GATEWAY CITIES TECHNOLOGY PLAN FOR GOODS MOVEMENT

Business and Implementation Plan

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SUBMITTED TO: Los Angeles Metropolitan Transportation Authority & Gateway Cities Council of Governments
SUBMITTED BY: Cambridge Systematics, Inc.

Metro

Gateway Cities Council of Governments
Gateway Cities Technology Plan for Goods Movement

Business and Implementation Plan

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date
November 2012
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## Definition of Terms

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ACC</td>
<td>Adaptive Cruise Control</td>
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<tr>
<td>AQMD</td>
<td>Air Quality Management District</td>
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<tr>
<td>ATMIS</td>
<td>Advanced Transportation Management and Information System</td>
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<td>ATMS</td>
<td>Advanced Transportation Management System</td>
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<tr>
<td>Caltrans</td>
<td>California Department of Transportation</td>
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<td>BCO</td>
<td>Beneficial Cargo Operators</td>
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<tr>
<td>CCTV</td>
<td>Closed-Caption Television</td>
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<td>CHP</td>
<td>California Highway Patrol</td>
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<td>CMS</td>
<td>Changeable Message Sign</td>
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<tr>
<td>ConOps</td>
<td>Concept of Operations</td>
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<tr>
<td>COTS</td>
<td>Commercial-Off-the-Shelf</td>
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<td>CSTAN</td>
<td>Countywide Significant Truck Arterial Network</td>
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<tr>
<td>DARPA</td>
<td>Defense Advanced Research Projects Agency</td>
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<tr>
<td>DHS</td>
<td>Department of Homeland Security</td>
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<td>DOT</td>
<td>Department of Transportation</td>
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<td>DPW</td>
<td>Department of Public Works</td>
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<td>DSRC</td>
<td>Dedicated Short Range Communication</td>
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<td>FEMA</td>
<td>Federal Emergency Management Agency</td>
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<td>FHWA</td>
<td>Federal Highway Administration</td>
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<td>FRATIS</td>
<td>Freight Advanced Traveler Information System</td>
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<td>FRS GP</td>
<td>Freight Rail Security Grant Program</td>
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<td>GCCOG</td>
<td>Gateway Cities Council of Governments</td>
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<td>GHG</td>
<td>Greenhouse Gas</td>
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<td>GMEC</td>
<td>Goods Movement Efficiency Committee</td>
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<td>HOV</td>
<td>High-Occupancy Vehicle</td>
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HTA    Harbor Trucking Association
I2O    Information Innovation Office
IEN    Information Exchange Network
ITS    Intelligent Transportations Systems
IVR    Interactive Voice Response
LA Metro Los Angeles County Metropolitan Transportation Authority
LA SAFE Los Angeles County Service Authority for Freeway Emergencies
MPO    Metropolitan Planning Organization
MTO    Marine Terminal Operators
NHPP   National Highway Performance Program
O&M    Operations and Maintenance
OCR    Optical Character Recognition
OEM    Original Equipment Manufacturer
OPSG   Operation Stonegarden
POLA   Port of Los Angeles
POLB   Port of Long Beach
PS&E   Plans, Specifications and Estimate
PSGP   Port Securing Grant Program
RFID   Radio Frequency Identification
RIITS  Regional Integration of ITS projects
RITA   Research and Innovative Technology Administration
RSSM   Rail Security-Sensitive Materials
SAFETEA-LU Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SHOPP  State Highway Operation and Protection Program
STIP   State Transportation Implementation Program
STP    State Transportation Funds
TCS    Traffic Control System
TEF    Truck Enforcement Facilities
TENS   Truck Enforcement Network System
TIFIA  Transportation Infrastructure Finance and Innovation Act
TIP    Transportation Improvement Program
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>TIS</td>
<td>Traveler Information System</td>
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<td>TMC</td>
<td>Traffic Management Center</td>
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<td>TSP</td>
<td>Transportation Strategic Plan</td>
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<tr>
<td>UASI</td>
<td>Urban Areas Security Initiative</td>
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<td>VMT</td>
<td>Vehicle Miles Traveled</td>
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<td>VWIM</td>
<td>Virtual Weigh in Motion</td>
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<td>WIM</td>
<td>Weigh-in-Motion</td>
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Summary and Roadmap

The Gateway Cities Technology Plan for Goods Movement study creates a wide ranging program and details how technology can be leveraged to improve and make goods movement more efficient in the Gateway Cities and the larger Los Angeles County region. This program is comprised of six initial, separate but interrelated projects (from the 13 technology projects from the Final Conceptual Goods Movement Project Descriptions Report and the Final Concept of Operations Report); focusing on traveler information, traffic management infrastructure, and safety/enforcement, as well as private sector drayage and terminal management technologies. This report documents the Business and Implementation Plan for the program. It provides the following:

- Detailed description of the steps needed for implementation for each project within the program, to include expected outcomes and benefits for stakeholders involved.
- Identification of how these projects could benefit both the public and private sectors.
- Schedules for each project delineated by major milestones.
- Identification of project costs, including long-term operations, maintenance, and replacement costs, along with potential funding sources (A detailed discussion of potential funding sources is documented in Appendixes A and B).
- Identification of interrelationships among each project, along with where projects can move ahead independently.
- Identification of potential implementing agencies and potential implication on staffing requirements.
- Identification of how performance measures will be utilized to monitor progress at major milestones.
- A list of first steps projects (to include demonstration projects).

This section provides a summary of the overall Business and Implementation Plan. It provides an overall graphical view, or roadmap, of the plan (Figure 1.1). This section also includes a summary of the initial recommended projects and next steps in developing this program. These are detailed out in this section so the reader can assess quickly (without reading the entire document) the key elements of the program that should be accomplished next to maintain the positive momentum of this current effort.
Figure S.1 Gateway Cities Technology Plan for Goods Movement Roadmap

- System Level Needs and Requirements Study
- Data Warehouse System Design and Deployment
- Data Dissemination System Design and Deployment
- Transportation Information System Operations Development
- Prototype Data Procurement and Integration
- Establish Freight Focused Regional Arterial Group
- Freight Specific Arterial Assessment
- Design
- Deployment + Monitoring
- Design
- Deployment
- Integration + Maintenance
- FRATIS Program (Los Angeles)
- Gateway Cities Strategic Plan
- Detailed Concept of Operations
- Testing + Proof of Concept
- Ongoing Research + Strategic Planning + Implementation
- Independent Evaluation

Months: 6 12 18 24 30 36
INITIAL PROJECTS AND NEXT STEPS

The Business and Implementation Plan for the Gateway Cities Technology Plan for Goods Movement study is the culmination of over 14 months of study and analysis. It outlines a comprehensive program for the initial technology projects that leverage technology to improve the efficiency of goods movement in the Gateway Cities region. These efficiency improvements will result in productivity benefits to the private sector goods movement community, better utilization of current and future transportation resources, and will also support the sustainability goals of the region. The way forward for each of these projects is detailed in Section 2.0. This section, however, outlines the immediate next steps that are recommended to move the program forward. The next steps detailed here include elements from each of the projects described later. These actions all can be carried out immediately. Some would have direct and immediate impact in the region; while others would build the needed foundation for larger components at a later date. As these projects are initiated it is critical that stakeholders begin to identify potential sources of funding for ongoing operations and maintenance of these projects. This is a major challenge and critical to the long-term success of all projects.

1. **Establish Goods Movement Efficiency Committee (GMEC) and Continue to Deploy.** Success of this overall program rests on an active partnership between the private sector goods movement and the public sector transportation communities. The formation of a Goods Movement Efficiency Committee, as a follow-on to this study’s successful Intelligent Transportation Systems (ITS) Working Group, would provide for the continuing collaborative public-private guidance for the planning, development, deployment, testing, operations, and maintenance of the Container Movement Productivity Improvements Program detailed in Section 2.4 of this document. The intention here would be to test the integration of these technologies as applications that drayage dispatchers, truck drivers, and Marine Terminal Operators (MTO) operations personnel could access and use – both through computer and mobile device applications. This goal will only be achieved through active participation and increased partnership with Beneficial Cargo Operators (BCO), MTOs, and drayage companies active in the region. The Goods Movement Efficiency Committee’s active guidance would help ensure its success by bringing MTOs to the table to share gate queue information, or drayage companies to share arrival times. Technology is the enabler for the potential increases in efficiency sought through this overall program, but the success will be based on active and interested participation and outputs that are developed incrementally and dependably.

The Committee can also address all the other aspects and technology projects shown in Figure 1.1. All these projects and their integration with
each other will be implemented quicker and with better results with input, analysis, and evaluation by the committee.

Finally, the ITS Working Group needs to decide if they want to continue or be incorporated into the GMEC.

2. **LA 511 in Spanish.** The ability to provide the Los Angeles County Service Authority for Freeway Emergencies’ (LA SAFE) 511 traveler information content in Spanish, as well as English, was a major regional need identified in through this study. LA SAFE has recognized this need and is currently testing an enhancement to their system that would provide this content on their web site and through their 511 telephony system. An early action item for the Technology Plan for Goods Movement should be to support these efforts as appropriate, and ensure that any freight-focused traveler information system design leverages and augments LA SAFE’s efforts in providing English and Spanish through their system.

3. **Purchase vendor arterial speed data and integrate with LA SAFE’s regional 511 system.** One of the highest priorities identified by the drayage community was the need to have a better understanding of traffic conditions on arterials in the Gateway Cities region. The current deployment of arterial ITS elements in the region, specifically detection data, does not provide this information in a comprehensive manner. Therefore, one of the first steps forward should be to explore the feasibility of purchasing third-party vendor speed data and integrating that data into the current LA SAFE platform. This should be coordinated with a marketing/outreach effort to promote the availability of this new data into the LA SAFE 511 system, as well as plans to promote the traveler information elements developed in later phases of this overall program. It should be noted that building the business case for the purchasing of this data needs to be the very first step in assessing the potential to integrate this data. The LA SAFE program has an already full program of future enhancements, how this new data fits into those priorities and how it can be not only funded initially but in out years will be established as part of this effort.

4. **Analyze, prioritize, and conceptually design candidate Arterial Smart Corridors.** As noted earlier, one of the highest priorities identified by the drayage community was the need to have a better understanding of traffic conditions on arterials in the Gateway Cities region. The current deployment of arterial ITS elements, specifically detection data, in the region does not provide this information in a comprehensive manner. The total number of arterial corridors that the drayage community is concerned about is a smaller subset of the all of the arterials in the Gateway Cities region. This next step project would develop, through a quantitative stakeholder involved methodology, a comprehensive list of arterials that should be the focus of enhanced signal coordination efforts and ITS
field devices, such as traffic management cameras and dynamic message signs. This effort would be done in coordination with other regional, county, and city signal upgrade and interjurisdictional projects in the region. Specifically, this project would integrate with related Los Angeles County Metropolitan Transportation Authority (LA Metro) and LA County of Public Works programs. Finally, this project would create conceptual designs of these arterials, and provide these plans to the responsible local municipalities to assist them in competing for funding for implementation. The ultimate goal would be to provide more accurate traveler information along these corridors, as well as enhanced traffic and incident management capabilities.

5. **Freeway Smart Corridor Deployment Plan.** This study has documented the known gaps in the ITS deployment on some key regional corridors, as well as the need for increased and dedicated funding for operations and maintenance of the current ITS devices. This next step project would confirm the gaps in the system that were identified in this project, identify any additional gaps, and then develop a detailed deployment plan to fill those gaps. The deployment plan will identify needs and make recommendations for the infrastructure to be deployed on each corridor within the project limits. The corridors will be prioritized for deployment based on needs and operational analysis. The plan will describe the sequencing and phasing of deployment of the project corridors, and include cost estimates. The plan also will include recommendations and plans for refurbishing and/or upgrading of existing equipment. The I-710’s freight corridor should also be considered as part of this plan; and conceptual plans for the deployment of technology along that corridor (to include zero emission, ITS, and connected vehicle infrastructure) will be developed in coordination with ongoing design efforts in the region. The ultimate goal would be to provide more accurate traveler information along these corridors, as well as enhanced traffic and incident management capabilities.

6. **System Requirement and Architecture for a Freight-Focused Traveler Information System.** The freight-focused traveler information system, detailed in Section 2.1 of this document, includes a comprehensive approach to building and maintaining a system that would gather traveler information on key freight corridors (both arterial and freeway); and create custom freight-focused telephone, web, and mobile-based traveler information products. In reality, much of what is detailed in this document, as well as the project description in the Final Conceptual Goods Movement Projects Description Report, could be accomplished by building and expanding the assets available today within the current LA SAFE 511 system. This project would take the development of these concepts to the next phase. Steps would include finalizing which data elements should (or could) be integrated with the 511 system. Tasks will include determining key system and architecture requirements, evaluating system
alternatives, and developing wireframes (computer screen mockups that show what the user interface will look like when functional) of potential freight-focused 511 webpages and mobile apps. It is possible that a private sector or public-partnership solution could emerge outside the 511 system. In this case, a different model for integration would be considered. As noted above, it should be noted that building the business case for creating this element within LA SAFE 511 needs to be the very first step in assessing the potential to integrate this functionality.

7. **Autonomous Truck Research.** A critical component to the success of the I-710 dedicated freight corridor could be how much autonomous vehicle technology increases the overall efficiency of trucks traveling the corridor. This first step would be to develop a detailed technical Concept of Operations for this research effort. This document would resolve some important questions, such as location of the test corridor; the initial operational test environment, including exact components that would be tested (done in coordination with other agencies and the Federal Highway Administration (FHWA) and other national efforts currently underway); the details of what is needed in the test corridor and test bed vehicles; and an enhanced framework and understanding of how the test results may fit into the I-710 truck lanes environment.

8. **Concept of Operations for I-710 Freight Corridor.** The I-710 freight corridor will heavily leverage technology for its operations. Toll, autonomous vehicles, zero emission, and traffic management technologies will all play a role in the daily operations of that corridor. A general concept has been advanced through this project, but more precise functional requirements need to be developed. For example, how are incidents or periodic maintenance approached? Do solutions to those issues lead to design impacts? Who is responsible for operations of the corridor? This progression of design can continue without knowing the precise technologies to be used. No matter which suite of technologies is ultimately implemented, however, it is important to develop, as soon as possible, a full Concept of Operations to guide the systems design work that currently is underway. The Concept of Operations will establish and describe the set of functions that the system(s) must perform, identify implementation and operating responsibilities, and establish a set of needs for the design teams to address. It is important that the Concept of Operations identify the universe of technology options that are known as of today, and understanding there will be changes over time. A strategy for tracking and responding to technological developments should also be included.

9. **Truck Enforcement Network (TEN).** This is an evolving project that is running in parallel and in coordination with the Gateway Cities Technology Plan for Goods Movement study. The separate report, entitled *Feasibility Study Report for the Implementation of a Truck Enforcement Network System*
for Gateway Cities and Surrounding Areas, details the work completed to date and the next steps needed. These next steps include continued stakeholder coordination; reviewing relevant California Codes that may need revision; and researching the potential of public/private partnership to achieve the goals of the enforcement network, along with further refinement of the smart roadside and truck enforcement facilities. This is a critical project for the Gateway Cities region and should be included as a next step project.
1.0 Overview

The Port of Los Angeles and the Port of Long Beach were established in the early 1900s and are now the largest and second largest ports in the United States, respectively, 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 are projected to double or triple in the next 25 years. This tremendous increase in cargo volume causes a direct increase in the amount of freight that will be hauled by trucks on the Gateway Cities subregion roadway network. Such a drastic increase in freight trucking volume will cause additional road traffic congestion, air pollution, noise, and freight delays – issues that could adversely affect the economic competitiveness of the Ports and intermodal freight industries, as well as the environment, commerce, and quality of life in the Gateway Cities subregion.

There are several initiatives underway to mitigate the effects of the increased goods movement, including proposed infrastructure improvements. One initiative is the expansion of the I-710 freeway to include new freight-only lanes. New regulations, including the SB 375 to restrict greenhouse gas (GHG) emissions and the Air Quality Management District’s (AQMD) restrictions on terminal queue idling, have been proposed to limit the environmental impact of growth in freight traffic. However, there is still an opportunity to improve efficiency and reduce congestion with the implementation of a relatively low-cost technology program to improve freight-focused traffic information in the Gateway Cities subregion.

An ITS Working Group, composed of both public and private sector stakeholders, was formed in 2008 to develop the ITS Integration Plan for Goods Movement to address the needs of the freight community. The Plan identified 14 possible project areas to improve freight efficiencies. The planning process continued in 2011 with the Gateway Cities Technology Plan for Goods Movement Project to refine the set of projects and provide implementation direction. The recommended program of projects seeks to draw on the strength of the latest innovations in traveler information, and leverage the wisdom gained from successful
projects across the U.S. in which various technologies have been used to reduce traffic congestion and help move goods more efficiently. The goal is to integrate these technologies to improve goods movement in the Gateway Cities subregion, as outlined in the Concept of Operations report.

This document (the Business and Implementation Plan) is the final product of the Gateway Cities Technology Plan for Goods Movement. The projects proposed in this plan are the culmination of research – which included numerous outreach working group meetings, vendor showcases highlighting the latest technology innovations, and meetings with key stakeholders in the region – that was conducted by the project team. Initial work conducted on this plan included development of a stakeholder outreach program, documentation of existing systems, and planned project and summary of user needs. A number of mechanisms, including truck driver and dispatcher surveys, was used to identify user needs and gaps in existing systems. This effort resulted in a consolidation of the original 14 projects into 7 projects, which have been developed in greater detail and defined in the report prepared for Task 3 of this project “Final Conceptual Project Descriptions”. Further elaboration on proposed projects is provided in the “Concept of Operations” (Appendix C), which includes project-level costs, schedules, linkages between projects, and scenarios illustrating how completed projects would work to benefit the various stakeholders.

This business and implementation plan provides a “roadmap” for the proposed projects, including project descriptions, specific tasks required for implementation, schedules, costs, risks, and challenges. Potential management responsibilities are identified by agency and potential funding sources identified.

In some cases, the path to project implementation can be clearly identified. In others, only a set of initial steps can be identified; research is required to determine
both the feasibility of the proposed plan and next steps. It is important to keep in mind when reading this plan that it is and will remain dynamic. For virtually all projects, technologies proposed and the roles of the public and private sectors are in flux. This will require that a change management process be in place for all projects as they move forward.

The remainder of this document is structured as follows:

- Summaries of the proposed projects, including the following:
  - Description;
  - Objectives;
  - Beneficiaries and description of benefits;
  - Implementation strategy;
  - Timeframe;
  - Roles and responsibilities;
  - Costs;
  - Risks and challenges;
  - Potential funding sources (Funding sources are not described in detail in the body of this report. A summary table of funding sources referenced in the report is included in Appendix A, while detailed descriptions are provided in an Appendix B.). This is an important component because, in reality, due to the fiscal realities in the region, these projects will not all be funded immediately, and understanding the funding requirements and timing of each project is important in prioritizing investments.
  - Performance measures and monitoring.

- A tabular implementation summary, including major tasks, estimated task budgets, responsible parties, risks, and challenges.

Following the project descriptions three additional sections are provided:

1. A summary of key linkages between projects;
2. A summary table arranged by stakeholder and project, summarizing stakeholder benefits, responsibilities, and funding options, and
3. A calendar summary of key next steps to advance the projects.
2.0 Implementation of Projects

This section of the implementation plan provides descriptions of the proposed projects, key linkages between them, and an overview of the risks and challenges involved in implementation.

2.1 Freight Traveler Information Data Fusion and Dissemination Project

What is it?

This project is comprised of two interrelated elements detailed in the Concept of Operations: a Freight Traveler Information System (TIS) and Data Fusion and a Freight Traveler Information Dissemination project. They have been combined here because to implement the goals outlined for these projects, these projects need to be integrated and developed in parallel. Most of the other projects discussed in this report focus on either the gathering or the dissemination of information. This combined project focuses on how that information is collected, processed, and packaged for delivery (Data Fusion); and then the delivery of that information to a variety of stakeholders and who is responsible for ensuring the goods movement community is receiving the most accurate, timely, and useful traveler information possible (Freight TIS).

What are the objectives?

