San Antonio Traveler
Real-time Information Portal (SA*TRIP*)

Advanced Transportation and Congestion Management Technologies Deployment Initiative Application

Project Name	**San Antonio Traveler Real-time Information Portal**
Previously Incurred Project Cost	**$ 3,244,000**
Future Eligible Project Cost	**$ 30,000,000**
Total Project Cost	**$ 3,000,000**
ATCMTD Request	**$ 1,500,000**
Total Federal Funding (including ATCMTD)	**$ 1,500,000**
Are matching funds restricted to a specific project component? If so, which one?	**No**
State(s) in which the project is located	**Texas**
Is the project currently programmed in the:	
Transportation Improvement Program (TIP)	**No**
Statewide Transportation Improvement Program (STIP)	**No**
MPO Long Range Transportation Plan	**No**
State Long Range Transportation Plan	**No**

TCI

VISION ZERO SAN ANTONIO
Drive safe. Bike safe. Walk safe.

SA TOMORROW

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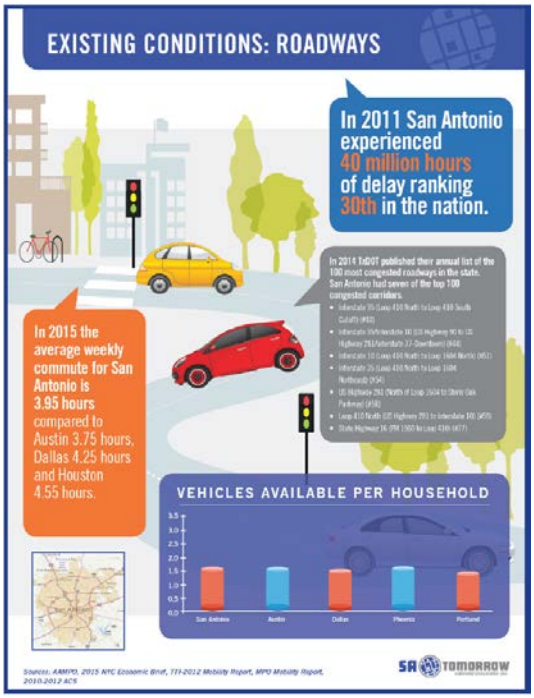
1 Introduction

The City of San Antonio is pleased to submit this application for the Advanced Transportation and Congestion Management Technologies Deployment Initiative. This funding opportunity comes at a perfect time as San Antonio prepares to align itself with the future growth scenario recently identified by the City of San Antonio Strategic Multi-Modal Transportation Plan. The Plan builds a critical bridge to cross from policy updates to capital construction. The City's goal is to ensure that locally we are maximizing our infrastructure investments to connect San Antonians with one another and to connect San Antonio with the rest of the nation. It is with this vision that San Antonio is submitting this application.

With a population of 1.4 Million, San Antonio is the seventh largest city in the United States and the second largest in Texas. Of the top ten largest cities in the United States, San Antonio was the fastest growing city in the United States in the last decennial Census (2010 US Census). The City of San Antonio is "job rich" with more jobs than residents of working age.

With approximately 436 square miles of land incorporated within the City of San Antonio limits, the City has a vast transportation network of approximately 4,800 lane miles of roads to keep in a state of good repair. On an annual basis, the City of San Antonio invests in capital improvements approximately $200 million in street reconstruction, maintenance and traffic safety, as well as, $70 million in drainage and flood control. The Strategic Multi-Modal Transportation Plan that was funded provided a framework for making decisions about the most beneficial uses of future funds. In the past, these decisions have been made based on community input with little regard to future expectations. This lack of strategic thinking was due to the fact that the City did not have an overall transportation plan and had not updated its Major Thoroughfare Plan policies in 36 years. The Strategic Multi-Modal Transportation Plan is a critical project for San Antonio to prepare for the future growth. The growth rate of San Antonio is anticipated to continue to climb. This Plan has helped the City and the region make the most strategic infrastructure investment choices possible to meet the demands of a growing population while protecting our economic competitiveness, quality of life, and environmental sustainability.

The Strategic Multi-Modal Transportation Plan, known as SA Tomorrow (http://www.satomorrow.com/) , is targeted at an



Urban and Suburban population within the City of San Antonio and is projecting that San Antonio will add an additional 1.1 million people by the year 2040. We expect a 900 percent increase in traffic delays by year 2040. The City of San Antonio will be significantly affected by the greater number of travelers passing through the city on the region's highways and transit lines. The regional demand will have to be accounted for when planning the future of major transportation facilities such as the limited-access highways and primary arterial corridors and the impact of traffic delays. Our challenge is to make the right decisions today in both transportation and land use so that we will meet the challenges of tomorrow. The City recognizes that to accomplish this we must become more proactive in planning for the future needs of the community through an interdisciplinary approach that looks at projections for housing and jobs and their relationship to the transportation system.

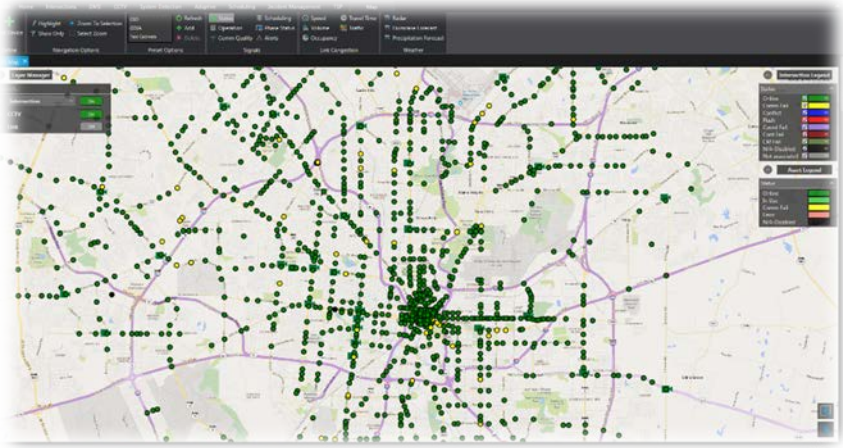
The Plan has identified the importance of technologies such as traffic monitoring cameras, vehicle detection devices, and traveler information systems to improve the City's ability to manage the congestion caused by incidents and other events. These technologies, when coupled with the City's new Advanced Traffic Management System (ATMS), can help improve the reliability of the transportation network as well as contribute to the City's sustainability goals. The Plan's five-year action plan calls for the following:

- Embracing tools that optimize available system capacity (such as development of new timing plans or programs to educate first responders on best practices with incident management).
- Leveraging autonomous vehicle and investments coming from others to allow San Antonio to be a leader in the next generation transportation system.
- Dedicating a portion of funding towards implementing innovative technologies to the City's transportation system.
- Developing Smart Cities program to inform City staff of emerging technologies.

The proposed project detailed in the following sections directly supports these actions and will help improve the safety, efficiency, and reliability of the transportation system for the City of San Antonio.

