Background Research
Executive Summary

DATE: March 2012
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executive summary

Gateway Cities Technology Plan for Goods Movement

Task 1: Background Research Executive Summary

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date
February 2012
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1.0 Introduction

1.1 Guide to the Executive Summary Report

To respond to concerns about accommodating freight traffic growth in the region, transportation leaders are undertaking a technology-based project in Southern California – the Gateway Cities Technology Plan for Goods Movement. This program represents the most significant fusion of ITS and freight operations technologies attempted to date in North America. Through the integration of traditional freeway, arterial and traveler information technologies, with intermodal freight, port, and truck technologies, this project is studying the potential of providing an end-to-end information support system that can improve the efficiency of goods movement in Southern California.

This report is part of the Gateway Cities Technology Plan for Goods Movement, which has 13 different feasibility studies as part of the larger project. The project team has organized these studies into five different groups:

1. Data Collection,
2. Transportation Operations and Management,
3. Emerging Goods Movement Technology Applications,
4. I-710 Corridor Advanced Technologies Applications, and

This Executive Summary Report includes research summaries for several key topic areas connected with these groups. Upon completing this document, you should have a strong understanding of the areas being explored to bring greater efficiency, economic growth, safety, and other benefits to the region’s thriving goods movement industry. The longer technical versions are available upon request.

The following graphic presents an overall picture of all the project components.
Gateway Cities Technology Plan for Goods Movement

TECHNOLOGY PROJECTS FOR GATEWAY CITIES GOODS MOVEMENT

Data Collection:
- Traffic monitoring will be enhanced and potentially more efficient and improve performance.
- Freeway congestion and incidents will be identified through real-time traffic condition data.
- Data collection will help improve traffic flow.

Data Collection:
- Data will be collected on areas with heavy traffic.
- Data will be collected on areas with low traffic.
- Data will be collected on areas with moderate traffic.

Data Collection:
- Data will be collected on areas with heavy congestion.
- Data will be collected on areas with low congestion.
- Data will be collected on areas with moderate congestion.

1,310 Applications:
- Long-term traffic data will be analyzed and trends will be identified.
- Long-term traffic data will be used to identify trends and patterns.

1,770 Applications:
- Future infrastructure planning will consider long-term traffic data.
- Future infrastructure planning will consider long-term traffic trends.

A Concept of Operations to Bring All the Projects Together:
All of the identified technology projects will be woven into one comprehensive concept of operations and business plans. This plan will ensure that real-world projects for implementation are the result of this multimodal planning effort. These projects will be developed in close coordination with Southern California stakeholders.
1.2 **STUDY OVERVIEW**

While 2008 to 2009 saw a dip in increases in international trade through the Southern California ports, in 2010 and early 2011 monthly container volumes at both the Port of Long Beach (POLB) and Port of Los Angeles (POLA), California, have shown significant growth. In terms of potential long-term growth, even with the most conservative growth scenario forecasts, port volumes are still expected to more than double or triple in the next 25 years\(^1\). As the levels of trade continue to rise, and with new infrastructure projects still years away from implementation, the Gateway Cities region can expect to experience increased truck traffic congestion problems. Based on recent modeling results, these congestion problems are expected to result in severe truck traffic congestion in and near the port areas, as well as general traffic congestion on metropolitan highways and arterials due to the increases in regional truck traffic. These increases in truck traffic also can generate negative regional effects related to air quality, noise, and safety; and freight delays have a negative economic impact on

\[^1\] 2035 forecast for POLB (28.5M TEU for “Low Growth” scenario and 42.7M for “High Growth” scenario) provided in Initial Feasibility Assessment, I-710 EIR/EIS, MTA, Cambridge Systematics, Inc. and URS, November 16, 2009; current port volumes based on 2009 TEU volumes from POLB and POLA web sites (6.7M TEU for POLA + 5.1M TEU for POLB = 11.8M TEU).
In addition, new policies to promote improved air quality in the Los Angeles basin, including SB 375 (greenhouse gas (GHG) emissions reductions), the California Air Resources Board (CARB) diesel emission standards program, the Southern California Air Quality Management District’s (AQMD) restrictions on truck terminal queue idling, and the POLB and Port of Los Angeles’ (POLA) Clean Trucks Program, together, present major operational and financial challenges to a local dray trucking industry – an industry that has historically relied on owner-operators and small fleets that use “yesterday’s trucks.”

