ENTERPRISE

ENTERPRISE Program
FY 2013 Work Plan
FINAL

Prepared for the

ENTERPRISE Pooled Fund Study

TPF-5(231)

Prepared by

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November 8, 2012

Program Overview

The ENTERPRISE Program represents a forum for collaborative Intelligent Transportation Systems (ITS) research, development, and deployment ventures reflecting the interests of governmental entities and industrial groups. This forum also facilitates the sharing of technological and institutional experiences gained from individual ITS projects conceived and initiated by each participating entity. The intent is to use a pooled fund program as a mechanism to support jointly-sponsored ITS projects of shared interest. These projects form this annual ENTERPRISE work plan. The scope of the ENTERPRISE Program promotes North American ITS development, reflecting the active involvement of U.S. and Canadian member agencies. ENTERPRISE also seeks to take advantage of technologies being developed outside North America. ENTERPRISE's European member is the Dutch Ministry of Transport, Rijkswaterstaat.

ENTERPRISE has approved a number of work plans since its inception in 1991 and completed over 50 projects. Each project has followed the vision of ENTERPRISE which defines the program's global view of highway travel. ENTERPISE aims to be consistent with the vision of higher bodies, such as ITS America and ITS Canada, concerning the development and use of ITS technologies and the benefits that this will bring. ENTERPRISE envisions a highway system in which advanced technologies continue to support the safe, efficient, convenient, and socially and environmentally sound movement of people and goods. Complete details on previous work plans and individuals projects are available through the program website at: http://enterprise.prog.org/.

Financial Status

ENTERPRISE North American members contribute $30,000 or more annually to the pooled fund and are reimbursed for program travel. Non North America members contribute $25,000 or more per year to the program and are not reimbursed by ENTERPRISE for program travel expenses. In FY 2012 (October 1, 2012 through September 30, 2013), 13 member agencies are anticipated to contribute financially to the projects included in this work plan.

Projects

During 2012 member agencies submitted project ideas for this FY 2013 Work Plan. The initial project ideas were reviewed by the ENTERPRISE Executive Board and a selected number of projects were approved for development of full project proposals to describe the project ideas in additional detail. The project proposals were then reviewed and voted on by the board and finally approved at the September 2012 Executive Board meetings as projects for the FY 2013 Work Plan. Complete details on the project selection process can be found in the ENTERPRISE Management Plan which is posted on program website: http://enterprise.prog.org/.

The following table summarizes the voting results and estimated project costs to complete the approved projects.

Table 1: FY 2013 Work Plan Funding Plan

Expense	Estimated Costs	
2013 Projects		
Project 1: Intersection Conflict Warning Systems Guidance (Phase 3)	$108,000	
Project 2: ITS Operational Plans	$78,000	
Project 3: Assess Speed Data for Traffic Management	$40,000	
Project 4: Dynamic Real Time Warning Systems	$58,000	
Project 5: Traffic Safety and Traveler Information Mobile Apps	$35,000	
Project 6: Wrong Way Vehicles on Freeways	$70,000	
Project 7: Performance Measures and Reporting	$50,000	
Project 8: The Future of DMS	$40,000	
2010-2012 Projects		
Project 11: Intelligent Workzone – Synthesis of Best Practices and Project 12: Connected Vehicles Data Element ConOps Budget Increase*	$35,000	
Program Administration Support	$70,000	
Member Travel Support (two in person meetings)	$40,000	
Revenue		**Estimated Revenue**
Carryover from previous work plans		$245,000
Project Specific Contributions from Members - MTO contribution		$20,000
Member Annual Contributions 11 members x $30,000 • Georgia DOT, Illinois DOT, Iowa DOT, Kansas DOT, Michigan DOT, Minnesota DOT, Oklahoma DOT, Ontario MTO, Texas DOT, Virginia DOT, Washington State DOT) 1 member x $18,255 • Idaho Transportation Department (NOTE: Contributed additional funds in 2012) 1 member x $24,990 • Dutch Ministry of Transport (NOTE: Travel expenses not paid by ENTERPRISE)		$373,245
Total (Revenue vs. Expenses)	**$624,000**	**$638,245**

**During the 2013 Work Plan voting process the ENTERPRISE Board approved a budget increase of $20,000 for Project 11 from $40,000 to $60,000 and a budget increase of $15,000 for Project 12 from $25,000 to $40,000.*

The states will be directly involved with finalizing contractor cost estimates, scopes of work and schedules for each of the projects to ensure concurrence with the final mix of projects contracted for this work plan.

Additional project details for the approved projects are included on the following pages.

2013 Work Plan Project Proposal

2013 Project #1:
Intersection Conflict Warning Systems Guidance (Phase 3)

Project Background, Summary, and Objectives:

Intersection crashes continue to represent a significant share of transportation fatalities and serious injuries throughout the country. In addition to intersection lighting, signing and geometric improvements, organizations have turned to ITS as another tool for improving safety. Over the past several years, a variety of mainline and cross street oriented intersection conflict warning systems have been developed and tested in many states across the country. Some systems have been developed using local expertise, while others have been supported by the USDOT Cooperative Intersection Collision Avoidance Systems program. No specific guidance has been available for these systems in regard to placement, size, messaging, failsafe, etc. This has resulted in a fairly broad range of approaches and with the states' growing experience there is now an opportunity to work together in moving toward standardization.