2 Project Description

The San Antonio Traveler Real-time Information Portal (SA*TRIP*) project will increase the number of advanced transportation technologies that are deployed in the City of San Antonio in order to reduce traffic-related fatalities and injuries, reduce traffic congestion and improve travel time reliability, reduce transportation-related emissions, and optimize multimodal system performance. The technologies deployed through this project will enable the collection of real-time data that can then be disseminated to the public, transit authorities, and other transportation stakeholders to allow travelers to make informed travel decisions. In addition, this project will incorporate the City's flood detection system into the Advanced Transportation Management System (ATMS) to further enhance the safety of the users of the transportation network during flood events. Finally, a portion of this project will install enhanced pedestrian detection technology to improve safety for pedestrians in an effort to achieve the City's Vision Zero Program goal of no fatalities on our roadways.



The City has recently invested $1.2 million in upgrading the ATMS to allow for better control and integration with the traffic signal system as well as other Intelligent Transportation System (ITS) equipment. Once the proper data sources are available, the new ATMS will be capable of displaying real-time speed and congestion information, alerting operators regarding system condition, and providing traveler performance metrics based on real-time data. In addition, the City has completed a $2 million upgrade of our ITS communications network to provide network connectivity to over 97% of all signalized intersections and ITS devices. Future funding has been identified to increase the number of fiber-optic connected intersections to improve network redundancy.

The application of ITS technologies has greatly improved the operation of traffic signals and resulted in improved performance on San Antonio area roadways. The City of San Antonio ATMS is housed in a central command center that communicates to the approximately 1,400 signalized intersections for which it has operational responsibility. Signal timing plans can be adjusted and the real-time status of signal operations can be obtained. The City of San

Antonio Transportation and Capital Improvements Department has installed 50 closed-circuit television (CCTV) cameras to view traffic conditions at major intersections and transit stations in real-time on workstation monitors and on wall-mounted display monitors. The SA*TRIP* project will build upon this foundation and will leverage the existing ITS communications network and command center as well as the command centers for our regional transportation partners.

The SA*TRIP* project will address several Department of Transportation (DOT) priorities including:

- transportation elements associated with Smart Cities;
- systemic applied pedestrian crossing technology;
- multimodal Integrated Corridor Management (ICM); and
- traffic signal data acquisition, analysis, and management.

The project also supports the DOT ITS initiatives of Integrated Corridor Management Systems and Emergency Transportation Operations.

SA*TRIP* Project Details

The SA*TRIP* project is divided into four core tasks: Deployment of Traveler Choice Corridors, Integration of High Water Detection System, Pedestrian Safety Enhancement Pilot Project, and Development of SA*TRIP* App. Each of these core tasks is discussed in the sections that follow.

Traveler Choice Corridors

The San Antonio area contains hundreds of miles of controlled access highway facilities that carry much of the daily commuting traffic. The arterial roadway network complements these facilities in taking travelers to and from their final destination by providing access to businesses and residential facilities. The arterial network can also serve as an alternative to a congested highway facilities as the main travel route between destinations. During times of incidents or other unplanned increases in congestion, the arterial network may be able to significantly reduce traveler delays and emissions.

Travelers need to be provided timely and accurate information in order to make route and mode choice decisions for reaching their destination. When mode, route, and/or trip time choices are made based upon reliable information on the status of the transportation network, delay, environmental, and economic benefits can be realized. In order to provide this

TRAVELER CHOICE CORRIDORS

OBJECTIVES

- gather real-time data to allow for improved management, operation, and maintenance of the traffic signal system
- use the data to derive transportation system performance measures that can be used to report on system status and to proactively improve performance

EXPECTED SYSTEM PERFORMANCE IMPROVEMENTS

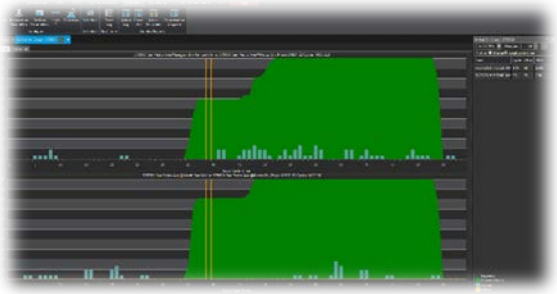
- optimizing system efficiency
- reducing traffic related crashes, congestion, and cost
- improving traveler mode and route choice

ANTICIPATED BENEFITS

- 5% reduction in nominal corridor travel times, vehicle emissions, delay, and fuel consumption
- 20% reduction in secondary crashes
- 15% reduction in delays during incidents

information, additional advanced transportation technologies must be deployed along Traveler Choice Corridors in which route change is feasible and mode choice is possible.

Advanced detection technologies that allow for automated collection of vehicle counts, turning movement counts, vehicle speeds, and travel times along a corridor, can be installed along these Traveler Choice Corridors to feed real-time data into the ATMS. These data can then be used by operators and traffic engineers to determine if the system is operating at a suboptimal condition under normal traffic patterns or to detect changes in traffic patterns that could indicate that a system abnormality has occurred.



Operational measures of effectiveness such as percent arrivals on green, total vehicle throughput, and average arterial speed will be used to establish thresholds in which actions such as timing adjustments or traveler alerts need to occur. These same detection technologies can be used as inputs into an adaptive traffic signal timing system that can automatically adjust signal timings based on changes in vehicle demand.

The data that is gathered by the advanced detection technologies can trigger alerts to operators in the central command center to anomalies in the corridor. A network of traffic monitoring cameras along the corridor allow the operators to visually confirm the problem and the corridor impacts and take appropriate action such as:

- triggering special event timing plan to flush the corridor
- alerting police, fire, or ambulance crews to an incident that requires emergency response
- notifying a towing provider if a disabled vehicle is hindering the flow of traffic on a corridor
- sending alerts to motorists and transit operators as to the condition of the route so a route or mode choice can me made

Existing video and data sharing agreements with the Texas Department of Transportation (TxDOT) enable incidents on highway routes parallel to the Traveler Choice Corridor to be identified in a timely manner so that adjustments can begin prior to the changes in traffic flow on the Traveler Choice Corridor. Colocation with the San Antonio Police dispatcher, the City of San Antonio towing contractor, TxDOT, and the VIA Metropolitan Transit Authority dispatchers in the TransGuide Traffic Operations Center will enable multijurisdictional sharing of information pertinent to incidents affecting the Traveler Choice Corridors.

The data that is gathered by the advanced detection technology and traffic monitoring cameras can also assist in reducing travel time and delays on the corridor for nominal traffic conditions as well. Automated traffic counts can be used as a basis for modifying traffic signal timing along the corridor and can be monitored overtime to determine when growth, traffic pattern changes, or development warrant a reexamination of the signal timing along the corridor. Real-time travel time data can provide a measure of how effective changes in signal operations are in reducing overall travel time and delay in the corridor.

While there are many potential Traveler Choice Corridors in the San Antonio area, this initial SA*TRIP* project will focus on two corridors:

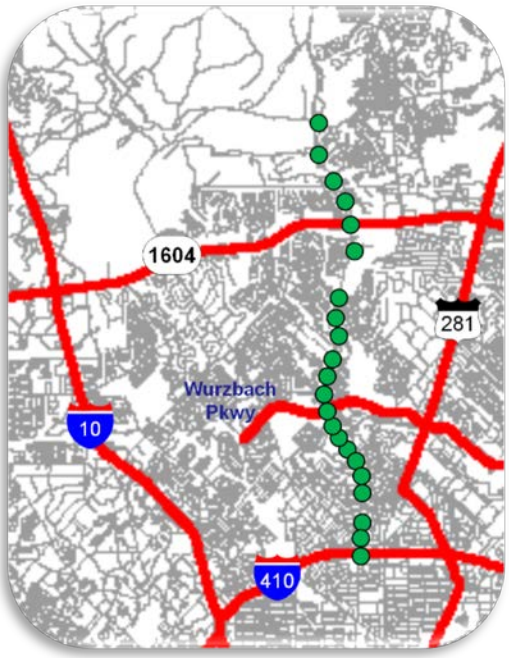
- Blanco Road from Wilderness Oak to I-410
- Military Dr. from Bynum Avenue to I-37

The characteristics of each of these corridors that make them good examples of Traveler Choice Corridors are described in the following sections.