The combination of severe freight congestion with the strictest regulations on truck air quality in the nation has the potential to adversely impact the economic competitiveness of the port and intermodal freight industries in the Gateway Cities subregion. These factors also can impact decisions made by international shippers and steamship lines about whether to continue to use the POLA/POLB complex, and these decisions will be further impacted by the near-term completion of the Panama Canal expansion in 2014.

To respond to these concerns in the near term, regional transportation leaders are undertaking a technology-based project in Southern California – the Gateway Cities Technology Plan for Goods Movement. This program represents the most significant fusion of ITS and freight operations technologies attempted to date in North America. Through the integration of traditional freeway, arterial and traveler information technologies, with intermodal freight, port, and truck technologies, this project is studying the potential of providing an end-to-end information support system that can improve the efficiency of goods movement in Southern California. This current project covers the key planning, conceptual and feasibility activities necessary to support the near-term deployment of these technologies.

The Gateway Cities Technology Plan for Goods Movement is a continuation of the work completed for the ITS Integration Plan for Goods Movement, building on the solid foundation of the 2008 study.

The 2008 ITS Integration Plan for Goods Movement identified the ITS needs of the Gateway Cities and Southern California, as well as several projects to improve goods movement. This ground-breaking project represented a significant fusion of ITS and freight operations technologies. The Plan was initiated by the GCCOG, in partnership with the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA).

An ITS Working Group was formed for the ITS Integration Plan, which included transportation and freight industry stakeholders in the Gateway Cities subregion from the public and private sectors. Public-sector stakeholders included Federal, state, and local governments, as well as regional metropolitan planning agencies. The public sector group also included ports, commissions, and coalitions. The private sector was represented by a variety of terminal operators, drayage operators, Class I and short line rail lines, and other private transportation and goods movement organizations and associations. This ITS Working Group
provided essential support throughout the Plan, ensuring that the projects identified reflected the real needs of both the public and private sectors in the region.

The ITS Working Group has again been assembled to support the new phase of this plan. Guidance of the ITS Working Group participants will be sought during quarterly meetings, where the project direction, preliminary findings, and recommendations will be reviewed. The ITS Working Group will be given the opportunity to review key deliverables and provide specific input unique to their needs to help shape the final Concept of Operations and Business Plan.

The Gateway Cities Technology Plan for Goods Movement will deliver the following:

• Detailed research on the latest applicable trends, practices, and regional priorities in technology applications for goods movement and other transportation needs;

• Feasibility studies for new and expanded technology applications for Gateway;

• Exploration of technologies supporting emerging alternatives for I-710 corridor improvements; and

• A detailed concept of operations and a business plan to ensure that real-world implementable projects are the outcome of the Plan.

Preliminary project outreach and research began in August of 2011. This project is anticipated to be completed in December 2012.
Executive Summary Sections

E.1 ITS DATA AND TRANSPORTATION MANAGEMENT

The focus of the ITS Data and Transportation Management project areas is on the development of data collection and traffic management programs oriented toward traffic in the Ports and Gateway Cities areas. There are significant opportunities to build upon existing ITS systems; in large part, this can be accomplished by tying together information and management services to improve traveler information, traffic flow, and drayage efficiency in the Ports and Gateway Cities area. This initial set of solutions will provide input to the comprehensive alternatives that will be developed in the later stages of the project and documented in the Concept of Operations and the Business Plan.

There have been several recent improvements in ITS services, including implementation of the regional 511 traveler information and supporting Motorist Aid and Traveler Information System (MATIS) under the auspices of the Los Angeles County Service Authority for Freeways and Emergencies (LA SAFE). LA SAFE also developed the Regional Integration of Intelligent Transportation Systems (RIITS) database, which is being used to integrate data from major ITS systems in the region. LA SAFE's Freeway Service Patrol operation on regional freeways includes “big rig” tow trucks in the Gateway Cities area to provide faster and more effective service to commercial vehicles. Another major deployment is the Advanced Transportation, Management, Information, and Security (ATMIS) system, which involves installation of cameras, detectors, and electronic signs in the Ports and surrounding areas. All of these newer systems and services have the potential to enhance the effectiveness of the largest ITS system in the region, the Caltrans Advanced Transportation Management System (ATMS). Another important development, which is a major focus of this project, is the increasing availability and sophistication of private sector services, including integration of real-time traffic and navigation systems with dispatching systems.

