOV High-Occupancy Lane
HPA Houston Port Authority
HTA Harbor Trucking Association
HVTS Hazmat Transport Vehicle Tracking System
ICC Maryland’s Intercounty Connector
ICM Integrated Corridor Management
ICTC Intermodal Container Transfer Facility
IEN Information Exchange Network
IFTA International Fuel Tax Agreement
IFTWG Intermodal Freight Technology Working Group
IMEX Intermodal Move Exchange
ISA Intelligent Speed Adaptation
ISP Internet Service Providers
ISTEA Intermodal Surface Transportation Efficiency Act
ITCS Integrated Traffic Control Systems
ITE Institute of Transportation Engineers
ITS Intelligent Transportation Systems
IV Intelligent Vehicle
IVR Interactive Voice Response
IXT International Express Transportation
JCCC Joint Command and Control Center
KTC Kentucky Transportation Center
LA Metro Los Angeles County Metropolitan Transportation Commission
LA SAFE Los Angeles County Service Authority for Freeways and Emergencies
LACDPW Los Angeles County Department of Public Works
LACFD Los Angeles County Department of Los Angeles County Fire Department
LADOT City of Los Angeles Department of Transportation
LARTMC Los Angeles Regional Transportation Management Center
LASD Los Angeles County Sheriff Department
LATC Los Angeles Transportation Center
LAWA Los Angeles World Airports
LBT Long Beach Transit
LCC Local Control Center
LCS Lane Closure System
LIDAR Laser Radar
LIVIC Laboratory for the Interactions between Vehicles, Infrastructure, and Conducteurs
LPR License Plate Reader
LTE Long-Term Enhancements
LV Lead Vehicle
MARS Mobile Autonomous Robot Software
MATIS Motorist Aid and Traveler Information System
MCP Mobile Computing Platform
MdTA Maryland (Toll) Transportation Authority
METI Ministry of Economy, Trade, and Industry
MTO Marine Terminal Operator
NAHSC National Automated Highway System Consortium
NATSO National Association of Truck Stop Owners
NATSN North American Truck Stop Network
NCFRP National Cooperative Freight Research Program
NEDO New Energy and Industrial Technology Development Organization
NHS National Highway System
NHTSA National Highway Traffic Safety Administration
NET Near-Term Enhancements
O&M Operations and Maintenance
OBC On-Board Computer
OCTA Orange County Transportation Authority

OFM Office of Freight Management and Operations

OOS Out of Service

OS/OW Oversize/Overweight

OSAP Open Source Architecture Package

OV Other Vehicle

PATH Partners for Advanced Transportation Technology

PANYNJ Port Authority of New York and New Jersey

PCS Port Community System

PDA Personal Digital Assistant

PELOPS Program for the Development of Longitudinal Traffic Processes in System Relevant Environment

PeMS Performance Measurement System

PFV Potential Following Vehicle

PIMS Port Information Management System

POLA Port of Los Angeles

POLB Port of Long Beach

PPV Potential Platooning Vehicle

PUC Platoon Use Case

RCTO Regional Concepts for Transportation Operations

RDF Relational Database Format

RFID Radio Frequency Identification

RIITS Regional Integration of Intelligent Transportation Systems

RITA Research and Innovative Technology Administration
ROC Rail Operations Center
RSE Roadside Equipment
RUI Regional User Interface
RTOC Regional Traffic Operations Center
RTTM Real-Time Traffic Monitoring
SAFETEA-LU Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SANBAG San Bernardino Associated Governments
SARTRE Safe Road Trains for the Environment
SCAG Southern California Association of Governments
SCIG Southern California International Gateway
SDMS Safety Data Message Set
SMBBB Santa Monica Big Blue Bus
SMS Safety Measurement System
SNRA Swedish National Road Administration
SWTC Southwest Public Safety Technology Center
TA Travel Centers of America
TDC Traveler Information Data Collection
TEU Twenty-foot equivalent unit
TI Traveler Information
TIC Traveler Information Center
TIM Traffic Incident Management
TMF Traffic Mitigation Fee
TOC Traffic Operations Center
TOT Truck-Only Toll
TSA U.S. Transportation Security Administration
TSE Truck Stop Electrification
TRP Truck Replacement Program
TTMD Traffic Management Data Dictionary
TTMS Travel Time Management Systems
TTSG TurnTime Stakeholder Group
TWP Twisted-Wire-Pair
UMTRI University of Michigan Transportation Research Institute
UP Union Pacific
USC University of Southern California
V2I Vehicle-to-Infrastructure
V2V Vehicle-to-Vehicle
V/C Volume-to-Capacity
VCTC Ventura County Transportation Commission
VHI Vehicle Hours Traveled
VMT Vehicle Miles Traveled
VPN Virtual Private Network
VSCC Vehicle Safety Communications Consortium
WDU Wireless Drayage Updating
WRI Wireless Roadside Inspection

Provided under separate cover.
Appendix D. CD – Final Conceptual Goods Movement Project Descriptions Report

Provided under separate cover.
Appendix E. CD – FRATIS Concept Information for FHWA

Provided under separate cover.