Bringing together organizations that have developed and deployed Intersection Conflict Warning Systems (ICWS), the purpose of Phase 1 of this project was to develop a consistent approach for accelerated, uniform deployment and further evaluation of intersection conflict warning systems, and to recommend preliminary standards for MUTCD consideration. This work was initiated through a webinar and two in-person workshops. An initial version of Design and Evaluation Guidance for ICWS was published by ENTERPRISE in December 2011. The guidance offers insight on current practice and is expected to evolve as more systems are deployed and further evaluation is conducted. The guidance was presented to the AASHTO Subcommittee on Traffic Engineering (SCOTE) and National Committee on Uniform Traffic Control Devices (NCUTCD) in June 2012. SCOTE is considering endorsement of this document as interim assistance for state and local transportation agencies in the deployment of ICWS. Meanwhile, NCUTCD has established a task force to review and recommend to FHWA content for the MUTCD.

Phase 2 is further supporting the standardization of ICWS by coordinating among the various national standards and association groups, and by developing a concept of operations and systems requirements for the four types of ICWS identified in the guidance document developed in Phase 1.

Phase 3 would continue moving towards ICWS standardization by publishing a second version of Design and Evaluation Guidance for ICWS. The next version will expand upon design and evaluation, and introduce policy considerations, planning and operational guidance for ICWS. This document would be similar to materials developed for roundabouts such as Roundabouts: An Informational Guide. A companion brochure will also be developed to support ICWS outreach to transportation professionals and the public. The intent of Phase 3 would be to provide engineers with support information on the use of ICWS.

Scope of Work with Task Descriptions:

Task 1: Establish Working Committee

In this task the Contractor will contact the key stakeholder groups that have been engaged in the previous two ENTERPRISE ICWS projects. These include traffic engineering and safety staff from transportation agencies throughout the country, Federal Highway Administration division and Office of Safety staff, the National Committee on Uniform Traffic Control Devices, AASHTO Subcommittee on Traffic Engineering, the American Traffic Safety Services Association, the Traffic Control Devices pooled fund and the Evaluation of Low Cost Safety Improvements pooled fund. The groups will be asked to provide representatives to a working committee that will offer their input on policy considerations, planning, design, safety and operations of ICWS as they will be presented in Design and Evaluation Guidance for ICWS, Version 2.

Task 1 Deliverable(s):

1.1 Working Committee Invitation

Task 2: Develop and Update Guidance Content

The design and evaluation content presented in the first version of the Guidance document will be updated to reflect the work completed and information gathered since it was released in December 2011. This will include additional design information about conditions, placement and sign combinations, as well as more definitive information about safety effectiveness and evaluation.

In addition to enhancing the design and evaluation content of the Guidance, the working committee will be asked offer input on new content associated with policy considerations, planning and operation of ICWS. Some of the key issues that the working committee will discuss under policy considerations include performance characteristics, procurement options, construction and operating costs, public education and involvement, and legal issues. Under planning, the committee will discuss the factors that ought to be considered when evaluating an intersection for the installation of ICWS. Operational issues

such as staff training, maintenance routines, data collection and failure protocols will also be discussed by the working committee.

Each of these topics will be characterized within the context of current practice and the working committee will be asked to provide input on recommended practice that should be captured in the Guidance.

The working committee will meet once during this task in a working session to develop the guidance contact. The remainder of their work will primarily be conducted via webinar, teleconference and email.

Task 2 Deliverable(s):

- Draft Design and Evaluation Guidance for ICWS, Version 2
- Final Design and Evaluation Guidance for ICWS, Version 2

Task 3: Develop Companion Brochure

A brochure will be developed to support ICWS outreach to and education of transportation professionals and the public. The brochure will highlight the conditions under which an ICWS may be considered an effective safety enhancement. It will also briefly describe the most significant policy considerations (e.g. public outreach, operating costs) and the anticipated safety effectiveness. This brochure may be used to introduce ICWS to transportation professionals and the public.

Task 3 Deliverable(s):

- Draft ICWS companion brochure
- Final ICWS companion brochure

Task 4: Coordination

The Contractor will maintain coordination with national standards groups, industry associations and other pooled fund programs that have been engaged through the ENTERPRISE ICWS work. These groups include:

- Federal Highway Administration – MUTCD Team and Office of Safety
- National Committee on Uniform Traffic Control Devices
- AASHTO Subcommittee on Traffic Engineering
- American Traffic Safety Services Association
- Traffic Control Devices Transportation Pooled Fund 5(065)
- Evaluation of Low Cost Safety Improvements Transportation Pooled Fund 5(099)
- Cooperative Transportation Systems Pooled Fund 5(206)
- National Association of County Engineers
- Institute of Transportation Engineers

The primary ENTERPRISE liaison with these organizations will be the Project Champion. The Contractor's coordination efforts will support the Project Champion and consist of periodic email updates, telephone contact, webinars and meeting/presentation support.

This task will also include budget for the Project Champion or designee to travel to meetings/conference to represent and/or present the ENTERPRISE ICWS efforts.

Task 4 Deliverable(s):

- Information materials (e.g. presentations, handouts, etc.) to support Project Champion coordination with national standards groups, industry associations and other pooled fund programs.

Project Schedule at the Task Level:

This project would have a 12-month duration with tasks occurring in the sequence outlined below.

Tasks	Months from Notice to Proceed											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Establish Working Committee												
1. Develop and Update Guidance Content												
2. Develop Companion Brochure												
3. Coordination												

Project Deliverables:

Task 1 Deliverable(s):

- Working Committee Invitation

Task 2 Deliverable(s):

- Draft Design and Evaluation Guidance for ICWS, Version 2
- Final Design and Evaluation Guidance for ICWS, Version 2

Task 3 Deliverable(s):

- Draft ICWS companion brochure
- Final ICWS companion brochure

Task 4 Deliverable(s):

- Information materials (e.g. presentations, handouts, etc.) to support Project Champion coordination with national standards groups, industry associations and other pooled fund programs.

