ENTERPRISE Transportation Pooled Fund Study TPF-5 (231)

ENTER❋PRISE

FY 2014 Work Plan

FINAL

Prepared by

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CONSULTANTS

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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 numerous 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 2014 (October 1, 2013 through September 30, 2014), 13 member agencies are anticipated to contribute financially to the projects included in this work plan.

Projects

During 2013 member agencies submitted project ideas for this FY 2014 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 August 2013 Executive Board meetings as projects for the FY 2014 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 2014 Work Plan Funding Plan

Expense	Estimated Costs
2014 Projects	
Project 1: It Warrants Review Support	$30,000
Project 2: Demonstrate and Evaluate Communications to Support Rural ITS	$75,000
Project 3: Investigating Distribution Mechanisms for ENTERPRISE Technical Products	$10,000
Project 4: ITS Resources and Decision Tree for Planners	$82,000*
Project 5: Maintenance of ITS Devices in Rural Areas	$80,000
Project 6: Intelligent Work Zones – Phase 2	$50,000**
Program Administration Support	$60,000
Member Travel Support (two in person meetings)	$43,000
Revenue	**Estimated Revenue**
Carryover from previous work plans	$15,000
Project Specific Contributions from Members - MTO contribution to Project 4	$20,000
Member Annual Contributions 10 members x $30,000 - Georgia DOT, Illinois DOT, Idaho Transportation Department, Iowa DOT, Kansas DOT, Minnesota DOT, Oklahoma DOT, Pennsylvania DOT, Texas DOT, Washington State DOT) 2　members　x $35,000 - Michigan DOT and Ontario MTO 1 member x $25,000 - Dutch Ministry of Transport (NOTE: Travel expenses not paid by ENTERPRISE)	$395,000
Total (Revenue vs. Expenses)	**$430,000　$430,000**

The total project budget for Project 4 is $82,000 (ENTERPRISE contribution is $62,000, MTO contribution is $20,000). Project 4 to be combined with 2013 Work Plan Project #2: ITS Operational Plans.

**The original scope for Project 6 was reduced from $70,000 to $50,000. The first task for this project is to define the project focus which will take into account the available budget.

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.

ENTERPRISE

2014 Project #1
ITS Warrants Review Support

Project Background, Summary, and Objectives:

ENTERPRISE developed, in two previous ITS Warrant phases (ITS Warrants – Phase 1 and Phase 2), initial warrants for nine Intelligent Transportation System (ITS) devices (Closed Circuit Television, Curve Warning Systems, Dynamic Message Signs, Dynamic Speed Display Signs, Highway Advisory Radio, Ramp Meters, Road Weather Information Systems, Variable Speed Limits, and ITS Devices in Work Zones).

Ideally, the ENTERPRISE Program envisioned that a National or International agency would embrace the concept of technology device warrants and carry the concept forward in order to support traffic engineers for years to come. In order to move towards this vision, ENTEPRISE approved and completed another ITS warrant project "Supporting the Transition of ENTERPRISE ITS Warrants to a Permanent Home" in 2012. The objective of this project was to document activities ENTERPRISE had conducted as owner and maintainer of the warrants to assist in identifying potential organizations for transitioning the warrants to a new owner. However after the ENTERPRISE Board reviewed options for one organization to maintain the warrants, it was determined that ENTERPRISE should continue to own and maintain the warrants and partner with organizations to review the warrants. This approach was based on the understanding that it would be easier to find agencies willing to review and comment on one or more warrants periodically than it will be to find an organization willing to accept the entire workload of all the warrants. Given this outcome, ENTERPRISE developed a warrants review process to assist with review and modifications of the warrants. . It is anticipated that as organizations are involved with the review process, that the ownership of the ITS Warrants may in the future be transitioned to a national organization.

After development of the ITS Warrants Review Process, potential organizations were identified to review the warrants, and ENTERPRISE contacted the AASHTO Subcommittee on Traffic Engineering (SCOTE) to request review of the ITS warrants. SCOTE discussed the request during their June 2013 meeting and approved a task force and a resolution to participate in the review of the warrants.

The objective of this project "ITS Warrants Support" is to continue to coordinate with the SCOTE ITS Warrants Review Task Force and other review committees for periodic review of the ITS Warrants. The project will also continue to maintain the ITS Warrants documentation, develop additional warrants for ITS devices and conduct outreach to promote use of the warrants.

