

# Research Digest

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## *Item 1*

### **Analysis of Bluetooth and Wi-Fi Technology to Measure Wait Times of Personal Vehicles at Arizona-Mexico Ports of Entry**

ARIZONA DEPARTMENT OF TRANSPORTATION (AZ DOT)

• 2015

Robust travel time data collection is possible using Bluetooth™ or Wi-Fi technology that matches anonymous MAC addresses from discoverable electronic devices (e.g., smart phones) to determine travel time along a roadway segment. Several hundred data points can be collected, and analyzed in real-time, each day. Anonymous Re-Identification (ARID), a term coined for local Arizona agencies, is commonly used for this technology and is inclusive on either Bluetooth™ or Wi-Fi technology. The Arizona Department of Transportation (ADOT), Office of P3 Initiatives and International Affairs selected Lee Engineering to analyze the penetration rate of ARID technology to measure wait time of U.S. and Mexico bound personal vehicles at 6 (six) United States-Mexico Ports of Entry (POEs) in Arizona. The purpose of this study is for ADOT and stakeholders to have an understanding of ARID data collection technology, validity of measuring wait time at POEs, and recommendations on which POEs to install permanent ARID technology, in priority order. (198 pages)

#### CONTENTS

- Introduction
- Project Stakeholders
- Data Collection
- Data Analysis
- Validity of Aris Wi-Fi Devices for Measuring Travel Time at POEs
- Permanent Installation of ARID Devices for Measuring Travel Time at POEs
- Principal Findings
- Appendix A. ARID Wi-Fi Match Data
- Appendix B. Miovision Volume Data
- Appendix C. Penetration Rate Analysis
- Appendix D. Delay Data

This report is available for free download (9.2 MB):

[https://apps.azdot.gov/ADOTLibrary/Multimodal\\_Planning\\_Division/Studies/ARID\\_POE-Final-Report-151124.pdf](https://apps.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Studies/ARID_POE-Final-Report-151124.pdf)

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## **Item 2**

### **Automated, Autonomous and Connected Vehicle Technology Assessment**

UNIVERSITY OF CENTRAL FLORIDA. ELECTRIC VEHICLE TRANSPORTATION CENTER  
*FSEC-CR-2020-16 • 2016*

The U.S. Department of Transportation (USDOT) and almost every state DOT are showing extreme interest in the application of automated and connected vehicles (ACV). This combined application can significantly reduce crashes, energy consumption, pollution and the costs of congestion which in turn will offer a fundamental change to the U.S. transportation network and system. The objective of this technology assessment project is to evaluate the vehicle technologies, actions, laws and policies that are now in place and to assess their future usage. The assessment also evaluates the highest level of automated vehicles called autonomous or self-driving vehicles. In fact, autonomous vehicles are the area that is receiving the most interest from both the general public and government agencies. The project will also evaluate how electric vehicles (EVs) will participate in this future ACV transportation system. (17 pages)

#### CONTENTS

- Summary
- Introduction
- Automated and Autonomous Vehicles
- Autonomous Vehicles
- Connected Vehicles
- Laws and Policies
- U.S. Department of Transportation (USDOT)
- U. S. Department of Energy
- Florida Department of Transportation (FDOT) AV/CV Program
- FDOT Pilot Projects
- Electric Vehicles and ACV
- Conclusions
- References

This report is available for free download (794 KB):

<http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-2020-16.pdf>

## **Item 3**

### **Automated congestion prediction with smart phones**

NEW ENGLAND UNIVERSITY TRANSPORTATION CENTER  
• [2015]

Accurate collection of traffic data is essential for tactical efficient highway operations and strategic planning. Currently, the collection of such traffic data relies on physical sensors, which gather limited measurements of vehicle speeds and times as observed from fixed locations. These sensors cannot systematically acquire data on the mobility dynamics of individual vehicles and collective interactions among them, preventing the formulation of detailed models of vehicle flow within a transportation network. Finally, deployment and maintenance of physical sensors is expensive and time consuming. To overcome these issues, this project demonstrated the feasibility of using location-aware smartphone technology as a simple, inexpensive alternative to facilitate the collection of dynamic vehicle behaviors. A privacy-preserving smartphone application was developed, deployed, and tested on the transportation network surrounding the University of Connecticut (UConn) in Storrs. (3 pages)