- To provide a one-stop location for real-time and useful goods movement and freight traveler information on the full trip that a freight operator makes in the Southern California region, including freeways, arterials, port terminals, intermodal yards, and warehouses/distribution centers.
- To provide real-time and useful information for other members of the goods movement community who would use the information to make their operations more efficient. This would provide a major improvement over the current system, which contains many gaps and requires freight industry personnel to access multiple sources of information on travel conditions along their route and for other goods movement-related information.
Examples of real-time and useful goods movement and traveler information to be supplied by this project would include:
- Scheduling for container pickup and deliveries,
- Queue times at gates,
- Estimated arrival times at gates for trucks,
- Predictive travel time to destinations via arterials or freeway systems, and
- Current traffic and travel conditions on arterials or freeway systems.

Another key objective for this project will be for the “end users” to be able to access varying degrees of “information” that they have determined to be most useful for their purposes.

A final key objective is to reduce truck trips while increasing turn times (particularly at MTOs).

Who will this project help and how will it help them?

- The Data Fusion project will create a data fusion engine and transfer the useful new and existing freight-focused freeway, arterial, MTO, and container moves data to a freight traveler information database for information sharing and Freight 511 traveler information. This fusion of useful freight data sources will ensure that the traffic management and goods movement operators will have a complete suite of regional real-time data at their fingertips that they can make use of to suit their information needs.

- The Freight TIS will provide the software integration applications, hardware, facility, staff, and other equipment to operate a freight-focused transportation information system that will improve transportation safety and efficiency and traveler information for goods movement in the Gateway Cities. The Freight TIS will not be a traditional Traffic Management Center (TMC) in the vein of the California Department of Transportation’s (Caltrans) District 7 TMC. Its focus will be ensuring the freight-related data that are gathered by the data fusion engine and disseminated through outlets, such as the Freight 511 project, function properly and provide the goods movement community with timely, useful, and accurate freight-focused information. Finally, and equally important, the Freight TIS will act as the clearinghouse for goods movement transportation and efficiency issues and information in the Gateway Cities and Southern California region.

- The primary benefactors of this project will be drayage companies and MTOs. For this project to be successful, they will not only have to use the information provided by the project, but provide proprietary information to the project. Any proprietary information will have to be kept proprietary via “firewalls”
How is this project going to be implemented?

There are two important initial steps that must be taken in order to initiate this project:

1. The system must have common elements that allow participants to easily communicate and exchange data. A definition of needs and requirements for the system must be developed upfront, including items such as data structures, inputs and outputs, standards, communications protocols, operating procedures, and system architecture.

2. A marketing and outreach effort is required to obtain buy-in from stakeholders and potential participants. Transportation agencies, the freight community, private sectors data providers, and applications developers are among those who should be brought into the initial project phase to help scope and define the project. This effort is not only important to initiate the project, but must continue on through implementation and ongoing operation.

Once the needs and requirements are determined, a detailed plan for operating and administrating the systems will be developed. The design of both the data warehouse and information dissemination system will begin in parallel with the operations plan. Once the design is completed and approved, software and database development on both systems will begin. The development process involves linkages with existing systems, such as Regional Integration of ITS (RIITS), installation, testing, integration, and verification. Initial implementation of the beta version will be followed by a period of operation, and then full implementation.

How long is it going to take?

The initial phase of determining needs and requirements will take about six months. The outreach effort will begin upon the initiation of the project. The design phase for both the data warehouse/integration and the freight information dissemination system will take about six months. System development is estimated at six months, with full deployment following seven to eight months after that. Full implementation of both phases is thus estimated at two and one-half to three years.

Who is going to be responsible?

It is anticipated that LA Metro or LA SAFE program will have primary responsibility for managing this work. A large number of stakeholders, shown in Table 2.1, will be involved in supporting this effort. Many of the stakeholders listed, such as Caltrans, the Port Authorities, and LA County, will both provide input to the systems and use the data that are output. Others, such as the Harbor Trucking Association (HTA) and freight companies, will be primarily users of the information.
How much will it cost?

Total development costs for both projects are in the range of $5.2 million to $5.3 million. Annual operating costs are estimated at $1.2 million for all elements, except the interactive voice response (IVR) system. The IVR component is estimated to incur an ongoing cost of $1.5 million.

There are several key components to the cost estimates. The upfront planning and marketing phases are estimated to cost about $900,000. The operations and administrative plan will cost about $250,000. Full development of the Data Warehouse and integration with other systems is estimated at approximately $1.9 million, while the Freight information dissemination system is estimated at $1.5 million. A parallel effort to develop an IVR capability is estimated at $675,000.

A critical cost-related issue is recurring and ongoing operations and maintenance (O&M) costs, which can be difficult to commit and sustain. A permanent and secure O&M cost program must be developed before proceeding with the implementation of this project.

What are the primary risks and challenges?

One of the major project risks involves the schedule for the upfront work to identify needs and requirements. A number of stakeholders, including both users and suppliers of information, will need to be involved in this task. Obtaining agreement on the range of requirements will be a challenge and will have to be accomplished efficiently in order to maintain schedule. This will require that stakeholders commit to actively participate and review materials, and that their representatives have the right technical credentials to address the issues involved.

A second challenge involves rapidly-advancing technology development in the private sector. Previous activity in the project, particularly the vendor showcase, has illustrated how private sector vendors are developing services and products that address much of the project need and may need to be integrated into this project. In some cases, pieces of the project may not be needed, as they become available in the private market. This challenge can be met by implementing a change management process that involves monitoring of these developments, and provides adequate flexibility to integrate changes into the process while maintaining schedule.

How will this project be funded?

The Freight TIS and Data Fusion projects may be eligible for the greatest range of funding sources, in part, because it is a place where surveillance and tracking/monitoring data is collected, stored, and distributed. This data may be used to support a variety of law enforcement and Homeland Security/border protection activities, making it eligible for special funding sources.
Gateway Cities Technology Plan for Goods Movement

- The National Highway Performance Program (NHPP) are Federal funds that are ITS eligible and can be used for this purpose through the State Transportation Implementation Program (STIP).

- State Transportation Funds (STP) from U.S. Department of Transportation (DOT) can pay for projects on any Federal aid highway, including ITS.

- Congestion Management and Air Quality Improvement Program (CMAQ) are Federal funds that are provided for transportation projects to improve air quality in nonattainment and maintenance areas.

- Discretionary Funds for Projects of National and Regional Significance are Federal funds for high-cost projects expected to have national or regional benefits with freight movement specifically mentioned.

- Urban Areas Security Initiative (UASI) funding through the Federal Emergency Management Agency (FEMA), with the Los Angeles/Long Beach Urban Area being classified as a Tier 1 area, may be eligible for funding to prevent and respond to acts of terrorism, which threaten goods movement and port operations.

- Operation Stonegarden (OPSG) Federal funds for projects, which enhance the coordination and cooperation of multiple agencies to jointly secure borders, may apply to the border enforcement activities associated with port operations and goods movement.

- Port Securing Grant Program (PSGP) Federal funds can be used for the support of increased portwide risk management. The Los Angeles/Long Beach area is a Group I eligible applicant for this funding source.

- Information Innovation Office (I2O) of Defense Advanced Research Projects Agency (DARPA) funds could potentially be obtained to advance the application of technologies into the freight movement and port operations environment.

- Proposition 1B funds in the California Corridor Mobility Improvement Account, the STIP Augmentation Account, and the State-Local Partnership Program Account could be used.

Finally, the U.S. DOT Connected Vehicle program-Dynamic Mobility Applications subprogram represents the primary program of relevance to development and deployment of the Container Moves Productivity Improvements projects. In fact, the recently begun the Freight Advanced Traveler Information System (FRATIS) small-scale development and testing program in the Gateway Cities-Los Angeles Region highlights how this program can leverage Federal funding opportunities to facilitate development and testing. Beyond the completion of the FRATIS program, U.S. DOT’s Research and Innovative Technology Administration (RITA) is expected to move forward in 2014 with the next phase of its Dynamic Mobility subprogram for freight applications - this will likely involved funding that will be available for large-scale testing of FRATIS-like
systems. Based on the implementation steps and schedule detailed earlier, this would likely be a significant opportunity for LA Metro and Gateway Cities to monitor over the next two years.

The larger Federal sources of funding described above, and in particular STP, are now flexible and allow use for O&M costs. It is recommended that the stakeholders work together through the regional Metropolitan Planning Organization (MPO) to obtain a commitment of these funds to operate and maintain the system in the Transportation Improvement Program (TIP). While most of these funds are committed to capital projects, the amount required is a relatively small proportion and the benefits potentially significant. Another important consideration is that many aspects of the project are additions to the existing 511 Traveler Information System supported by LA Metro and LA SAFE funds, and thus significant local commitment has already been demonstrated. LA Metro and LA SAFE would continue to be likely candidates for funding the operations and maintenance of the added elements. Future local transportation revenue-generating proposals would also provide opportunities to commit a portion of new revenues to Freight Traveler Information system support.

To the extent that improved freight movements improve air quality and reduce emissions, CMAQ funds may be used to support O&M costs. A public-private partnership agreement would be needed if this source of funds were to be considered going forward.

Less likely sources of O&M funding should be explored to the extent that the ports area is considered to be of high-ranking importance to the Department of Homeland Security (DHS), and therefore potentially eligible for some degree of O&M support under the Urban Security Initiative and PSGP.

A possible resolution of long-term costs may come from a business model focused on the private sector. Once the system is up and running, it could be turned over to a private sector operator who could fund continuing O&M through value-added subscription products. These products could be sold to freight operators, MTOs, BCOs, and private traffic information services. While public sector agencies may have to pay for the data as well, their costs would be greatly reduced under this scenario.

A permanent, reliable, and sustainable O&M cost program has to be developed for this project before proceeding with its implementation.

How will the success of this project be monitored and what performance measures will be used?

The ultimate goal of this project is to improve the efficiency and reliability of freight traffic in the Gateway Cities area. This information can also be used to better manage the area’s roadway system, improving mobility while reducing the negative impacts of traffic and environmental issues on the community. In addition to standard monitoring of project budget, schedule, and quality, there are three main components of the monitoring system for this project:
1. Freight mobility and efficiency should be measured directly by obtaining the cooperation of freight operators to collect before and after data on truck movements in the area. Data on travel times from various locations to and from the Ports could be collected automatically from on-board GPS units. The data would have to be aggregated and scrubbed of information that could be use to identify individuals vehicles or drivers. Regional performance measure standards should be incorporated into the analysis and background information on roadway segment travel times and volumes would be needed as well to help isolate the impact of this project.

2. User surveys should be distributed before and after implementation to determine levels of usage among operators, dispatchers and others. Surveys would be used to gather information on awareness of the system, levels of usage and qualitative assessments of whether the system is saving time and providing economic benefit to the users.

3. Overall transportation system performance data will be collected to help determine whether there is a system impact that can be identified. Measures would be taken along corridors and spot locations with heavy freight usage to determine whether delays have been reduced. It should be noted that it may be difficult to separate normal fluctuations in background traffic from the impacts of the information system. Therefore, the two methods identified above should have priority on available resources.

Summary Table

Table 2.1 summarizes the key elements of the implementation plan for the Freight Traveler Information Data Fusion and Dissemination project.
Table 2.1  Freight Traveler Information Data Fusion and Dissemination Project Steps

<table>
<thead>
<tr>
<th>Key Steps</th>
<th>Schedule</th>
<th>Lead Agency</th>
<th>Supporting Agencies</th>
<th>Key Supporting Roles</th>
<th>Anticipated Budget</th>
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<td><strong>Initial Steps</strong></td>
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<td><strong>Task 1. Assess Needs and Develop Requirements Definition</strong></td>
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<td>• Develop data structure</td>
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<td>• Review TIS/ data output requirements</td>
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<tr>
<td>• Develop network and communication system needs</td>
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<td>• Develop standards and communications protocol</td>
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<td>• Define and evaluate system alternatives</td>
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<td>• Develop system architecture</td>
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<td>3rd party data</td>
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<td>• Update capital cost estimate</td>
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<td>• Evaluate and develop permanent, reliable, and sustainable</td>
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<td>funding for O&amp;M costs</td>
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<td>• Coordinate with Goods Movement Efficiency Committee</td>
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<td><strong>Task 2. Conduct Marketing and Outreach</strong></td>
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<td>• Conduct outreach to freight community, applications</td>
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<td>developers, and traffic information community</td>
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<td>Key Steps</td>
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<td><strong>Data Warehouse and Integration</strong></td>
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<td>Task 3. Conduct Data Warehouse High-Level Design</td>
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<td>Task 4. Conduct Data Warehouse Detailed Design</td>
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<td>Task 5. Develop Software and Database</td>
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<td>LA SAFE</td>
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<td>Supply data</td>
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<td>(Includes adjustments to RIITS/511 to</td>
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<tr>
<td>Task 6. Install, Test, Integrate, and Verify</td>
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<td><strong>Freight Data Dissemination</strong></td>
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<td>Task 7. Conduct High-Level Design for Freight Data Dissemination</td>
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<td>Task 8. Conduct Detailed Design for Freight Data Dissemination</td>
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<td>Task 9. Develop Data Dissemination Software and Database</td>
<td>Months 21-27</td>
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<td>Task 10. Install, Test, Integrate, and Verify Data Dissemination</td>
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<td>Task 11. Conduct IVR Development (concurrent with Task 9)</td>
<td>Months 21-27</td>
<td>Same as Task 7</td>
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<td>$675,000</td>
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## Transportation Information System

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<td>Task 12. Develop Operations and Administrative Plan</td>
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<td>LA SAFE</td>
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<td>• Develop dissemination and data usage policies</td>
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<td>• Develop job descriptions and organization plan</td>
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<td>• Develop Standard Operating Procedures</td>
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<td>• Develop maintenance plan</td>
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<td>• Assess training needs</td>
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### Anticipated Costs

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<th>Cost</th>
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<td>Total Development Cost</td>
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<tr>
<td>Systems Operation and Maintenance Costs – Annual (covers all except IVR)</td>
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<tr>
<td>IVR O&amp;M Costs – Annual</td>
<td>$1,500,000</td>
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2.2 ARTERIAL SMART CORRIDOR FOR FREIGHT

What is it?
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 sub-region. 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 devices and communication links, and will 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 (CMS).

What are the objectives?
This project has several specific objectives, including the following:

- Reduce recurrent intersection delay and improve travel time reliability and information, fuel consumption, and emissions on designated truck route arterials through cross-jurisdictional signal coordination and updated signal controllers and systems;
- Fill ITS coverage gaps (detection, CCTV cameras, CMSs, and communications) along identified truck route arterials for freight traffic management and traveler information;
- Generate data for use in real-time traveler information delivered to drivers and freight operators for the arterial highways; and
- Improve incident detection and management on arterials, as well as improve freight traffic management and traveler information in response to freeway incidents and emergency situations.

Who will this project help and how will it help them?
This project will benefit both the freight industry and the residents of the Gateway Cities area by enabling better freight traffic and incident management on arterials. This will be accomplished by generating data for real-time traffic information for regionwide exchange, dissemination, and use. This effort will be
coordinated with LA Metro’s Countywide Significant Truck Arterial Network (CSTAN) study.

The benefits of this project will include the following:

- Reduced intersection delay will help improve mobility for users of the arterial system, and will reduce fuel consumption and emissions.

- More efficient movement of freight along arterials will provide economic benefits to all stakeholders in the freight industry.

- The ability to better manage truck traffic that uses the arterial system will benefit both residents and freight stakeholders. Truck traffic will be encouraged to use those arterials approved for truck traffic, which are better equipped to move the traffic and have lower levels of residential land use. Traffic and the related impacts of noise and emissions will be reduced on those arterials with higher residential concentrations.

- Incident management on the arterial system will be enhanced as a result of improved detection and camera surveillance. Incidents will be removed more quickly, which will result in improved mobility and reduced risk to the local community from hazardous material spills or secondary crashes.

**How is this project going to be implemented?**

This project will build upon the existing signal system improvement programs in the region, including the Los Angeles Department of Public Works (DPW) Atlantic Boulevard/I-710 Corridor, the Telegraph Road/I-5 Gateway Cities project, the Traffic Signal Synchronization Program (TSSP), and Information Exchange Network (IEN), to upgrade traffic signal control systems, enhance signal coordination, address potential communications deficiencies, and install additional ITS detection and signing devices for the purpose of improving freight mobility through enhanced corridor and incident management. It will also leverage locally deployed and operated signal, communications, and Traffic Control System (TCS) deployments.

Key implementation steps include:

- Establishment of a working group of traffic agency and freight stakeholders to solicit requirements, identify priority corridors, prioritize actions, and coordinate project efforts;

- A gap analysis to identify the corridors where additional technology and communications infrastructure are needed;

- Assessment of the feasibility of obtaining data from third-party vendors;

- Development of a priority list of specific improvements based on a realistic assessment of available funding; and
• Development of Plans, Specifications and Estimate (PS&E) packages for construction and installation of the field devices, traffic control systems, and communications.

All installed field devices will be owned and operated by their local jurisdiction, with monitoring and control done at their own respective TMC or with their TCS control systems. In some cases, this is the LA County TMC. The connection back to the data fusion engine will be made through LA County’s IEN system or video distribution network, or through direct integration with local TMCs or TCSs.

How long is it going to take?

The first phase of the project will involve an identification and assessment of arterial corridors truck routes. City-approved truck routes, travel patterns, land use, and current equipment and capabilities will be reviewed to prioritize specific corridors for improvement. This phase will take roughly five months. In parallel, an assessment of signal timing will take place with completion scheduled after seven months.

Also in parallel with these efforts, a procurement for third-party probe data will be conducted. The data will be used for support project prioritization in the planning phase, and to begin providing travel time information on the arterial system to the public. The third-party contract will be in place by Month 8 of the project, or sooner if possible.

By Month 10, a full assessment of needs and gaps will be completed; and by Month 12, an initial set of priority projects will be designated. A technology assessment will be conducted in parallel and completed 14 months into the project. This assessment will address technology choices for detection, communications, ITS devices, controllers, and advanced software. Development of PS&E packages will begin at this point with the first set of projects, mainly timing adjustments, ready for implementation in four to six months after the PS&Es are started. The current assumption for planning purposes is that work on major priority corridors can be completed within three years; however, this is dependent on funding.

Who is going to be responsible?

It is anticipated that Gateway Cities Council of Governments (GCCOG) will be the lead coordinating agency for this effort during the planning and design phase. Other “frontline” agencies involved in this project are the Gateway City municipalities that own and operate many of the signals that will be improved and LA County, which also operates signals in the area and runs the IEN system. Municipalities, LA County, and on some corridors, Caltrans, will be responsible for actual implementation, including construction management and implementation of revised signal timing.
LA Metro, Caltrans, and the Port Authorities are important stakeholders as well, since they will be involved in funding, prioritization, and information dissemination activities. Other freight community stakeholders, such as the HTA, will also be involved in the selection of priority corridors and projects. All parties identified, as well as the FHWA, will serve on an Arterial Steering Committee, which will be formed at the outset of the project. It is anticipated that this committee will set parameters for technology selections and operational strategies, so that the full benefits of the project are achieved.

**How much will it cost?**

It is estimated that the series of planning tasks leading up to the beginning of design will cost roughly $250,000. This includes Steering Committee activities, analysis of travel patterns and user needs, equipment and timing inventory, and setting of priority corridors and projects. This does not include approximately $180,000 in additional funds that will be needed to implement the first stage of the probe data purchase.

Some implementation costs can be estimated, while some are very difficult to determine at this point:

- An initial estimate for updating signal timings at 180 intersections in the study area is in the range of $2 million;
- Nine CMSs are proposed at a cost of approximately $2.5 million; and
- Software and enhanced communications for integrating arterial data into other systems are estimated at approximately $1 million.

Cost for new signal equipment will be dependent on the status of current equipment and timings, as determined by the inventory effort, and the level of new technology that is incorporated into the plans. Costs for an expansion of the first stage probe data project will be determined based on the initial deployment. This is an area where new technology is advancing at a rapid pace, and there is increasing competition. This may create opportunities to significantly lower current costs, which are significant. Operations and maintenance costs for a coordinated system are estimated at an additional $1 million to $1.4 million per year, but this again is dependent on the type of equipment deployed. There are opportunities to reduce operations and maintenance costs by employing more advanced equipment, but the tradeoffs with increased capital costs will need to be considered. At project initiation, options to fund O&M costs will be assessed and a permanent, reliable and sustainable funding source determined before proceeding with project initiation.