Scope of Work with Task Descriptions:

Task 1: Coordinate ITS Warrants Review Process
Task 1 will support the SCOTE ITS Warrants Task Force and other selected review committees in review of the ITS warrants. This may include coordinating meetings, providing additional information and details of warrant documentation, and serving as the point of contact for ENTERPRISE. Based on comments and input from SCOTE it may be necessary to re-scope some or all of the remaining tasks of this project. Work under this task will include developing and coordinating any potential scope changes with the ENTERPRISE Board.

Task 2: Maintain ITS Warrants Documentation
It is anticipated that working with SCOTE in Task 1will identify some modifications and improvements to the existing warrants. Under Task 2 such changes will be documented and presented to the ENTERPRISE Board for action. Since the scope of such changes are not known at this time funding for implementing the changes may not be covered in the project budget and will need to be determined if and when the need to make the changes is approved by the ENTERPRISE Board. Task 2 will focus on maintaining and updating all ITS Warrant documentation based on budget and approval by the ENTERPRSE Board to track modifications made during Task 1. Documentation includes:

- **ITS Warrants Manual**
  The ITS Warrants Manual is Microsoft Word document that contains textual descriptions of the warrants for each of the ITS devices in one document. All assumptions, calculations, and sources used to determine the thresholds in the warrants are cited in this document. Task 2 activities will update the manual as modifications are made to the warrants and as additional devices are added.
- **ITS Warrants Website**
  The ITS Warrants Website matches the information provided in the ITS Warrants Manual. Task 2 activities will update and modify the website content as modifications are made to the warrants and as additional devices are added.
- **ITS Warrants Review Process**
  A warrants review process was developed during ENTERPRISE Project "Supporting the Transition of ENTERPRISE ITS Warrants to a Permanent Home" in 2012. Task 2 activities will review the warrants process summary and as necessary recommend changes and update the documented process.

Task 3: ITS Warrants Outreach
Task 3 will identify opportunities at conferences and meetings to present the ENTERPRISE ITS Warrants as they are modified in Task 1. Activities in Task 3 will develop all materials for the selected presentation events (e.g. Power Point presentation, project summary handout). This task will also identify opportunities to develop and submit news articles to transportation related publications.

Task 4: Develop Additional Warrants for ITS devices
Task 4 will develop one (1) additional device warrant. Project Champion and ENTERPRISE Board will select an ITS device for warrant development. If necessary, a project team will be established for detailed review of the warrant. Efforts in Task 4 will develop a draft warrant, coordinate review of the warrant, and finalize the warrant text. The warrant development process will follow the process used in the previous phases of this project (ITS Warrants – Phase 1 and Phase 2).

Project Schedule at the Task Level:

It is anticipated that it will take 12 months to complete this project.

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Coordinate ITS Warrants Review Process	██											
Task 2: Maintain ITS Warrants Documentation	██											
Task 3: ITS Warrants Outreach	██											
Task 4: Develop Additional Warrants for ITS devices	████████████████████											

Project Deliverables:

Deliverable 1 – Updated Warrants Documentation
Deliverable 2 –Outreach Materials
Deliverable 3 – ITS Device Warrant

Project Cost:

Deliverables	Cost
Task 1: Coordinate ITS Warrants Review Process	$5,000
Task 2: Maintain ITS Warrants Documentation	$5,000*
Task 3: ITS Warrants Outreach	$5,000
Task 4: Develop Additional Warrants for ITS devices	$15,000
Total Cost	**$30,000**

Estimated cost. Final cost to be determined once feedback is received from the ITS Warrants review by AASHTO SCOTE.

Relationship to Similar Activities and Projects If Known:

- ITS Warrants – Phase 1 and Phase 2
- Supporting the Transition of ENTERPRISE ITS Warrants to a Permanent Home

Project Participants (Agencies): TBD

Project Champion: Bill Legg, Washington State DOT

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2014 Project #2
Demonstrate and Evaluate Communication to Support Rural ITS

Project Background, Summary, and Objectives:

Wireless communication has changed dramatically since the late 1800s when the first wireless communication began via the photophone and radio transmissions. According to the International Telecommunication Union statistics on mobile cellular subscriptions, there were over 900,000 subscribers worldwide in 2000 and that number grew to over 6 billion at the end of 2012. Significant progress has been made over the past decade in improving the breadth and quality of cellular coverage yet challenges still remain with using such communication in rural areas to support ITS devices. Satellite service can be an alternative with greater potential coverage but also greater cost than cellular communication. Radio communication is yet another alternative but with limitations such as line of sight.