This report is available for free download (173 KB):

<http://utc.mit.edu/system/files/UCNR24-29%20FP.pdf>

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## **Item 4**

### **Automated Vehicle Crash Rate Comparison Using Naturalistic Data**

VIRGINIA TECH TRANSPORTATION INSTITUTE

• 2016

The fundamental objectives of the research described in this report are to improve the quality of the available data involving self-driving cars and to analyze existing data to better understand the relative crash rate of self-driving cars. Five research questions guided this analysis: (1) How many crashes go unreported to police or insurance? (2) Do unreported crash rates vary by location? (3) How is the comparison between crash rates for the Self-Driving Car and national crash rates affected by the percentage of unreported crashes and severity level? (4) How do crash rates vary based on street type and speed limit? (5) What are the factors contributing to unreported crashes? (88 pages)

This report is available for free download (15.1 MB):

[http://www.vtti.vt.edu/PDFs/Automated%20Vehicle%20Crash%20Rate%20Comparison%20Using%20Naturalistic%20Data\\_Final%20Report\\_20160107.pdf](http://www.vtti.vt.edu/PDFs/Automated%20Vehicle%20Crash%20Rate%20Comparison%20Using%20Naturalistic%20Data_Final%20Report_20160107.pdf)

## **Item 5**

### **Commercial Weight Enforcement Innovation**

MINNESOTA DEPARTMENT OF TRANSPORTATION (MN/DOT). RESEARCH SERVICES SECTION

*MN/RC 2015-17 • 2015*

Conventional methods for detecting vehicles for permanent travel monitoring stations have relied on detecting physical attributes of vehicles without correlating these with the specific vehicles and/or motor vehicle freight operators. However, by using a license plate reader camera, information can be gathered and cross referenced to other known data related to the specific vehicle assigned to the license plate. This could provide additional tools for enforcing overweight vehicles or targeting enforcement communication with freight carriers that consistently violate weight limits. The analysis conducted during this project compared machine-read license plates to manually collected license plates. The license plates were read as the vehicle traveled highway speeds in a generally uncontrolled environment. Analysis is also provided that correlates hours of direct sunlight with accuracy of the automated reader. A second analysis was conducted as an effort to improve the accuracy of the Minnesota Department of Transportation's weigh-in-motion classification scheme and bring it in line with the Department's classification scheme for automatic traffic recorder stations (sites with axle-based detection that do not collect weight information).

This report is available for free download (1.7 MB):

<http://www.dot.state.mn.us/research/TS/2015/201517.pdf>

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## **Item 6**

### **Delay and User Cost Estimation for Work Zones on Urban Arterials**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT)

*FHWA/NC/2013-09 • 2015*

This is the final project report of North Carolina Department of Transportation (NCDOT) research project 2013-09: Delay and User Cost Estimation for Work Zones on Urban Arterials. The project sought to develop a methodology for quantifying delay and user cost impacts of arterial work zones in North Carolina in an analytical framework, supported by NC-specific empirical performance data of arterial work zones. NCDOT recently acquired a similar methodology for the evaluation of significant work zones on freeways, and this research aims to build on that prior effort to develop a companion tool for arterial streets. Just as with the prior effort (NCDOT Research Project 2010-08), the methodology developed in this project would be implemented in a software tool, ARTVAL-WZ, which can be used directly for in-house analyses of these types of work zones to assure seamless technology transfer of these research products. This report summarizes the findings of all project tasks. (107 pages)

This report is available for free download (Website with PDF link):

<https://connect.ncdot.gov/projects/planning/Pages/ProjDetails.aspx?ProjectID=2013-09>

## **Item 7**

### **Demonstrating electric vehicles in Buffalo CarShare. Final report**

NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT)