Project Cost Detailed at the Task Level:

Task	Estimated Cost
1. Establish Working Committee	$15,000.00
2. Develop and Update Guidance Content	$52,000.00
3. Develop Companion Brochure	$17,000.00
4. Coordination (includes travel)	$24,000.00
Total Project Costs	**$108,000.00**

Relationship to Similar Activities and Projects If Known:

As noted in the background, this project is related to two earlier ICWS projects completed by ENTERPRISE. Based on the stakeholder groups engaged in the earlier two projects, related activities outside ENTERPRISE have also been initiated. Most notably:

- ATSSA passed a motion and ENTERPRISE accepted their invitation to further collaborate on efforts to standardize ICWS through the ATSSA Sign Committee.
- Traffic Control Devices pooled fund TPF-5(065) is conducting human factors research on sign placement and legend;
- Evaluation of Low Cost Safety Improvements pooled fund TPF-5(099) is completing a nationally oriented safety effectiveness evaluation;
- AASHTO SCOTE passed a resolution to recommend NCUTCD establish a task force, to assess ICWS work by the three pooled funds, and to endorse “Design and Evaluation Guidance for Intersection Conflict Warning Systems; and,
- NCUTCD created a task force on this topic under the Regulatory/Warning Sign Technical Committee.

Project Participants (Agencies):

TBD

Project Contact:

Jon Jackels, Minnesota DOT

2013 Work Plan Project Proposal

2013 Project #2:
ITS Operational Plans

Project Background, Summary, and Objectives:

Operational plans for transportation are commonly developed corridor-wide, metro-wide and statewide. These plans do not always include or address ITS which can leave devices (e.g. cameras, dynamic message signs) and data (e.g. traffic volume, roadway temperature) unused or underutilized. There is a need to identify overall guidance for including ITS in operational plans. Such guidance can be used to describe the placement of ITS devices, who will operate, maintain and own them, and how the devices will be used in daily or other operational scenarios.

The guidance should consider recurring traffic issues, planned special events, incident/weather event needs, and trends in population and travel patterns.

The objectives of this project are:

- Create guidance for including ITS in operational plans
- Identify what operational factors should be considered when planning ITS deployments
- Identify 1-3 Pilot Corridors where operational plans can be modified or created to encompass ITS using the guidance developed in this project

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Scope of Work with Task Descriptions:

Task 1: Research

This task will begin with research on existing operational guidance for individual ITS devices and overall guidance for transportation operational plan development. This will allow the Contractor and ENTERPRISE members to understand what may already exist as references for transportation professionals. Research may determine that existing materials simply need to be modified or that additional education is needed to help transportation professionals understand how to better

incorporate ITS into their operational plans. Research may also determine that no clear guidance exists and must be developed. A research summary will be prepared with a recommendation on how to proceed with developing additional guidance.

Task 1 Deliverable(s):

- Research summary

Task 2: Develop Guidance

Depending on the research results this task may consist of:

- A summary of existing operational planning references with additional recommendations on how to emphasize the inclusion of ITS into those references.
- A new guidance document that describes what was believed to be lacking in existing materials (as identified from the research in Task 1), outlines how an agency can determine if their operational plans adequately address ITS, and recommends steps for adding or enhancing their operational plans to include ITS.

Task 2 Deliverable(s):

- Recommendation summary or new guidance document

Task 3: Pilot Test Guidance

With input from the ENTEPRISE members, identify 1-3 corridors where existing operational plans could be evaluated for how well they address ITS. Minnesota and Washington corridors examined in an earlier ENTERPRISE project, "Impacts of Traveler Information on the Overall Network," will be the initial targets for this task. Using knowledge of dynamic message signs and operational plans related to travel times, in particular, may be further assessed to determine how well all ITS devices are included. At least one pilot corridor will rural in nature to understand unique operational needs, uses and benefits of including ITS in operational plans outside urban areas.

Based on these pilot test evaluations, the Contractor will make recommendations to enhance or add completely new ITS oriented content to the plans. Recommendations will be considered and accepted or rejected by the individual states and their relevant operations staff.

Task3 Deliverable(s):

- Pilot test recommendations

Project Schedule at the Task Level:

This project would have a schedule of 12 months with tasks occurring in the sequence described below.

Tasks	Months from Notice to Proceed											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Research												
2. Develop Guidance												
3. Pilot Test Guidance												

Project Deliverables:

Task 1 Deliverable(s):

- Research summary

Task 2 Deliverable(s):

- Recommendation summary or new guidance document

Task3 Deliverable(s):

- Pilot test recommendations

Project Cost Detailed at the Task Level:

Task	Estimated Cost
1. Research	$18,000
2. Develop Guidance	$30,000
3. Pilot Test Guidance	$30,000
Total Project Costs	**$78,000**

Relationship to Similar Activities and Projects If Known: -

Project Participants (Agencies): TBD

Project Contact: Jon Jackels, Minnesota DOT

ENTERPRISE

2013 Work Plan Project Proposal

2013 Project #3:
Assess Speed Data for Traffic Management

Project Background, Summary, and Objectives:

Volume and Occupancy data are used for a variety of traffic management strategies. For example, ramp metering algorithms typically rely on volume and occupancy values and do not function with only speed data. There is a cost to installing loop detectors or other vehicle detection devices capable of providing volume and occupancy data. As an alternate, there is an increasing number of private sector providers of probe-based speed data. As a result, 3rd Party speed data is increasingly being considered for purchase by state, provincial, and local DOTs. One barrier that DOTs face when they consider purchasing 3rd Party speed data is the fact that they still need volume and occupancy data for other purposes (e.g. traffic counts, ramp metering, etc.).