**What are the primary risks and challenges?**

One of the major challenges related to this project involves funding, particularly O&M. Agencies are already struggling to obtain adequate funds for operations and maintenance of signal systems, including both staff and equipment.
maintenance. New technologies will require additional skills and training and potentially increase costs.

Some of the risks identified above may be mitigated to some degree by increasing levels of automation of purchasing data, and possibly other services, from private vendors. However, private vendor purchase presents another set of risks and challenges as many public agencies have concerns about tying themselves to a vendor in a field where technology is rapidly evolving and competition increasing.

Additional risks include technical issues that may arise in the integration of arterial data into other databases, including RIITS and Freight TIS. Integration of additional data sources, particularly those with a large legacy component, can provide unexpected challenges.

Finally, a challenge related to those already identified is the ability to track, evaluate, and incorporate new technologies into planning, design, and deployment. Without a process and resources in place to do this, there is a greater risk that the proposed investments will not realize the level of benefit that is possible.

How will this project be funded?

The most promising funds for this project are:

- CMAQ funds can be used for projects that include traffic monitoring, management, and control if they contribute to cleaner air;
- Discretionary – Projects of National and Regional Significance; and
- Proposition 1B funding Corridor Mobility Improvement Account, the Trade Corridor Improvement Fund, and STIP Augmentation.

O&M responsibilities will require ongoing coordination and funding agreements with and between the cities through which the project arterials pass. Local funds will need to be identified by LA Metro, and the stakeholders should consider setting up an account through which funds could be allocated and/or passed through to the cities to cover O&M costs.

How will the success of this project be monitored and what performance measures will be used?

The objectives of this project are to improve travel times and mobility along the approved arterial corridor system, while helping to mitigate the impacts of freight traffic on the local neighborhood. Based on stakeholder input, some arterials will be oriented to accommodate freight traffic, while it will be discouraged on others. Performance measures will include the following:

- Freight traffic volumes on arterials, particularly whether it is following desired truck routes;
- Travel speeds and stops on freight-oriented arterial corridors;
• Crash rates for both commercial and noncommercial vehicles; and
• Emissions in the study area.

Determining the impacts of the program requires before-and-after studies, which should be conducted on both freight corridors and nonfreight corridors. A combination of ITS equipment, including traffic counters, speed detection, and signal controller data, can be used to estimate shifts in volume, speed, and stops resulting from deployment of the arterial management system.

Measurement of air quality at specific hot spots can be taken as well; however, these measurements will vary greatly depending on other environmental factors. Determining the impact of the system will be more difficult.
<table>
<thead>
<tr>
<th>Key Steps</th>
<th>Schedule</th>
<th>Lead Agency</th>
<th>Supporting Agencies</th>
<th>Key Supporting Roles</th>
<th>Anticipated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Phase</strong></td>
<td></td>
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<tr>
<td><strong>Task 1. Form and Maintain Arterial Steering Committee</strong></td>
<td>Month 1-Ongoing</td>
<td>GOCOG</td>
<td>LA Metro</td>
<td>Provide staff and coordination</td>
<td>n/a</td>
</tr>
<tr>
<td>• Refine Committee scope</td>
<td></td>
<td></td>
<td>LA County and municipalities</td>
<td>Participate as needed</td>
<td></td>
</tr>
<tr>
<td>• Define duties of working group</td>
<td></td>
<td></td>
<td>FHWA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Establish Committee</td>
<td></td>
<td></td>
<td>Caltrans</td>
<td></td>
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<tr>
<td>• Ports/HTA</td>
<td></td>
<td></td>
<td>ASC</td>
<td></td>
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<tr>
<td><strong>Task 2. Identify and Assess Designated Arterial Truck Routes</strong></td>
<td>Months 1-5</td>
<td>GOCOG</td>
<td>LA Metro</td>
<td>Support countywide study</td>
<td>$25,000</td>
</tr>
<tr>
<td>• Coordinate with County Study</td>
<td></td>
<td></td>
<td>LA County and municipalities</td>
<td>Provide input on priorities</td>
<td></td>
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<tr>
<td>• Conduct more detailed analysis of freight origins and destinations</td>
<td></td>
<td></td>
<td>Caltrans</td>
<td></td>
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<tr>
<td>in Gateway Cities</td>
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<td>Ports/HTA</td>
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<tr>
<td>• Identify prohibited truck routes in individual cities</td>
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<td>ASC</td>
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<tr>
<td>• Coordinate with previous studies (I-710, etc.)</td>
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<tr>
<td>• Review forecasts</td>
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<tr>
<td><strong>Task 3. Procure Probe Data on Key Arterials</strong></td>
<td>Months 2-8</td>
<td>LA Metro</td>
<td>FHWA</td>
<td>If Federal money is used, close</td>
<td>$180,000</td>
</tr>
<tr>
<td>• Develop scope</td>
<td></td>
<td></td>
<td></td>
<td>coordination will be needed</td>
<td>(includes $25,000 capital, $30,000 set up), plus $50,000 for short-term 511 integration</td>
</tr>
<tr>
<td>Key Steps</td>
<td>Schedule</td>
<td>Lead Agency</td>
<td>Supporting Agencies</td>
<td>Key Supporting Roles</td>
<td>Anticipated Budget</td>
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<tr>
<td>Task 4. Determine Status of Signal Timing Plans and Local Traffic Signal Control Systems</td>
<td>Months 1-7</td>
<td>GCCOG</td>
<td>• LA County and municipalities</td>
<td>• Supply detailed data on signals</td>
<td>$30,000</td>
</tr>
<tr>
<td>• Review plans and systems</td>
<td></td>
<td></td>
<td>• Caltrans</td>
<td></td>
<td></td>
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<tr>
<td>• Inventory findings</td>
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<tr>
<td>Task 5. Inventory of Existing ITS and Signal Systems and Identify Gaps</td>
<td>Months 1-10</td>
<td>GCCOG</td>
<td>• LA County and municipalities</td>
<td>• Submit O&amp;M costs</td>
<td>$30,000</td>
</tr>
<tr>
<td>• Review maintenance and communications</td>
<td></td>
<td></td>
<td>• Caltrans</td>
<td>• Support identification of gaps and issues</td>
<td></td>
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<tr>
<td>• Review timing adjustments</td>
<td></td>
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<tr>
<td><strong>Second Phase</strong></td>
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<tr>
<td>Task 6. Conduct Project Phasing and Prioritization</td>
<td>Months 10-12</td>
<td>GCCOG</td>
<td>• Metro</td>
<td>• Supply data and review it</td>
<td>$60,000</td>
</tr>
<tr>
<td>• Estimate benefit/cost ratios</td>
<td></td>
<td></td>
<td>• LA County and municipalities</td>
<td></td>
<td></td>
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<tr>
<td>• Review qualitative factors</td>
<td></td>
<td></td>
<td>• Caltrans</td>
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<tr>
<td>TASK 7. Assess Infrastructure Technology Choices and Develop Recommendations</td>
<td>Months 10-14</td>
<td>GCCOG</td>
<td>• Metro</td>
<td>• Set priorities and supply information</td>
<td>$100,000</td>
</tr>
<tr>
<td>• Develop recommendations in areas of detection, communications, ITS devices, controllers, and advanced software</td>
<td></td>
<td></td>
<td>• LA County and municipalities</td>
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<td>• Caltrans</td>
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<td>• Ports/HTA</td>
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<td>Key Steps</td>
<td>Schedule</td>
<td>Lead Agency</td>
<td>Supporting Agencies</td>
<td>Key Supporting Roles</td>
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<td><strong>Third Phase</strong></td>
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<td>Task 8. Develop PS&amp;E for each Corridor</td>
<td>Months 14-</td>
<td>LA County and municipalities</td>
<td>LA Metro</td>
<td>Funding and coordination</td>
<td>TBD</td>
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<td></td>
<td>Ongoing</td>
<td>Caltrans</td>
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<tr>
<td>Task 9. Deploy, Test, and Integrate Equipment on Arterials</td>
<td>Months 18-</td>
<td>LA County and municipalities</td>
<td>LA Metro</td>
<td></td>
<td>Dependent of Funding Sources</td>
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<td></td>
<td>Ongoing</td>
<td>Caltrans</td>
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<tr>
<td>Task 10. Ongoing Operate and Maintain</td>
<td>Months 18-</td>
<td>LA County and municipalities</td>
<td>LA Metro</td>
<td></td>
<td>Other funding $1.1 million to</td>
</tr>
<tr>
<td></td>
<td>Ongoing</td>
<td>Caltrans</td>
<td></td>
<td></td>
<td>$1.4 million/year</td>
</tr>
<tr>
<td>Task 11. Monitor and Evaluate Results</td>
<td>Months 18-36</td>
<td>GCCOG</td>
<td>LA Metro</td>
<td>Supply data and review it</td>
<td>Part of TIS Project</td>
</tr>
<tr>
<td></td>
<td>and Ongoing</td>
<td></td>
<td>LA County and municipalities</td>
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<td>Caltrans</td>
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<td>Ports/HTA</td>
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</table>
2.3 **Freeway Smart Corridor for Freight**

**What is it?**

This project will complete and update (including filling existing gaps) the basic Caltrans surveillance, data collection, and traveler information infrastructure on key freight freeway corridors (lane-by-lane) to support traveler information and traffic management activities in the Gateway Cities area. Along their freeway system, Caltrans currently has deployed ITS to support device control, roadway surveillance, and dissemination of traffic information. ITS devices include ramp meters, CCTV cameras, loop detector stations, CMSs, and highway advisory radio. This project identifies gaps in these existing systems on freeways that service the Ports, rail yards, and major distribution centers. The geographical scope of this project includes freeways and state routes running east-west from I-110 to I-605, and north-south from the I-10/I-5 to the Ports. This includes more than 100 miles of roadway.

In addition to filling unserved ITS gaps, the project will also identifying malfunctioning equipment on existing corridors and institute a refurbishing program to repair and update equipment to bring it back on-line. The project will include deployment, testing, and integration of the field hardware to the central systems, including the addition of fiber communications, where necessary, to complete the basic infrastructure on missing freeway segments. The data from these systems will be transmitted to the Caltrans ATMS, and be disseminated to the data fusion engine and others through RIITS.

This new ITS infrastructure will include collection of truck-specific data on all freeways. This would include not only lane-by-lane information for trucks, but also the ability to categorize by vehicle classification or vehicle length classification.

It is recognized that I-710 will be reconstructed during the life of this project. The designs developed by this project should be coordinated with I-710 construction to ensure that all ITS components are maintained or replaced, and that continuity of data along the corridor is preserved during construction.

**What are the objectives?**

This project has several objectives including the following:

- Filling technology gaps and expanding the ITS system, including additional data collection devices, technologies, and infrastructure;
• Improving traffic management using additional detection sites, traffic monitoring, and traveler information;
• Reducing congestion on key freeway freight routes;
• Increasing freight mobility and reliability;
• Providing improved traveler information;
• Locations and estimated arrival times for trucks together;
• Predictive travel times; and
• Real-time travel times and alternative routes.

Who will this project help and how will it help them?
The intent of this project is to decrease overall congestion by reducing incident identification and clear times, providing travelers with increased information on alternative routes, and improving overall traffic management capabilities. Freight traffic will directly benefit from this project as truck time spent in mixed traffic congestion will be reduced, and travel times will be more reliable. Improved responsiveness to freeway incidents will help reduce the amount of traffic diverting to arterials, and thus reduce the impact of freight traffic on Gateway Cities residential neighborhoods. Other benefits include:

• More data on freeway conditions that is of specific interest to truck operators on freeways and other freight stakeholders;
• Improved incident identification and management leading to faster implementation of response plans, posting of alternative routes, and travel time data geared towards freight traffic;
• Additional CMSs will provide more timely information and greater coverage on incidents, congestion, and alternative routes; and
• Additional detection and surveillance equipment will provide a richer database that can be made available to private application developers and third parties for traveler information product development.

How is this project going to be implemented?
The first phase of the project will involve a planning analysis, including assessment of existing conditions, gap analysis, and identification of needed improvements and expansion. An inventory of each corridor within the project limits will be conducted for existing ITS devices (CCTV cameras, vehicle detection, CMSs, ramp meters) and communications. This will be followed by an analysis of gaps in the system, including development of criteria for defining gaps and a comparison of these criteria to existing equipment. This work has been initiated during the current project. Much of the equipment on the existing Caltrans freeway systems is not operating, so this project will coordinate with Caltrans to
identify reasons for failure, including issues such as no power, no communications, and equipment failure.

Once the inventory phase is complete, corridor needs will be identified and recommendations will be made for the infrastructure to be deployed on each corridor within the project limits. The corridors will be prioritized for deployment based on needs. A deployment plan will be developed that describes the sequencing and phasing of deployment of the project corridors, and includes cost estimates for each. The plan will also include recommendations and plans for refurbishing and/or upgrading of existing equipment.

Detailed designs will be developed for construction. Separate designs will be developed for each corridor to allow for flexibility in how the corridors are packaged for bid. There is a variety of vendors currently offering accurate freeway speed data that could be converted into travel time data. No infrastructure would be needed for such a solution.

After design of each package, construction contracts will be let; or in the case of refurbishing and maintenance activities, work may be assigned to Caltrans personnel. Caltrans will be responsible for ongoing maintenance and operation of the freeway system.

**How long is it going to take?**

The initial planning and inventory phase will take approximately five months. The full deployment plan, with corridors selected and deployment packages defined, will be complete after nine months. Plan development can be conducted concurrently with the inventory and gap analysis since corridor plans can be defined sequentially. Prioritization of projects will take place in Months 8 and 9.

The design phase is estimated at nine months (Months 9 to 18), although there will probably some early deployment projects that can be put out to bid more quickly. The construction period is estimated at one year, from Months 18 to 30. Testing and integration will take roughly three months with full operation beginning in Month 33.

**Who is going to be responsible?**

Since this project is focused on the Caltrans freeway system, Caltrans will be the lead agency throughout the project. Since integration with RITS and other regional databases is an important component of the project, LA SAFE will play a key supporting role. During the planning phase of the project, it is expected that the ITS Working Group formed for the current study would continue to have input on proposed projects and priorities (or the GMEC). Participants would include LA County, GCCOG, municipalities, port representatives, and freight industry representatives.
How much will it cost?

Initial plan development tasks are estimated to cost approximately $250,000 to $300,000, including coordination with the I-710 design consultants. Full construction of the system is estimated at $24 million with an estimated design cost of $2.4 million. Ongoing operation and maintenance are estimated at $3.6 million or 15 percent of capital cost, although there may be opportunities to reduce this as these devices will be integrated into the existing Traffic Management System.

What are the primary risks and challenges?

The major challenge involved in this project is securing funding for the maintenance of additional ITS equipment. Lack of funding has been the major reason for the failure and lack of modernization of much of the current ITS equipment that is in the field. Another important challenge is ensuring the integrity of the ITS system on the I-710 during its construction phase. Maintaining this functionality is crucial to ensure the traveler information is available for the corridor during what will be a lengthy construction period.

One of the key challenges in this project and most others proposed is the need to establish guidelines and procedures for testing and adopting new technology. New technology offers significant opportunities to improve performance and reduce cost; as a result, it is critical to have a process and resources in place to assure that these opportunities are realized. It is important to note that these processes cannot eliminate risks of new technology, but can significantly reduce them.

How will this project be funded?

The most likely funding sources for this project include the following:

- CMAQ funds can be used for projects that will reduce freight-related emissions to improve regional air quality;
- Discretionary funds, via Projects of National and Regional Significance, and supported by policies that prioritize the improvement of freight movement, can be allocated for Freeway Smart Corridors in the National Freight Network; and
- Proposition 1B Corridor Mobility Improvement Account, the Trade Corridor Improvement Fund, STIP Augmentation, and the State Highway Operation and Protection Program (SHOPP).

Funding for O&M is a special challenge for pioneering projects of this type. This project, since it is highly integrated with the existing Freeway Management System, raises the larger question of O&M funding for the large existing Caltrans ITS infrastructure. Securing of a sustainable source of O&M funding for this project should be coordinated with similar efforts on the Freight Traveler Information Data Fusion and Dissemination Project. The ability to tap a one of
the larger Federal sources, such as STP or CMAQ, will be enhanced by a coordinated effort, rather than a piecemeal approach. Aside from public funds, there are opportunities to explore public-private partnerships that would encourage private sector partners to maintain infrastructure in exchange for permission to package and sell subscription data.

**How will the success of this project be monitored and what performance measures will be used?**

The objective of the Freeway Smart Corridor project is to fill in gaps in the current Freeway ITS system, and ensure continued functioning of the system during the I-710 construction period. As the freeway management system covers most of the LA region and the benefits of such systems are well-established, there is no need for special expenditures to measure the benefits of these particular deployments. Data collected on a regular basis by both LA SAFE and Caltrans can be used to measure the impact of these deployments.
Table 2.3 Freeway Smart Corridor for Freight Project Steps

<table>
<thead>
<tr>
<th>Key Steps</th>
<th>Schedule</th>
<th>Lead Agency</th>
<th>Supporting Agencies</th>
<th>Key Supporting Roles</th>
<th>Anticipated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1. Conduct Inventory, Gap Analysis, and Deficiency Analysis of Existing System</td>
<td>Months 1-5</td>
<td>Caltrans</td>
<td>LA SAFE</td>
<td>Provide RIITS data</td>
<td>$120,000 + $50,000 for input I-710 TMP</td>
</tr>
<tr>
<td>• Coordinate and assess with other projects (710, 605, Alameda Corridor)</td>
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<tr>
<td>Task 2. Develop Deployment Plan</td>
<td>Months 2-9</td>
<td>Caltrans</td>
<td>LA SAFE</td>
<td>Provide RIITS data</td>
<td>$100,000</td>
</tr>
<tr>
<td>Task 3. Develop Design Plans</td>
<td>Months 9-18</td>
<td>Caltrans/LA Metro</td>
<td>LA SAFE</td>
<td>Provide RIITS data</td>
<td>$2,400,000</td>
</tr>
<tr>
<td>• Conduct preliminary engineering</td>
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<tr>
<td>• Design to 100%</td>
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<tr>
<td>• Conduct PS&amp;E</td>
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<td>Task 4. Bid/Award/Construct</td>
<td>Months 18-30</td>
<td>Caltrans</td>
<td>LA SAFE</td>
<td>Information and coordination of mitigation activity</td>
<td>$24,000,000</td>
</tr>
<tr>
<td>Task 5. Test and Integrate</td>
<td>Months 30-33</td>
<td>Caltrans/LA SAFE</td>
<td>LA SAFE</td>
<td>Integrate data into ATMS</td>
<td>Cost included in construction</td>
</tr>
<tr>
<td>Task 6. Conduct Ongoing Operation and Maintenance</td>
<td>Months 33- Ongoing</td>
<td>Caltrans</td>
<td></td>
<td></td>
<td>$3,600,000¹ (15% of capital)</td>
</tr>
</tbody>
</table>

¹ Assumed to be funded by Caltrans.
2.4 CONTAINER MOVES PRODUCTIVITY IMPROVEMENTS

What is it?

This program, over a period of three to five years, will implement a series of projects that will eventually be fully integrated into an overall Container Productivity Prototype system. These projects are defined in terms of four technology deployments, and an institutional process, as shown below.

- **Freight-Focused Traveler Information.** To be integrated and disseminated to drayage dispatchers and drivers through multiple methods, including web access and smartphone applications (Note: This is covered in Section 2.1.1, Freight Traveler Information Dissemination.).

- **Marine Terminal Queues Information.** To provide key information to trucking companies on the length and time in queues of trucking at marine terminal approaches - queue measurement, alerts, and predictive algorithms for port terminal queue approaches.

- **Container Status Information/Terminal Appointments.** Two-way information exchange between drayage companies and port terminals to schedule appointments for trucking companies to pick up/deliver containers, thereby, spreading out truck trips across time and reducing terminal and port regional truck traffic congestion.

- **Predictive Information for MTOs on Dray Truck Arrivals.** Real-time predictive information for marine terminals about expected drayage truck approaches, thereby, allowing the terminals to better plan gate staffing and support terminal operations and to assist dispatchers in controlling and updating trucks for pickups.

- **Goods Movement Efficiency Committee.** This entity would provide the collaborative public-private guidance for the planning, development, deployment, testing, operations, and maintenance of the Container Movement Productivity Improvements Program.