*NYSERDA Report 15-27 • 2015*

Buffalo CarShare (BCS) deployed four Ford Focus electric vehicles (EVs) in their fleet to evaluate the potential performance and suitability of this technology in a carsharing operation. Sponsored by the New York State Energy Research and Development Authority (NYSERDA), this project tested EVs in a carsharing environment, gathered a broad range of information on the operational characteristics of EVs in real-world conditions as used by a multitude of drivers, and increased awareness of EVs throughout Buffalo. The EVs met the carsharing member needs for many of their trips, especially during warm weather operations. BCS members were very satisfied with the EVs' performance and many chose the EVs afterward because of the superior driving experience. Unfortunately, the EVs did not have a positive return on investment for the carsharing organization because they were not driven nearly as much (only used 53% as much as the ICE cars). The EVs' limited range in cold conditions and need to charge back at base to be ready for use the next day hurt the economic viability of this concept. However, carsharing operations are a good opportunity to understand the functionality and durability of vehicle technologies in real-world conditions for a broad audience of drivers. This project also provided some useful insight on EV operations in a New York State-based fleet and gave many drivers a chance to drive an EV for the first time, significantly increasing its awareness and acceptance (40 pages)

This report is available for free download:

[https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/NYSERDA\\_Report\\_15-27.pdf](https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/NYSERDA_Report_15-27.pdf)

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## **Item 8**

### **Effects of Overweight Vehicles on New York State DOT Infrastructure**

NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT)

*C-08-13 • 2015*

This report develops a methodology for estimating the effects of different categories of overweight trucks on NYSDOT pavements and bridges. A data mining algorithm is used to categorize truck data collected at several Weigh-In-Motion stations around the state of New York based on the trucks' adherence to the state's legal weight limits. The data indicate that about 11% of the trucks traveling on New York highways may be carrying divisible load permits, 1% may be carrying special hauling permits, while about 6% may be illegally overweight

The analysis shows that these overweight trucks are increasing the risk to failure of bridges by causing stresses above those specified in design specifications and by reducing bridge service (fatigue) lives through repetitive overloading. A monetization of the safety margin utilization due to the combined overstress and cyclic fatigue shows that trucks carrying divisible load permits may be responsible for \$50M per year in NYS bridge infrastructure cost, trucks with special hauling permits may be responsible for \$2M/yr in additional cost while illegally overweight trucks may be responsible for \$43M per year for a total of \$95M/yr. The cost allocation study performed on the NYS pavement network shows that the cost to NYS pavements due to overweight trucks is about \$145M/yr divided into \$78M/yr for divisible load permits, \$7M/yr for special hauling permits and \$60M/yr for illegally overweight trucks. (192 pages)

This report is available for free download:

[https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-08-13 Final Report Sept 2015.pdf](https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-08-13%20Final%20Report%20Sept%202015.pdf)

## **Item 9**

### **Evaluation of mobile work zone alarm systems**

MISSOURI DEPARTMENT OF TRANSPORTATION (MODOT)

*cmr 15-011 • 2015*

Maintenance of highways often involves mobile work zones for various types of low speed moving operations such as striping and sweeping. The speed differential between the moving operation and traffic, and the increasing problem of distracted driving can lead to potential collisions between approaching vehicles and the truck-mounted attenuator (TMA) protecting the mobile work zone. One potential solution to this problem involves the use of a mobile work zone alarm system. This report describes the field evaluation of two types of mobile work zone alarm devices: an Alarm Device and a Directional Audio System (DAS). Three modes of operation were tested: continuous, manual, and actuated. The components of the evaluation included sound level testing, analysis of merging distances and speeds, and observations of driving behavior. The sound level results indicated that the sound levels from both systems fall within national noise standards. All of the tested configurations increased the merging distance of vehicles except for the Alarm Actuated setup. The DAS Continuous setup also reduced vehicle merging speeds and the standard deviation of merging distance. In some instances, undesirable driving behaviors were observed for some of these configurations, but it is unclear whether these driving behaviors were due to the presence of the mobile work zone alarm device. Analysis of alarm activations indicated that factors such as horizontal curves and movement of the TMA vehicle created false alarms and false negatives. The research demonstrated that mobile work zone alarms have the potential to be an effective tool in improving safety by providing audible warnings. Further refinements to the systems, such as modifications to the alarm sound and warning message, could improve system effectiveness. (70 pages)