Needs identified as part of the ITS Data and Transportation Management research were categorized into topical areas; and both needs and solutions are summarized briefly below. These needs were identified through review of previous reports, existing information systems and sources, and interviews with stakeholders.
Arterial Systems. Stakeholders consider improved arterial system operations and coordination in the Gateway Cities area a major priority. Systems are operated by a combination of LA County and local municipalities, with some signals also controlled by Caltrans. Fragmentation of management and control inhibits the ability to implement signal coordination strategies on major arterials. Stakeholder input indicated that priority routes for freight movement need to be identified. Some freight traffic must use arterials, so coordinated strategies related to timing and management can help to encourage use of those arterials that service key freight destinations, while discouraging use of those that serve residential and commercial areas. Solutions are focused at least in part on the LA County Information Exchange Network (IEN), which provides an opportunity to share arterial system data. Some municipalities that operate their own systems do not belong to IEN, and IEN is not currently linked into the RIITS system. Making these linkages is an important first step in developing and implementing arterial management strategies that can benefit the stakeholders and residents in the Ports and Gateway Cities area.

Performance Measurement. Development of management strategies in the Gateway Cities can benefit from a structured performance management system using the large volume of traffic and speed data being collected in the region. There are a number of opportunities identified in this document for collecting more complete and higher quality information on truck volumes and traffic patterns. There are already archived databases in place or under development, including Caltrans’ Performance Measurement System (PeMS) and the LA Metro’s Archived Data Management System (ADMS) at the University of South California (USC), can be used as the basis for a more extensive performance management system.
**Incident Management.** The LA SAFE system provides wide geographic Freeway Service Patrol (FSP) operations on the LA freeway system, including the deployment of “big rig” tow truck routes in the Gateway Cities area. Stakeholders have identified a need to extend coverage of big rig wreckers and provide more contractual flexibility in their deployment. Stakeholders noted that there are potential data sources that can be used to improve response and clearance time in the Gateway Cities area. Data can be mined to help improve truck positioning and better identify the delay impacts of incidents, so that the benefits and costs of different investments can be determined. Stakeholders also identified a need for feedback from the trucking community on their incident management needs. It also was noted that implementing direct communications between the California Highway Patrol (CHP), which dispatches the FSP, and LA Metro/LA SAFE, which manages it, could help to improve response and clearance time. Another important issue to be resolved is the incident management system to be installed on the proposed I-710 freight corridor.

**Traveler Information.** RIITS is providing the most comprehensive source of traveler information data on the public sector side. RIITS can serve as clearinghouse for the specialized information services required in the Gateway Cities area, but it is missing data from the arterials and the Ports. Stakeholders place high importance on information about port terminal queues and other potential delays in port area. Integration of the ATMIS and IEN data into RIITS and the 511/MATIS would be an important first step in achieving this. There also are opportunities to leverage the significant efforts being undertaken in the private sector to collect and disseminate truck-related traveler information. It appears that the private sector is increasingly capable of meeting traveler information needs, but the public sector still needs comprehensive information for management and planning purposes. Information needs identified for the freight market include general truck restrictions, truck routes, oversize (OS)/overweight (OW) restrictions, parking location and availability, truck volumes and travel times, support and repair facilities, and diesel stations. The proliferation of private sector and public sector services can make comprehensive trucking information available through additional dissemination channels, such as smart phone applications and in-vehicle navigation systems, as well as 511. The mix of private sector and public sector roles in this market will depend at least in part on the ability to recover costs for premium information. Another factor is the ability to develop a two-way system, with trucks providing data to the system, and then receiving high quality data and information in return. Other improvements of interest to stakeholders include Spanish language capability on the 511 system and traveler information in general, greater availability of weather information, and wider geographic coverage of roadways for long-distance truckers.