Blanco Road Corridor

Blanco Road runs primarily north-south in the north-central portion of San Antonio from the northernmost city limits to just outside of the downtown area. The portion of the corridor that will be included in the *SATRIP* project is 8.6 miles long beginning just south of the city limits and ending at I-410. This corridor carries an average of over 30,000 vehicles per day and is served by a local bus route for almost the entire length and is crossed by two additional bus routes. Dedicated bicycle lanes are present for almost the entire length of the corridor and the corridor crosses several other dedicated bicycle facilities.

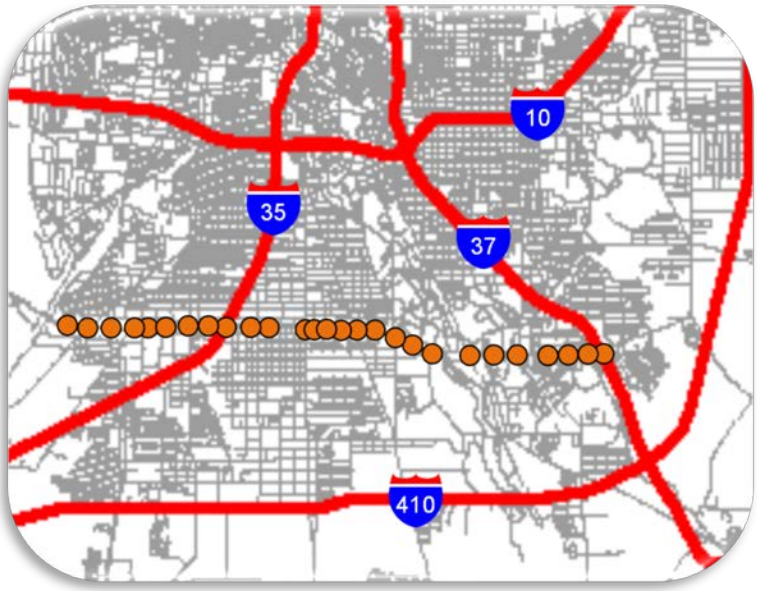
The corridor is centrally located between the I-10 and US-281 highways on the north side of San Antonio. The corridor is also crossed by both of San Antonio's main loop highways, Loop 1604 to the north and I-410 to the south. The heavily traveled Wurzbach Parkway, which provides additional east-west connectivity, bisects the corridor. These factors combine to make this a perfect Traveler Choice Corridor. Travelers informed of incidents on a parallel or crossing route can divert to this corridor to improve their travel time. Furthermore, data collected along the corridor can alert motorists when they should divert to a parallel corridor due to an abnormality on Blanco Road. The availability of transit service and dedicated bicycle facilities provide travelers the ability to alter their mode in addition to their route.



For the SA*TRIP* project, advanced detection technology and traffic monitoring cameras will be installed at 22 signalized intersections. These data will be used to improve overall travel time on the corridor during nominal and incident conditions. In addition, the data will be shared with partner agencies and travelers on the corridor.

Military Drive Corridor

Military Drive runs primarily east-west in southern portion of San Antonio. The portion of the corridor that will be included in the *SATRIP* project connects the large employment centers of Lackland Air Force Base, Port San Antonio, South Park Mall, and Brooks City-Base. The corridor is 8.3 miles long and carries over 35,000 vehicles on an average day. The corridor provides express bus service, is crossed by several local bus routes, and provides a connection to two large transit centers. In addition, VIA



Metropolitan Transit plans to begin a Bus Rapid Transit service along this corridor beginning in 2018.

As the primary east-west corridor on the south side of the city, Military Drive serves as an incident diversion route from the parallel highways of I-10/US-90 to the north and I-410 to the south. In addition, it can provide relief for travelers diverting from I-35 or I-37 to reach other north-south facilities. Residents that live in areas close to this corridor use transit to travel to and from work 3 times more than residents in the rest of San Antonio.

The large number of transit riders combined with a variety of transit options in the corridor make this an excellent Traveler Choice Corridor. Data collected along the corridor can be used to help travelers select the appropriate mode and route to reduce their delays. Providing accurate and timely information may shift more motorists to the available transit options thereby reducing environmental impacts as well as overall congestion in the corridor. The information provided will improve service for existing transit uses, thus enabling a safe, reliable, and affordable connections to employment, education, healthcare, and other services.

For the SA*TRIP* project, advanced detection technology and traffic monitoring cameras will be installed at 27 signalized intersections. These data will be used to improve overall travel time in the corridor during nominal and incident conditions. In addition, the data will be shared with partner agencies and the travelers.

High Water Detection System Integration

The City of San Antonio has experienced numerous major flash flooding events over the years. Major storms in October 1998, April 2002, October 2002, and May 2013 left many local roads, arterials, and highways closed for days. In some cases, damage to roadway infrastructure from these storms took years to repair. In the period from 1993 to 2014 there have been 129 flood events resulting in 16 deaths and 507 injuries. Information from the National Climatic Data Center estimates that property damage from these events totaled $14,694,785.

As the data indicate, flash flooding has a large impact on the lives of the citizens in the San Antonio area. There are currently 148 identified locations in which flash flooding has the potential to cross a roadway. To help improve safety and improve warning during flooding events, the City of San Antonio as well as Bexar County have installed over 40 High Water Detection System (HWDS) stations at flood prone areas throughout

the City. These stations are able to detect the rapid rise in flood waters across low points on roadways and alert travelers using flashing warning beacons on signs. In addition, when a station is activated it sends a signal to a computer system.

The SA*TRIP* project will enhance the safety benefits of the HWDS by integrating the system status and alerting capability with the ATMS. This integration will enable operators in the central command center to utilize other devices such as nearby traffic monitoring cameras and vehicle detectors to monitor the impacts of the flood waters. More importantly, data on flooded roadways can be shared with travelers and partner transportation agencies in the region to reduce the number of vehicles that either have to turn around at a closed crossing or attempt to cross and then require rescue. Advanced information about a closing can prevent unnecessary delay to motorists and reduce vehicle emissions while eliminating the need for rescue operations thereby freeing valuable first responder resources that are often needed elsewhere during a storm.