In addition to not having a clear understanding of which communication to use with ITS devices in rural areas, ENTERPRISE members expressed concerns about high costs and low reliability. These issues can be even more challenging during disaster situations when information needs to be exchanged across rural areas and traditional networks may be unavailable.

The purpose of this project is to document communication alternatives and available resources for selecting communication for ITS devices in rural areas, and to demonstrate and evaluate alternate rural communication technologies in disaster situations (e.g. cell tower disruption) to assess their reliability, functionality and costs. The demonstration may include a test of satellite communication with dynamic message signs in Kansas.

Scope of Work with Task Descriptions:

Task 1: Conduct Literature Search
 To initiate the project, a literature search will be conducted to identify:

1. What guidance or resources may currently exist to support transportation agencies in their selection of wireless communication for ITS devices, particularly in rural areas;
2. What the potential costs may be for various types of wireless communication in typical rural environments for common ITS devices (e.g. dynamic messages signs, cameras); and,
3. What rural communication technologies and vendors are available to provide services for rural ITS devices, particularly during disaster situations, and the demonstration envisioned for this project.

A summary report of the literature review will be prepared and presented to ENTERPRISE members. It will help them understand what communication alternatives and resources are available to support their

selection of communication for ITS devices in rural areas. The summary will also highlight communication technologies available for use in rural areas, as well as a reference to their potential use in disaster situations.

Task 2: Identify Communication Vendors for Demonstration
Using the information gathered in Task 1, Task 2 will kick off with a discussion among ENTERPRISE members on a monthly call regarding whether a demonstration and evaluation of one or more technologies identified in Task 1 is needed. If a demonstration is selected, a communications vendor will be selected (with approval from the ENTERPRISE members) to conduct a brief demonstration of how their technology performs in disaster situations.

Task 3: Conduct Demonstration
The selected communications vendor will install their equipment at 1-2 rural sites designated by an ENTERPRISE member agency. The agency will identify the ITS device(s) and the rural site(s) based on their view of which would be most critical during a disaster situation. The agency will also pre-approve and oversee the temporary installation of the vendor's communication equipment. The demonstration will consist of several simulated disaster scenarios that will be used to demonstrate how the communication technology could function as an alternate form of communication during a disaster. For example, a dynamic message sign that routinely uses cellular communication may be selected for installation of satellite communication equipment that could be used as an alternate during a disaster when cellular communication becomes overburdened or completely unavailable. Agency assistance will be needed to temporarily disable primary communication to the ITS device during the evaluation scenarios. During these scenarios, the support consultant will observe and gather information regarding performance of the vendor's communication equipment.

Task 4: Evaluate Demonstration
An evaluation plan will be developed and will consist of several test case scenarios that will demonstrate performance of the vendor communication equipment under normal conditions and then under various disaster-oriented situations. These test case scenarios will be used to evaluate how alternate forms of communication can be used in situations when traditional communication to a rural ITS device may become unavailable.

Project Schedule at the Task Level:

The duration of this project is estimated at 12 months.

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Conduct Literature Search	▬	▬	▬									
Task 2: Identify Communication Vendors for Demo				▬	▬	▬						
Task 3: Conduct Demonstration							▬	▬	▬			
Task 4: Evaluate Demonstration										▬	▬	▬

Project Deliverables:

Deliverable 1 – Summary of Literature Review
Deliverable 2 – Demonstration Equipment and Demonstration
Deliverable 3 – Evaluation Plan
Deliverable 4 – Final Evaluation Report

Project Cost:

Deliverables	Cost
Deliverable 1 – Summary of Literature Review	$10,000
Deliverable 2 – Demonstration Equipment and Demonstration	$40,000
Deliverable 3 – Evaluation Plan	$10,000
Deliverable 4 – Final Evaluation Report	$15,000
Total Cost	**$75,000**

Relationship to Similar Activities and Projects If Known:

- AASHTO Special Committee on Wireless Technology
- AASHTO Radio Frequency Coordination: AASHTO is designated by the Federal Communications Commission (FCC) as the National Frequency Coordinator for the Highway Maintenance frequencies in the Public Safety Radio Service. There is a designated local coordinator for highway maintenance frequencies in each of the 52 AASHTO member departments who possesses technical knowledge and is familiar with local terrain and radio propagational characteristics necessary for proper coordination of the frequencies.