While parts and applications of the four technology deployment projects described above would be designed and tested, in part, separately, the intention here would be to test the integration of these technologies as integrated applications that drayage dispatchers, truck drivers, and MTO operations personnel could access and use - both through computer and mobile device applications.
Testing related to these projects would be conducted over the next two years, and is currently beginning on a small scale under the U.S. DOT-sponsored LA-Gateway Region Test bed for the Freight Advanced Traveler Information System (FRATIS). Deployment would begin in year three; and based on both public and private financial and institutional support, deployment activities would occur between years three and five.

**What are the objectives?**

This program has several objectives that address private sector intermodal operations and the corresponding effect they have on regional traffic congestion, air quality, and economic competitiveness. Collectively, these act to reduce the number of truck trips and/or bobtails, thereby, reducing freight congestion and supporting emissions reductions in the Gateway Cities subregion:

- Provide real-time traffic data applications, through the Internet and using smartphones, to drayage dispatcher and drivers to better plan for trips and avoid congestion.
- Monitor and disseminate marine terminal approach queue information to support drayage dispatchers and drivers.
- Provide a common integration system that will allow any terminals container appointment system data to be included in an “appointment system network,” where all marine terminal appointment status data across the San Pedro Bay port terminals can be combined, distributed, and used.
- Support improved marine terminal operations by providing real-time information and near-term predictions on the timing and number and identification of drayage trucks approaching marine terminals.
- Provide key archived data and other information from the above applications, which will support improved public sector freight planning for the Gateway Cities subregion, as well as the Greater LA region.
- (During the test phase) Provide data on most effective container movement efficiency and ITS technologies.
- Develop a public-private long-term program to lead the regional development of the above container movement efficiency projects.
- Establish an ongoing partnership with U.S. DOT in testing and developing container movement efficiency and freight ITS technologies (e.g., the FRATIS program); and correspondingly cement the Greater LA Region as the most important test bed in the national for developing and testing freight ITS.
Who will this project help and how will it help them?

This program will support the following users/stakeholders, and assist each of them in differing ways:

- **Trucking Company Dispatchers and Operations Managers.** This program will help these system users by providing much improved and real-time data on arterials, freeways, and ports traffic conditions/congestion, marine terminal queues, and terminal appointment status. Drayage firms can use this information to improve the efficiency of their operations, which can result in elimination of unnecessary trips, shortened trip times, reductions in bob-tails, and improved daily planning of container pickups and deliveries.

- **Truck Drivers.** This program will help these users by providing a distraction-safe smartphone or mobile-based interface that reports the specific real-time information they need across the day related to traffic conditions/congestion, marine terminal queues, and terminal appointment status. This information, collectively, can assist them in making more turns per day, thereby, directly increasing the efficiency and economics of their operations.

- **MTO Users.** These system users are responsible for the key intermodal interface that involves transferring containers between ships and the regional dray trucking companies. This program will help them by providing real-time information and near-term predictions on the number and identification of drayage trucks approaching marine terminals. They can help them to better plan gate staffing and support their daily terminal operations.

- **Gateway Cities Subregion and the Great Los Angeles Region.** When this program is fully implemented, these regions will realize significant corresponding benefits in reductions and shortening of truck trips, and corresponding improvements in air quality.

- **Public Sector Users.** These include local and regional transportation agencies (e.g., LA Metro, GCCOG) responsible for generating, collecting, processing, and utilizing freight data to support freight planning efforts in the region. The archived data developed from this program can improve the quality of freight planning efforts that these agencies continually conduct. Over the long term, this can result in the approval of freight projects that are better targeted to relieve specific intermodal freight transportation problems and congestion in the region.

How is this project going to be implemented?

Deployment and integration of the Container Moves Productivity Improvements projects across the Gateway Cities/San Pedro Bay ports region will be a complex and challenging endeavor, with many moving pieces, and with institutional learning and changes required to realize success. To facilitate success on this program, a staged development, testing, and deployment approach is recommended. This type approach fosters the necessary “confidence-building
measures” necessary so that cooperation between private sector partners in the tests will facilitate improved trust among all parties. The key steps in this staged approach include:

- **Small-Scale Testing (FRATIS).** Initial collaboration with U.S. DOT on the FRATIS small-scale testing program currently is underway in the Los Angeles-Gateway Cities region. This FRATIS development and testing program currently is developing technologies related to the Gateway Cities ITS Container Moves Productivity Improvements program, including freight-focused traveler information, terminal queue approach measurements, and appointment status information. Testing under the program will occur in the second one-half of 2013. Results of this testing can be used to both define and further refine the four proposed Container Moves Productivity Improvements projects.

- **Detailed Design and Technical Concept of Operations (ConOps) Development.** Detailed project designs and specific technical ConOps will need to be developed for each of the four Container Moves Productivity Improvements projects. This effort will include a determination of which specific technologies should be included in the initial test deployment by undertaking a technology assessment that factors in the physical characteristics of the expected deployment sites, as well as the short- and long-term feasibility of each technology.

- **Prototype Test Bed – Large-Scale Testing.** Selection and implementation of a “Prototype Test Bed” in the Gateway Cities region to conduct large-scale testing of the four Container Moves Productivity Improvements projects, as well as testing the integration of these projects is the next step. The concept would involve implementing these projects with a defined number of prototype private sector users (e.g., three MTOs and six trucking fleets); and then utilize (via Performance Monitoring) the utility and benefits demonstrated in the test to make a powerful case to the San Pedro Bay Ports and Gateway Cities freight community for full-scale deployment of the technologies, and corresponding supporting operational changes.

- **Full-Scale Deployment.** The final phase will encompass full-scale deployment of the technologies across the Gateway Cities and San Pedro Bay ports region. This is expected to be facilitated by a joint public-private effort to finance and guide the deployment of the Container Moves Productivity Improvements project. This deployment will be supported by detailed deployment and planning guidance, which will be developed based on the results of the Prototype Test Bed program described above.

**How long is it going to take?**

The length of this program is estimated to be five years to reach a near-full deployment stage, in which the integrated projects are deployment in comprehensive manner in the Gateway Cities/San Pedro Bay ports region. Outlines of an overall program schedule are as follows:
• **Small-Scale Testing (FRATIS).** The FRATIS small-scale testing program is currently underway in the Los Angeles-Gateway Cities region. This project will include baseline data collection from a trucking company and an MTO between spring and summer 2013. This will be followed by operational testing between fall 2013 and winter 2013/2014. Results (including a detailed Independent Evaluation Report) and guidance developed from the test will be available in spring 2014.

• **Detailed Design and Technical ConOps Development.** This effort is expected to occur as part of LA Metro’s upcoming Gateway Cities Strategic Freight Plan project. The likely timeframe for this effort is January 2013 to January 2014. As such, this design effort can be conducted in parallel with the FRATIS development and testing project – this will allow for technical results and lessons learned from the FRATIS project to impact the designs of the Container Moves Productivity Improvements projects.

• **Prototype Test Bed – Large-Scale Testing.** This is envisioned as an 18-month development and testing program, including at least three MTOs and six trucking companies. This effort could potentially commence in mid-2014, and continue through 2015. The schedule would include the following elements:
  - Month 1 to 4. Needs/Requirements/Technologies, Test Bed Site Survey;
  - Month 4 to 6. Prepare Design Documents;
  - Month 7 to 12. Install, Test, and Integrate; and
  - Month 12 to 18. Monitor and Evaluate

• **Full-Scale Deployment.** This is envisioned as beginning in early 2016, with the goal of being deployed across the majority of the trucking companies and MTOs in the region by 2018. Full build out would be dependent on how many additional MTOs signed up. It is estimated that each installation would take no more than six to eight months (including design) to complete, and could be done concurrently across multiple MTOs.

**Who is going to be responsible?**

A major finding of the Gateway Cities Technology Plan for Goods Movement study over the past year concerns the lack of general transportation-level coordination between parties involved in drayage operations – drayage fleets, MTOs, and BCOs. Recently, through one-on-one meetings, and leveraging the ITS Working Group, the Gateway Cities lead and the Study Team have been more successful in discussing potential solutions. Based on these emerging efforts, it is recommended that a formal committee of these industry stakeholders be developed to serve as the guidance body, along with selective public sector participation, for overseeing this Container Moves Productivity Improvements program. This committee – the **Goods Movement Efficiency Committee** – would be kept small enough (perhaps less than 10 to 12 members initially) to allow for significant
cooperation and real-world project participation decisions to be made – so as to “move the ball forward” within the next several years.

The desired outcome here would be that this committee would function as an arm of the private sector intermodal industry (e.g., perhaps three dray operators, three MTOs, and two BCOs), with perhaps two to four public sector entities maintaining involvement (e.g., Gateway Cities, LA Metro, the Ports). The committee would provide the “steering function” for this program, overseeing the program implementation elements discussed previously.

**How much will it cost?**

The FRATIS program initial development and testing effort, as well as the already programmed ITS Design effort, can be considered as “sunk costs,” as they have already been captured under the U.S. DOT FRATIS program, and the LA Metro’s Gateway Cities Strategic Freight Plan program, respectively.

Costs for the Prototype Test Bed program are estimated to be between $3.0 million and $4.6 million. Costs are for the initial 18-month phase for 6-month support set-up and one-year initial implementation of project functions for three sites, three terminals, and six truck fleets, including O&M for that initial year.

Full-scale deployment/build-out costs are not provided as it is dependent on the outcomes of the test bed deployment. As is the case for other technology projects, a permanent, reliable, and sustainable funding source for O&M costs for this project has to be established at project initiation.

**What are the primary risks and challenges?**

This project involves greater uncertainties than most of the others proposed, with risks summarized as follows:

- **Institutional Risk – High.** Success on this project will require a level of cooperation and trust between intermodal transportation private sector service providers – primarily drayage trucking companies, MTOs, BCOs, and Class I Rail Lines – that has not typically existed in recent years in the Gateway Cities/San Pedro Bay Ports region. Risk here can be mitigated through two steps: 1) the implementation of the Goods Movement Efficiency Committee, which can foster a cooperative problem-solving atmosphere among the parties; and 2) implementation of our staged approach to deployment, which results in “confidence building” between the parties as small successes are realized through the test program.

- **Technical Risk – Low.** The basic technologies needed to develop and deploy this system are available as Commercial-Off-the-Shelf (COTS) technologies today. These largely related to Internet data transfer, web pages, RFID, archived data, ITS sensors, and mobile devices/smartphones. Software will need to be developed to facilitate the overall system, but existing software
practices, such as web services and API-based systems, are available for tailored use here.

How will this project be funded?

The U.S. DOT Connected Vehicle Program-Dynamic Mobility Applications subprogram represents the primary program of relevance to development and deployment of the Container Moves Productivity Improvements projects. In fact, the recently begun FRATIS small-scale development and testing program in the Gateway Cities-Los Angeles region highlights how this program can leverage Federal funding opportunities to facilitate development and testing. Beyond the completion of the FRATIS program, U.S. DOT’s RITA is expected to move forward in 2014 with the next phase of its Dynamic Mobility subprogram for freight applications – this will likely involved funding that will be available for large-scale testing of FRATIS-like systems. Based on the implementation steps and schedule detailed earlier, this would likely be a significant opportunity for LA Metro and Gateway Cities to monitor over the next two years.

Other programs that should be considered to support ContainerMoves include:

- CMAQ funds can be used for projects that will reduce freight-related emissions to improve regional air quality;
- Discretionary funds, via Projects of National and Regional Significance, and supported by policies that prioritize the improvement of freight movement, can be allocated for Freeway Smart Corridors in the National Freight Network; and
- Proposition 1B Corridor Mobility Improvement Account, the Trade Corridor Improvement Fund, STIP Augmentation, and SHOPP.
- The Goods Movement Efficiency Committee will be key to identifying and securing sources of funding for O&M. As partners with direct, and sometimes financial, opportunities to benefit from implementation, members of the committee are also well positioned to lead public-private partnerships and apply for funds that can be used to sustain the system, or implement other arrangements using local funds.

How will the success of this project be monitored and what performance measures will be used?

The ultimate goal of this program is to improve the efficiency of the intermodal transportation system by improving the planning and decision-making of intermodal drayage fleets and marine terminal operators – making the pickups and deliveries of container more efficient through real-time data exchange and through deployed web and mobile applications. Use of this system by drayage fleets and MTOs will results in elimination of truck trips, reductions in truck trip times, and vehicle miles traveled (VMT), which will correspondingly result in improvements in air quality for the region.
Research has already been conducted by Cambridge Systematics to develop performance measures for the FRATIS testing in the Los Angeles-Gateway Cities region. These performance measures can be directly applied as well to this Container Moves Productivity Improvements program. These measures are outlined below in Table 2.4.

### Table 2.4 Summary of Near-Term Goals, Performance Measures, and Performance Targets to be Tested in the LA-Gateway FRATIS With Ease of Measurement Levels

<table>
<thead>
<tr>
<th>Goal</th>
<th>Performance Measure</th>
<th>Transformative Performance Target</th>
<th>Predominant Benefit(s)</th>
<th>User-/System-Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve travel time</td>
<td>Travel time</td>
<td>15 percent travel time reduction</td>
<td>Mobility</td>
<td>System/user oriented</td>
</tr>
<tr>
<td>Reduce fuel consumption</td>
<td>Fuel consumption</td>
<td>5 percent reduction in fuel use</td>
<td>Energy</td>
<td>System/user oriented</td>
</tr>
<tr>
<td>Reduce emissions</td>
<td>Level of criteria pollutants and GHG equivalents</td>
<td>5 percent reduction in criteria pollutants</td>
<td>Environment</td>
<td>System/user oriented</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 percent reduction in GHG equivalents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce terminal wait times outside the gates</td>
<td>Terminal queue time</td>
<td>20 percent reduction in terminal queue times</td>
<td>Efficiency</td>
<td>User oriented</td>
</tr>
</tbody>
</table>

Methods of obtaining and monitoring these performance parameters on this program include the following:

- Freight mobility and efficiency should be measured directly by obtaining the cooperation of freight operators to collect before and after data on truck movements in the area. Data on travel times from various locations to and from the Ports could be collected automatically from on-board GPS units. The data would have to be aggregated and scrubbed of information that could be use to identify individuals vehicles or drivers. Background information on roadway segment travel times and volumes would be needed as well to help isolate the impact of this program.

- User surveys should be distributed before and after implementation to determine levels of usage among operators, dispatchers, and others. Surveys would be used to gather information on awareness of the system, levels of usage, and qualitative assessments of whether the system is saving time and providing economic benefit to the users.
<table>
<thead>
<tr>
<th>Key Steps</th>
<th>Schedule</th>
<th>Lead Agency</th>
<th>Supporting Agencies</th>
<th>Key Supporting Roles</th>
<th>Anticipated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRATIS Development and Testing Program</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRATIS Development and Testing Program – Los Angeles-Gateway Cities region</td>
<td>10/12-5/14</td>
<td>U.S. DOT</td>
<td>LA Metro, GCOOG</td>
<td>Data sharing and integration</td>
<td>$830,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HTA company, MTO</td>
<td>Participation in test</td>
<td></td>
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<tr>
<td><strong>Strategic Freight Plan ITS Elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Gateway Cities Strategic Freight Plan – ITS Design Element related to the</td>
<td>1/13-1/14</td>
<td>LA Metro</td>
<td>GCOOG</td>
<td>Oversee technical system design of Container Moves</td>
<td>TBD</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements projects</td>
<td></td>
<td></td>
<td></td>
<td>Productivity Improvements projects</td>
<td></td>
</tr>
<tr>
<td><strong>Prototype Test Bed Program</strong></td>
<td></td>
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</tr>
<tr>
<td>Task 1. Needs/Requirements, Select Technologies, and Survey Test Bed Site</td>
<td>6/14-9/14</td>
<td>LA Metro</td>
<td>GCOOG</td>
<td>Participation in test</td>
<td>$3,000,020 to $4,650,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 HTA fleets company</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3 MTOs</td>
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<tr>
<td>Task 2. Prepare Design Documents for each Technology and for Integration</td>
<td>10/14-12/14</td>
<td>See above</td>
<td>See above</td>
<td>See above</td>
<td>Cost included in</td>
</tr>
<tr>
<td>Case</td>
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<td></td>
<td></td>
<td></td>
<td>above estimate</td>
</tr>
<tr>
<td>Task 3. Install, Test, and Integrate all Container Moves Productivity</td>
<td>1/14-5/14</td>
<td>See above</td>
<td>See above</td>
<td>See above</td>
<td>Cost included in</td>
</tr>
<tr>
<td>Improvements Projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>above estimate</td>
</tr>
<tr>
<td>Task 4. Monitor and Evaluate all Container Moves Productivity Improvements</td>
<td>6/14-12/14</td>
<td>See above</td>
<td>See above</td>
<td>See above</td>
<td>Cost included in</td>
</tr>
<tr>
<td>Projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>above estimate</td>
</tr>
</tbody>
</table>
2.5 I-710 AUTOMATED TRUCK RESEARCH

What is it?

This project will implement a staged progression of commercial vehicle technologies in order to transition from current research-based, automated, commercial vehicle demonstration efforts to staged operational testing of a flow efficiency system of trucks along the planned I-710 truck lanes. The project will demonstrate laboratory-proven technologies in a real-world heavily congested truck corridor through a staged test of a flow efficiency system for trucks.

This project will build upon the unique operational environment and potential partnerships of the Gateway Cities region to promote and enhance truck automated commercial vehicle research by bringing together the applications of automated commercial vehicle and automation technologies with the real-world operational realities of a heavily congested truck corridor. Finally, the project will provide for staged operational testing over time with an eye towards understanding the specific design and operational concerns that impact the future development of the I-710 and its approaches. 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.

What are the objectives?

This project has several objectives that address traffic concerns, as well as economic development issues:

- Helping ensure the future viability of the Ports and Gateway Cities region, as well as the I-710 corridor;
- Building upon ongoing and rapidly advancing intelligent vehicle technologies for trucks to define an effective conveyor operation of trucks is on the I-710 freight corridor that will safely maximize the throughput of trucks in the freight corridor;
- Helping Southern California establish a leadership position in Connected Vehicle technologies;
Establishing an ongoing partnership and environment that attract additional funding opportunities to bridge the gap between research efforts and effective real-world solutions in a real-world freight corridor, and

Promoting the state of the art in truck guidance and flow efficiency.

Who will this project help and how will it help them?

Benefits will accrue to the Ports and freight industry stakeholders in the region by providing increased capacity on the proposed I-710 freight corridor. The vision is to achieve maximum effective capacity within the substantial physical constraints of the region’s key truck corridors. This will reduce congestion and result in more cost-effective and safe freight operations. By safely increasing the capacity of the I-710 freight corridor, fewer vehicles will be inclined to use the arterial system, reducing the negative impacts of truck traffic on Gateway Cities communities.

There is also potential economic benefit for Southern California in developing and supporting a test site in the region, where technologies and operational concepts can be tested in conjunction with public and private partners. The test site and subsequent implementation on I-710 and possibly other locations will leverage Original Equipment Manufacturer (OEM) and Tier 1 vehicle supplier technologies to provide a viable real-world operational model focused on the needs and characteristics of the region. This will help create opportunities to spin off businesses that specialize in freight-related applications of Connected Vehicle technology. This will encourage widespread deployments using OEM available equipment.

How is this project going to be implemented?

The first step in this project will be a ConOps that will bring together stakeholders to a common understanding of what will be accomplished on the vehicle test bed and corridor test bed. Summary components of the ConOps will help bring in funding and industry partners who want to participate. The ConOps should address operations, roles and responsibilities, and envisioned technologies for:

- **Initial Operational Tests Environment.** Defining the details of what is needed in the test corridor and test bed vehicles; and

- **I-710 Environment.** Providing an enhanced framework and understanding of how the test results may fit into the I-710 freight corridor environment.

The next step will be to use the ConOps as a basis to define test requirements and potential operational requirements for I-710. A simulation model will be developed so that actual results can be compared with anticipated results. Test facilities will be identified and detailed test plans developed, preferably with a multiyear program. Test vehicles and required equipment will be specified and obtained. Three categories of test have been identified, although these may be modified by the demonstration and operations group:
1. Tests focused on the potential for the real-world application of a loosely defined conveyor of trucks using available Adaptive Cruise Control (ACC), and possibly braking technology with prescribed operational speeds for a corridor.