HIGH WATER DETECTION SYSTEM INTEGRATION

OBJECTIVES

- improve dissemination of current flooding conditions to travelers
- remotely observe conditions at flooded locations to ensure that the response is timely and appropriate
- provide real-time information to travelers near a flooded site to prevent additional delays and congestion in flooded areas

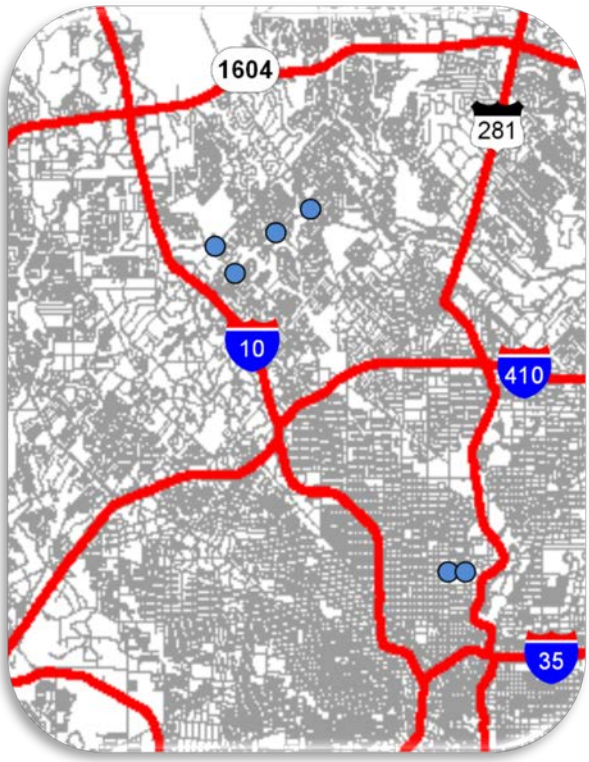
EXPECTED SYSTEM PERFORMANCE IMPROVEMENTS

- reduced flooding related crashes and congestion
- reduction in the number of flood related fatalities
- improving traveler information to avoid closed roadways

ANTICIPATED BENEFITS

- 20% reduction in response time to flooding events on a roadway
- 60% reduction in high water rescues at the pilot crossings

In addition to the ATMS integration, the SA*TRIP* project will install traffic monitoring cameras and blank out or dynamic message signs at signalized intersections near selected flood-prone locations that are equipped with the HWDS. The addition of the cameras and signage will allow better monitoring of flood conditions for transportation and emergency personnel and will enable travelers to receiver timely information about road closures to avoid turning down impassable roadways. The locations at which this equipment will be installed as part of the SA*TRIP* project include:



- George Road at Northwest Military Highway
- George Road at Lockhill Selma Road
- Shenandale Street at Vance Jackson Road
- Huebner Road at Vance Jackson Road
- Hildebrand Avenue at Shook Avenue
- Hildebrand Avenue at McCullough Avenue

Pedestrian Safety Enhancement Pilot Project

In 2015, the City of San Antonio launched its Vision Zero San Antonio campaign with a vision of achieving zero fatalities on area roadways. The program was launched in part to combat the nearly 800 pedestrian related traffic crashes that resulted in 54 pedestrian fatalities in 2015. The campaign combines education, encouragement, engineering, enforcement, and evaluation solutions to help achieve the goal.

Several efforts have already taken place to enhance the safety of pedestrians and bicyclists on the area roadways. These efforts include:

PEDESTRIAN SAFETY ENHANCEMENT PILOT PROJECT

OBJECTIVES

- reduce the number of pedestrian related injuries and fatalities
- demonstrate the abilities of the pedestrian detection systems for possible expansion to other corridors

EXPECTED SYSTEM PERFORMANCE IMPROVEMENTS

- reduction in the number of pedestrian related crashes, near crashes, injuries and fatalities

ANTICIPATED BENEFITS

- 80% reduction in pedestrian injuries and fatalities at the pilot locations

- a "safe passage" ordinance requiring vehicles to provide space for vulnerable roadway users,
- a Complete Streets policy that requires all modes of transportation to be considered,
- a hands-free ordinance that prohibits the use of handheld devices while driving or stopped at traffic signals, and
- numerous educational campaigns.

The SA*TRIP* project will add to these pedestrian safety measures by piloting the use of enhanced pedestrian detection technology at select signalized intersections. This technology enables pedestrians that are in crosswalks at signalized intersections to be detected and to hold conflicting vehicle traffic until the pedestrian is able to clear the intersection. The intersections are located along the Blanco Road and Military Drive Traveler Choice Corridors. Between 2011 and 2015 there were 3 fatal pedestrian crashes and 7 pedestrian crashes resulting in an incapacitating injury on Blanco Road. During the same time

period, the Military Drive corridor experienced 5 fatal pedestrian related crashes and 12 pedestrian related crashes resulting in an incapacitating injury.

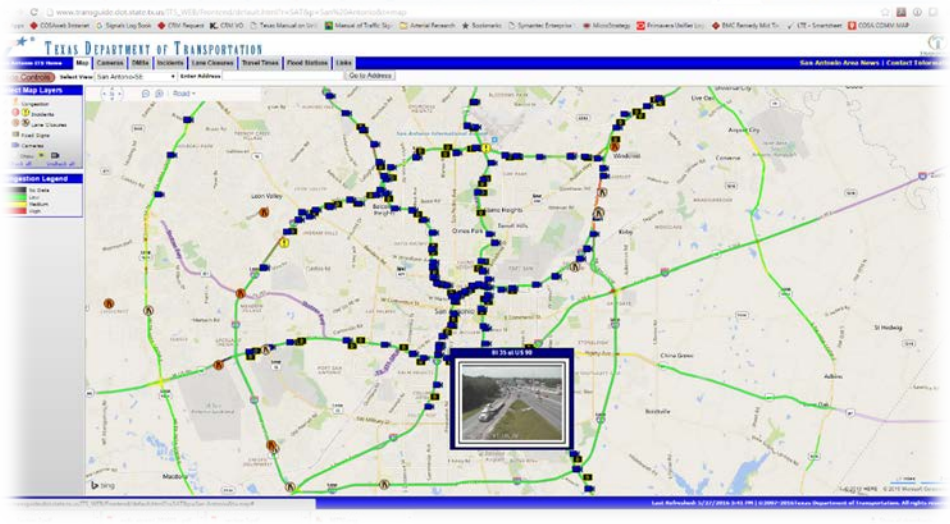
The specific intersections along the corridor for this pilot were selected because they are either located in a marked school crosswalk or because they are currently heavily used crosswalks. The intersections are located along the Blanco Road and Military Drive Transportation Choice Corridors and are as follows:

- Blanco Road at Sir Winston Drive
- Blanco Road at Parliament Drive
- Blanco Road at Lockhill Selma Road
- Military Dr. at Zarzamora Street
- Military Dr. at Flores Street

SA*TRIP* Traveler Information App

The last component of the SA*TRIP* project is the development of the SA*TRIP* Traveler Information App. This app will be the conduit to provide information directly to travelers. The app will contain the following characteristics:

- be accessible from multiple types of devices
- provide real-time alerts/notifications to travelers who desire the notifications
- integrate will existing traveler information applications to provide data that can also be viewed on those platforms



- Integrate with the ATMS to allow defined messages to be automatically generated when conditions warrant and to allow operators in the central command center to manually send information to travelers

Development of the app will also require integration with existing systems such as the Computer Aided Dispatch (CAD) system used by the fire and police departments as well as the TxDOT Lone Star software. This integration will allow data on active incidents that are reported to 911 to alert traffic operators in the central command center and will more easily allow data to be shared with TxDOT.

In order to promote the use of the app, a public service announcement campaign will be conducted to encourage and educate travelers on the use of the app. Information will also be made available on the city website and tourist materials to allow visitors to the area to benefit from the app as well.