Project Participants (Agencies):

Jon Jackels, MnDOT
Leslie Fowler, KDOT
Bob Koeberlein, ITD

Project Champion:

Bob Koeberlein, ITD

2014 Project #3
Investigating Distribution Mechanisms for ENTERPRISE Technical

Project Background, Summary, and Objectives:

Outreach and communications efforts that are designed to disseminate new information and exchange experiences are critical to advancing the state of practice in transportation. The ENTERPRISE pooled fund program, with the collective experience of its agency members and the wealth of information produced by its project findings, is a key source of expertise for the development, application, and deployment of ITS.

It is possible that ENTERPRISE project results may not reach individuals who could benefit from the findings. This project explores the potential for ENTERPRISE project results to be disseminated more broadly (e.g. targeted email lists, catalogued in transportation libraries and databases so they are more easily accessed via search engines). These steps will attempt to reach a wider audience, increase the impact of ENTERPRISE's work, more effectively contribute to the state of practice in ITS, help reduce duplication of effort on ITS-related investigations/research, and increase the likelihood that products and findings will be utilized by the transportation community.

The objectives of this project are as follows:

- Objective #1: To investigate mechanisms (e.g. libraries and databases) for distribution of ENTERPRISE Final Reports, exploring requirements, procedures, and related costs that would be involved if the wider distribution mechanisms were selected.

- Objective #2: To facilitate discussions among ENTERPRISE Board members to discuss the dissemination mechanisms and debate the benefits vs. costs and ultimately to determine if any additional distribution should be pursued.

Scope of Work with Task Descriptions:

Task 1: Investigate Distribution Options for Final Reports
During this task, mechanisms for distribution of ENTERPRISE Final Reports (e.g. libraries and databases) will be investigated. First, a distribution list of potential repositories/recipients will prepared. This list may include national libraries and databases such as the National Transportation Library (NTL), the FHWA Research Library, and the TRB Transport Research International Documentation (TRID) database. The libraries of ENTERPRISE state agencies may also be potential recipients.

Second, requirements such as document format (e.g. electronic and/or hard copy, standards, etc.) of

each repository will be investigated and documented. This investigation will result in a summary that will include potential repositories, requirements, and estimated costs associated with preparing reports and distributing them to recipients.

The final activity of Task 1 will be a series of facilitated calls with ENTERPRISE members to discuss and debate the benefits of investing the resources required to circulate ENTERPRISE documents through the channels identified in this project. Note that it is possible that some dissemination mechanisms will require little to no effort. However, other dissemination mechanisms might require document modification or alternative version deployment, and this is where the possible costs may be identified.

Project Schedule at the Task Level:

It is anticipated that it will take three (3) months to complete this project.

Task	Month		
	1	2	3
Task 1: Investigate Distribution Options for Final Reports	▬▬▬		

Project Deliverables:

Deliverable 1 – Summary of Report Distribution Options

Project Cost:

Deliverables	Cost
Task 1 - Summary of Report Distribution Options	$10,000
Total Cost	**$10,000**

Relationship to Similar Activities and Projects If Known:

None known.

Project Participants (Agencies):

All ENTERPRISE member agencies

Project Champion(s):

Bill Legg, Washington State DOT
Jon Jackels, Minnesota DOT

2014 Project #4
ITS Resources and Decision Tree for Planners

NOTE: 2014 Project #4 to be combined with 2013 Project #2 ITS Operational Plans because similar resources and staff will be contacted for information for the projects. One common working group of planning and operations staff from ENTERPRISE member agencies will be established.

Project Background, Summary, and Objectives:

As ITS continues to expand and become mainstream, planning for deployment and operations of ITS systems is becoming increasingly critical. For many years, USDOT has required state transportation agencies to develop and maintain an ITS architecture. There are elements of the ITS architectures that correlate with traditional planning practices. However, there is sometimes limited coordination among the ITS staff responsible for the architecture and planners working on future transportation projects.

ENTERPRISE members have noted that planners may not have adequate tools to assist their decision making regarding when it may or may not be appropriate to use ITS alternatives to address transportation challenges. For example, a planner in a regional office may be reviewing a growing congestion issue on the state network and may lean toward a traditional roadway expansion options instead of the management and operations strategies that can be applied using ITS. As such, the purpose of this project is to more clearly identify the needs and information gaps of transportation planners' understanding of ITS alternatives. Based on planner feedback, the project will also develop a decision tree for planners to assist them in investigating the use of ITS to solve transportation issues.