2. Tests designed to achieve tighter spacing (or closer) of trucks (in a safe environment) with DSRC and intertruck communications. This approach may allow for tighter spaces between trucks with forewarning of problems several trucks in advance. This also may include roadside DSRC communications stations to provide an overall corridor view of the operations of the conveyor of trucks.

3. The third test stage would use lessons learned from Stages 1 and 2, which would be applied to enhance vehicle automation, possibly including lateral guidance and control at a greater level with combined cooperative ACC, safety, braking, and vehicle-to-vehicle communications, to establish the most effective conveyor options possible. This stage would combine corridor-wide simulation and management concepts, where speeds of vehicles may be managed, given the levels of traffic and conditions in the corridor as communicated by vehicle-to-roadside DSRC methods.

Stages of the test process will include establishing the physical test corridor with the required equipment, integrated testing and proof of concept, the initial demonstration segment with nontest bed trucks. Monitoring and evaluation activities would occur throughout the course of the demonstration.

**How long is it going to take?**

The ConOps and initial test concepts are anticipated to take one year. The physical development of the test bed will take a minimum of six months. The starting date for this activity could begin concurrently with the test plan development, but probably toward the end of this period. The initial set of tests are estimated to take approximately one year at a minimum, but this schedule depends largely on availability of vehicles, the test bed, and required equipment and the specifications developed for the test plans. These cannot be estimated with a high level of confidence until the ConOps and initial test concepts are completed.

**Who is going to be responsible?**

The core institutional effort will be to develop an ongoing demonstration and operations group. This group will coordinate and act as overall project supporters

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1ACC is an existing technology available currently available on some automobiles. It allows the driver to set and retain a specific vehicle speed, but different from traditional cruise control systems, the system is able to decrease its speed automatically when the preceding vehicle decreases its speed. It also maintains a specific distance from the preceding vehicle that can be set by the driver (IVsource.net, 2011).
and sponsors. The group will represent the partnership between government and private industry. Likely partners are OEMs, other equipment suppliers, road designers and contractors, freight industry stakeholders, and universities. It is anticipated that LA Metro will take the initiative in forming this group and, along with Caltrans, serve as the conduit for project funding. The success of this project will depend in large part on the active participation of private sector and public sector partners. Given the highly technical nature of the work, it is likely that management of the overall demonstrations and many of the tasks will be contracted, either to private companies, nonprofit research organizations, or universities. Bringing all interested parties into the group at the outset is a critical step in accomplishing this.

**How much will it cost?**

Initial work on the ConOps, initial test plan, and formation and support to the Research Group is estimated at between $700,000 and $1 million over the first year. Test bed development and establishment of the test corridor are estimated to cost between $2.5 million and $4.0 million, depending on location and scope of the project.

**What are the primary risks and challenges?**

This project involves greater uncertainties than most of the others proposed, with risks summarized as follows:

- **Institutional Risk – Moderate.** Many stakeholders in the region and in the truck OEM industry will need to cooperate to make the project come to fruition. Allowing the test corridor to be implemented and maintained will take detailed and ongoing coordination and project promotion. Finding and locating a suitable test corridor will be important.

- **Technical Risk – Moderate to High.** While many of the technologies have been individually proven, there is the potential that the technologies, while combined with operational environment, may not provide the benefits desired for ultimate implementation on the I-710 corridor. By the same token, the whole goal of the project is to determine whether or not the operational benefits of the technologies prove themselves, and what design considerations should be made for the I-710 corridor to maximize its effectiveness. In many ways, this project would act as risk mitigation for the ultimate design and deployment of dedicated truck lanes on the I-710.

- **Design Complexity – Moderate.** The project should involve moderate physical design considerations, and it should also provide input to mitigate future integrated corridor applications.
How will this project be funded?

Several viable sources are available for funding this project including:

- To the extent that automated systems on trucks need to be integrated with the roadways, NHPP funds may be used to augment the private sector investment being made in the vehicles;
- STP flexible funds through the STIP to fund operational improvements and highway research, including development and technology transfer, and to facilitate access into and out of Ports;
- Funding for Projects of National and Regional Significance may be applied to help reduce congestion and improve safety;
- National Freight Network/Prioritization of Project to Improve Freight Movement allows for an increase in the proportion of Federal funding on projects in the National Freight Network to improve the flow of freight; and
- Proposition 1B funds in the Trade Corridor Improvement Fund may be used for this purpose.

During testing and development, private sector stakeholders’ involvement will include O&M, with ongoing coordination and oversight. As long as it is in Research and Development status, Federal and private funding sources should cover the ongoing expenses of the operational corridor. Subsequently, there will need to be a framework established for allocating local funds and sustaining private sector beneficiaries’ financial participation. The ongoing operation of the system, as part of the I-710 freight corridor, may be funded by toll revenue.

How will the success of this project be monitored and what performance measures will be used?

A technical committee will be formed consisting of Gateway Cities area stakeholders and experts in the Connected Vehicle area. As in other research projects, the committee will develop a series of specific goals and objectives for the project, and will design tests to address them. Likely issues to be addressed include:

- Spacing and size of truck platoons,
- On-board equipment required, and
- Communications requirements.
### Table 2.6  I-710 Automated Truck Research Project Steps

<table>
<thead>
<tr>
<th>Key Steps</th>
<th>Schedule</th>
<th>Lead Agency</th>
<th>Supporting Agencies</th>
<th>Anticipated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task 1. Conduct Detailed ConOps</strong></td>
<td>Months 1-4</td>
<td>GCCOG</td>
<td>• Caltrans&lt;br&gt; • LA Metro&lt;br&gt; • FHWA&lt;br&gt; • Vehicle Supplier</td>
<td>$700,000 to $1,000,000</td>
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<tr>
<td><strong>Task 2. Conduct Design Validation and Impact Assessment</strong></td>
<td>Months 4-12</td>
<td>GCCOG</td>
<td>• See above</td>
<td>$2,500,000 to $4,000,000</td>
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<tr>
<td><strong>Task 3. Form Demonstration and Operations Research Group</strong></td>
<td>Months 1-Ongoing</td>
<td>GCCOG</td>
<td>• See above</td>
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</tr>
<tr>
<td><strong>Task 4. Develop Vehicle Test Bed</strong></td>
<td>Months 6-12</td>
<td>GCCOG</td>
<td>• See above</td>
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<td><strong>Task 5. Establish Test Corridor</strong></td>
<td>Months 6-12</td>
<td>GCCOG</td>
<td>• See above</td>
<td>TBD</td>
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<tr>
<td><strong>Task 6. Conduct Truck/Corridor Integrated Testing and Proof of Concept</strong></td>
<td>Months 12-18</td>
<td>GCCOG</td>
<td>• See above</td>
<td>TBD</td>
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<tr>
<td><strong>Task 7. Initial Demonstration Segment</strong></td>
<td>Months 18-24</td>
<td>GCCOG</td>
<td>• See above</td>
<td>TBD</td>
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<tr>
<td><strong>Task 8. Independent Evaluation of Results</strong></td>
<td>Months 16-24</td>
<td>GCCOG</td>
<td>• See above</td>
<td>TBD</td>
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</tbody>
</table>
2.6 **TRUCK ENFORCEMENT NETWORK SYSTEM (TENS)**

The TENS project is an evolving project; and as a result, there is not enough information to present a full implementation plan. A brief description is provided. The TENS project description, as it currently stands, is contained in a separate report, *Gateway Cities Technology Plan for Goods Movement Feasibility Study Report for the Implementation of a Enforcement Network System for Gateway Cities and Surrounding Areas*.

**What is it?**

This project includes strategies, concepts, and layouts to truck enforcement that works for the needs of the stakeholders within the study area. This Truck Enforcement Network System (TENS) must meet the needs of the California Highway Patrol’s (CHP) daily truck enforcement facilities operations, Caltrans as overseer of the transportation system, including Truck Enforcement Facilities (TEF) design, and also the shippers, receivers, logistic and trucking industries, to process safe trucks from point to point in a timely manner. The current approach and practice of truck enforcement cannot process trucks at a rate that will match the present and future truck volume demands. The challenge is to modify and add to the existing approach of truck enforcement to meet these ever-growing truck volume demands.

The feasibility study involved finding locations and conceptually developing permanent truck enforcement facilities and bypass screen/sort sites to process the large number of truck movements per day in the Gateway Cities subregion, plus an approach to truck enforcement that could be automated to maximize the effectiveness and efficiency of the enforcement operations. This automation piece was important to this study; it is with the intention that any permanent truck inspection facilities would be safe and not result in trucks backing up onto any adjacent freeways and city streets from these facilities. These automated functions are to safely process as many trucks as possible through an inspection, weighing, and measuring environment. In addition, there is a need to realign the truck overweight fine structure to be proportional to the damages the vehicles produce to the roadway and bridges.

Appendix D contains a CD Report of the Feasibility Study for The Implementation of a TENS for Gateway Cities and Surrounding Areas.
The results of this feasibility study are:

1. Container volumes are expected to continue to increase at the two ports. This could result in truck volumes on the I-710 freeway in the future of approximately 90,000 truck trips per day (currently the freeway transports about 25,000 truck trips per day).

2. Gateway Cities is an urbanized area with many freeways and arterial highways traversing through it. This would allow truck drivers to “bypass” permanent truck inspection facilities. Therefore, automation and technology will need to be incorporated into permanent truck inspection facilities to address this issue (e.g., Weigh-in-Motion (WIM) or VWIM).

3. As the Gateway Cities subarea is highly urbanized, there are no sites that could be easily developed along the freeways near the Ports. Nonetheless, after extensive review and research, four potential sites (three on I-710 and one on I-405) were conceptually developed as permanent truck inspection sites. The report contains aerial maps and layouts for these sites as permanent truck inspection facilities. The next phase of this process is to develop each of these sites to be cost-effective and operationally feasible to meet the needs of CHP operations, Caltrans traffic concerns, and reduce the impacts to the cities.

4. TENS was also developed to help manage the inspection and enforcement for such a large numbers of trucks using technology along freeways and some arterial highways that service the Ports. This system is proposed to be constructed with permanent truck inspection facilities. This would consist of automating the potential permanent truck inspection facilities, combined with a series of technologies placed on the freeway system primarily that could automatically monitor the license plates, U.S. DOT #, inspection decals, transponders, weights of these large volumes of trucks, etc. This TENS would allow automated screening/sorting of large amounts of trucks while minimizing disruptions to their operations, but providing permanent truck enforcement sites to process as many trucks as possible. Major issues associated with TENS include how to collect and use this information (for inspection, enforcement, compliance notifications, information or all). Also who collects and has use of this information needs to be resolved. Existing codes, regulations, and laws will likely have to be modified to make TENS effective, usable, and enforceable, especially for CHP.

Additional Conclusions and Recommendations

Based on these comments (and the report), the following additional conclusions were reached:

1. CHP priority is the construction of permanent truck inspection facilities along I-710. Further development of the sites shown in the report will be required as a next step. Close coordination and cooperation with Caltrans and CHP in the next phase of the study will be needed.
2. Automation should continue to be pursued with coordination with both Caltrans and CHP. This includes the development of TENS for LA Metro/Gateway Cities, as outlined in the report. Each automation type or functionality will require an assessment in order to build this approach in an effective and acceptable approach to CHP and Caltrans.

3. Research needs to be conducted on the existing California Codes to identify any needs for modifications, omissions, or additions for TENS to perform at its potential effectiveness. This will include an evaluation of existing codes, laws, regulations, and changes to them to make TENS effective and workable.

4. Traffic analyses and impact studies of all new or modified vehicular movements need to be conducted.

5. The development of an environmental report for evaluation of impacts, including potential mitigation that may be required.

6. Cost for the TENS will be developed and evaluated in the next phase of the study. Those conceptual costs will include right-of-way, construction, operations, and maintenance/repair cost. Also, the cost of a “no build” that includes the damages cost for not having any truck enforcement in the area.

7. Funding sources for the TENS will be evaluated in the next phase of the study. These funding sources may be public and/or private.

It is technologically feasible to implement the truck inspection network that the Gateway Cities subregion needs to handle future freight throughput safely. For a truck inspection network in this area to be both effective and safe, the integration of TEFs and multiple smart roadside screening/sorting sites will be necessary. The primary cause that is driving the need for smart roadside screening/sorting network is the sheer volume of trucks traversing on multiple freeways and truck routes throughout the Gateway Cities subregion. It is projected that this volume of trucks will triple in the next 20 years. The functionality and technology needed for these smart roadside sites are up and operating in like kind truck inspection stations within other states. The new primary function that is needed in this subregion is to network and integrate multiple screening/sorting sites with proven smart roadside technologies and TEFs into one seamless truck inspection/enforcement network. The following are the main points of this study:

1. Smart Roadside is a proven approach that will process the high truck volume demands.

2. The current approach that all trucks must exit the mainline needs to be modified to smart roadside mainline screening/sorting.

3. Land of like kind use is available for two TEFs (one on I-710 at Del Amo and a second on I-405 at Del Amo).

4. Host City for the two large TEFs is in favor of TENS approach.
5. More research, evaluation, and design are needed to confirm the operational, legal, and funding concerns are also feasible. These items will be addressed in Phase II of the feasibility study.

The Gateway Cities subregion continues to demonstrate the need for a safe and effective truck inspection system that meets current and future truck volume demands. The volume and density of trucks throughout the subregion are unequalled anywhere in the nation. The majority of these trucks are drayage trucks and do not travel outside a local area. Therefore, most of these trucks do not go through other regions that have truck inspection facilities for them to be evaluated, checked, and processed through. Meanwhile these mostly noninspected trucks traverse the Gateway Cities subregion daily.

The purpose of this study was to find a functionally and technologically feasible way to safely and effectively inspect trucks that flow through the Gateway Cities subregion. The current approach to truck inspection requires a large acreage for a fixed facility next to the roadway; a three- to four-mile segment of roadway without interchanges in it; and all trucks have to exit the roadway and enter the inspection station. This current approach does not have a throughput rate required to safely inspect the volume of trucks traversing the freeways and truck routes throughout the Gateway Cities subregion. The chokepoint in the current approach is in requiring all trucks to leave the roadway and enter the inspection station, and then return to roadway. Smart roadside screening/sorting will greatly reduce the number of trucks required to enter the inspection station from 100 percent to about 20 to 25 percent. This 20 to 25 percent sorting off the roadway and into inspection station may also reduce when the trucking and freight industries respond to the permanent and continual presence of a truck inspection/enforcement network. This major reduction in the number of trucks that require processing through the inspection station will also reduce the size of right-of-way needed for the station. For available land of like kind use in the Gateway Cities subregion is limited. TENS will screen/sort current and future demands while reducing the amount of needed land for the fixed station.

It is acknowledged that it is functionally and technologically feasible to implement a truck inspection network for the Gateway Cities subregion. The next phase of the feasibility study will focus on getting information to different level of government on the need and value of TENS; studying potential daily operations of transportation system and TEFs; reviewing California Code to identify the need to modify, omit, or add to the existing codes; assessing positive and negative impacts that the TENS will have on the transportation system, local areas, goods movement, inspection group and more; estimating life-cycle costs for each TEF and the TENS in total; and identifying potential funding sources both public and private.
The additional recommendation is to move forward into Phase II of the feasibility study as follows:

1. Educate and inform the appropriate levels of government of the need and value of a truck inspection network in the subregion.

2. Study, develop, and design this network to meet or exceed the operational needs of those that will do the inspection of trucks and those that have authority over the transportation system in this subregion.

3. Evaluate California Codes that may need to be modified, omitted, or added for the new approach to truck inspection to be completely effective to its potential.

4. Analyze potential added or modified vehicular movements (from mainline through stations and back to mainline) for impacts and safety.

5. Develop more detailed plans and costs for the TENS.

6. Develop more detailed plans and costs for the proposed TEF sites.

7. Research and study the environmental impacts and how to mitigate them.

8. Develop cost estimates to construct, operate, and maintain this TENS.

9. Research and find funding sources for the construction, operations, and maintenance of the TENS.

The integration and dissemination of the data from TENS will need to be part of the Freight Traveler Information Data Fusion and Dissemination Project.
3.0 Benefits, Interdependencies, and Responsibilities

A number of project overlaps and interdependencies have been identified throughout the narrative above. Significant efforts throughout this project have been put into molding these projects into a complete integrated program. However, due to 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 standalone projects. The Survey and Roadmap at the beginning of this document provides a master schedule that estimates project timing.

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 3.1 below depicts the coordination required between the seven projects.

These interdependencies are important in order to improve the efficiency of the project implementation. However, no project is critically dependent on another (except for the TIS/Data Fusion). 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.
3.1 **SUMMARY OF STAKEHOLDER BENEFITS AND RESPONSIBILITIES**

The following table summarizes the benefits and responsibilities of the different Gateway Cities ITS project stakeholders for each of the proposed projects described in the document. Responsibilities include project management and support roles, service on project steering committees, and supply of technical input or direct services. Potential funding obligations are shown in the separate, right-hand column; and it should be noted that these are preliminary and subject to further negotiation and discussion. As noted in the project descriptions, there are multiple funding options for each of the projects, and more specific sources and amounts will be identified as these projects are further developed in the next phase.
<table>
<thead>
<tr>
<th>Project</th>
<th>Benefits</th>
<th>Role and Responsibility</th>
<th>Financial Obligation</th>
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<tbody>
<tr>
<td>LA Metro (LA SAFE)</td>
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<tr>
<td>Freight TIS and Data Fusion</td>
<td>Improves service level of LA SAFE Incident Management and 511 by incorporating freight related data</td>
<td>Project Management</td>
<td>Lead applicant for Federal and state funds and coordination with LA SAFE funding sources</td>
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<tr>
<td></td>
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<td></td>
<td>High level of effort</td>
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<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>Improved operation of arterial system will help LA SAFE’s freeway operations, particularly when detours are required during incidents or construction</td>
<td>Project Steering Committee</td>
<td>Lead applicant for Federal and state funds; pass through to cities as appropriate for certain corridor improvements</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Medium level of effort</td>
</tr>
<tr>
<td>Container Moves Productivity Improvers</td>
<td>Will provide improved data on freight movements in Gateway Cities for dissemination via 511 and web site</td>
<td>Share current datasets</td>
<td>Possible lead applicant to fund prototype tests with possible sources Discretionary Funds for Projects of National and Regional Significance or Proposition 1B funds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High level of effort</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Future improvements to freeway operations from automated truck operations</td>
<td>Project Steering Committee</td>
<td>LA Metro lead applicant for Federal and state funding sources</td>
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<td>Reduced incident management requirements resulting from truck safety requirements</td>
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<td>Medium level of effort</td>
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<td></td>
<td>Private sector participation significant for vehicle technology and roadway integration, development and testing</td>
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<tr>
<td>Project</td>
<td>Benefits</td>
<td>Role and Responsibility</td>
<td>Financial Obligation</td>
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</table>
| Freight TIS and Data Fusion                 | • Provides improved data for area planning work, particularly with regard to freight movement  
• Provides additional data supporting I-710 design effort                   | • Project Steering Committee  
• Organize and represent local communities                                      | • Support development of applications for Federal and State funds  
• Medium level of effort                                                          |
| Arterial Smart Corridor for Freight         | • Provides improved arterial operations for Gateway Cities communities    | • Project Manager  
• Collect and provide data for analysis                                              | • Coordinate funding for cities working on corridor improvement projects  
• Medium level of effort                                                          |
| Container Moves Productivity Improvements   | • Reduced congestion from truck traffic by improving operation at Ports   | • Provide input into planning phase and technical design of Container Moves projects   | • Support applications for Federal and State funding  
• Low level of effort                                                             |
| Automated Truck Research                    | • Potential applications provide opportunity for reduced truck impact on Gateway Cities communities and improved roadway safety  
• Test track and demonstration projects provide potential economic benefit for region | • Project Manager  
• Input into test track locations and applications to I-710 project           | • Low level of effort                                                             |
| Ports OF Los Angeles and Long Beach         |                                                                          |                                                                                        |                                                                                      |
| Freight TIS and Data Fusion                 | • Project will provide consolidated source for freight-related traveler information  
• TIS will improve reliability of truck traffic in and out of the Ports          | • Provide Advanced Transportation Management and Information System (ATMIS) data  
• Project Steering Committee                                                      | • Lead applicant for Federal and state funds designated for port management and related good movement  
• Possible funding sources for integration of system with ATMIS                   |
<table>
<thead>
<tr>
<th>Project</th>
<th>Benefits</th>
<th>Role and Responsibility</th>
<th>Financial Obligation</th>
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</thead>
</table>
| Arterial Smart Corridor for Freight          | - Project will provide for more efficient movement of goods in and out of the Ports  
- Project will provide ability to manage traffic more effectively in case of incidents, construction, or other disruption | - Project Steering Committee  
- Provide data on signal operations inside the port area | - Apply for state and Federal funds related to goods movement, air quality management through efficient signalization  
- Low level of effort |
| Container Moves Productivity Improvements    | - Improved efficiency in port operations  
- Reduced congestion in port area  
- More detailed information available on port traffic | - Data sharing from ATMS systems  
- Coordinate participation of MTOs in project  
- Serve on Goods Movement Efficiency Committee | - Potential applicant or coapplicant for discretionary funds Projects of National Regional Significance or freight-oriented funding programs  
- Likely lead applicant for DHS funding programs  
- Help coordinate in-kind contributions from MTOs, BCOs, and others  
- Major level of effort |
| Automated Truck Research                    | - Provides potential to efficiently accommodate projected growth in port traffic, and thus keep market share  
- Improve reliability of shipments in and out of the Ports  
- Tests may result in potential efficiency improvements within Ports | - Project Steering Committee  
- Provide space for test facilities  
- Coordinate input from port stakeholders on potential test activities | - Lead applicant for funds dedicated to safety and security of identifying and tracking goods being moved through Ports  
- Low level of effort |
| Caltrans                                    |                                                                          |                                                                                        |                                                                                        |
| Freight TIS and Data Fusion                  | - Improved freeway operations data will be available for use in Caltrans freeway operation | - Provide data on freeway conditions, including travel times and construction and ramp meter timings  
- Project Steering Committee | - Lead applicant for Federal funds, which are allocated based on formula, project merit, and implementation of adopted Master Plans (such as STIP), or other designation  
- Major level of effort |
# Gateway Cities Technology Plan for Goods Movement