**Freeway Management and Operations.** Stakeholders identified a need to expand ITS infrastructure on freeways, arterials, and roadways in ports area. While some of this is being accomplished through deployment of ATMIS, the traffic operations and management strategy for ATMIS still needs to be
determined. There also is a need to integrate ATMIS with other ATMS in the area and to find ways to provide adequate and permanent operations and maintenance of the system. Stakeholders also identified a longer term need to share data between ATMIS and other port traffic information with commercial management/dispatching systems used in the trucking industry such as EModal/Voyager. There also are integration opportunities with the next generation of the PierPass. Current technology limits these opportunities, but in the future, PierPass could be integrated with traffic management systems and tolling systems, providing additional information on traffic conditions both inside and outside the Ports. Improved information on port queues and terminal conditions was cited by stakeholders as another component that would help to integrate various information sources. A clear need was identified for an emergency operations and detour plan for ports area and Gateway Cities, along with the formation of a permanent committee with personnel representing transportation, law enforcement, port operations, emergency response, and municipal government. One of the main issues raised was regarding the condition of the Caltrans ATMS, which is by far the largest collection of ITS equipment and services in the region. Budget limitations are making it increasingly difficult to keep the current system in good repair and replace aging equipment.

**Policy/Institutional.** On the policy level, there is a need for better integration of freight concerns into planning, deployment, and management of ITS systems. Bringing the Ports’ management, terminal operators, and shippers into this process would be helpful but challenging as much of their information is proprietary. Management and quality control of proliferating data sources is another major issue; will it migrate fully to the private sector or will the public sector still have a role to play? Another important issue is how to keep up with the rapidly changing technology in an area where the planning/design/deployment cycle can be slow. It is important for agencies to work together with research institutions to speed the evaluation and testing process for new technologies. Major advances in technology are scheduled for the I-710 corridor. There will be major challenges in deployment, management, operations, and maintenance of these systems.

More detailed technical findings are available in the full version of this report, *ITS Data Collection and Transportation Management*, which includes the goals of the ITS data collection and transportation management feasibility study areas; a description of the ITS Data and Transportation Management Inventory and Systems serving both the Gateway Cities region and greater LA; a summary of issues, gaps, and needs identified through the development process; an initial set of potential ITS solutions to address issues, needs, and gaps; and a summary of next steps in this area of the overall project.
E.2 DRAYAGE OPERATIONS

Efficient goods movement is critical to the quality of life of Los Angeles County residents and the long-term health of local businesses. Local residents benefit from the air quality improvements that result from efficient freight operations, while businesses rely on predictable, timely delivery of products to meet regional and national demand and to improve their bottom line. Truck idling and unnecessary trip legs worsen air quality and cost drayage firms more; costs which are then passed on to the shipper and eventually to the consumer.

In the Gateway Cities subregion, the largest port complex in North America generates particularly high and growing volumes of drayage trucks. By 2035, port traffic is expected to triple at the San Pedro Bay Ports. The continued increase in truck trips has the potential to result in increased congestion and reduced air quality, presenting a major challenge for the region.

The long-term future of economic and public health in the region will depend on the implementation of ITS strategies and other proactive steps that support the efficient movement of drayage trucks into, out of, and within the Gateway Cities area. Due to continued forecasted growth in freight demand, improving productivity of drayage truck operators alone will not eliminate these negative externalities and increased costs. However, improving the flow of information through enhanced communication to drayage truck drivers and dispatchers is a critical step toward minimizing these adverse effects.

2 Port of Long Beach and Port of Los Angeles.
Stakeholder insight and research about drayage operations indicate that the primary drivers of drayage-related lost productivity include high queue times at marine terminal gates, delay within marine terminals, extra drayage trips that add no value, and truck congestion on key truck routes. Key to mitigating these impacts is the improved data and dissemination of real-time traveler information and other useful data, which would assist drayage truck firms in optimizing workflows. For example, better information about queue times and improved dissemination of critical data would support efficient decision-making, while improved coordination and collaboration between marine terminal operators (MTO) and drayage fleets would eliminate queuing and other terminal-related inefficiencies. Ideally, this coordination would include improved sharing of information between all critical members of the supply chain (ocean carriers, MTOs, drayage fleets, railyards, warehouses, and third-party logistics firms (3PLs).

Moving forward, now that the preliminary issues have been defined and potential next steps identified to help address some of these issues, the project team will clearly define drayage ITS system needs in the region. This will involve close collaboration within the project team and with the ITS Working Group to determine which issues should be addressed, and in what way. A key next step will be coordinating with other project tasks, including Truck Parking, Truck Fleet Communications, and ITS Data and Transportation Management, to define which ITS alternatives would best address some of the main themes.