Scope of Work with Task Descriptions:

Task 1: Catalog Existing ITS Planning Processes and Tools
Research will be conducted to catalog the process and tools currently available to planners to support their consideration of ITS alternatives. The National ITS Architecture, USDOT's Planning for Operations, AASHTO Subcommittee on System Operations and Management, and ITS Joint Program Office will be the initial focal points of this research. Emphasis will be placed on locating tools and processes that help planners determine when ITS strategies may be warranted, what the potential costs and benefits of an ITS deployment may generate, and how ITS strategies may factor into future infrastructure changes. This information will then be cataloged in a brief fashion to share as a quick reference with planners from the ENTERPRISE member agencies.

Task 2: Identify Transportation Planner Needs and Information Gaps
In this task, planners from the ENTERPRISE member states will be contacted to discuss how they currently consider ITS alternatives. In particular, planners will be asked if and how they use their state or

regional ITS architecture. They will also be asked if they are aware of or using the tools cataloged in task 1. There will also be discussion about how planners (in conjunction with other transportation agency staff) determine when ITS is warranted, what the costs and benefits are likely to be, and what the long-term maintenance and operational costs may be. The intent of this task is to understand how planners in the ENTERPRISE states view ITS as a transportation alternative and to understand what limitations they may have in doing so.

Task 3: Develop an ITS Decision Tree (Optional)
Based on the information cataloged in task 1 and responses from the planners interviewed in task 2, the project champion will decide at this point if a decision tree is needed and what the tool would consist of. For example, if the research in tasks 1 and 2 show there isn't adequate resources to help planners identify and evaluate ITS strategies, a decision tree could be developed in this task to help planners bridge that gap.

Task 4: Conduct Planner Outreach on ITS Decision Tree
This task will focus on sharing information with transportation agency planners, primarily within the ENTERPRISE member states, but outreach could extend to a broader planner audience if the opportunity arises. The nature of information shared during this outreach will be varying based on the decision to complete task 3 or not. If task 3 is completed, the outreach will focus on sharing information about the decision tree as a supplement to the existing tools available for incorporating ITS into planning. If task 3 is NOT completed, the outreach will still proceed but it will focus on sharing information about the existing planning tools cataloged during the project. Outreach will primarily consist of 2-3 webinars featuring the planning information.

Project Schedule at the Task Level:

It is anticipated that it will take nine (9) months to complete this project.

Task	Month								
	1	2	3	4	5	6	7	8	9
Task 1: Catalog Existing ITS Planning Processes and Tools	████								
Task 2: Identify Transportation Planner Needs and Information Gaps			████						
Task 3: Develop an ITS Decision Tree (Optional)					████				
Task 4: Conduct Planner Outreach on ITS Decision Tree							████		

Project Deliverables:
Task 1: Summary document of existing ITS planning processes and tools
Task 2: Summary of planner interview responses and recommendation for task 3
Task 3 (Optional): ITS decision tree for planners
Task 4: Outreach presentation, webinar announcements, 2-3 webinars

Project Cost:

Deliverables	Cost
Task 1: Catalog Existing ITS Planning Processes and Tools	$15,000
Task 2: Identify Transportation Planner Needs and Information Gaps	$15,000
Task 3: Develop an ITS Decision Tree (Optional)	$26,000
Task 4: Conduct Planner Outreach on ITS Decision Tree	$26,000
Total Cost	**$82,000**

Relationship to Similar Activities and Projects If Known:

- National ITS Architecture, Architecture Use for Planning. Most states and metropolitan areas have developed a regional ITS architecture based on the National ITS Architecture that represents the future integrated surface transportation system for a region. Using the ITS architecture, a region can plan for technology application and integration to support more effective planning for operations. The ITS architecture provides context for ITS projects so that each project can build a piece of the envisioned transportation system. By using the architecture as a planning tool, the steps taken by each project will be on the path to fulfilling larger objectives set forth in long range transportation plans.

