



U.S. Department of Transportation

Connected Vehicle Pilot Deployment Program: Tampa (THEA)

ITS Benefits, Costs, and Lessons Learned: 2018 Update Report

Connected Vehicle Pilot – Tampa

Highlights

- For the Tampa Pilot, approximately 1,600 cars, 10 buses and 10 trolleys that frequent downtown Tampa and the Selmon Reversible Express Lanes (REL) will be fit with connected vehicle (CV) technology.
- The cost to design, build, test, operate, and maintain the Tampa Pilot is estimated to total \$19,076,761.
- THEA is partnering with FDOT to receive funding for video traffic detectors that will provide the market penetration needed for CV traffic signal control applications to work at their full potential.



Photo Source: USDOT and THEA

Introduction

This factsheet is based on past evaluation data contained in the ITS Knowledge Resources database at: www.itskrs.its.dot.gov. The database is maintained by the U.S. DOT's ITS JPO Evaluation Program to support informed decision making regarding ITS investments by tracking the effectiveness of deployed ITS. The factsheet presents benefits, costs and lessons learned from past evaluations of ITS projects.

Connected vehicles are poised to transform our streets, communities, and personal lives. But first, we must tackle deployment challenges head on and provide interested regions with examples of success stories and champions. The U.S. Department of Transportation (USDOT) is taking on this challenge by investing in a regional pilot deployment program that is not only accelerating deployment but also uncovering what barriers remain and how to address them. This program will help ensure that this revolutionary technology can meet its fullest potential in the near future.

In September of 2015, USDOT selected New York City Department of Transportation (NYCDOT), Wyoming Department of Transportation (WYDOT) and Tampa Hillsborough Expressway Authority (THEA) as the recipients of a combined \$42 million in federal funding to implement a suite of connected vehicle applications and technologies tailored to meet their region's unique transportation needs. These pilot sites will help connected vehicles make the final leap into real-world deployment so that they can deliver on their promises of increasing safety and improving mobility. Moreover, these sites will lay the groundwork for even more dramatic transformations as other areas follow in their footsteps.

The sites are conducting the pilots in three Phases. Under Phase 1, the sites spent 12 months preparing a comprehensive deployment concept that was suitable for further design, building, testing, and operation. This comprehensive concept included identifying specific performance measures, targets and capabilities associated with performance monitoring and performance management. In Phase 2, the sites embarked on a 20-month phase of activity to design, build and test the nation's most complex and extensive deployment of integrated wireless in-vehicle, mobile device, and roadside technologies. In Phase 3, the tested pilot deployment applications and technologies will be placed into operational practice, where the impact of the deployment on a set of key performance measures will be monitored and reported.

Tampa Pilot Overview¹

Tampa-Hillsborough Expressway Authority (THEA) owns and operates the Selmon Reversible Express Lanes (REL), which is a first-of-its-kind facility to address urban congestion.

The REL morning commute endpoint intersection is on major routes into and out of the downtown Tampa commercial business district. Drivers experience significant delay during the morning peak hour resulting in, and often caused by, a correspondingly large number of rear-end crashes and red light running collisions. Because the lanes are reversible, wrong way entry is possible and fatalities have occurred. The THEA pilot will deploy a variety of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) applications to relieve congestion, reduce collisions, and prevent wrong way entry at the REL exit. THEA also plans to use CV technology to enhance pedestrian safety, speed bus operations and reduce conflicts between street cars, pedestrians and passenger cars at locations with high volumes of mixed traffic.

The THEA Connected Vehicle Pilot is the only pilot to utilize volunteer drivers of privately owned vehicles.

The THEA CV Pilot will employ Dedicated Short Range Communication (DSRC) to enable transmissions among approximately 1,600 privately-owned automobiles, 10 buses, 10 trolleys, 500 pedestrians with smartphone applications, and approximately 40 roadside units along city streets. Tampa’s pilot is unique from the other two pilots in that volunteer drivers are being recruited for participation in the project, with a 30 percent discount on select tolls on the REL (up to a maximum of \$550 in savings per driver) being offered as an incentive.