SA*TRIP* TRAVELER INFORMATION APP

OBJECTIVES

- reduce the number of pedestrian related injuries and fatalities
- demonstrate the abilities of the pedestrian detection systems for possible expansion to other corridors

EXPECTED SYSTEM PERFORMANCE IMPROVEMENTS

- increase in the number of mode and route changes based on real-time data
- reduction in overall trip travel time

ANTICIPATED BENEFITS

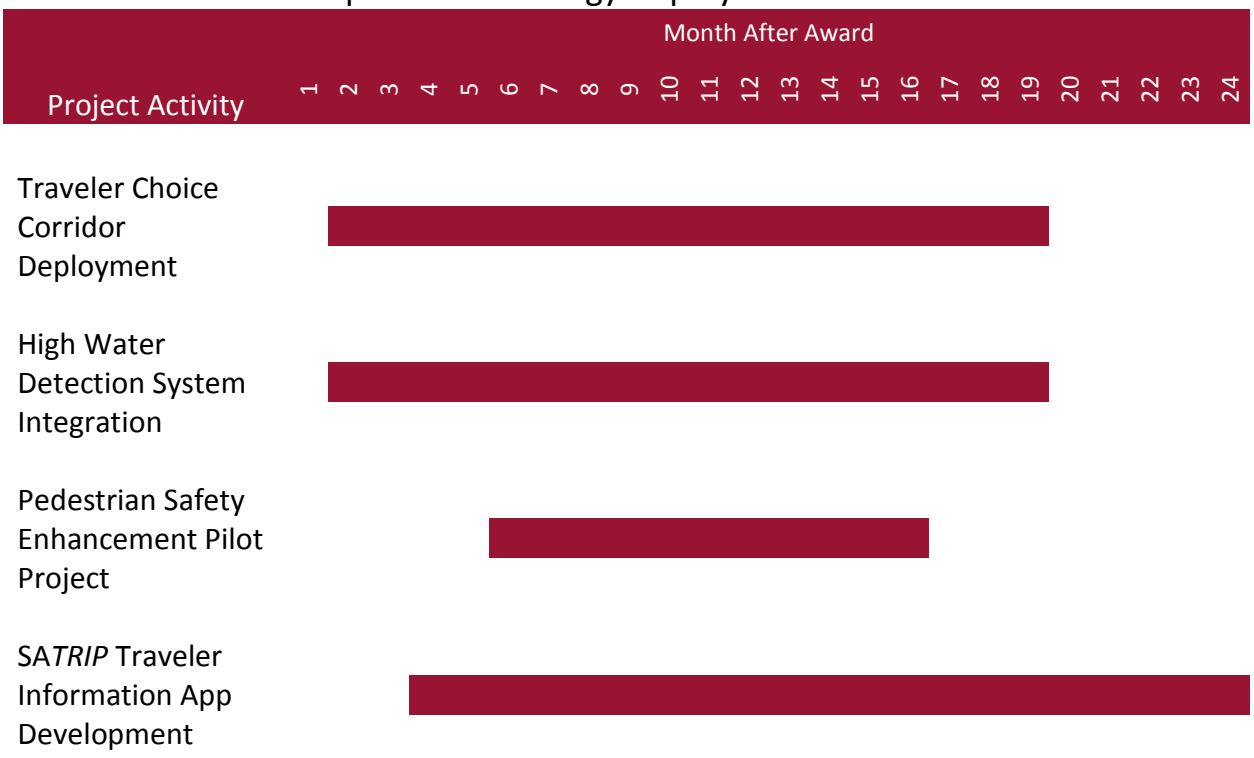
- 5% reduction in nominal corridor travel times, vehicle emissions, delay, and fuel consumption
- 20% reduction in secondary crashes
- 15% reduction in delays during incidents

SA*TRIP* Project Administration

If selected for award, the SA*TRIP* project will be managed by the City of San Antonio. As with other federally funded transportation programs, project funding will be channeled to the City through the Texas Department of Transportation by means of a Local Project Advance Funding Agreement. The Texas Department of Transportation is aware of the submission and is supportive of the SA*TRIP* project goals.

The initial deployment of the technologies in the SA*TRIP* program will be funded through this grant award (and local match). Funds for ongoing maintenance of the technology will be requested through the City budget process in future fiscal years. Future expansion of the model deployments from the SA*TRIP* project will be funded by future City projects, projects funded by the Metropolitan Planning Organization, TxDOT, or future federal funding opportunities. Currently there are no foreseen regulatory, legislative, or institutional challenges that would prevent deployment of the technologies discussed in this application.

Proposed Technology Deployment Schedule



In addition, a kick-off meeting will be held within four weeks after award and progress reports will be submitted monthly. An annual report to the DOT Secretary will also be prepared.

3 Staffing Description

The SA*TRIP* project will be managed and conducted by the Traffic Management Section of the Department of Transportation and Capital Improvements for the City of San Antonio. The Traffic Management Section is staffed with engineers, technicians, and project managers with over 300 years of combined experience in implementing innovative traffic signal and ITS projects. As a member of the Traffic and Transportation Planning Division, the Traffic Management Staff work very closely with planners and sustainability personnel to ensure that projects that are undertaken are consistent with the goals, mission, and values laid out by the City's Transportation Plan.

Some of the key City of San Antonio personnel that will be involved in the project delivery include:

- Marc Jacobson, P.E., PTOE, Senior Engineer, Traffic Management Center Manager
- Miguel Barrera, P.E., PTOE, Engineer
- Christopher Georges, P.E., PTOE, Engineer
- Kwaku Obeng-Boampong, P.E., PTOE, PMP, Engineer
- Sek Choy, Senior Engineering Associate
- Cesar Escobar, Electronic Technician Supervisor, Traffic Management Center Supervisor

Resumes for these personnel can be found in the appendix.

The City of San Antonio also has relationships with a number of private traffic engineering consultants that could be utilized to assist in the delivery of this project.

The primary point of contact for any information regarding this application is:

Marc Jacobson, P.E., PTOE
Traffic Management Center
Department Transportation and Capital Improvements
City of San Antonio
P.O. Box 839966
San Antonio, TX 78283-3966
Phone: W|210.207.4574 M|210.722.4312
E-mail: marc.jacobson@sanantonio.gov

4 Funding Description

The SA*TRIP* project described in this application is expected to have a total cost of $3 million. Under the rules of the program, 50% of the funding would be from the ATCMTD grant with the remainder coming from City of San Antonio funding sources. A breakdown of the costs for each project task is in the following table.