The objective of this project is to take a fresh look at speed data in relation to the functions that DOTs have typically relied upon volume and occupancy data. For example, if speeds are available for the entire metro area network (but no volume and occupancy) could a new and innovative strategy for controlling ramp meters be developed (using the entire network of speeds vs. just the volumes and occupancies nearest the ramp meter).

Effectively, this project is an attempt to take advantage of the market of relatively low cost speed data that can be procured competitively without long term commitments to loop detectors or other infrastructure, and to determine if some or all of the roles typically thought to require volume and occupancy can be accomplished with network-wide speed data.

Finally, the algorithms examined and the strategies reviewed may not ever replace existing algorithms or the use of existing volume and occupancy data. However, if 3rd Party Speed data together with newly developed algorithms could help avoid deployment of future vehicle detectors (perhaps in small urban areas or 'suburban fringe' areas where devices, such as ramp meters, often run based solely on time of day configurations) the results of this project could still create significant improvements.

Scope of Work with Task Descriptions:

Task 1: Research DOT Uses of Volume & Occupancy Data – Identify Candidates

In Task 1, the Contractor will identify a series of DOT needs for volume and occupancy data that currently would not be met with speed data alone. The idea would be to identify those uses (such as ramp meter algorithms) that would prevent a DOT from being able to meet their needs solely with speed data from 3rd party providers. In this task, background information will be summarized (e.g. the mathematical reasons why volume and occupancy data are needed) and challenges will be identified for using tradition speed only data.

Task 1 will conclude with the ENTERPRISE group selecting a small set of uses/needs (1-3) that will be the focus of later tasks. Ramp meter algorithms are already identified as one need, but there is the opportunity to select additional ones.

Task 1 Deliverables:

- List of DOT needs for volume and occupancy data
- Prioritized list to define those needs to be the focus of later tasks

Task 2: Algorithm/tool development using Speed Data

In Task 2, the Contractor will work with appropriate representatives for the ENTERPRISE member states to develop alternative algorithms or tools that use only speed data. The uses of the speed data might be in traffic management (e.g. ramp metering algorithm), or in planning (e.g. volume counts) or other areas within the DOT.

Efforts in Task 2 will attempt to create the algorithms and tools to a level where some preliminary performance can be measured to assess if speed only data can produce results that would be acceptable to the DOTs. The efforts in Task 2 will go beyond simply replacing tradition volume data with speed data. For example, the 3rd Party data now offered can potentially cover all freeways and major local roads in a metro area. Therefore, using ramp meters as an example, this project will examine the concept of integrating speed data from an entire metropolitan area when controlling ramp meters (either individually or collectively as a group). This is just one example of the innovative attempts that are expected to assess the uses of speed data. Finally, efforts in Task 2 will test these newly developed algorithms with actual data, to the extent possible.

Task 2 Deliverables:

- Algorithms/tools to use speed data to accomplish what typically requires volume and occupancy data
- Testing results and evaluation of the outcomes of using the new algorithms and speed data.

Task 3: Final Report

In Task 3, the Contractor will prepare a Final Report to summarize the activities and findings of this project. The research in this project may or may not identify one or more algorithms that could make speed data an acceptable substitute for volume and occupancy data. However, regardless of those findings, the process followed and the findings and feedback from DOT representatives will be fully documented so as to contribute to this topic for future consideration. The findings will also be shared with 3rd Party Data Providers, as appropriate, to assist them in understanding the needs of DOTs for data and possibly to understand how to improve or enhance 3rd Party data products to better meet DOT needs.

Task 3 Deliverables:

- Final Report describing project process, findings, and details of any algorithms developed.

Project Schedule at the Task Level:

This project would have a schedule of 9 months.

Task	Month								
	1	2	3	4	5	6	7	8	9
Task 1: Research DOT Uses of Volume & Occupancy Data – Identify Candidates									
Task 2: Algorithm/tool development using Speed Data									
Task 3: Final Report									

Project Deliverables:

Task 1 Deliverables:

- List of DOT needs for volume and occupancy data
- Prioritized list to define those needs to be the focus of later tasks

Task 2 Deliverables:

- Algorithms/tools to use speed data to accomplish what typically requires volume and occupancy data
- Testing results and evaluation of the outcomes of using the new algorithms and speed data.

Task 3 Deliverables:

- Final Report describing project process, findings, and details of any algorithms developed.

Project Cost Detailed at the Task Level:

Task	Estimated Cost
Task 1: Research DOT Uses of Volume & Occupancy Data – Identify Candidates	$10,000
Task 2: Algorithm/tool development using Speed Data	$20,000
Task 3: Final Report	$10,000
Total Project Costs	**$40,000**

Relationship to Similar Activities and Projects If Known:

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Project Participants (Agencies):

TBD

Project Contact:

Steve Travia, Illinois DOT

2013 Work Plan Project Proposal

2013 Project #4:
Dynamic Real Time Warning Systems

Project Background, Summary, and Objectives:

Warning signs are used to provide drivers with a variety of messages. As defined in the Manual on Uniform Traffic Control Devices, warning signs call attention to unexpected conditions on or adjacent to a highway, street, or private roads open to public travel and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. These signs can be static (message always visible) or dynamic (message or an alert displayed only when needed).

As detection and dynamic sign technology becomes more available and affordable, providing dynamic warnings only when conditions exist is also becoming more feasible. This project will focus on identifying when static warning signs may be more effective as dynamic warning signs. For example, if a static warning sign message is "Ice" and this is always displayed to drivers, it is possible that the sign could be more effective if it only displayed the message or an alert when there was ice present.