More detailed technical findings are available in the full version of this report, Drayage Opportunities, which provides background research on the major causes of drayage operations concerns, as well as an overview of potential mitigation methods. It draws on recent surveys, interviews, and past region-specific reports to identify drayage operations issues that are specific to the Gateway Cities region. Outputs of this report include a summarized, high-level overview of drayage and drayage import/export processes; a list of key drayage issues and causes identified in the National Cooperative Freight Research Program (NCFRP) 11; an overview of regional drayage issues identified through interviews, surveys, and background research; and discussion of sample technologies and solutions that have been implemented elsewhere.

**E.3 PRIVATE SECTOR FLEET MANAGEMENT AND DYNAMIC MOBILITY APPLICATIONS**

As the name suggests, Fleet Management involves the management of a business’ fleet. Vehicle maintenance, telematics (use of telecommunications to share information), driver management, fuel, safety, and health management are amongst some of the functions of fleet management. The goal is to lower the risk a company assumes while improving productivity and efficiency of its operations. Companies that own a fleet of commercial vehicles also are looking to keep costs down and comply with government regulations as they relate to
them and their industry. The most basic function in all fleet management systems is the vehicle tracking component. This component is usually GPS based. Once vehicle location, direction, and speed are determined from the GPS components, additional tracking capabilities transmit this information to a fleet management software application.

Companies can either handle fleet management themselves (in-house) or outsource the duties. Many companies utilize fleet management software and systems to manage their fleet. It is used to handle all management-related tasks from the beginning of the vehicle management cycle to the end of it. It monitors fleet functions from the initial acquisition of a vehicle to its disposal. Fleet management software handles functions, such as vehicle tracking, vehicle/driver profiling, trip planning, dispatch via GPS fleet tracking, vehicle diagnostic reports, etc.

There are many technologies in the market that offer fleet tracking capabilities and several vendor-based systems that offer fleet management services. INRIX, NAVTEQ, Advent, Teletrac, TomTom, and XATA Turnpike are a few vendors that provide fleet management and tracking capabilities.

There are several emerging U.S. DOT programs/initiatives relevant to fleet management applications and those that focus on ITS connectivity between the public and private systems. Some of them are listed below:

- **Connected Vehicle Research.** Connected Vehicle (previously Intellidrive) research is a multimodal initiative that aims to enable safe, interoperable networked wireless communications among vehicles, the infrastructure, and passengers’ personal communications devices.

- **Dynamic Mobility Applications (DMA) Program.** The FHWA’s DMA program (which is one component of the Connected Vehicle Applications) seeks to identify, develop, and deploy applications that leverage the full potential of connected vehicles, travelers, and infrastructure to enhance current operational practices and transform future surface transportation systems management. This program is evolving with the next step being a series of demonstrations sites to be selected to pilot aspects of the program.

- **Freight Advanced Traveler Information System (FRATIS).** The FHWA is developing a Concept of Operations (ConOps) and Functional Requirements for a FRATIS. This project encompasses the ConOps for the freight and commercial vehicle operations (CVO) DMA, which is part of the larger DMA program described above. These Functional Requirements for the FRATIS ConOps programs are leveraging developments in the private sector, including smart phones, DSRC 5.9 GHz, and other technologies, to develop a series of future phased deployment packages.

The study team conducted a workshop with private-sector stakeholders to learn first-hand about the issues that negatively impact the productivity of truck-based goods movement in the Gateway Cities region, and also get their inputs on
technology and fleet management communications. In addition to this stakeholder workshop, the team sent an on-line survey to approximately 100 members of the Harbor Trucking Association (HTA). There were several significant findings, including high adoption rates for the latest fleet communication systems and recognition of their contribution to productivity.

In conclusion, GPS used for fleet management by trucking companies provide probe data that can support a truck performance-monitoring program. There are several private-sector fleet management technologies and systems in the marketplace. There also is significant advancement being made in these systems – the range of functions and the data that these systems provide are continually improving.

Effort should be taken to leveraging the existing technologies and data sources. Creating public-private partnerships to collect, analyze, and disseminate data and performance measures using GPS positional data from commercial truck fleets is a route that could be considered. Partnerships can be made with direct aggregator or third-party companies (such as INRIX) and other GPS vendors to acquire fleet management data, and then process those data so they can eventually be used for a network-based truck performance measures program.