To support the pilot, THEA will be working with their primary partners, The City of Tampa (COT), Florida Department of Transportation (FDOT) and Hillsborough Area Regional Transit (HART) to create a region-wide Connected Vehicle Task Force. The primary mission of this Task Force is to support the deployment of Connected Vehicle infrastructure in the region in a uniform manner to ensure interoperability and interagency coordination as these deployments transition from concept to planning to operations.

Costs

The CV Pilots were each required to submit a Comprehensive Deployment Plan under Phase 2. In the plan are details about the design approach, procurement, development, integration, testing, and final readiness demonstration. Additional details address the preparation of project plans to secure, operate, and maintain the system and protect privacy. A Cost Summary was also included in the plan to provide insight into the types of costs anticipated for this project (Cost ID: [2017-00379](#)).

The table below summarizes the projected cost estimates at a high-level, and is intended to provide information and guidance for other deployers regarding the costs allocated for the project.

Table 1: High Level Costs for the Tampa Connected Vehicle Pilot Deployment by Task

Phase / Task	Cost
2-A. Program Management	\$1,240,000
2-B. System Architecture and Design	\$2,950,000
2-C. Data Management Planning	\$1,000,000
2-D. Acquisition and Installation Planning	\$4,265,000
2-E. Application Development	\$1,400,000
2-F. Participant and Staff Training	\$250,000
2-G. Operational Readiness Test and Demonstration Planning	\$150,548
2-H. Installation and Operational Readiness Testing	\$500,000
2-I. Maintenance and Operations Planning	\$1,000,000

Phase / Task	Cost
2-J. Stakeholder Outreach	\$400,000
2-K. Performance Measurement and Independent Eval Support	\$300,000
2-L. Participation in Standards Development	\$450,000
<u>Phase 2 Total</u>	\$13,905,548
3-A. Program Management	PM: \$350,000; Toll incentive plan: \$1,395,000
3-B. System Operations and Maintenance	\$1,528,990
3-C. Stakeholder Outreach	\$347,000
3-D. Performance Measurement and Independent Eval Support	\$1,400,223
3-E. Post-Pilot Deployment Transition Planning	\$50,000
3-F. Participation in Standards Development	\$100,000
<u>Phase 3 Total</u>	\$5,171,213
Phase 2 and Phase 3 Total	\$19,076,761

Lessons Learned

Consider installing additional vehicle detection equipment if it is determined that there is not sufficient market penetration for CV traffic signal control applications to work at their full potential (Lesson ID: [2017-00793](#))

For the pilot, THEA is installing "intelligent" traffic signal controllers to help improve the flow of traffic. As THEA moved into the design phase, the project engineers delved into the details of signal optimization with the designers of the signal control process at the University of Arizona. They learned that signal control optimization can reach its full potential only when over 90% of the vehicles approaching the intersection have known location and speeds. The number of vehicles instrumented for V2I communication as part of the CV Pilot program would provide a far smaller percentage of vehicle coverage.

Florida Department of Transportation (FDOT) District 7 and HNTB (THEA's General Engineering Consultant) came to the rescue with a method for obtaining information on all vehicles approaching the instrumented intersections. After considering several technologies, including loop detectors and microwave detectors, FDOT agreed to pay for the procurement and installation of over 40 video traffic detectors at 12 intersections along Florida Ave. and Nebraska Ave. as part of a Joint Partnering Agreement with THEA. HNTB will provide the design to integrate them with the rest of the CV pilot operation under its existing contract, at no cost to the CV Pilot program. THEA will provide ten "Bluetooth" detectors to determine travel time between points on these streets and along Meridian Avenue. These detection technologies will pick up the needed number of unequipped vehicle without identifying or retaining any information about individual drivers or vehicles.

References

[1] Connected Vehicle Pilot Deployment Program. Tampa Pilot. https://www.its.dot.gov/pilots/pilots_thea.htm. Last Accessed: January 24, 2018.