Scope of Work with Task Descriptions:

Task 1: Gather Information on Static Warning Sign Practices

In Task 1 the Contractor will gather and summarize information about ENTERPRISE members' current practices with static warning signs. This will include at a minimum documenting the warning signs most commonly allowed, policy and engineering approach to selecting them, challenges (e.g. political, liability, public perception) encountered and perspective on common limitations of the signs. A reference table will be included in the summary of this information to highlight similar and unique practices among members.

Task 2: Review Research of Warning Sign Effectiveness

In this task the Contractor will review and summarize research focused on the effectiveness of both static and dynamic warning signs. Emphasis will be placed on research that specifically explores the impact of constant exposure to a warning sign when the corresponding condition is only occasionally present. The Contractor will also identify if additional research on the effectiveness of replacing static signs with dynamic warning signs may be needed.

Task3: Identify Candidates for Dynamic Warning Signs

Based on the information gathered in tasks 1 and 2, in Task 3 the Contractor will identify static warning signs that would be more effective as dynamic warning signs. The Contractor will develop and clearly document the process that will be used to select the candidate signs and the rationale behind their selection.

Task4: Identify Considerations for Dynamic Warning Signs

In Task 4 the Contractor will identify important details for an agency to consider when replacing static signs with dynamic warning signs. This will include at a minimum of providing details on installation and operating costs, maintenance impacts and policy implications.

Task 5: Summary Report

In Task 5 the Contractor will summarize the efforts of Task 1 – 4 in a summary report for review and approval by the ENTERPRISE Board.

Project Schedule at the Task Level:

This project would have a schedule of 9 months.

Task	Month								
	1	2	3	4	5	6	7	8	9
Task 1: Information Gathering of Static and Dynamic Warning Sign Uses									
Task 2: Review Research and Evaluations of Warning Signs									
Task 3: Identify Static Signs that would be most effective as Dynamic Warning Signs									
Task4: Identify Issues and Process with Replacing Static Signs with Dynamic Warning Signs									
Task 5: Summary Report									

Project Deliverables:

Task 1 Deliverable(s)

1.1 Summary of Static Warning Sign Practices among ENTERPRISE Members

Task 2 Deliverable(s):

2.1 Summary of Research on Static Warning Sign Effectiveness

Task 3 Deliverable(s):

3.1 Summary of Candidate Static Signs for Dynamic Warning Signs

Task 4 Deliverable(s):

4.1 Summary of Considerations for Dynamic Warning Signs

Task 5 Deliverable(s):

5.1 Draft and Final Summary Report

Project Cost Detailed at the Task Level:

Task	Estimated Cost
Task 1: Gather Information on Static Warning Sign Practices	$16,000
Task 2: Review Research of Warning Sign Effectiveness	$6,000
Task 3: Identify Candidates for Dynamic Warning Signs	$18,000
Task4: Identify Considerations for Dynamic Warning Signs	$12,000
Task 5: Summary Report	$6,000
Total Project Costs	**$58,000**

Relationship to Similar Activities and Projects If Known:

The work in this project is somewhat related to previous work that ENTERPRISE has completed in the area of Intersection Conflict Warning Systems. Connections and stakeholders engages through that previous work will be leveraged in this project, particularly those made with the National Committee on Uniform Traffic Control Devices.

Project Participants (Agencies): TBD

Project Contact: Jon Jackels, Minnesota DOT

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2013 Work Plan Project Proposal

2013 Project #5:
Traffic Safety and Traveler Information Mobile Apps

Project Background, Summary, and Objectives:

Independent of any State, Provincial, or local transportation agencies, there are a number of private sector companies developing transportation related software applications (Apps) for mobile devices. A quick search through available Apps reveals dozens of products available on the market. There are at least two 'categories' of Apps available, for which this project will focus:

Category #1: Apps related to safe driving and/or mobile device use while driving. Apps are available to perform such tasks as: disabling cell phones when phones are traveling greater than a selected speed, setting times or locations where cell phones are disabled (e.g. zones such as highways), and only enabling 911 calling from phones that are traveling.

Category #2: Apps that disseminate real-time traffic, roadwork, transit, or weather information to assist travelers (. New Apps are introduced daily, often times from developers with very little experience in the transportation industry, and therefore with little knowledge of the MUTCD, road signs, logos and icons. As a result, there are many inconsistencies with the icons used to display the information to users. Without any input, the number of different icons that are developed and used in Apps will continue to increase.

The objectives of this project are to:

- Research and document a 'current snapshot' of the safety and traveler information Apps available and the potential benefits they provide to users.
- Summarize the services offered by these Apps.
- Identify the role of DOTs with apps and app standards

Scope of Work with Task Descriptions:

Task 1: Review of Safety Apps and Traveler Information Apps

In Task 1 the Contractor will research and identify mobile apps that provide safety and traveler information to users (e.g. apps that can detect when a vehicle is moving, apps that provide construction alerts). The Contractor will develop a matrix of the apps that will include documenting details of the apps to educate ENTERPRISE members on apps. The matrix may include:

- Web link to location of App
- Overview of agreement signed when downloading the App
- Cost of App
- Safety benefit of App
- Icons and phrases displayed (e.g. construction, incident, weather)
- Guidelines/Specifications Used to Develop Apps

In order to provide a detailed matrix, the Contractor may be required to download and test the Apps as well as contact App developers if additional information is needed.

Task 1 Deliverable(s):

- Matrix of Safety and Traveler Information Apps

Task 2: Identify the role of DOT's with apps and apps standards

In Task 2 the Contractor will work with the ENTERPRISE states to document state DOTs that develop and create apps to learn the process, issues and lessons learned with app development. The Contractor will also document the reason why DOTs that do not develop apps. This task will also focus on learning if standards were following within their agency with creation of apps to help determine any consistency for future app standards or recommendations.