It is important to note the challenges associated with public-private partnerships, such as maintaining data confidentiality for the trucking industry partners who are providing the GPS data. The actual data is owned by the providers, who govern whether and how it can be shared. Because a large proportion of real-time information is crowd-sourced, the crowd has to be able to trust that their information will not be misused or shared inappropriately. Most of the private aggregator companies already have developed methods of safeguarding the privacy of individuals and the information they provide. These will continue to evolve as the number of channels providing crowd-sourced information grows.

Additionally, outreach is important in order to educate carriers about the partnership benefits to the private sector by allowing for better regional freight advanced traveler information systems (ATIS) and connectivity to new applications that the Gateway Cities ITS might offer possibly, including container pick-up information, real-time terminal queue data, etc. Agreements should be drafted in a way that defines these mutual benefits to both parties, while at the same time maintaining the confidentiality of the fleet providers.

The fleet management system overviews and information resulting from this background research will be used to further identify gaps, as well as opportunities to leverage existing data sources and related technology to implement innovative solutions to address freight movement and traveler information needs in the ports and Gateway Cities areas. This will result in further identification and refinement of potential solutions, coordination with recommendations from other project areas, and evaluation and packaging of alternatives to address the ITS data needs in the region.
More detailed technical findings are available in the full version of this report, **Private Sector Fleet Management and Dynamic Mobility Applications**, which identifies and assesses state-of-the-art truck fleet communication systems, dynamic mobility applications, and other technologies deploying ITS connectivity between the public and private systems. It covers U.S. Department of Transportation (DOT) programs and initiatives, fleet management technologies used by stakeholders in the Gateway Cities region, and draws conclusions based on review of the key findings and lessons learned from the existing body of knowledge.

**E.4 I-710 Freight Corridor Opportunities**

In order to address the opportunities to use technology to manage and operate the proposed I-710 freight corridor, the study team reviewed recent and ongoing research related to vehicle platooning technologies, truck tolling strategies, and other potential automation needs. The I-710 freight corridor is designed to be used by either conventional trucks or zero emission trucks. For the zero emission option, to be able to process as many trucks as possible, truck platooning may represent an opportunity to increase throughput. Additional automation technologies may also need to be examined with respect to operations, potential electrification, enforcement, and tolling.

Vehicle platooning technologies are part of the broader topic area of intelligent vehicles. The concept of intelligent vehicles (IV) is not new; many transportation research centers have been studying various concepts that fall under the topic of IV for many years. Study team research focuses on commercial vehicle platooning studies and demonstrations from the 1990s to the present, as well as ongoing and planned demonstrations. It also highlights the key aspects of platooning studies about other vehicle types and the work of relevant research organizations in the United States and abroad.

Some key takeaways from this research are as follows:

- Safety was and continues to be a major impetus for many of the intelligent vehicle projects included in this research;
- User acceptance is a major challenge to be faced when trying to implement vehicle platooning technologies; and
- One of the major benefits of implementing some of the vehicle platooning technologies is the relatively small infrastructure investment that is required.

While this paper focuses on commercial vehicle platooning, it is important to note that research and development in the more general topic of autonomous vehicles is happening at a fast pace. For example, Google developed a fleet of seven autonomous vehicles and has been testing them since 2010. The fleet has covered more than 140,000 miles. Sebastian Thrun, a member of the winning team in the 2005 DARPA Grand Challenge, heads Google’s Driverless Car program. Components of Google’s autonomous vehicles include: Google Street View data, camera data, LIDAR, and RADAR data. These combined data inform
the vehicle of its position on a map. Though autonomous, human drivers are present in the case that intervention is needed.

The accomplishments of the Google project highlight the fact that in a short period of time, significant progress has been made in the field of autonomous vehicle research. In 2004, no winner emerged at the DARPA Grand Challenge on a course that covered less than 200 miles in the desert, whereas to date, Google’s vehicles have driven more than 140,000 miles at speeds greater than 60 mph. Many automakers have also made great strides in the field of autonomous vehicle research including BMW; Audi, which sent an autonomous vehicle up Pike’s Peak; VW; Toyota; and General Motors. Safety is a major impetus behind many projects, but in the case of Google, transforming mobility is another goal. One of Google’s major functions is to collect data; that is also the case with its autonomous vehicles. In this context, however, the data are specific to transportation. The autonomous vehicles record what they see and the car’s algorithm’s figure out the rules. Google views the car as a large computer, that can learn from the data it collects.