This report is available for free download (2.7 MB):

<http://library.modot.mo.gov/RDT/reports/TR201412/cmr15-011.pdf>

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## *Item 10*

### **Exploring a road usage charge as an alternative to the gasoline tax**

CALIFORNIA STATE TRANSPORTATION AGENCY (CALSTA)

• 2015

"The California State Transportation Agency (CalSTA) established the California Transportation Infrastructure Priorities (CTIP) Workgroup in April 2013, to examine the current status of the state's transportation system, discuss the challenges that lie ahead, and make recommendations to the Secretary... The CTIP Workgroup continued to meet on specific topics in 2014 – one of these being the feasibility of a road usage charge for addressing the state's long-term funding challenge to preserve state and local transportation infrastructure... This whitepaper provides background and recommendations from the CTIP Workgroup on the establishment of a demonstration program to explore the feasibility of a road usage charge. Participants at the September meeting were asked to vote in an anonymous text poll about support for the recommendation of this whitepaper – of the participants voting, 42 people (or 93 percent) indicated they "strongly agree" or "agree" with the recommendations, while 3 people (or 7 percent) indicated they "disagree" with the recommendations. A list of attendees at the September meeting is attachment I of this whitepaper." --p.1 (12 pages)

This report is available for free download (548 KB):

[http://www.calsta.ca.gov/res/docs/pdfs/2015/Agency/CTIP\\_RUCWhitepaper01122015.pdf](http://www.calsta.ca.gov/res/docs/pdfs/2015/Agency/CTIP_RUCWhitepaper01122015.pdf)

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## *Item 11*

### **Final Report of the Transportation Library Connectivity & Development Pooled Fund Study, TPF-5(237)**

HS INFOCUS LLC

*cmr 16-005 • 2015*

This report is a record of the major activities and accomplishments of the Transportation Library Connectivity and Development pooled fund study, TPF-5(237), from its approval by FHWA in 2010 through its fifth and final annual meeting in August 2015. To deal with the overwhelming amount of valuable information produced by transportation agencies available in digital and physical formats, the transportation sector needs to engage libraries and leverage the specialized skills and systematic approach of professional librarians to effectively locate and curate this information.

The Transportation Library Connectivity and Development pooled fund study is a continuation of the work of the previous study, TPF-5(105). In response to the recommendations of the previous study, a functional library consortium was established. This consortium offered members opportunities to enhance and improve services to their customers, while reducing costs and to prepare for federally funded scientific research and data policy changes, MAP 21 and the evolution of the National Transportation Library. A new pooled fund study, to be led by Missouri DOT, is being planned to build upon the achievements of this study. (57 pages)

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- INTRODUCTION
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- GOALS AND OBJECTIVES
- METHODOLOGY
- RESULTS
- LESSONS LEARNED AND RECOMMENDATIONS
- NEXT STEPS
- APPENDICES

This report is available for free download (4.9 MB):

<http://library.modot.mo.gov/RDT/reports/TRyy1127/cmr16-005.pdf>

## *Item 12*

### **Fostering Innovation within state departments of transportation**

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

*• 2015*

In response to the California State Transportation Agency's report that the California Department of Transportation (Caltrans) is "in need of modernization", Caltrans is seeking to better understand organizational structures, methods, and approaches that are used by other agencies to promote cultures of innovation. Several state DOTs were interviewed about leading practices for promoting innovation at their agencies. This preliminary investigation presents the key points and repeated themes from the interviews.

This report is available for free download (2.3 MB):

[http://www.dot.ca.gov/research/researchreports/preliminary\\_investigations/docs/fostering\\_innovation\\_preliminary\\_investigation\\_revised\\_2015-07-28.pdf](http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/fostering_innovation_preliminary_investigation_revised_2015-07-28.pdf)