Task 2 Deliverable(s):

- Summary of DOT's role with app development and app standards

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Project Schedule at the Task Level:

This project would have a schedule of 6 months.

Task	Month					
	1	2	3	4	5	6
Task 1: Review of Safety Apps and Traveler Information Apps						
Task 2: Identify the role of DOT's with apps and app standards						

Project Deliverables:

Task 1 Deliverable(s):

- Matrix of Safety and Traveler Information Apps

Task 2 Deliverable(s):

- Summary of DOT's role with app development and standards

Project Cost Detailed at the Task Level:

Task	Estimated Cost
Task 1: Review of Safety Apps and Traveler Information Apps	$15,000
Task 2: **Identify the role of DOT's with apps and app standards**	$20,000
Total Project Costs	**$35,000**

Relationship to Similar Activities and Projects If Known:

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Project Participants (Agencies):

TBD

Project Contact:

Sinclair Stolle, Iowa DOT
Bob Koeberlein, Idaho Transportation Department

2013 Work Plan Project Proposal

2013 Project #6:
Wrong Way Vehicles on Freeways

Project Background, Summary, and Objectives:

Vehicles entering freeways and traveling in the wrong direction seems to be a growing problem nationwide. Typically 350 fatalities in the US each year are from wrong way vehicles on the freeways. Research has shown that three fourths of the wrong way drivers are intoxicated. The majority of the other wrong way drivers is reported to be either elderly or disoriented drivers.

There are numerous wrong way detection systems and initiatives throughout the United States. These initiatives are generally categorized into either ***preventive*** solutions or ***reactive*** solutions.

Preventative wrong way solutions in use or that are being tested include:

- Static 'Wrong Way' signs placed lower in the line of sight
- 'Cat's eyes' reflectors in the pavement (dark in the direction of travel, red to the wrong way traffic)
- Red reflective tape on the backside of highway signs

Reactive solutions that have been tried include:

- Wrong way detection (various sensors)
- Dynamic signs to alert drivers traveling the wrong way
- Red 'Airport like' pavement lights that illuminate when wrong way vehicles are detected
- Pavement spikes
- Horns attached to wrong way signs
- Warning signs to travelers in the proper direction (warning of possible collisions)

This ENTERPRISE project will create a matrix of wrong way systems being tested and developed by building off previous related projects and research. The matrix will include details of the wrong way system (e.g. location of wrong way system, type of system deployed, data being collected). The project

will also track research results of each deployment. By tracking the deployments, this project will seek to understand which approaches have the greatest impacts, which are socially acceptable, and which have institutional issues.

Scope of Work with Task Descriptions:

Task 1: Information Gathering of Wrong Way Systems

In Task 1 the Contractor will research current wrong way systems being deployed and related standards/guidelines. The Contractor will work with ENTERPRISE member states and non-ENTERPRISE member states to assemble as comprehensive a list of systems as possible. The information gathered will be compiled into a summary document/list, and all supporting documents and resources will be assembled for placement on the ENTERPRISE website. This listing of wrong way system information will serve as one location for members to gather information on options for wrong way systems.

Evaluations of systems deployed with be reviewed and documented. If possible, the Contractor will work with ENTERPRISE members to attempt to develop ITS Warrants for wrong way devices.

Task 1 Deliverable(s):

- Summary document of wrong way vehicle systems in place or in design.

Task 2: Develop a Matrix of Wrong Way System Types

In Task 2 the Contractor will build upon the information gathered in Task 1 and assemble a matrix of different approaches to wrong way systems. This comprehensive listing shall include at a minimum:

- Agency and individual contact for the system deployed
- Type of system (e.g. static, dynamic)
- Wrong way system details and design (e.g. placement of signs, sign message, horns, reflective tape)
- Any guidelines or standards used for the wrong way system
- Results of deployment (e.g. reduction in wrong way detection crashes)
- Feedback and/or reaction from the local population.

Whenever possible, approaches and design decisions of wrong way systems will be documented. For example, one challenge facing wrong way systems that detect wrong way vehicles and warn other drivers is the fact that these systems will be activated very infrequently. Therefore, a malfunction in any portion of the device may not be detected and could result in the system not activating when a wrong way vehicle does occur. This is one example of a design decision that is likely approached differently by each system, and will be documented.

Task 2 Deliverable(s):

- Matrix of Wrong Way System Deployments with details of each deployment

Task 3: Track Wrong Way System Deployments and Assemble Evaluation Results

In Task 3, the Contractor will continue to remain in contact with the key contacts at each of the wrong way detection deployments, continuing to gather and assemble any data or evaluation results the project collects. The goal is that this ENTERPRISE project can assist the industry by being a central repository, assembling all data available as the wrong way projects progress. Whenever possible, evaluation results and data will be compared or presented together with descriptions of the local geometry and social factors related to the deployment. The overall goal would be to help the industry understand which wrong way detection and/or alert approaches are most beneficial under which conditions.

Task 3 Deliverable(s):

- Summary of Information and data collected from each wrong way system featured in the matrix, together with local factors associated with the deployment.

Project Schedule at the Task Level:

This project would have a schedule of 2 years, with the majority of efforts in the first year. The second year will primarily be tracking and assembling information gathered from the deployment sites.

Task	Month											
	2	4	6	8	10	12	14	16	18	20	22	24
Task 1: Information Gathering of Wrong Way Systems												
Task 2: Develop a Matrix of Wrong Way System Types												
Task 3: Track Wrong Way System Deployments and Assemble Evaluation Results												

Project Deliverables:

Task 1 Deliverable(s):

- Summary document of wrong way vehicle systems in place or in design.