The truck tolling strategies research within this section addresses the question of how the proposed changes to I-710 – construction of new facilities, operation, and maintenance – will be funded. Examples of the following major tolling strategy types are described in detail: Truck-Only Toll Lanes, Congestion Pricing, Distance-Based Pricing, and “Other Pricing Schemes”. The case studies included in each strategy type provide information on the context in which each tolling solution was implemented and possible issues and topics to consider.

More detailed technical findings are available in the full version of this report, I-710 Freight Corridor Opportunities, which identifies potential technology applications that could be coordinated with ongoing I-710 freight corridor project and investments. The Section identifies the status of vehicle platooning research that could be applied to address problems in the I-710 freight corridor. It further documents truck tolling or other tolling strategies incorporating elements that could be applied to trucks in the I-710 corridor and Port area. These include Truck Only Toll Lanes, Congestion Pricing, Distance-Based Pricing, and other pricing schemes.

E.5 TRUCK PARKING, STAGING, AND SERVICES COORDINATION

At the conclusion of the 2008 ITS Integration Plan, truck parking was identified at a high level as an issue, and somewhat prioritized as an air quality concern. Stakeholders showed interest in coordinating truck parking strategies with the development of the Commercial Vehicle Enforcement Facilities. To this end, historical information on the genesis of the state of practice of truck parking and available funding was researched by the study team. Understanding the technologies, services, and systems being tested across the nation to mitigate the truck parking and staging issues and related impact on congestion, safety, air
quality, public health, and the trucking industry’s productivity will inform options available for the Gateway Cities region and arterials.

Public and private stakeholders must find compromise among conflicting priorities and cross-purposes in developing solutions to the complex issues of truck parking. The basis for this complexity lies in finding solutions representative of five primary factors:

- End user (commercial vehicle driver) needs;
- Regulatory compliance;
- Enforcement resources;
- Geography; and
- Economic forces.

Convergence in satisfying each of these factors simultaneously is the optimal goal; the reality of doing so is the nature of the challenge in finding realistic solution(s). These factors represent the national truck parking dialogue but are increasingly exacerbated in the Gateway Cities subregion by the sheer volume of truck trips, the presence of two primary U.S. ports and highway congestion.

In light of the complexity of truck parking issues and industry needs, and regardless of “public” or “private” truck stop designation, absent the carrier segment the driver represents, there are two fundamental approaches to addressing the base issue:

1. Increase the number of truck parking locations and spaces available, and/or
2. Collect and disseminate accurate information about existing locations and available spaces.

Options to achieving these ends are many (high-tech, low tech) and not without obstacle (Statutes, Codes, Regulations, public perception) or cost. Solutions can provide relief to the truck parking conundrum and in turn provide solutions to safety, productivity, and air quality issues exacerbated by truck parking shortfalls. Preliminary options discussed below will be further investigated and expanded over subsequent project tasks with the goal of prioritizing potential solutions to regional and statewide truck parking strategies.

Preliminary technology scans related to accurately inventorying truck parking spaces includes a variety of sensor technologies tested and reported by (U.S. DOT; 2005). Technology scans will continue for applicable solutions related to data capture; synthesis, and dissemination methodologies of interest/choice (may include such items as driver distraction mitigation solutions including pre-trip planning systems; interactive voice recognition and speech detect systems).

The truck parking information resulting from this background research will be used to further identify gaps in end user parking, staging, and service needs. As results of national tests/deployments are revealed and pursuant to available resources, it is possible that not all end user segment (local, short, long haul dray, agricultural haulers, and other intra and interstate users) needs may be met with one solution or simultaneously. Coordination efforts will continue with the related Commercial Vehicle Enforcement Facility (CVEF) development plans. Opportunities to leverage existing data sources and related technology from the other Gateway Cities projects will be identified as we move forward to address freight mobility and advanced CVO traveler information needs in the ports and Gateway Cities areas.

More detailed technical findings are available in the full version of this report, Truck Parking, Staging, and Services Coordination, which details the challenges related to truck parking facing the nation and Gateway Cities. Safety and efficiency problems can stem from a severe shortfall of truck parking and the majority of public and private truck parking facilities operating above capacity at peak periods, safety and efficiency.