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## *Item 13*

### **Motorists' Preferences for Different Levels of Vehicle Automation**

UNIVERSITY OF MICHIGAN. TRANSPORTATION RESEARCH INSTITUTE

*UMTRI-2015-22 • 2015*

This report builds on a recent series of reports addressing public opinion, human factors, and safety-related issues with self-driving vehicles (Schoettle and Sivak, 2014, 2015; Sivak and Schoettle, 2015a, 2015b). A survey was developed for this study to examine motorists' preferences among levels of vehicle automation, including preferences for interacting with and overall concern about riding in self-driving vehicles. The survey yielded completed responses from 505 licensed drivers in the U.S. The main findings are as follows: (1) The most frequent preference for vehicle automation was for no self-driving capability, followed by partially self-driving vehicles, with completely self-driving vehicles being the least preferred choice. (2) Concern for riding in self-driving vehicles was higher for completely self-driving vehicles than for partially self-driving vehicles. (3) Respondents overwhelmingly want to be able to manually control completely self-driving vehicles when desired. (4) Preferences were generally divided between touchscreens or voice commands to input route or destination information for completely self-driving vehicles. (5) Most respondents prefer to be notified of the need to take control of a partially self-driving vehicle with a combination of sound, vibration, and visual warnings. The levels of concern for riding in completely self-driving vehicles found in this study are similar to those found in our previous survey that was administered in June 2014. Currently, as in the previous study, concern about riding in completely self-driving vehicles remains high. (20 pages)

This report is available for free download (205 KB):

<http://deepblue.lib.umich.edu/bitstream/handle/2027.42/114386/103217.pdf>

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## *Item 14*

### **Proof of concept for using unmanned aerial vehicles for high mast pole and bridge inspections**

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

*BDV28 TWO 977-02 • 2015*

Bridges and high mast luminaires (HMLs) are key components of transportation infrastructures. Effective inspection processes are crucial to maintain the structural integrity of these components. The most common approach for inspections is visual examination by trained and experienced inspectors. A proposed approach to assist inspectors during the visual inspection process is to use small unmanned aerial systems (sUAS) equipped with high-definition cameras to transmit video data of structural components in near real time. The use of sUAS as tools for structural inspections can significantly reduce costs and safety risks associated with inspectors and motorists, and improve the effectiveness and accuracy of structural health evaluations. Following a systems engineering approach, a proof-of-concept initial study was conducted to identify system limitations and gain insights into the expected usefulness of sUAS as tools for structural inspections. Extensive indoor controlled experiments using industrial fans were conducted to evaluate sUAS flight response in controlled wind conditions, to measure image quality in different flight scenarios, and to determine image quality in low-light conditions. Altitude, payload, and maneuverability tests were conducted to understand sUAS performance and limitation parameters related to their use for transportation infrastructure inspections. In full coordination with Florida Department of Transportation (FDOT), limited field tests were conducted to collect image data of underside bridge sections and HMLs. The collected images were of similar quality than those collected by inspectors during previous inspections. In addition, a basic sUAS flight training program was developed, and a preliminary cost analysis was conducted to estimate the cost for using sUAS as tools during inspections. Preliminary results showed potential cost savings in man-hours by using an sUAS approach instead of conventional methods. Overall, results provided evidence that significant benefits can be obtained from using sUAS during bridge and HML inspections. However, there still exist gaps that need to be addressed in order to use these aerial systems safely and effectively in practice. Various future research areas are identified to close these gaps and increase the general understanding of sUAS for structural inspections. (170 pages)

This report is available for free download (7.5 MB):

[http://www.dot.state.fl.us/research-center/Completed\\_Proj/Summary\\_MNT/FDOT-BDV28-977-02-rpt.pdf](http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_MNT/FDOT-BDV28-977-02-rpt.pdf)

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## *Item 15*

### **Shared mobility: a sustainability & technologies workshop : definitions, industry developments, and early understanding**

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

• 2015

Shared mobility - the shared use of a vehicle, bicycle, or other mode - enables users to gain short-term access to transportation modes on an “as-needed” basis. Shared mobility includes carsharing, bikesharing, ridesharing, and on-demand ride services. It can also include alternative transit services, such as paratransit, shuttles, and private transit services. Smartphone “apps” are available to aggregate options and optimize routes. New ways of transporting and delivering goods also have emerged with the potential to change the nature of the package and food delivery industry. Shared mobility has had a transformative impact on many global cities by enhancing transportation accessibility, while simultaneously reducing driving and personal vehicle ownership. This white paper provides an introduction and background to different types of shared modes, as well as smartphone-based trip planning apps that can facilitate access to public transit and shared mobility services. It also notes where potential benefits of shared mobility could align with the new mission of the California Department of Transportation (Caltrans). (30 pages)