Task 2 Deliverable(s):

- Matrix of Wrong Way System Deployments with details of each deployment

Task 3 Deliverable(s):

- Summary of Information and data collected from each wrong way system featured in the matrix, together with local factors associated with the deployment.

Project Cost Detailed at the Task Level:

Task	Estimated Cost
Task 1: Information Gathering of Wrong Way Systems	$ 20,000
Task 2: Develop a Matrix of Wrong Way System Types	$ 20,000
Task 3: Track and Recommended Wrong Way System Types	$ 30,000
Total Project Costs	**$ 70,000**

Relationship to Similar Activities and Projects If Known:

The Texas Department of Transportation (DOT) sponsored a research project by the Texas Transportation Institute (TTI) that was completed in January 2004 to gather information on wrong-way driving countermeasures (e.g. traditional signing and pavement marking techniques, ITS applications) and document recommended guidelines for installing wrong way systems. Recently, in 2012, the Texas DOT as part of a test project to combat wrong-way driving is outfitting a 15-mile stretch of US 281 with a series of radar detectors and illuminated wrong-way signs. In 2011, this portion of US 281 had the highest number of reported wrong way driving incidents in the San Antonia area and most of the crashes involved intoxicated or thought to be intoxicated drivers.

Project Participants (Agencies):

TBD

Project Contact:

Bill Legg, WSDOT

2013 Work Plan Project Proposal

2013 Project #7:
Performance Measures and Reporting

Project Background, Summary, and Objectives:

The Federal Highway Administration (FHWA) highway authorization bill that was enacted in July 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21), has created a surface transportation program with additional emphasis on performance-based measures. MAP-21 calls for states to establish performance goals, and then to report to FHWA on progress towards meeting these performance measures.

ENTERPRISE member states are in a transition period, as they position themselves to work with broad, federally-established measures. Selecting the best measures, targets and data sources for performance management is challenging because of the amount, type and availability of data has grown considerably in the last decade. In recent ENTERPRISE meetings, members have identified concerns that performance measures may disregard regional factors and that a lack of comprehensive data may present challenges. This project is intended to be a support to ENTERPRISE member agencies that are either currently using or planning to use performance management.

The objectives of his project are to:

- Research and summarize the implications of the performance-based management (note MAP-21 is one aspect f performance management but others will be considered), and the member agencies' planned approach to address these;
- Research and summarize current practice among agencies that have established performance management efforts around traffic and corridor management, and the technologies used to gather and evaluate the data needed to assess performance;
- Document a series of case-studies where technologies are used to collect and analyze performance.

Scope of Work with Task Descriptions:

Task 1: Document Member States' Proposed Approaches to Performance Measurement

In Task 1 the Contractor will research and summarize the latest published materials on performance management, and then survey member states for specific questions they have regarding performance management. This ENTERPRISE project will attempt to establish a dialog with FHWA to discuss and understand answers to the states' questions about MAP-21. This task will then transition to a task that communicates with each member state to document their plans (or challenges in developing plans) for how performance measurement will be conducted.. The Contractor will contact the ENTERPRISE members to gather information on performance measures and management within in their state (both current and planned). As deemed appropriate by the ENTERPRISE Project Champion, other states will also be contacted to learn of performance measure practices within their state. The Contractor will develop an interview guide and/or survey to assist in gathering similar information from the states.

The key deliverable to Task 1 will be a comprehensive list of the performance measures by ENTERPRISE member agencies, including the specifics of the measures to be collected and evaluated.

Task 1 Deliverable(s):

- Summary of performance management information and performance measures used or planned to be used by ENTERPRISE member agencies

Task 2: Research Technology-Based Data Gathering Tools to Support Performance Measurement

In Task 2 the Contractor will work with list of performance measures developed in Task 1, and review, evaluate, assess, and prioritize technology-based tools for gathering data and evaluating performance. The goal with this task will be to help member agencies understand what technology tools are available to help them gather and analyze data associated with the performance goals that they have identified.

Task 2 Deliverable(s):

- Summary of technology-based tools for performance measurement

Task 3: Develop Performance Management Case Studies

There are a variety of needs for performance monitoring. In Task 3 the Contractor will develop case studies of different approaches with performance management that members have already developed. The case studies may include:

- Metro Area Case Study – where performance is measured for an entire metropolitan area (e.g. where performance commitments were made to local commuters and local freight delivery vehicles).

- Corridor Case Study – where performance is measured for a selected corridor (e.g. a key commercial vehicle corridor through a state, where the DOT has made a commitment to the freight industry to maintain travel speeds above a target threshold).
- Work Zone Case Study – where performance is measured for a limited period of time in a temporary work zone (e.g. during a summer tourist season where performance commitments were made to local commerce not to delay tourists in the area).

The case studies would document the approach, successes, challenges and issues with performance monitoring including a brief summary of how the performance management is used overall within their state. Whenever possible, the technologies identified in Task 2 will be the focus of the Case Studies in this task.

Task 3 Deliverable(s):

- 3 to 4 performance management case studies

Project Schedule at the Task Level:

This project would have a duration of twelve months.

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Document Member States' Proposed Approaches to Performance Measurement												
2. Research Technology-Based Data Gathering Tools to Support Performance Measurement												
3. Develop Performance Management Case Studies												

Project Deliverables:

Task 1 Deliverable(s):

- Summary of MAP-21 performance management information and performance measures used or planned to be used by ENTERPRISE member agencies

Task 2 Deliverable(s):

- Summary of technology-based tools for performance measurement

Task 3 Deliverable(s):

- 3 to 4 performance management case studies

Project Cost Detailed at the Task Level:

Task	Estimated Cost
1. Document Member States' Proposed Approaches to Performance Measurement in MAP-21	$20,000
2. Research Technology-Based Data Gathering Tools to Support Performance Measurement	$10,000
3. Develop Performance Management Case Studies	$20,000
Total Project Costs	**$50,000**

Relationship to Similar Activities and Projects If Known:

Caltrans developed a Performance Measurement System (PeMS) that displays individual detector data on over 25,000 sensors across all major metropolitan areas in California.
http://pems.dot.ca.gov/

Michigan is working a project to furnish a web-based Transportation Performance Measure Reporting and Analysis System (TPMRAS) that will integrate MDOT traffic, incident, construction, weather data and other traffic information.