<table>
<thead>
<tr>
<th>Project</th>
<th>Benefits</th>
<th>Role and Responsibility</th>
<th>Financial Obligation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>More efficient arterial operations will help improved freeway operations, particularly during incidents or major construction</td>
<td>Project Steering Committee</td>
<td>Lead applicant for Federal funds, which are allocated based on formula, project merit, implementation of adopted Master Plans (such as STIP), or other designation</td>
</tr>
<tr>
<td></td>
<td>Could help in mitigating impacts of upcoming I-710 construction</td>
<td>Provide data on Caltrans arterial roads in project area</td>
<td>Major level of effort</td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>More accurate and timely information on port traffic for input to freeway management system</td>
<td>Provide freeway management system for integration</td>
<td>Major level of effort</td>
</tr>
<tr>
<td></td>
<td>Potential statewide economic benefits from project</td>
<td>Provide technical support in design and testing of projects</td>
<td>Lead applicant for Federal funds, which are allocated based on formula, project merit, implementation of adopted Master Plans (such as STIP), or other designation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coordinate with other state agencies in any applications for DHS funds</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>Input to design of I-710 truck lanes and improved efficiency in truck lane operation</td>
<td>Project Steering Committee</td>
<td>Lead applicant for Federal funds, which are allocated based on formula, project merit, implementation of adopted Master Plans (such as STIP), or other designation.</td>
</tr>
<tr>
<td></td>
<td>Lessons from test that can be applied to other facilities in the State</td>
<td>Coordinate with universities and other research institutions that may be interested in tests</td>
<td>Major level of effort</td>
</tr>
<tr>
<td></td>
<td>Establish and confirm California as a national leader in connected vehicle research</td>
<td>Provide technical support in test facility development and in test plan development and execution</td>
<td>Source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
</tr>
<tr>
<td>FHWA</td>
<td></td>
<td></td>
<td>Source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
</tr>
<tr>
<td>Freight TIS and Data Fusion</td>
<td>Demonstrate ability to fuse different sources of data related to freight operation and improve overall system performance</td>
<td>Project Steering Committee</td>
<td>Source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
</tr>
<tr>
<td></td>
<td>Leverage activities in this project to increase benefits from FRATIS project</td>
<td>Coordination activities with FRATIS project</td>
<td>Major level of effort</td>
</tr>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>Demonstrate ability to fully equip major arterial system with ITS capability and improve operation</td>
<td>Project Steering Committee</td>
<td>Source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
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<tr>
<td></td>
<td></td>
<td>Provide information on best practices</td>
<td>Major level of effort</td>
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<tr>
<td>Project</td>
<td>Benefits</td>
<td>Role and Responsibility</td>
<td>Financial Obligation</td>
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</tr>
<tr>
<td>Container Moves: Productivity Improvements</td>
<td>• Develop and demonstrate new technologies and techniques, which can be used nationally</td>
<td>• Project manager for FRATIS development (first phase of project)</td>
<td>• Currently funding initial, related work on FRATIS project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitor design and implementation phase</td>
<td>• For later phases, serve as source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
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<td></td>
<td></td>
<td></td>
<td>• Support applications to DHS and other Federal agencies</td>
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<td></td>
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<td></td>
<td>• Major level of effort</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• Advance national research agenda on freight-related connected vehicle technology</td>
<td>• Project steering committee</td>
<td>• Source of significant funds to advance the national interests in improving the safety and efficiency of goods movement</td>
</tr>
<tr>
<td></td>
<td>• Leverage investments in I-710 projects and other projects in Gateway Cities area</td>
<td>• Assure that tests are compatible with national connected vehicle agenda and leverage other activities</td>
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<tr>
<td></td>
<td></td>
<td>• Provide technical support in test facility design and test plan development and execution</td>
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<tr>
<td>LA County</td>
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<tr>
<td>Freight TIS and Data Fusion</td>
<td>• Improved information on freeway conditions and freight traffic will help LA County better manage arterial system</td>
<td>• Project Steering Committee</td>
<td>• Support LA Metro as the lead applicant for Federal and state funds</td>
</tr>
<tr>
<td></td>
<td>• Additional data will be provided that can be used by IEN</td>
<td>• Provide IEN data to system</td>
<td>• Low level of effort</td>
</tr>
<tr>
<td></td>
<td>• Better archived information on freight movements in region providing ability to improve signal timings</td>
<td>• Integrating new data into IEN</td>
<td></td>
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<tr>
<td>Project</td>
<td>Benefits</td>
<td>Role and Responsibility</td>
<td>Financial Obligation</td>
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</tbody>
</table>
| Arterial Smart Corridor for Freight          | • Additional data that can be incorporated into IEN, improving regional arterial operations  
• ITS and signal improvements on county arterials in the Gateway Cities area | • Project Steering Committee  
• Provide data and design input on county-operated arterials  
• Integrate data from new deployments into IEN  
• Coordinate signal timing improvements with municipalities | • Support LA Metro as the lead applicant for Federal and state funds  
• Support and coordinate with city-level applicants applying for local funds to implement parts of the project  
• Medium level of effort |
| Container Moves                              | • Improved flow on county-owned arterials  
• Additional data for integration with IEN and management of truck traffic on arterials | • Supply IEN data to the project, as needed  
• Integrate applicable project data into IEN | |
| Gateway Cities Municipalities                |                                                                          |                                                                                  |                                                                                     |
| Freight TIS and Data Fusion                  | • Improved real-time information on area traffic conditions  
• Better archived information on freight movements in region providing ability to improve signal timings and anticipate freight traffic patterns | • Project Steering Committee  
• Provide arterial traffic data and signal timing data to system | |
| Arterial Smart Corridor for Freight          | • Improved regional arterial operations that will reduce the impact of truck traffic on local communities  
• ITS and signal improvements on municipally-owned arterials in the Gateway Cities area | • Project Steering Committee  
• Provide arterial traffic data and signal timing data to system | • As needed, apply for funds that must come from local planning and programming priorities, including Federal and state funds that are allocated through, for example, the STIP or CMAQ  
• Major level of effort |
| Container Moves                              | • More efficient flow in and out of Ports will provide improved traffic flow in area and reduced impacts from truck traffic | • Participate in FRATIS development, planning, and design activities  
• Monitor test bed project development and participate in tests | |

Cambridge Systematics, Inc.
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<tr>
<th>Project</th>
<th>Benefits</th>
<th>Role and Responsibility</th>
<th>Financial Obligation</th>
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</thead>
<tbody>
<tr>
<td>Automated Truck Research</td>
<td>• Reduced traffic in area from potential automated truck operation</td>
<td>• Project Steering Committee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Economic benefits from test facility and connected vehicle research</td>
<td>• Input into test track location</td>
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<tr>
<td>Marine Terminal Operators</td>
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<tr>
<td>Freight TIS and Data Fusion</td>
<td>• Improved real-time information on area traffic conditions, improving ability to increase terminal throughput</td>
<td>• Project Steering Committee</td>
<td>• Lead applicant for special port or goods movement funds, such as PSGP, which can provide data</td>
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<tr>
<td></td>
<td>• Ability to better anticipate truck arrivals and staff accordingly</td>
<td>• Provide data on terminal turnaround times and ship arrivals</td>
<td>• Medium level of effort</td>
</tr>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>• Improved ability to move traffic in and out of Ports, particularly during incidents and construction</td>
<td>• Provide input on key arterials and bottlenecks that impact operations</td>
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<tr>
<td></td>
<td>• Ability to better anticipate truck arrivals and staff accordingly</td>
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<tr>
<td>Container Moves Productivity Improvements</td>
<td>• Provide real-time information and near-term predictions on number and identification of trucks approaching MTOs</td>
<td>• Serve on Goods Movement Efficiency Committee</td>
<td>• Support to public agencies in developing applications for funding of later phases</td>
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<td></td>
<td>• Data to support better planning of gate staffing and terminal operations</td>
<td>• Provide facilities and data for prototype testing</td>
<td>• Low level of effort</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• Increase reliability of truck travel to and from the terminals</td>
<td>• Project steering committee</td>
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<td></td>
<td>• Accommodate projected growth in traffic on roadway system</td>
<td>• Possible future use of facilities for certain test activities</td>
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<td></td>
<td>• Potential improvements in terminal operation technologies may result from research</td>
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<td>Role and Responsibility</td>
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<tr>
<td>Freight Operators</td>
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<tr>
<td>Freight TIS and Data Fusion</td>
<td>• Improved information on travel conditions in port area providing ability to deploy resources more cost effectively</td>
<td>• Project Steering Committee</td>
<td>• Allocate resources for testing and reporting findings</td>
</tr>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>• Higher quality and more specific information on arterial conditions in Gateway Cities area</td>
<td>• Project Steering Committee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• More efficient operation of arterial corridors in the Gateway Cities area will improved travel times and help increase company revenue</td>
<td>• Input to project planners and designers on problems areas and preferred priority corridors</td>
<td></td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>• Provide much improved real-time data on traffic conditions, marine terminal queues, and terminal appointments</td>
<td>• Participate directly in prototype planning, design, and development phase</td>
<td>• Provide resources for testing and reporting findings</td>
</tr>
<tr>
<td></td>
<td>• Improve efficiency of operations through elimination of unnecessary trips, reduced trip times, bobtail reductions, and more efficient overall operation</td>
<td>• Provide personnel and vehicles to participate in prototype demonstration phase</td>
<td>• Support to public agencies in developing applications for funding of later phases</td>
</tr>
<tr>
<td></td>
<td>• Will provide distraction-free information to truck drivers on roadway and terminal conditions</td>
<td>• Serve on Goods Movement Efficiency Committee</td>
<td>• Medium level of effort</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• More efficient and reliable movement of goods and in and out of Port via I-710</td>
<td>• Project Steering Committee</td>
<td>• Provide resources for testing and reporting findings</td>
</tr>
<tr>
<td></td>
<td>• Potential benefits in fuel reduction from automated operation</td>
<td>• Support in design of tests</td>
<td>• Low level of effort</td>
</tr>
<tr>
<td>Project</td>
<td>Benefits</td>
<td>Role and Responsibility</td>
<td>Financial Obligation</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Beneficial Cargo Owners</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight TIS and Data Fusion</td>
<td>• Improved information on status of shipments</td>
<td>• Project Steering Committee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Greater efficiency in deliveries could help to reduce costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>• Improved operation of arterials will help improve efficiency and reliability of deliveries with potential cost reduction</td>
<td>• Provide input on key arterials and bottlenecks that impact operations</td>
<td></td>
</tr>
<tr>
<td>Container Moves Productivity Improvements</td>
<td>• More efficient pickup and delivery of goods from Port</td>
<td>• Serve on Goods Movement Efficiency Committee</td>
<td>• Support to public agencies in developing applications for funding of later phases</td>
</tr>
<tr>
<td></td>
<td>• Improved information on Port and roadway conditions</td>
<td>• Participate in planning, design, and development of prototype projects</td>
<td>• Low level of effort</td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• For those BCOs who operate their own fleets, benefits are similar to those for freight operators</td>
<td>• For those BCOs who operate their own fleets, responsibilities would be similar to those of freight operators</td>
<td></td>
</tr>
<tr>
<td>Third Party Data Providers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight TIS and Data Fusion</td>
<td>• Additional business opportunities in providing and processing data</td>
<td>• Provide advanced techniques to data fusion and freight-oriented traveler information</td>
<td>• Provide resources for testing and reporting findings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Utilize available data from improved arterial ITS to provide improved travel time data</td>
<td>• Medium level of effort</td>
</tr>
<tr>
<td>Arterial Smart Corridor for Freight</td>
<td>• Additional business opportunities in providing and processing data</td>
<td>• Provide resources for testing and reporting findings</td>
<td>• Medium level of effort</td>
</tr>
<tr>
<td>Project</td>
<td>Benefits</td>
<td>Role and Responsibility</td>
<td>Financial Obligation</td>
</tr>
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<td>-----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td><strong>Truck Manufacturers and Equipment Suppliers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• Improved technologies resulting in economic benefits</td>
<td>• Project Steering Committee</td>
<td>• Provide resources for testing and reporting findings</td>
</tr>
<tr>
<td></td>
<td>• Reduced expense by reducing need to do own tests</td>
<td>• Provide input to test facility design, test plan development, and execution</td>
<td>• Major level of effort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide equipment for testing</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Monitor tests</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide resources for testing and reporting findings</td>
<td></td>
</tr>
<tr>
<td><strong>Universities and Other Research Institutions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated Truck Research</td>
<td>• Economic benefits of national leadership in connected vehicle opportunities</td>
<td>• Project Steering Committee</td>
<td>• Provide resources for testing and reporting findings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide input to test facility design, test plan development, and execution</td>
<td>• Major level of effort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide equipment for testing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Primary responsibility for monitoring tests</td>
<td></td>
</tr>
</tbody>
</table>
A. Summary of Funding Source Options

Table A.1 shows the summary of funding source options.
### Table A.1 Summary of Funding Source Options

<table>
<thead>
<tr>
<th>Program</th>
<th>Application</th>
<th>Grant/Loan</th>
<th>Source</th>
<th>ITS Eligible?</th>
<th>Local Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHPP</td>
<td>Funding on the Interstate System, all principal arterials and border crossings on the principal arterials, intermodal connectors (between the NHS and major intermodal transportation facilities), STRAHA-NET, and the STRAHA-NET links that connect to major military institutions.</td>
<td>Grant</td>
<td>Federal through State DOT</td>
<td>Yes</td>
<td>Varies (35% or lower)</td>
</tr>
<tr>
<td>STP</td>
<td>Projects on and Federal aid highway, bridge and tunnel projects on any public road, transit capital projects (including intercity bus terminals), and bicycle/pedestrian infrastructure.</td>
<td>Grant</td>
<td>Federal through State DOT</td>
<td>Yes</td>
<td>Varies (generally 20%, but 10% if project add high-occupancy vehicle (HOV) or auxiliary lanes)</td>
</tr>
<tr>
<td>Coordinated Border Infrastructure Program</td>
<td>Funding to border states for projects that improve safe movement of motor vehicles and cargo at or across the U.S. border with Canada and Mexico.</td>
<td>Grant</td>
<td>Federal through State DOT</td>
<td>Yes</td>
<td>0-20%</td>
</tr>
<tr>
<td>CMAQ</td>
<td>Transportation projects in nonattainment and maintenance areas that improve air quality. Can be used for capital and operations.</td>
<td>Grant</td>
<td>Federal through State DOT</td>
<td>Yes</td>
<td>0-20%</td>
</tr>
<tr>
<td>Projects of National and Regional Significance</td>
<td>High-cost projects expected to have national and/or regional benefits – improving economic productivity, relieving congestion, and improving transportation safety and security by facilitating passenger and freight movement; project should significantly improve Federal-aid Highway System and be supported by non-Federal funding.</td>
<td>Grant</td>
<td>Federal</td>
<td>Yes</td>
<td>Unsure</td>
</tr>
<tr>
<td>National Freight Network/ Prioritization of Projects to Improve Freight Movement</td>
<td>Policy that establishes National Freight Network and prioritizes projects that improve freight movement.</td>
<td>Policy</td>
<td>Federal</td>
<td>Yes</td>
<td>n/a</td>
</tr>
<tr>
<td>Urban Areas Security Initiative (UASI)</td>
<td>Projects targeted for urban areas to build enhanced capacity to prevent/respond to acts of terrorism.</td>
<td>Grant</td>
<td>Federal</td>
<td>Maybe</td>
<td>Unsure</td>
</tr>
<tr>
<td>Operation Stonegarden (OPSG)</td>
<td>Projects to enhance coordination/cooperation among different agencies and jurisdictions to secure territorial borders.</td>
<td>Grant</td>
<td>Federal</td>
<td>Maybe</td>
<td>Varies</td>
</tr>
<tr>
<td>Program</td>
<td>Application</td>
<td>Grant/Loan</td>
<td>Source</td>
<td>ITS Eligible?</td>
<td>Local Match</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
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<td>-------------</td>
</tr>
<tr>
<td>PSGP</td>
<td>Funding for transportation infrastructure security activities and facility security plans at Ports.</td>
<td>Grant</td>
<td>Federal</td>
<td>Likely</td>
<td>Varies</td>
</tr>
<tr>
<td>Freight Rail Security Grant Program (FRSGP)</td>
<td>Funding for security initiatives for freight rail carriers that transport Rail Security-Sensitive Materials (RSSM) through high threat urban areas.</td>
<td>Grant</td>
<td>Federal</td>
<td>Likely</td>
<td>Varies</td>
</tr>
<tr>
<td>Defense Sciences Office (DARPA)</td>
<td>Office within DARPA with programs that pursue promise science and engineering research ideas with goal of transforming research into Department of Defense capabilities.</td>
<td>Unsure</td>
<td>Department of Defense</td>
<td>Maybe</td>
<td>Varies</td>
</tr>
<tr>
<td>Information Innovation Office (I2O)</td>
<td>Office within DARPA with focus on areas that can provide a decisive military advantage.</td>
<td>Unsure</td>
<td>Department of Defense</td>
<td>Maybe</td>
<td>Varies</td>
</tr>
<tr>
<td>Transportation Infrastructure Finance and Innovation Act (TIFIA)</td>
<td>Loans and credit assistance for major transportation investment, including public intermodal freight facilities.</td>
<td>Loan</td>
<td>Federal</td>
<td>Yes</td>
<td>0% but can only cover 33% of eligible project costs</td>
</tr>
<tr>
<td>GoCalifornia Proposition 1B</td>
<td>Various programs supported through Transportation and Air Quality Bond Package with funding for corridor mobility, trade corridors, STIP augmentation, state and local partnerships, and SHOPP (highway rehabilitation).</td>
<td>Grant</td>
<td>State of California</td>
<td>Maybe</td>
<td>0%</td>
</tr>
<tr>
<td>STIP Interregional Transportation Improvement Program</td>
<td>Projects to improve the interregional movement of people and goods to and through urbanized areas.</td>
<td>Grant</td>
<td>State of California</td>
<td>Likely</td>
<td>Varies</td>
</tr>
<tr>
<td>GARVEE Bond Program</td>
<td>All Title 23 eligible projects and intermodal facilities that are eligible for Federal assistance under Title 23 or 49; NHS-eligible intermodal connectors.</td>
<td>Debt (loan) repaid through future federal highway revenues</td>
<td>State of California</td>
<td>Maybe</td>
<td>0%</td>
</tr>
<tr>
<td>Measure R</td>
<td>Transportation upgrades and projects contributing to congestion relief in Los Angeles County.</td>
<td>Grant</td>
<td>Los Angeles County</td>
<td>Likely</td>
<td>0%</td>
</tr>
</tbody>
</table>
B. Detailed Potential Funding Sources

B.1 Project Funding

In general, state and local agencies play the largest role in financing, owning, and operating highway and ITS systems. While Federal funds are available to manage, operate, and maintain ITS systems, the bulk of funds typically comes from or is programmed by states and localities. The following chapter discusses various sources of funding at the Federal, state, and local levels, which may be applicable to finance goods movement projects. It also discusses Moving Ahead for Progress in the 21st Century (MAP-21), the two-year reauthorization of Federal surface transportation programs signed into law in July 2012. The body of the Implementation Plan identifies potential sources of funding for each project and the potential funding responsibilities of each stakeholder.