Project Activity	Projected Costs
Traveler Choice Corridor Deployment	$2,100,000
High Water Detection System Integration	$350,000
Pedestrian Safety Enhancement Pilot Project	$250,000
SA*TRIP* Traveler Information App Development	$300,000
Advanced Transportation and Congestion Management Technologies Deployment Initiative Funding	**$3,000,000**
Advanced Transportation and Congestion Management Technologies Deployment Initiative Funding	**$1,500,000**
City of San Antonio Funding/Match	**$1,500,000**

5 Conclusion

The City of San Antonio is pleased to have the opportunity to participate in the submission of projects for the Advanced Transportation and Congestion Management Technologies Deployment Initiative. This funding opportunity will allow the deployment of the SA*TRIP* Project to be accelerated to provide timely information to travelers to enable them to make route and mode choices and avoid flooded roadways. It will also enable the testing of technologies that could reduce pedestrian related fatalities and injuries. By selecting the SA*TRIP* Program for funding the following goals can be realized:

- reducing overall transportation costs and improve return on investments, including through the enhancement use of existing transportation network capacity;
- delivering environmental benefits that alleviate congestion and streamline traffic;
- measuring and improve the operational performance of the transportation network
- reducing the number and severity of traffic crashes and increase driver, passenger, and pedestrian safety;
- collecting, disseminating, and using real time transportation-related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation;
- monitoring transportation assets to improve infrastructure management, reduce maintenance costs, prioritize investment decisions, and ensure a state of good repair; and
- delivering economic benefits by reducing delays, improving system performance, reconnecting communities through advanced technology, and providing for the efficient and reliable movement of goods and services.

Our partners at the Texas Department of Transportation and VIA Metropolitan Transit Authority support the goals of this project and will participate as needed to ensure the success of the project. Statements of support are provided in Appendix B.

Appendix A

Resumes of Key Staff

Marc Stuart Jacobson, P. E., PTOE

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San Antonio, Texas 78245
Work: (210) 207-4574 Mobile: (210) 722-4312

EDUCATION

M.S., Civil Engineering, Texas A&M University, 1997 (GPA: 4.0)
B.S., Civil Engineering, Texas A&M University, 1996 (*Summa Cum Laude,* GPA: 4.0)

EXPERIENCE

Senior Engineer, Public Works Department, City of San Antonio, Texas, April 2006 – Present.

Managing the day-to-day operations of the City's Traffic Management Center with a staff of 13 professional and technical staff. Responsible for reviewing and coordinating the development of all traffic signal plans for the City of San Antonio. Managing the Traffic Signal System Modernization Program including coordinating with the Information Technology Services Department and developing project scope, budget, and schedule. Performing transportation system analyses using microscopic and macroscopic transportation modeling tools. Managing the indefinite deliveries contracts for traffic signal construction and professional traffic engineering services. Preparing information for and presenting information at public meetings. Preparing information for presentation to City Council. Coordinating activities with the Texas Department of Transportation, VIA Metropolitan Transit Authority, and the San Antonio/Bexar County Metropolitan Planning Organization.

Assistant District Traffic Engineer, San Antonio District, Texas Department of Transportation, June 2004 – April 2006.

Responsible for coordinating, preparing, developing and reviewing the plans and estimates for traffic projects including traffic signals, signs, and pavement markings for a 12 county area in Texas. Managing traffic signal construction contracts and working with contractors. Investigating and responding to public complaints on traffic signals, signs, pavement markings. Performing traffic engineering studies to recommend solutions for high accident locations and to warrant traffic signals. Developing project budgets and selecting consultants.
Responsible for the oversight of traffic signal maintenance operations.

EXPERIENCE (continued)

Assistant Research Engineer, San Antonio Office for Research and Implementation, Texas Transportation Institute, February 2002 – May 2004.

Responsible for managing and participating in various research projects sponsored by the TxDOT and other agencies. Preparing research problem statements, proposals, budgets, selecting project staff, and managing project tasks. Specializing in projects that involved the modeling of transportation systems using simulation tools, developing optimized traffic signal timing, and recommending short term and long term improvement alternatives to increase operational efficiency.

Traffic Engineering Assistant, Public Works and Transportation Department, City of Dallas, Texas, July 1999 – February 2002.

Responsible for developing and implementing traffic signal timing plans to improve efficiency throughout the City of Dallas, including calculation of proper clearance intervals and the determination of cycle lengths, splits, and offsets. Responding to requests and complaints from citizens and City Council members and the City Manager. Responsible for project to procure and install dynamic message signs throughout the city to provide information on key arterials. Project manager for the City of Dallas Intelligent Transportation System project to install dynamic message signs on arterial roadways throughout the city.

Assistant Research Scientist, System Implementation Program, Texas Transportation Institute, December 1997 – July 1999.

Participating in research for the TxDOT research program and performing operational analyses for the TxDOT Districts in South Texas. Performing studies focusing on accident analysis, traffic modeling, traffic signal optimization, access management, and Intelligent Transportation Systems.

PROFESSIONAL LICENSES AND CERTIFICATIONS

Licensed Professional Engineer in Texas (License #89335)
Certified as a Professional Traffic Operations Engineer by the Transportation Professional Certification Board

AFFILIATIONS

Associate Member, Institute of Transportation Engineers (ITE) Delegation, National Committee on Uniform Traffic Control Devices Railroad and Light Rail Transit Technical

Committee (2016-present)
Member, National Committee on Uniform Traffic Control Devices Railroad and Light Rail Transit Technical Committee (2013-present)
Member, Institute of Transportation Engineers (ITE) Member, American Public Works Association (APWA)

AWARDS AND HONORS

Texas Public Works Association Management Innovation Award (2013)
Texas Institute of Transportation Engineers Young Engineer of the Year (2009)
TTI/Trinity New Researcher Award (2003)
Distinguished Service Award, Institute of Transportation Engineers (District 9) (2002)
Association of Former Students Fellowship, Texas A&M University (1997)
Graduate Research Assistantship, Texas A&M University (1997) Graduated with Honors: Summa Cum Laude (Texas A&M December 1996)

SELECTED PUBLICATIONS

Jacobson, Marc S., and Banda, L. "The City of San Antonio, TX, USA's Traffic Signal System Modernization Program", *ITE Journal*, Institute of Transportation Engineers, Washington, DC, May 2009.

Venglar, Steven P., Jacobson, Marc S., Sunkari, Srinivasa R., Engelbrecht, Roelof J., and Urbanik, Thomas, II. *Guide for Traffic Signal Preemption Near Railroad Grade Crossings,* Research Report 1439-9. Texas Transportation Institute, College Station, TX, September 2000.

Quiroga, C. A., Henk R., and Jacobson, M., 2000. "Innovative Data Collection Techniques for Roadside Origin-Destination Surveys". Transportation Research Record 1719, Transportation Research Board, National Research Council, Washington, DC, pp. 140-146.

Jacobson, M., and Henk R., 1999. "Innovative Commuter Surveying Techniques Used In Advanced Transportation Management System Evaluation". Transportation Research Record 1660, Transportation Research Board, National Research Council, Washington, DC, pp. 172-179.

Miguel Angel Barrera, P. E., PTOE

431 Mesa Hill
San Antonio, Texas 78258
Work: (210) 207-4583 Mobile: (210) 748-3054

EDUCATION

B.S., Civil Engineering (Building Science Program), University of Southern California, 1984

EXPERIENCE

Engineer, Public Works Department, Traffic Management Center, City of San Antonio, Texas, June 2008 – Present.

Manage the traffic activities in the North and Northeast areas of the City of San Antonio, including the in-house design and consultant review of traffic plans, the development and implementation of signal timing and Time-Space Diagrams for the coordination of signals along major arterials, and the submittal of work orders for signal, signing and pavement marking modifications in response to citizen's requests. Coordinate traffic signal modifications with state and other local agencies. Managed the indefinite deliveries contracts for traffic signal construction and professional traffic engineering services for the 2009-10 Infrastructure Management Program (IMP) and reviewed all traffic plans included in the City's 5-Year Bond Program.