Washington State has an extensive performance reporting (http://www.wsdot.wa.gov/accountability/) and Washington State's website includes a library of performance measurements used in different states: http://www.wsdot.wa.gov/Accountability/Publications/Library.htm

Project Participants (Agencies):

TBD

Project Contact:

Angie Kremer, Michigan DOT

2013 Work Plan Project Proposal

2013 Project #8:
The Future of DMS

Project Background, Summary, and Objectives:

Departments of Transportation (DOTs) at the State, Provincial, and local levels receive many requests to display messages on Dynamic Message Sign (DMS) (e.g. advertising, safety messages, wayfinding to special events). DOTs must decide how to respond to these requests. In addition to local policies and preferences about the use of DMS, there are also laws and design standards to consider with deciding which requests are options to consider. The Highway Beautification Act (HBA) enacted in 1965 established requirements and guidelines for advertising and signage along the Interstate and Federal Aid Primary Highway systems. The HBA has been amended and updated many times, and in 2007 FHWA released the report "Guidance on Off-Premise Changeable Message Signs" addressing the duration of messages, transition times, brightness, spacing, and locations. The topic of non-DOT content (e.g. public service announcements, sponsorship, etc.) is not specifically addressed in this report.

Beyond the policy and legal discussion, there are technical issues with deploying certain types of messages. For example, sponsorship or wayfinding uses of DMS may demand flashing text, scrolling text, graphics, color, etc. Each of these poses both technical challenges for the signs, but also distraction and human factors related issues.

This project recognizes several key factors:

- That technologies for DMS are improving and the costs of DMS are decreasing;
- That requests for alternate messages are increasing as are the requests for different display formats and features (e.g. flashing, scrolling, color, graphics, etc);
- That DOTS have expanded uses for DMS with new and innovative traffic control strategies;
- That various message formats may be limited by the DMS type deployed.

The objectives of this project are as follows:

Objective #1: To research and document the requests by DOT's of messages to post on signs and the foreseeable "demands" of DMS signs (both content to be displayed and features and functionality of the signs) in the coming 10-20 years, recognizing that requests are likely to increasingly come from private and public agencies.

Objective #2: To document the federal rules of messages posted to DMS.

Objective #3: To identify higher level DMS specifications necessary to support future message requests.

Scope of Work with Task Descriptions:

Task 1: Research Current and Future DMS Uses

In Task 1 the Contractor will interview and or/survey state, provincial, and local DOTs to gain input on the following:

- Current DMS requests (type of request, features of the sign that are required to meet the request, agency requesting messages, etc.)
- Future anticipated requests (based on current trends)
- Processes used currently for accepting or rejecting a DMS request
- Processes for which signs display a DMS request
- DOT policies on DMS Use
- DOT performance measures on DMS messages

The Contractor will also research other related studies and documentation on DMS requests and policies. For example, many states have DMS guidelines and/or DOT operational concepts that are followed. These will be summarized as part of the project.

Task 1 Deliverable(s):

- Summary of Anticipated "demands" on DMS in coming years
- Summary of current approaches, guidelines of member states.

Task 2: Research the Legal, Design, Policy, and Technical Appropriateness of DMS Demands

In Task 2, the Contractor will research each of the identified "demands" expected to be placed on DMS against legal, design, policy, and technical aspects. This research will include design manuals, legal documents, policy statements, and personal discussions with DOT representatives and federal rules of messages posted to DMS. As a few examples:

- Requests may require scrolling text, flashing text, graphics, or color; any of which the DOT may decide against displaying on signs;
- Requests for new uses of signs (and funding for the requests) may add considerable maintenance and operations costs;

- Requests for new uses of signs may violate design standards

Task 2 Deliverable(s):

- A matrix identifying each DMS demand against any issues related to legal, design, policy, maintenance, and technical aspects;
- A matrix identifying technical specifications required for DMS to support the various message requests;
- A detailed report describing the findings of the research and detailing any anticipated barriers to the demands expected for DMS.

Project Schedule at the Task Level:

This project would have a schedule of 9 months.

Task	Month								
	1	2	3	4	5	6	7	8	9
Task 1: Research Current and Future DMS Uses									
Task 2: Research the Legal, Design, Policy, and Technical Appropriateness of Anticipated DMS Demands									

Project Deliverables:

Task 1 Deliverable(s):

- Summary of Anticipated “demands” on DMS in coming years
- Summary of current approaches, guidelines of member states.

Task 2 Deliverable(s):

- A matrix identifying each DMS demand against any issues related to legal, design, policy, maintenance, and technical aspects;
- A matrix identifying technical specifications required for DMS to support the various message requests;
- A detailed report describing the findings of the research and detailing any anticipated barriers to the demands expected for DMS.

Project Cost Detailed at the Task Level:

Task	Estimated Cost
Task 1: Research Current and Future DMS Uses	$20,000
Task 2: Research the Legal, Design, Policy, and Technical Appropriateness of Anticipated DMS Demands	$20,000
Total Project Costs	**$40,000**

Relationship to Similar Activities and Projects If Known:

-

Project Participants (Agencies):

TBD

Project Contact:

Mark Johnson, Texas DOT