Federal Funding Sources

Federal Reauthorization

While the passage of MAP-21 has brought about many changes in Federal transportation funding, some key provisions relevant to this project are summarized below.

- Many highway and transit programs have been consolidated and a large portion of Federal funding has been appropriated to four core formula programs.

- Establishes a National Freight Policy and National Freight Network. U.S. DOT is required to create a National Freight Plan, and states are encouraged to establish state freight plans and freight advisory committees. Additionally, U.S. DOT is allowed to increase the Federal share of funding from 90 to 95 percent on interstate freight projects, and from 80 to 90 percent for freight projects included in a state freight plan.

- Establishes seven national goals areas, one of which is Freight Movement and Economic Vitality. As part of this, U.S. DOT must create performance measures for the following programs/areas through a collaborative process with the states, MPOs, transit agencies, and stakeholders: NHPP, Highway Safety, CMAQ, freight movement, and transit safety and state of good repair.
Federal-Aid Highway System and Federal-Aid Programs

The Federal-aid highway system, or National Highway System (NHS), as defined in law, includes the Interstate Highway System, the Strategic Highway Network (StratHNet), other Principal Arterial roadways not designated as part of the Interstate or StratHNet systems, and connections from the NHS to intermodal or strategic military facilities. The MAP-21 legislation expanded the NHS definition to include principal arterials that were not included in the NHS under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). While there are numerous Federal programs available to fund transportation improvements, the following discussion focuses on those programs, which have the potential to fund ITS projects to enhance goods movement/freight transportation.

Core Highway Formula Programs

Under MAP-21, there are a number of “core” formula-based programs. The programs relevant to ITS projects include: 1) NHPP; 2) Surface Transportation Program (STP); 3) Congestion Mitigation and Air Quality Improvement Program (CMAQ); 4) Highway Safety Improvement Program (HSIP); and 5) Metropolitan Planning. Different from the SAFETEA-LU, MAP-21 authorizes a lump sum total for the core formula programs rather than assigning a set amount to individual programs. After the lump sum total is determined, each State’s share is calculated following the guideline that states will receive at least 0.95 cents of each dollar it contributed to the Highway Account of the Highway Trust Fund. Finally, each state’s total is divided among programs within the state. Approximately $38 billion per year in funding is authorized for the core programs.

National Highway Performance Program (NHPP)

The NHPP provides funding for the National Highway System (NHS), which includes the Interstate System; all principal arterials and border crossings on the principal arterials; intermodal connectors, which provide a connection between the NHS and major intermodal transportation facilities; STRAHNET, the highway network critical to U.S. military defense; and the STRAHNET links that connect to major military institutions.

The program has three main objectives:

- Support the performance and condition of the NHS;
- Build new facilities on the NHS; and
- Ensure that Federal-aid funds in highway construction are spent on projects that support performance targets established in state asset management plans for the NHS.

Funding can be provided for freight-related projects on the NHS involving construction, reconstruction, resurfacing, restoration, rehabilitation, preservation, or operational improvements on NHS segments. In addition, the following activities are eligible on NHS bridges and tunnels: construction, replacement (including
replacement with fill material), rehabilitation, preservation, and protection (including scour countermeasures, seismic retrofits, impact protection measures, security countermeasures, and protection against extreme events). In California, NHPP funds are programmed in the State Transportation Improvement Program or STIP, with 75 percent programmed by the regional planning agencies and 25 percent programmed by Caltrans. The Federal share of NHPP funding varies according to the type of project. Safety projects receive a special rate. In addition, projects that incorporate Innovative Project Delivery receive an increased funding share. Projects in states that have not implemented an asset management plan within the specified timeframe may receive a Federal share of 65 percent. There are also a few other exceptions to the maximum Federal share a project may receive including freight projects.

**Surface Transportation Program (STP)**

The STP program provides flexible funding for projects on any Federal-aid highway, bridges and tunnels on public roads, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. The share of STP funding contributed by the Federal government is generally 80 percent, but like NHPP, the share can be as much as 90 percent for projects that add high-occupancy vehicle (HOV) or auxiliary lanes (not other general purpose lanes). In California, STP funds are provided through a transportation program administered by the FHWA and Caltrans. States are required to distribute 50 percent of its funds to areas based on population; the remaining 50 percent may be used in any part of the State.

In addition, 15 percent of each state’s Fiscal Year (FY) 2009 Highway Bridge Program apportionment is to be used for off-system bridges (those not on Federal-aid highways); 2 percent is to be used for State Planning and Research.

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2 The STIP is California’s multiyear capital improvement program of transportation projects on and off the State Highway System, funded with revenues from the Transportation Investment Fund and other funding sources.

3 To be considered “innovative”, a technology or practice must meet one of the following criteria: “…project delivery methods that improve work zone safety for motorists or workers and the quality of the facility; technologies, manufacturing processes, financing, or contracting methods that improve the quality of extend the service life of, or decrease the long-term costs of maintaining highways and bridges; technologies and practices that accelerate project delivery while complying with other applicable Federal laws (including regulations) and not causing any significant adverse environmental impact; or technologies and practices that reduce congestion related to highway construction.” Source: FHWA, 2012, “Sec. 1304: Innovative Project Delivery Methods Questions & Answers.” [http://www.fhwa.dot.gov/map21/qandas/qaipd.cfm](http://www.fhwa.dot.gov/map21/qandas/qaipd.cfm).
(SPR); and a portion is set aside for the state’s Transportation Alternatives (TA) program.4

STP funds can be used for construction, reconstruction, rehabilitation, resurfacing, restoration, preservation, and operational improvements highways.5 For California, these funds are programmed in the STIP, with 75 percent programmed by the regional transportation planning agencies and 25 percent programmed by Caltrans. Other eligible projects include the construction of new bridges and tunnels on Federal-aid highways; replacement, rehabilitation, preservation, protection, and anti-icing/deicing for bridges and tunnels on any public road, which includes project needed to accommodate other modes; and bridge and tunnel inspection and evaluation and training for bridge and tunnel inspectors. The following freight-related project types are also eligible:

- Highway and transit safety infrastructure improvements and programs, installation of safety barriers and nets on bridges, hazard eliminations, mitigation of hazards caused by wildlife, railway-highway grade crossings.
- Highway and transit research, development, technology transfer.
- Capital and operating costs for traffic monitoring, management and control facilities and programs, including advanced truck stop electrification.
- Surface transportation planning.
- Development and establishment of management systems.
- Infrastructure-based ITS capital improvements.
- Border infrastructure projects.
- Truck parking facilities.
- Congestion pricing projects and strategies, including electric toll collection and travel demand management strategies and programs.
- State asset management plan development and implementation (for the NHS), and similar activities related to a performance based management program for other public roads.

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4 The Transportation Alternatives (TA) program replaces the former Transportation Enhancements (TE), Safe Routes to School and Recreational Trails Programs. Funding for Transportation Alternatives is set aside from five of the core programs: NHPP, STP, HSIP, CMAQ, and Metropolitan Planning. The total share of TA funding each state receives is equal to FY09 TE Funding share.

5 This includes designated routes of the Appalachian Development Highway System (ADHS) and some local access roads, as outlines under 40 USC 14501.
Surface transportation infrastructure modifications within port terminal boundaries, only if necessary to facilitate direct intermodal interchange, transfer, and access into and out of the port.

**Congestion Management and Air Quality Improvement Program (CMAQ)**

The CMAQ program provides a flexible funding source to state and local governments for transportation projects and programs that improve air quality by reducing transportation-related emissions in nonattainment and maintenance areas for ozone, carbon monoxide (CO), and particulate matter (PM_{10} and PM_{2.5}). CMAQ funds can be used for freight-related projects, both capital and operations, that improve air quality by reducing truck, locomotive or other emissions. This includes projects that improve traffic flow, signalization, add HOV lanes, improve intersections and other similar activities that reduce congestion and improve air quality. Included are projects that implement ITS, such as incident response, multimodal traveler information, and other projects that improve mobility.

Examples of CMAQ projects include construction of intermodal facilities for moving containers from highways and onto rail, defraying barge operating costs, rail track rehabilitation, diesel engine retrofits, and new rail sidings. Additionally, traffic monitoring, management, and control facilities are eligible if they contribute to achieving an air quality standard; this includes advanced truck stop electrification systems. The Port of Long Beach/Port of Los Angeles ATMIS was funded in part by CMAQ funds and in part by local funding from the Ports of Long Beach and Los Angeles as well as the Alameda Corridor Transportation Authority. ATMIS is a major part of the overall I-710 Corridor/Gerald Desmond Bridge Gateway Program. This system monitors vehicle traffic conditions and distributes this information to drivers, other agencies, and other information systems through message signs, Internet video, and other means.\(^6\)

CMAQ funds may be used to fund construction and other activities that could benefit a private entity if it can be documented that the project will remove truck traffic on the Federal-aid system or reduce other freight-related emissions, improving regional air quality. This could be accomplished through a public-private partnership agreement which would allow public CMAQ funds to be spent on private freight projects. Other eligible projects include facilities that serve electrical or natural gas-fueled vehicles. In some cases, CMAQ funds can be used for transit operations.

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MAP-21 authorizes a lump sum total for all core formula programs in a state rather than individual amounts for each program. After the state’s total core formula program apportionment is determined, the state’s CMAQ funding is set aside from that amount using a calculation based on the relative size of a state’s FY 2009 CMAQ apportionment. The total estimated CMAQ funding for all states is $2.21 billion in FY 2013 and $2.23 billion for FY 2014. To provide a reference point for what the state and Los Angeles region’s apportionment could be, in FY 2009, California’s received approximately $33.9 million in CMAQ funds and SCAG received approximately $17.8 million.7

Within a state, CMAQ funds are apportioned according to a formula based on population and severity of pollution in ozone and carbon monoxide nonattainment and maintenance areas. Funds are programmed at the discretion of the MPOs. A performance-based component has been added to this program. Within 18 months of the enactment of MAP-21, U.S. DOT must establish performance measures to assess traffic congestion and on-road mobile emissions. Within one year of the establishment of these measures, each state must identify a target for the measures. Additionally, each MPO with a transportation management area that has a population over 1 million (that is a nonattainment or maintenance area), must develop a performance plan for achieving the targets and update it on a biennial basis.

Discretionary Programs

Through discretionary programs, Congress allocates funding for specific projects or provides a fixed amount to states for a particular type of transportation investment. MAP-21 eliminated many discretionary programs, but incorporated many of the eligibilities from these former programs into the core programs. One discretionary program is described in this section.

Projects of National and Regional Significance

The Projects of National and Regional Significance program provides funding for high-cost projects expected to have national and regional benefits, including 1) generating national or regional economic benefits in excess of the project cost including improved access to jobs, labor, and other important economic inputs; 2) reducing long-term congestion across the nation, in the state, or in a region and aiding in the movement of people and goods; and 3) improving transportation safety and security. Additionally eligibility requirements include: 1) the project should result in a significant improvement of the Federal-aid Highway System; and 2) the project is supported by non-Federal financial commitments. In sum, $500 million was authorized to fund this program for FY 2013 only. The

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Alameda Corridor East received funding under a similar program included in previous appropriations legislation.

New Freight Policies

As mentioned in Section 1.0, Federal Policy, MAP-21 established some new freight-supportive policies that focus on improving the condition and performance of the National Freight Network.

National Freight Network/Prioritization of Projects to Improve Freight Movement

Along with the establishment of a National Freight Network, this policy prioritizes projects that improve freight movement. As part of this policy, U.S. DOT may increase the Federal share of funding from 90 to 95 percent for projects that are on the Interstate system. Additionally, if the project meets the following eligibility requirements, U.S. DOT may increase the Federal funding share from 80 to 90 percent for freight projects that are included in a state freight plan and can show progress toward achieving freight movement performance targets.

Eligibility requirements for freight projects are as follows:

- Construction, reconstruction, rehabilitation, and operational improvements directly relating to improving freight movement;
- ITS and other technology to improve the flow of freight;
- Efforts to reduce the environmental impacts of freight movement on the primary freight network;
- Railway-highway grade separation;
- Geometric improvements to interchanges and ramps;
- Truck-only lanes;
- Climbing and runaway truck lanes;
- Truck parking facilities eligible for funding under section 1401;
- Real-time traffic, truck parking, roadway condition, and multimodal transportation information systems;
- Improvements to freight intermodal connectors; and
- Improvements to truck bottlenecks.

Non-U.S. DOT Federal Funding Programs

Various programs administered by Federal agencies other than the U.S. DOT also could provide potential funding opportunities for GCCOG ITS goods movement projects, particularly if they can supplement other funding sources.
Department of Homeland Security (DHS)

DHS administers Preparedness Grants to “assist states, urban areas, tribal and territorial governments, nonprofit agencies, and the private sector in strengthening our nation’s ability to prevent, protect, respond to and recover from terrorist attacks, major disasters, and other emergencies.” Some of the programs which may present an opportunity are shown below.

Urban Areas Security Initiative (UASI)

The UASI project provides funding to address the unique planning, organization, equipment, training, and exercise needs of high-threat, high-density urban areas, and assists them in building an enhanced and sustainable capacity to prevent and respond to acts of terrorism. The State Administrative Agency designated through the Federal Emergency Management Agency (FEMA) is the eligible applicant. As a designated, Tier 1 urban Area, the Los Angeles/Long Beach Urban Area would be an eligible applicant under the Urban Areas Security Initiative (UASI).

Operation Stonegarden (OPSG)

The OPSG program provides funding to enhance cooperation and coordination among local, tribal, territorial, state, and Federal law enforcement agencies in a joint mission to secure the United States’ territorial borders along routes of ingress from international borders to include travel corridors in states bordering Mexico and Canada, as well as states and territories with international water borders. The State Administrative Agency designated through the Federal Emergency Management Agency (FEMA) is the eligible applicant.

Port Securing Grant Program (PSGP)

PSPG provides funding for transportation infrastructure security activities to implement Area Maritime Transportation Security Plans and facility security plans among port authorities, facility operators, and state and local government agencies required to provide port security services. The program is intended to support increased port-wide risk management, enhanced domain awareness, training and exercises, expansion of port recovery and resiliency capabilities, and further capabilities to prevent and respond to attacks involving improvised explosive devices (IED) and other nonconventional weapons. The Los Angeles-Long Beach area is included in Group I (highest risk) as an eligible applicant for funding under this program.

Freight Rail Security Grant Program (FRSGP)

FRSGP is intended to fund security initiatives for freight rail carriers that transport Rail Security-Sensitive Materials (RSSM) through designated high threat urban areas. Freight railroad car owners and offerors that transport bulk poisonous by inhalation/toxic inhalation hazardous (TIH) materials and owner of rail bridges which are used for freight rail transportation may apply for infrastructure hardening capabilities. Grant applicants can include Class I, II, and III carriers depending on their annual operating revenues.
Defense Advanced Research Projects Agency (DARPA)

DARPA was established in 1958 to prevent strategic surprise from negatively impacting national security and create strategic surprise for the United States’ adversaries by maintaining the technological superiority of the U.S. military. To fulfill its mission, the DARPA relies on diverse entities to apply multidisciplinary approaches to both advance knowledge through basic research and create innovative technologies through applied research. DARPA’s scientific investigations encompass laboratory efforts to the creation of full-scale technology demonstrations in a wide range of fields including biology, medicine, computer science, chemistry, physics, engineering, mathematics, material sciences, social sciences, and neurosciences. DARPA serves as the Department of Defense’s primary innovation engine.

Solicitations for innovative technology applications are periodically issued by DARPA through its various divisions. Depending on timing and applicability, projects identified through the GCCOG ITS Goods Movement study may be considered appropriate for DARPA funding. Specific offices within DARPA which pursue efforts which may involve technologies identified through the GCCOG study include:

- **Defense Sciences Office (DSO).** DSO programs bridge the gap from fundamental science to applications by identifying and pursuing the most promising ideas within the science and engineering research communities and transforming these ideas into new Department of Defense capabilities.

- **Information Innovation Office (I2O).** The I2O focuses on all areas where information can provide a decisive military advantage. This includes the conventional defense mission areas where information has already been applied to military affairs: intelligence, surveillance, reconnaissance, command, control, communications, computing, networking, decision-making, planning, training, mission rehearsal, and operations support. It also includes emergent information-enabled technologies and application domains such as social science and human, social, cultural, and behavioral modeling; social networking and crowd-based development paradigms; natural language processing, knowledge management, and machine learning and reasoning; and information assurance and cyber-security. I2O works to ensure U.S. technological superiority in these areas by conceptualizing and executing advanced research and development (R&D) projects to develop and demonstrate interdisciplinary, crosscutting and convergent technologies derived from emerging technological and societal trends that have the potential to disrupt the status quo.
Federal Financing Tools

Federal financing tools consist of four mechanisms that can be used to finance transportation investments or leverage available funds:

1. Loans, where a project sponsor borrows Federal highway funds directly from a state DOT or the Federal government (e.g., State Infrastructure Banks and TIFIA loans).

2. Credit Enhancement, where a state DOT or the Federal government provides Federal funds on a contingent (or standby) basis (e.g., TIFIA loan guarantees and lines of credit). This mechanism reduces risk to investors, allowing the project sponsor to borrow at a lower interest rate.

3. Debt financing through Grant Anticipation Revenue Vehicles (GARVEE) bonds, where a state DOT can pledge a share of future Federal highway funding toward debt service on a long-term bond issue.

4. Special Experimental Project Number 15 (SEP-15), allows the Secretary of DOT to waive certain funding requirements and regulations on a case-by-case basis, allowing FHWA to experiment in areas of project delivery involving contracting, right-of-way acquisition, project finance, and compliance with the National Environmental Policy Act (NEPA) and other environmental regulations.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

Originally enacted in the Transportation Equity Act for the 21st Century (TEA-21), the goal of the TIFIA credit program is to leverage limited Federal resources and stimulate private capital investment by providing credit assistance for major surface transportation investments of national or regional significance. MAP-21 increased the amount of funding available for TIFIA: $750 million was authorized for FY 2013 and $1 billion was authorized for FY 2014. As a general note, a TIFIA authorization of $1 billion supports about $10 billion in actual lending capacity. Credit assistance of up to 33 percent of the project cost is provided through secured loans, loan guarantees, or lines of credit for surface infrastructure projects of national or regional significance. MAP-21 also allows “master credit agreements,” in which U.S. DOT can make a future commitment of TIFIA funds (contingent upon future funding availability) for a program of projects secured by a common revenue pledge. The project costs must meet one of the following criteria in order to be eligible:

- At least $50 million;
- At least $25 million if it is a rural infrastructure project;
- At least $15 million if it is an ITS project; or
- One-third of the state’s most recently-completed fiscal year’s formula apportionments.
Eligible freight activities include:

- Projects eligible under Chapter 53 of Title 49;
- Public or private freight rail facilities providing benefits to highway users via direct highway-rail freight interchange;
- Projects providing access to, or improving the service of, the freight rail projects and transfer facilities described above;
- Intermodal freight transfer facilities;
- Port terminals, when related to surface transportation infrastructure modifications to facilitate direct intermodal interchange, transfer, and access into and out of port; and
- Surface transportation infrastructure modifications necessary to facilitate direct intermodal interchange, transfer and access into and out of a port.

Repayment of TIFIA loans is required to be obtained from tolls, user fees, or other dedicated revenue sources, including payments received under a public-private partnership agreement. The repayment process for a TIFIA loan must begin no later than 5 years after the project is completed and the loan must be fully repaid within 35 years of the project is completed or by the end of the financed asset’s useful life (if the useful life is less than 35 years).