Engineer, Capital Improvements Management Services Department, City of San Antonio, Texas, May 2001 – June 2008.

Responsible for the development and update of the City's standard plans and specifications, the in-house design for the reconstruction of local and collector streets including Hackberry Street – Linda Lou Drive, Evers Road, Pierce Avenue, the design for connecting Knight Cross Drive grade differential at Hardy Oak Boulevard, and the design for the Goliad Street earthen channel widening. As a member of a team, reviewed Requests for Qualifications (RFQ) and selected consultants for engineering design contracts.

Supervising Civil Engineer I, Information Technology Division, Los Angeles County Department of Public Works, California, September 1999 – April 2001.

Developed custom GIS applications using Esri's MapObjects and CAD applications for Microstation in Basic and C++ programming languages. Developed and maintained the estimating program for traffic signal projects which featured the cost breakdown for each jurisdiction in a project.

EXPERIENCE (continued)

Supervising Civil Engineer I, Traffic and Lighting Division, Los Angeles County Department of Public Works, California, October 1984 – September 1999.

Signal Design Engineer in charge of the supervision and training of a 10-person unit of Engineering Assistants and Technicians. The unit was responsible for the design and upgrades of traffic signals, pavement markings, and signing in conjunction with the Traffic Signal Synchronization Program and design of new traffic signals in unincorporated areas and contracted Cities throughout the County. Responsible for the development of time-space diagrams and coordinated timing for major arterials in the county including Imperial Highway, Main Street-Arrow Highway, Diamond Bar Boulevard, White Avenue, and Towne Avenue. Customized ComputerVision CAD application for the design of traffic signal projects.

Engineer Assistant, Design Division (Rotation Program), Los Angeles County Department of Public Works, California, June 1987 – June 1989.

Assisted in the design of road reconstruction and storm water projects throughout the County.

PROFESSIONAL LICENSES AND CERTIFICATIONS

Licensed Professional Engineer in Texas (License #88851)
Registered Professional Engineer in California (License #45101)
Certified as a Professional Traffic Operations Engineer by the Transportation Professional Certification Board

AFFILIATIONS

Institute of Transportation Engineers (ITE) Member
Society of Hispanic Professional Engineers (SHPE) Member

AWARDS

Los Angeles County Department of Public Works, Individual Productivity Award, 1998

Christopher Georges, P.E., PTOE

3500 NW Loop 410, Suite 321
San Antonio, TX 78229
Work: (210) 207-4507 Mobile: (210) 378-4402

EDUCATION

B.S., Civil Engineering, Texas A&M University, 2003

EXPERIENCE

Engineer I-III, Pape-Dawson Engineers, San Antonio, Texas - 2003 to 2008

Under direct supervision by a Profession Engineer completed projects of varying degrees of difficulty and duration. The projects included traffic signal design, future forecasting, traffic impact studies, minor roadway design and traffic signal coordination.

Assistant Project Manager, Pape-Dawson Engineers, San Antonio, Texas – 2008

With supervision by a Professional Engineer completed traffic engineering projects by directing other staff and team members to project completion.

Owner, PT Data LLC, San Antonio, Texas - 2008 to 2010

Completed projects by specializing in using new technologies to improve the quality of traffic engineering data available to the engineer. “Better results with Better data”

Traffic Operation Engineer, Naztec ITS, Virginia Beach, Virginia - 2010 to 2012

Re-timed traffic signal systems in the Hampton Roads and surrounding areas. Responsibilities included data management, signal modeling, traffic signal timing plan development (primary task) and implementation (primary task). As the lead engineer I directed the team to successful project completion. Majority of work focused on 170 controllers and Naztec systems, with familiarity with 2070, Econolite, Peek, and Eagle traffic controllers. Used ATMS.now and Quicknet as part of work flow.

Traffic Engineer, Transportation and Capital Improvements, City of San Antonio, Texas, 2013 – Present.

Aide and Support in managing the day---to---day operations of the City's Traffic Management Center. Responsibilities include, system wide signal coordination, plan review, signal warrant studies, signal design and daily improvements to the system.

PROFESSIONAL LICENSES AND CERTIFICATIONS

Licensed Professional Engineer in Texas (License #101081)
Certified as a Professional Traffic Operations Engineer by the Transportation Professional Certification Board

Innovations

Portable weatherproof micro video recorder for traffic data collection system
Video road surveys with 1' of accuracy over 1000'.
Active time space diagram with video
Average speed and corridor speed maps

KWAKU OBENG-BOAMPONG, P.E., PTOE, PMP

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Email: Kwaku.Obeng@sanantonio.gov

EDUCATION

M.S., Civil Engineering, Texas A&M University - College Station, August 2004.
B.S., Civil Engineering, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, August 2001. Graduated with Honors.

EXPERIENCE

Traffic Engineer, City of San Antonio, San Antonio, Texas – March 2012 to Present

Responsible for the operation of over 320 traffic signals within the City of San Antonio. Development of traffic signal timing plans for isolated signals, corridor-wide coordinated signals, and area-specific timing plans. Conducting traffic signal warrant studies and designing traffic signals for new locations and signal upgrades from span wire to mast arm poles. Review of timing plans and traffic signal designs provided by consultants. Coordination of traffic signal components of city capital projects including coordination with project management team and contractors. Responding to citizen concerns regarding traffic signal timings and operations, pedestrian signal operations including provision of accessible pedestrian signals and ADA-compliant pedestrian ramps. Preparing information and data for public meetings and meetings with city district council offices.

Adjunct Lecturer I – University of Texas at San Antonio, January 2012 – Present

Development and teaching of course lecture notes, modules, and assessments for senior-level courses in Highway Engineering and Transportation Engineering.

Assistant Research Engineer, San Antonio Office for Research and Implementation, Texas Transportation Institute, September 2008 – March 2012

Responsible for managing interagency contract with the Texas Department of Transportation - Laredo District. Design and implementation of data collection and analysis for transportation engineering projects in the region. Providing analysis of freeway main lanes and freeway ramp operations and at bottlenecks on various corridors in Laredo, assessing and evaluation of ITS performance in the Laredo area. Assistance with developing traffic signal timing plans on arterial corridors. Assessment and development of access management plans for the Laredo region.

EXPERIENCE (continued)

Assistant/Associate Transportation Researcher, San Antonio Office for Research and Implementation, Texas Transportation Institute, August 2004 – March 2007

Provide operational analysis and data collection oversight on various FHWA and TxDOT sponsored research projects on freeway operations, speed zoning near schools, and Intelligent Transportation Systems evaluation. Provide road user cost analysis for various construction projects for Texas Department of Transportation south-central districts of cities of Laredo, Pharr, San Antonio and Corpus Christi. Provide analysis of alternative long term infrastructure improvements and their impacts on projected traffic demand within various south Texas municipalities. Specifically using simulation tools to assess alternative freeway-to-freeway direct connector ramps and freeway main lane configurations for various freeway corridors. Traffic signal operations analysis to determine appropriate timing plans for several arterial streets in San Antonio, Corpus Christi, Pharr and Laredo among others. Evaluation of Traffic Impact Analysis (TIA) study reports submitted by consultants in support of local Department of Transportation districts.

Graduate Research Assistant, Texas Transportation Institute, College Station, September 2002 – August 2004.