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This report is available for free download:

[http://innovativemobility.org/wp-content/uploads/2015/11/SharedMobility\\_WhitePaper\\_FINAL.pdf](http://innovativemobility.org/wp-content/uploads/2015/11/SharedMobility_WhitePaper_FINAL.pdf)

## *Item 16*

### **Study on Illumination for State Highways**

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT)  
*WA-RD 847.1 / Research Report T1461-06 • 2016*

Increasing budget pressures are causing the Washington State Department of Transportation (WSDOT) to look for ways to reduce costs. WSDOT currently owns and operates illumination fixtures on state freeways and highways with annual operating costs measured in millions of dollars. Given the pressures to reduce the WSDOT budget, it is important to have a complete understanding of the means available to reduce operating and capital costs with the least negative impact on service, safety and sustainability. There are several ways that the WSDOT can reduce expenditures on illumination. One way is to use more efficient lighting technologies. A second is to operate illumination more judiciously. Another option is to install fewer luminaires, remove superfluous luminaires and consolidate luminaires. Executing these options effectively requires the WSDOT to collect additional information regarding current and near future illumination practices and technologies. A natural way in the process of revising and adapting WSDOT's illumination standards is examining how the WSDOT standards compare to other state DOTs, utilities, cities, counties and other public entities internationally. Given the work required to revise, publish and promulgate a new illumination standard, it is advisable to examine the current state of practice in illumination standards in order to inform comprehensive updates. Toward that end, a comprehensive review of illumination design standards, light-emitting diode (LED) illumination technologies and illumination control systems is useful for revising illumination standards. To address these aspects of illumination operation and design, a thorough literature review of existing illumination products, illumination control systems, and illumination spectrum technologies is conducted. This report reviewed existing public agency illumination standards domestically and internationally and outlined the difference in designing standards. An overview of existing luminaire technology performance, as well as operational and maintenance characteristics are provided. In addition, available illumination control and spectrum technologies for performance characteristics are summarized. The results of this literature review are useful for design and business case decisions regarding illumination installation, maintenance, and operation. (100 pages)

This report is available for free download:

<http://www.wsdot.wa.gov/research/reports/fullreports/847.1.pdf>

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## *Item 17*

### **Task 2 of Preparing a Possible Oregon Road Map for Connected Vehicle/Cooperative Systems Deployment Scenarios. Literature Review and Desk Scan**

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

*FHWA-OR-RD-16-12 • 2016*

The goal of this project was to lay the groundwork for Oregon to be prepared to lead in the implementation of a connected vehicle/cooperative systems transportation portfolio, and/or to avoid being caught by surprise as developments in this area evolve quickly. The project assessed ODOT's internal mechanisms for addressing connected vehicle/cooperative systems, scanned, reviewed and assessed the technical maturity of potential connected vehicle/cooperative system applications, developed preliminary goals, linked to prospective connected vehicle/cooperative systems applications, and refined/ranked/prioritized those that fit with potential ODOT role in advancing/leading these initiatives. The project identified opportunities for linking ODOT's current programs with national and international connected vehicle/cooperative system research, testing and deployment initiatives, and recommended a final shared vision and "road map" for Oregon's priority connected vehicle/cooperative system applications. This volume contains a literature review and annotated bibliography regarding policy and technical questions about the potential for introducing automated vehicles in the state for research and testing purposes. This includes a discussion of the history and development of automated vehicles for highway use as well as a discussion of the relationship between automated and connected vehicles and the potential for integrating the two technologies. The review also includes an analysis along twelve Oregon-specific dimensions related to specific question about the potential introduction of automated vehicles in Oregon. These dimensions include: liability, implementation, privacy, cyber security, governance, risk, certification, data, legislation, deployment approach, financing and sustainability. (133 pages)