The cost of many proposed ITS Goods Movement projects will be less than the minimum amount of $15 million, depending on how they might be structured or combined with other major infrastructure improvements. While some Goods Movement projects may qualify, many will not meet this threshold. As a result, State Infrastructure Bank (SIB) loans and GARVEE bonds, described below, may offer more feasible funding options.

The Secretary of U.S. DOT selects project to receive TIFIA credit assistance through a rolling, competitive application process administered by the TIFIA Joint Program Office. Selection is based on a few criteria including creditworthiness and inclusion in transportation plans and programs.

**Grant Anticipation Revenue Vehicle (GARVEE) Bond**

A GARVEE bond is a financing instrument that allows states to issue debt backed by future Federal-aid highway revenues. Eligibility for freight projects is constrained by the underlying Federal-aid highway programs that will be used to repay debt service. GARVEE bonds are discussed in greater detail in the following section relevant to California funding sources.
Private Activity Bonds

The provisions related to private activity bonds under SAFETEA-LU remain the same in MAP-21. SAFETEA-LU amended Section 142(a) of the IRS code to allow the issuance of tax-exempt private activity bonds for highway and freight transfer facilities. States and local governments are allowed to issue tax-exempt bonds to finance highway and freight transfer facility projects sponsored by the private sector. SAFETEA-LU specifies a cap of $15 billion on private activity bonds. This program reflects the Federal Government’s policy to increase private sector investment in transportation infrastructure. Providing private developers and operators with access to tax-exempt interest rates significantly lowers the cost of capital and enhances investment prospects.

Special Experimental Project 15 (SEP-15)

SEP-15 is an experimental process for the FHWA to identify new public-private partnership approaches to project delivery for trial evaluation. If successful, these new approaches could facilitate the efficient delivery of transportation projects without impairing the FHWA’s ability to carry out its stewardship responsibilities to protect the environment and the resources of American taxpayers. SEP-15 addresses but is not limited to four major components of project delivery:

- Contracting;
- Compliance with environmental requirements;
- Right-of-way acquisition; and
- Project finance.

Elements of the transportation planning process may also be involved. For example, SEP-15 applications may include suggested changes to FHWA’s traditional project approval procedures and may require modifications in the implementation of the FHWA policies or deviations from current Title 23 USC requirements or the FHWA regulations.

B.2 STATE FUNDING SOURCES

STIP: Interregional Transportation Improvement Program

The State Transportation Improvement Program (STIP) is California’s multiyear capital improvement program of transportation projects on and off the State Highway System. It is funded primarily from the State Highway Account, whose principal sources of funds are excise taxes on motor-vehicle fuels.

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commercial vehicle weight fees, and funds from the Federal Core programs. The STIP is the principal account that commits major resources for improving the interregional road system and highway safety.

The California Transportation Commission (CTC) adopts the Caltrans five-year estimate of available funds for transportation projects and then schedules most of the State’s new transportation projects through the STIP prioritization process, with the participation of regional agencies and Caltrans. Specific performance indicators and measures have been adopted by the CTC to assist the regional agencies in the quantitative and qualitative evaluation of candidate STIP projects.

STIP capital improvement funding goes into two broad programs, with 75 percent going to the Regional Improvement Program and 25 percent to the Interregional Transportation Improvement Program (ITIP). Caltrans recommends projects for the ITIP with input from regional agencies. The ITIP is intended to provide funding for projects to improve the interregional movement of people and goods to and through urbanized areas. The Interregional Transportation Strategic Plan (ITSP) functions as a guide to be used in programming ITIP funds for completion of key portions of the freeway and expressway system and the intercity passenger rail program. Key program objectives are:

- Complete the ITSP focus routes;
- Reduce congestion and promote livable communities;
- Improve goods movement; and
- Encourage rural funding partnerships.

Sixty percent of ITIP funds are required to be used for interregional roads that are outside the boundaries of urbanized areas or for intercity rail projects. Forty percent of ITIP funds can be used for projects needed to facilitate interregional movement of people and goods, including state highways.

**California Infrastructure and Economic Development Bank (I-Bank)**

The California Infrastructure and Economic Development Bank (I-Bank) was created in 1994 to finance public infrastructure and private development that promote a healthy climate for jobs, contribute to a strong economy and improve the quality of life in California communities. The I-Bank operates pursuant to the Bergeson-Peace Infrastructure and Economic Development Bank Act contained in the California Government Code Sections 63000 et seq. The I-Bank is located within the Business, Transportation and Housing Agency and is governed by a five-member Board of Directors. The I-Bank has broad authority to issue tax-exempt and taxable revenue bonds, provide financing to public agencies, provide credit enhancements, acquire or lease facilities, and leverage State and Federal funds.
While there are several programs, the one most relevant to the Gateway Cities ITS Study is the Infrastructure State Revolving Fund (ISRF) Program which provides low-cost financing to public agencies for a wide variety of infrastructure projects. ISRF Program funding is available in amounts ranging from $250,000 to $10,000,000, with loan terms of up to 30 years. Interest rates are set on a monthly basis. Eligible applicants include any subdivision of a local government, including cities, counties, redevelopment agencies, special districts, assessment districts, joint powers authorities and nonprofit corporations formed on behalf of a local government. Eligible project categories include city streets, county highways, state highways, drainage, water supply and flood control, educational facilities, environmental mitigation measures, parks and recreational facilities, port facilities, public transit, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, defense conversion, public safety facilities, and power and communications facilities.

**GARVEE Bond Program**

As described above, GARVEE bonds are tax-exempt debt instruments where future Federal-aid highway funds in the State Highway Account are used to meet debt service requirements on bonds issued to fund transportation projects. In authorizing the use of GARVEE financing in California, the State Legislature intended to facilitate the funding and construction of critical transportation infrastructure projects sooner than would be possible using traditional pay-as-you-go funding mechanisms. In establishing this program, the Legislature limited GARVEE debt service to 15 percent of total Federal revenues deposited in the State Highway Account for any consecutive 12-month period within the preceding 24 months. Each bond must be structured for debt service payment over a term of no more than 12 years.

The CTC has the authority to select projects for GARVEE bonding. The projects with the greatest potential for GARVEE funding are major improvements to corridors and gateways for interregional travel and goods movement, including projects that increase capacity, reduce travel times, or provide long-life rehabilitation of key bridges or roadways.

A report written by the state treasurer to the California Transportation Commission in May 2012 provides an analysis of GARVEE bonding capacity. The state’s capacity to issue bonds depends upon a number of factors, including the statutory cap for debt service, which means that annual debt service for outstanding GARVEE bonds must be no greater than 15 percent of the total amount of Federal transportation funds deposited into the State Highway Account. Additional factors that contribute to the state’s ability to issue these bonds include interest rates, maturity structures, and policy decisions. The analyses show a bonding capacity of between $2.83 billion and $5.40 billion depending upon amortization periods and market conditions.

However, while the report projected a capacity for issuing GARVEE bonds, it also noted that the state does not plan to issue any GARVEE bonds in the near
future. Recent events support that statement. In March 2012, the California Transportation Commission approved the 2012 State Highway Operation and Protection Program (2012), which included no GARVEE projects.9

**Transportation Finance Bank (TFB) Revolving Loan Program**

Although currently inactive, the TFB Revolving Loan Program was implemented to provide flexible, short-term financing to public entities and public/private partnerships to accelerate the delivery of transportation projects in California. The program was initiated in 1998 as a State Infrastructure Bank (SIB) authorized in TEA-21 and was capitalized with $3 million in Federal funding. Caltrans took over responsibility for the program from the California Technology, Trade, and Commerce Agency in 2002. Any local transportation planning agency or county transportation commission may apply for a loan under the program. Projects must be included in the STIP and comply with all Federal requirements. Among other requirements to qualify for a loan, the borrower must provide a financial plan for each project and must demonstrate that the project has a high probability of resulting in a completed facility.

Under the initial guidelines for the TFB, loan amounts could not be less than $300,000 or over $1 million, with a maximum loan term of six years. Although the program is currently dormant, it could be reactivated if improved state transportation revenues permit.

**Proposition 1B – Transportation Bond Program**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, was approved by the voters as Proposition 1B on November 7, 2006. Proposition 1B provides $19.925 billion for transportation and, with funds still remaining in various accounts, provides a significant source of state funding for ITS goods movement projects. The following accounts represent potential funding opportunities.

**Corridor Mobility Improvement Account**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 includes a program of funding from $4.5 billion to be deposited in the Corridor Mobility Improvement Account (CMIA). The funds in CMIA are to be available to the California Transportation Commission, upon appropriation in the annual Budget Bill by the Legislature, for allocation for performance improvements on the state highway system or major access routes to the state highway system. The CMIA presents an opportunity to provide demonstrable congestion relief, enhanced mobility, improved safety, and stronger connectivity. As of January 2012, approximately $3.75 billion from this account were

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appropriated by the legislature through 2011 to 2012, leaving approximately $750 million available and unappropriated.

**Trade Corridor Improvement Fund**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 includes $2 billion, available to the California Transportation Commission upon appropriation in the annual Budget Bill by the Legislature for infrastructure improvements along Federally designated “Trade Corridors of National Significance” in the state or along other corridors within the state that have a high volume of freight movement. The Commission is to consult the Trade Infrastructure and Goods Movement Plan, trade infrastructure and goods movement plans adopted by regional transportation planning agencies, regional transportation plans and the Cal-MITSAC Statewide Port Master Plan. As of January 2012, approximately $1.75 billion from this account were appropriated by the legislature through 2011 to 2012, leaving approximately $25 million available and unappropriated.

**STIP Augmentation**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 authorized $2 billion in general obligation bond proceeds to be available for projects in the STIP to augment funds otherwise available for the STIP from other sources. Under the Bond Act, the funds shall be deposited in the newly created Transportation Facilities Account (TFA) and shall be available, upon appropriation by the Legislature, in the same manner as other STIP funds. As of January 2012, approximately $1.75 billion from this account were appropriated by the legislature through 2011 to 2012, leaving approximately $25 million available and unappropriated.

**State-Local Partnership Program Account**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 includes $1 billion to be deposited into the newly created State-Local Partnership Program Account. The funds will be available to the California Transportation Commission, upon appropriation by the Legislature, for allocation over a five-year period to eligible transportation projects nominated by an applicant transportation agency. A dollar-for-dollar match of local funds is required for an applicant transportation agency to receive state funds under this program. As of January 2012, approximately $1.75 billion from this account were appropriated by the legislature through 2011-2012, leaving approximately $25 million available and unappropriated.

**SHOPP Augmentation**

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 deposited $750 million in the newly created Highway Safety, Rehabilitation, and Preservation Account for highway safety, rehabilitation, and pavement
preservation projects. Funds will be available to Caltrans upon appropriation by the Legislature, through the State Highway Operation and Protection Program (SHOPP), California’s ten-year transportation infrastructure investment plan. The most recent program was finalized in March 2012. The 2012 SHOPP includes programming for fiscal years 2012/2013 through 2015/2016. This funding is reserved for projects that aim to reduce collisions; restore damaged roadways; preserve bridges, roadways, and roadsides; enhance mobility; and preserve other transportation facilities related to the state highway system. The 2011 10-Year Highway Operation Protection Program Plan estimated that the needs for rehabilitating and reconstructing the state highway system is $7.4 billion per year. The 2012 SHOPP provides $2 billion per year (for the four-year period).10

B.3 LOCAL FUNDING SOURCES

Measure R

In November 2008, Los Angeles County voters approved “Measure R,” committing a projected $40 billion to traffic relief and transportation upgrades within Los Angeles County over a 30-year timeframe. Measure R is one-half-cent sales tax for the County to finance new transportation projects and programs, while accelerating other projects that may already be underway. The tax went into effect in July 2009. Included in the Measure is an Expenditure Plan that identifies projects to be funded and other sources of funding to supplement Measure R funds to complete projects. The Expenditure Plan addresses seven transportation categories for funding:

- 35 percent to new rail and bus rapid transit projects;
- 3 percent to Metrolink projects;
- 2 percent to Metro Rail system improvement projects;
- 20 percent to carpool lanes, highways and other highway improvements;
- 5 percent to rail operations;
- 20 percent to bus operations; and
- 15 percent for local city sponsored improvements.

Given the extent to which specific projects are earmarked for funding under Measure R, it is unclear whether a goods movement ITS project would qualify

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10 California Department of Transportation, 2012 State Highway Operation and Protection Program (SHOPP), [http://www.dot.ca.gov/hq/transprog/SHOPP/2012_SHOPP_as_approved_by_the_CTC.pdf](http://www.dot.ca.gov/hq/transprog/SHOPP/2012_SHOPP_as_approved_by_the_CTC.pdf).
for funding unless incorporated into one of the eligible projects defined within the measure.

A summary of all funding sources is included in Appendix A.

**B.4 APPROACHES TO INNOVATIVE FINANCING**

Details of specific innovative financing strategies will be developed as components of the individual feasibility projects being addressed through the GCCOG ITS Goods Movement Study. These strategies will be individually tailored to address the unique elements of the various feasibility projects and will provide a detailed strategy to undertake the particular project for which they were developed. The following discussion is intended to provide a general overview of a range of innovative financing techniques which may or may not be applicable to these individual projects but which provides a menu of options that may be considered for more intensive investigation. A number of the feasibility studies being undertaken in the GCCOG ITS Goods Movement Study will be examining innovative financing opportunities in greater detail.

**Funding Sources**

These potential funding sources could support goods movement projects, either as “pay-as-you-go” funding or to support debt.

**User Fees/Tolls**

User fees can provide a dedicated stream of revenue to repay loans or bonds issued in support of an investment. Truck-only toll (TOT) lanes are proposed as a possible strategy for further investigation through the GCCOG Goods Movement ITS study. TOTs have already been studied in the Los Angeles region on SR 60 and I-710, which are both heavily utilized truck corridors serving the Ports of Los Angeles and Long Beach. TOT lanes have also been studied in Georgia on heavily congested truck routes in the Atlanta Metropolitan Area. Tolling strategies will be considered in more detail as one of the GCCOG Goods Movement technology opportunities.

**Dedicated Taxes**

Highway projects are traditionally funded through motor vehicle fuel taxes which are levied by the state to fund local transportation investments. Local governments also use property taxes as a source of revenue to fund local transportation projects. Local governments have lately been implementing other local option taxes to support transportation investments. For example, the ReTRAC project in Reno, Nevada includes a one-eighth-cent sales tax and a one-percent hotel occupancy tax as part of a package of dedicated revenue sources to repay a TIFIA loan.
Special Taxing and Assessment Districts

Special taxing or assessment districts capture the financial benefits of particular infrastructure investments. Residents and/or business owners who would receive these benefits are assessed additional property taxes that are allocated to finance these improvements. Special districts can be dissolved after a designated period of time. This strategy is typically applied to transit investments, although it can also be used for general highway, port, or freight rail investments. Revenues from special assessment districts can be applied to the full value of the affected property or used as tax increment financing applied to the anticipated increase in property value which would result from redevelopment of the property.

Development Impact Fees

Development impact fees are charges assessed by the public sector against property being developed to recover costs incurred to provide transportation facilities to serve the new development. Local government evaluates the proposed development, identifies the necessary capital improvements to provide the desired level of service, and charges the developer a fee to cover a portion of the costs of the improvements. These fees are typically one-time cash payments. The developer of the proposed project who pays the impact fee may in turn pass on the cost to the purchaser of the developed property.

Equity and In-Kind Contributions

Private sector participation in the funding of goods movement improvements could be in the form of cash or in-kind contributions. In-kind contributions could include donation of land or professional services which are included as part of the project costs. Local governments can donate right-of-way for highway projects which often is used as the non-Federal share for Federally funded projects.

Financing Tools

These tools generally entail the repayment of debt incurred in the implementation of a project.

Public Debt

Debt incurred in the use of credit to finance a project must be repaid eventually. When bonds are issued by public entities, there are two broad classifications of debt: 1) tax-supported bonds; and 2) revenue bonds. General obligation bonds (or GO bonds) are backed by the full faith and credit of a state or local government and are considered the most secure type of revenue bond. As such, they are usually the highest-rated form of debt with the lowest interest rate. Revenue bonds are backed by a specific revenue source, such as a dedicated tax or tolls that are generated as a result of the project. Lease revenue bonds or certificates of participation are backed by a state or locality’s general credit, but with no specific tax pledge. Debt service payments for these bonds are subject to annual appropriation and, as a result, have a lower rating that general obligation bonds.
Special tax district bonds are financed through special charges added to property tax bills and are only applied to beneficiaries of the bonds. Tax increment bonds, referenced above, are paid from increases in property tax revenues in designated tax increment districts. Such financing is primarily applicable to redevelopment areas, requiring a long-term financing plan which anticipates the increased value accruing from the redevelopment effort.

**Tax-Exempt Facility Bonds/Private Activity Bonds**

Tax-exempt facility bonds, also known as private activity bonds (also discussed above), allow a portion of the proceeds to be used for nongovernmental purposes and have been widely used to finance port and airport capital projects. By definition, a private activity bond is either:

- A bond of which more than 10 percent of the proceeds will be used for nongovernmental purposes and which is going to be repaid from revenues received from a private entity; or
- A bond that will have the lesser of 5 percent or $5 million of the proceeds used for loans to nongovernmental entities.

SAFETEA-LU amended the IRS code to allow these types of bonds for highway and freight transfer facilities and MAP-21 did not make changes to these bonds. The interest on tax-exempt facility bonds is excluded for Federal income tax purposes in the gross income of recipients. However, interest on such bonds is taken into consideration for some Federal tax purposes such as the alternative minimum tax for individuals and corporations. With this qualified status and tax benefits to investors, tax-exempt facility bonds can be offered at a lower interest rate, providing the issuer with overall cost savings.

The types of highway and freight transfer facility projects that would qualify for this revenue source could include:

- Any surface transportation project which receives Federal assistance under Title 23;
- Any project for an international bridge or tunnel for which an international entity authorized under Federal or state law is responsible and which receives Federal assistance under Title 23; and
- Any facility for the transfer of freight from truck to rail or rail to truck which receives Federal assistance under Title 23 or Title 49.

**Institutional Arrangements**

**Joint Development**

Joint development can imply many different concepts relevant to public capital development. Joint development typically involves any formal arrangement between a public authority and a private organization that entails either private sector payments to the public authority, or private sector sharing of project
capital costs. Applied to freight and goods movement, these partnerships have been successfully utilized at port facilities. These partnerships can involve a revenue-sharing arrangement in the form of a contractual lease arrangement, transferring future services rendered by a fixed asset (such as a container crane) to a private organization, while retaining the title to that fixed asset. Another form of partnership could be a cost sharing agreement where a private party recognizes the benefit of a capital investment to its own operations and therefore agrees to share the initial capital costs. In this case, the agreement reduces the capital costs that must be funded by the public agency and also enables the agency to share any risk associated with the project with the private party.

**Public-Private Partnerships (PPP)**

PPP refers to contractual agreements between a public agency and private sector entity that allow for greater private sector participation in the delivery of transportation projects. The three principal aspects of private sector participation are:

1. **Project Delivery.** Development phase through design and construction
2. **Project Management.** Long-term operational and maintenance responsibilities; and
3. **Project Financing – Raising the capital necessary to finance the project**

PPP can involve only one of these elements or multiple elements. PPPs are particularly appropriate when applied to goods movement projects, given that the private sector is heavily invested in freight transportation through ownership of infrastructure and by facilitating the movement of goods. Unlike most other transportation investments, freight investments are often on private property, which can raise issues in regard to public funding. Furthermore, the efficient movement of goods is critical for both the private and public sectors.

**Tax-Exempt Corporations**

Creation of tax-exempt corporations allows for the issuance of debt at lower interest rates, reducing the financing costs of a project. This is particularly important when the high cost of a project acts as a barrier to private sector participation. A number of recent highway projects have been financed through the creation of a 63-20 Nonprofit Corporation. A 63-20 Nonprofit Corporation is an entity created under IRS Rule 63-20, which allows it to issue tax-exempt debt on behalf of private project developers.

### B.2 SOURCES


C. CD of Final Concept of Operations Report
D. CD of Feasibility Study Report for the Implementation of TENS for Gateway Cities and Surrounding Areas