Data collection and analysis for FHWA and TxDOT-sponsored research on Advanced Warning for End of Green Phase System (AWEGS). Evaluation of the impact of AWEGS on red light running at test locations in east Texas.
Review of freeway incident management plans for several states in the country and subsequent development of a report on how to develop a model response plan for freeway incidents.

PROFESSIONAL LICENSES AND CERTIFICATIONS

Professional Engineer in the State of Texas, No. 101212
Professional Traffic Operations Engineer, Certificate No. 3617
Project Management Professional, Certificate No. 1904561

AFFILIATIONS

Young Member, Transportation Research Board (TRB) Freeway Operations Committee AHB20, (2006-2009)
Transportation Research Board (TRB) Paper Reviewer for Work Zone and Freeway Operations Committees (2006 – 2012)
Member, TRB Joint Traffic Simulation Subcommittee (2006 – 2012)
Member, Phi Kappa Phi Honor Society
Member, Institute of Transportation Engineers

AWARDS AND HONORS

Texas Transportation Institute/Trinity Industries New Researcher Award, 2007

SELECTED PUBLICATIONS

S.R. Sunkari, P. Songchitruksa, X. Zeng, K.N. Balke, K.O. Obeng-Boampong. Guidelines for Signal Operations at Intersections with Wide Medians. 0-6176-1. Texas Transportation Institute, College Station, TX. March 2010.

J.L. Carson, K.O. Obeng-Boampong, R.H. Henk. Framework for the Intelligent Transportation System (ITS) Evaluation - ITS Integration Activities. Final Report. 409840-1. September 2009.

K.O. Obeng-Boampong, L. Ding, R.H. Henk, J.C. Williams, P. Vo. An Assessment of Yield Treatments at Frontage Road-Exit Ramp and Frontage Road-U-Turn Merge Areas. Technical Report. 0-4986-1. Texas Transportation Institute, College Station, TX. November 2008.

K. Fitzpatrick, M.A. Brewer, K.O. Obeng-Boampong, E. Park, N.D. Trout. Speeds in School Zones. 0-5470-1. Texas Transportation Institute, College Station, TX. February 2009.

B.T. Kuhn, K.N. Balke, N.A. Chaudhary, D.L. Jasek, G.J. Karkee, K.O. Obeng-Boampong, J.A. Shelton, S.P. Venglar. Managed Lane Strategies Feasible for Freeway Ramp Applications. Research Report. 0-5284-2. Texas Transportation Institute, College Station, TX. January 2008.

S.P. Venglar, K.O. Obeng-Boampong. Applying Techniques to Increase Warning of Signals Beyond Vertical Curves. Research Report. 5-4084-01-1. Texas Transportation Institute, College Station, TX. October 2007.

Obeng-Boampong, K. Evaluation of Daytime vs. Nighttime Red Light Running Using an Advanced Warning for End of Green Phase System. Master's Thesis. Texas A&M University. August 2004.

Obeng-Boampong, K. Developing a Model Response Plan for Freeway Incidents. Presented at the 2004 Texas ITE, San Antonio, January, 2004.

Sek Fai Choy

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EDUCATION

Bachelor of Science degree in Mechanical Engineering, University of Texas at San Antonio, May 1987

EXPERIENCE

Senior Engineering Associate, Transportation Planning Division, Transportation & Capital Improvements Department, City of San Antonio, Texas, February 2008 – Present.

Design traffic signal phasing and timings for intersections, diamond interchanges and locations with complex configurations. Optimize traffic signal systems. Develop signal timings for transit signal priority operations. Schedule reversible lane control signal operations. Implement signal timings in the field or using central system. Design new traffic signals and signal modifications. Perform analysis for projects using traffic computer models. Analyze and recommend traffic improvement proposals. Supervise Engineering Technician and oversee collection of traffic study data. Perform traffic engineering studies, and recommend traffic controls and regulations. Prepare responses for citizens and city council requests regarding traffic signals and other traffic-related issues. Review signal designs and traffic studies prepared by traffic engineering consultants and conduct testing for signal system upgrades.

Engineering Associate, Traffic Management Division, Public Works Department, City of San Antonio, Texas, May 1990 – February 2008.

Developed traffic signal phasing and timing plans for temporary, construction and permanent installations. Developed and optimized traffic signal timing plans for the Traffic Light Synchronization Projects involving over 500 locations. Maintained traffic signal system database and signal timing records. Prepared signal timing records for use by Traffic Operations personnel. Supervised Engineering Technicians and oversaw collection of traffic study data. Evaluated traffic signal operations and developed signal phasing/timing improvements. Conducted traffic signal warrant studies. Investigated and prepared responses for citizens and city council requests. Participated in the Model Deployment Initiative Project.

AFFILIATIONS

Member, Institute of Transportation Engineers
Member, Texas District - Institute of Transportation Engineers
Member, South Texas Section - Institute of Transportation Engineers

Appendix B

Letters of Support from Partner Agencies

Texas Department of Transportation

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June 6, 2016

Mr. Mike Frisbie, P.E.
Director/City Engineer
Transportation & Capital Improvements
City of San Antonio
P.O. Box 839966
San Antonio, TX 78283-3966

Subject: **Letter of Commitment – City of San Antonio Grant Application to USDOT: Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD)**
Funding Opportunity Number DTFH6116RA00012

Dear Mr. Frisbie:

The Texas Department of Transportation (TxDOT) is pleased to participate and support the City of San Antonio's proposal for the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD). TxDOT is committed to this development and deployment effort, as the project is directly related to the business goals and strategies of the agency. The project will deploy advanced detection technologies, integrate the City's high water detection system, and develop a traveler information app. In addition, data collected by the new technologies will be shared with our agency and other transportation partners to improve travel for users of all transportation models. This project will positively impact safety, traffic and congestion management, and fuel efficiency.

We look forward to supporting the City of San Antonio throughout the course of this interesting and valuable project. Please let me know if any additional information is needed.

Sincerely,

Mario R. Jorge, P.E.
San Antonio District Engineer

cc: Matt Sneed, P.E., TxDOT TransGuide Operations Manage

June 16, 2016

Mr. Mike Frisbie, P.E.
Director/City Engineer
Transportation & Capital Improvements
City of San Antonio
P.O. Box 839966
San Antonio, TX 78283-3966

Subject: Letter of Commitment – City of San Antonio Grant Application to USDOT: Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD)
Funding Opportunity Number DTFH6116RA00012

Dear Mr. Frisbie:

VIA Metropolitan Transit (VIA) is pleased to participate and support the City of San Antonio's proposal for the Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD). VIA is committed to this development and deployment effort, as the project is directly related to providing our community additional options and empowerment in their daily travel. The project will deploy advanced detection technologies, integrate the City's high water detection system, and develop a traveler information app. In addition to the larger benefits for the community, VIA will also benefit from access to the data collected by these new technologies– data with the potential to improve travel for users of all transportation modes.

This project will positively impact safety, fuel efficiency, and traffic and congestion management, and we at VIA are glad to offer our support. VIA looks forward to working with the City of San Antonio, throughout the course of this project and beyond, to increase the efficiency of our regional transportation system.

As technologies continue to evolve, we welcome the opportunity this initiative represents to bring innovation and increased efficiencies to our community as together, we work to manage congestion and continue developing transportation options.

Sincerely,

Keith Hom
Deputy CEO