#### CONTENTS

- Introduction
- Automated Vehicles Desk Scan
- Conclusions and Next Steps
- References

This report is available for free download:

[http://www.oregon.gov/ODOT/TD/TP\\_RES/docs/Reports/2016/SPR764\\_Task2\\_Lit\\_Review\\_Final.pdf](http://www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/2016/SPR764_Task2_Lit_Review_Final.pdf)

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## *Item 18*

### **The Transportation Futures Project: Planning for Technology Change**

MINNESOTA DEPARTMENT OF TRANSPORTATION. RESEARCH SERVICES & LIBRARY  
*MN/RC 2016-02 • 2016*

After a long period of system deployment of the auto-highway system, and several decades of maturity of that system, the surface transportation sector is facing a large number of technological shifts that could change whether and how people travel. While nascent, their prospects are potentially significant. This research proposed to explore these technologies - ascertain their potential market, consider their interactions, understand what that might do to travel demands, and address how planning and forecasting should respond. This research developed a series of white papers: high-level policy briefs based on the analysis of each technology, its direction, and its implications for Minnesota. This work extends and complements the Minnesota Department of Transportation (MnDOT) 50 year vision expressed in Minnesota GO. It also builds on the ideas developed in the National Cooperative Highway Research Program (NCHRP) 750 project: Strategic Issues Facing Transportation. The timeframe on these technologies varies, and the authors looked at deployment paths over time rather than simple snapshots in time. (141 pages)

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This report is available for free download:

<http://www.cts.umn.edu/Publications/ResearchReports/pdfdownload.pl?id=2658>

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## ***Item 19***

### **Understanding Public Perceptions of Different Options to Fund the Highway System**

COLORADO STATE UNIVERSITY

*MPC 15-300 • 2015*

The purpose of this research was to generate an understanding of the public perceptions of different revenue generation systems that are already in use or that have the potential to be used in the future, and to educate the public on the different revenue generation systems. In addition, this study tested a number of hypotheses that were focused on finding relationships (correlations) between the choice of funding options to support the highway system in the United States and the demographic information.

The results of this survey indicate that the public in the states of Colorado, North Dakota, South Dakota, Utah, and Wyoming selected “increasing the federal gas tax that is collected at the time of purchase” as its first choice of funding option. The support for the use of highway tolling to fund the highway system was somewhat moderate among the population across the five states. The collection of additional sales taxes on all goods to fund the highway system was an unpopular funding mechanism among the population in the five states. Similarly, the support for the use of mileage-based user fees was disliked among the population in the five states. This research is significant, as few studies have been done on understanding the public perceptions of different options to fund highway systems. (181 pages)

This report is available for free download (2 MB):

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## ***Item 20***

### **Wayne County, NY, Municipal Vehicle Retrofit Project. Final Report**

NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT)

*C-10-20 • 2015*

Police Departments struggle with both increasing fuel prices and increasing demands for greater fuel efficiency and lower emissions. According to vehicle manufacturers, an average of one gallon of gasoline is burned every hour that a vehicle’s engine idles. Excessive idling creates increased wear and tear on a vehicle’s engine (between 29 and 33 ghost miles per idle hour), which makes for hidden maintenance costs. Constant dead batteries result from auxiliary equipment power draw and causes many police cruisers to end up in the maintenance shop instead of out on patrol. Running these systems (lights, radios, etc.) requires officers to keep the police cruiser’s gasoline engine turned on when stationary. Municipal truck engines are left idling for hours in order to supply electricity for power tools and construction lights. The goal of this project was to demonstrate that vehicle retrofits with anti-idling power cell battery units can serve as an example of fuel savings technology and reduced vehicle emissions. Data results, which included before and after fuel costs and emissions data, are being shared with the involved project communities, Wayne County, and Communities throughout Upstate New York. It was found from research done in this project that utility truck retrofits can be very streamlined, efficient, and effective – saving communities fuel costs. Research was performed regarding police car vehicle retrofits. Challenges and learning tools were examined.

This report is available for free download:

[https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-10-20%20-%20Final%20Report\\_8-2015.pdf](https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-10-20%20-%20Final%20Report_8-2015.pdf)