- Planning for Operations (plan4operations.dot.gov) seeks to integrate operations into the metropolitan and statewide transportation planning processes. The Planning for Operations web site includes a wealth of resources including three primary sources:
    - The Building Blocks of a Model Transportation Plan Incorporating Operations - A Desk Reference
    - An Objectives-Driven, Performance-Based Approach — A Guidebook
    - Applying a Regional ITS Architecture to Support Planning for Operations: A Primer

Project Participants (Agencies):

TBD

Project Champion:

Rashmi Brewer, MnDOT

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2014 Project #5
Maintenance of ITS Devices in Rural Areas

Project Background, Summary, and Objectives:

Maintenance of ITS devices (e.g. weather stations, curve warnings, dynamic message signs, sensors, etc.) located in rural areas can be challenging and costly for transportation agencies, due to several factors, such as lack of timely knowledge that a device has malfunctioned and service is required, the need for specialized expertise to perform routine maintenance and repairs, and potentially long distances between maintenance facilities and device locations.

The objective of this project is to identify and document best practices for maintenance of ITS devices in rural areas. Best practices may include methods, procedures, and practices for:

- Prevention of outages (e.g. routine maintenance, grounding strategies, enclosures, etc.)
- Monitoring devices and detecting service needs (e.g. automatic alerts when a device is not functioning)
- Effective methods and practices for maintenance of various devices
- Innovative contracting (e.g. warranties, outsourcing services, clustering maintenance contracts by specialty services performed, etc.)
- Clustering ITS device maintenance function within an agency, across districts, and/or across agencies
- Specialized training for agency staff

The project will gather input, document case studies, and identify best practices for maintenance of ITS devices in rural areas that have proven to be effective within transportation agencies. In addition, the project will work with an ENTERPRISE agency or agencies to prepare documentation of best practices that can be incorporated into agencies' specific ITS guidance documents (e.g. design guidelines, maintenance manuals, or other documentation formats.)

Scope of Work with Task Descriptions:

Task 1: Gather Input from Transportation Agencies
Task 1 research activities will gather input from State DOTs and other transportation agencies (such as Canadian Ministries of Transport), through literature reviews, email, phone conversations, or possibly a web survey, to collect information about best practices for maintenance of ITS devices in rural areas. Best practices may include methods, procedures, or practices for any of the following: prevention of outages; monitoring devices and detecting service needs; innovative contracting, clustering the ITS device maintenance function within an agency, across districts, and/or across agencies; specialized

training for maintenance staff; or other relevant practices. Task 1 will determine information needs (e.g. survey/interview questions, etc.) prior to gathering input. Information provided by transportation agencies will be collected and summarized.

Task 2: Document Case Studies and Identify Best Practices
After the input collected in Task 1 is summarized, a webinar meeting will be held with the Project Champion and other interested ENTERPRISE members to review the input received in Task 1 and select 3-5 case studies for further review and summary. Case studies will be selected based upon factors such as level of effectiveness as reported by the responding agency, applicability for implementation by other agencies, and innovativeness of approaches. For each case study, the interviews will be conducted with agency staff, as needed, to collect and clarify information. Case studies will summarize each practice, aspects of effectiveness, issues and challenges encountered, and lessons learned. Using the information collected, best practices for maintenance of ITS devices in rural areas will be identified.

Task 3: Prepare Best Practices for Inclusion in Agency Guidance Documents
Task 3 activities will prepare a documentation of best practices in a format (or formats) that can be incorporated into specific agencies' ITS guidance documents (e.g. design guidelines, maintenance manuals, or other documentation formats.) Task 3 will prepare sections that describe best practices for maintenance of ITS devices in rural areas. A final report documenting the project approach and findings will be prepared.

Project Schedule at the Task Level:

It is anticipated that the project will be completed 12 months.

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Gather Input from Transportation Agencies	▬	▬	▬	▬	▬	▬						
Task 2: Document Case Studies and Identify Best Practices							▬	▬	▬			
Task 3: Prepare Best Practices for Inclusion in Agency Guidance Documents										▬	▬	▬

Project Deliverables:

Deliverable 1 – Summary of input received in Task 1
Deliverable 2 – Best Practices documentation, for inclusion in selected agencies' guidance documents
Deliverable 3 – Final Report

Relationship to Similar Activities and Projects If Known: None known.

Project Participants (Agencies): Lee Nederveld, Michigan DOT

Project Champion: Leslie Fowler, Kansas DOT

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2014 Project #6
Intelligent Work Zones – Phase 2

Project Background, Summary, and Objectives:

ENTERPRISE in 2012 approved a project "Intelligent Work Zones Synthesis of Best Practices" to document the best practices and lessons learned regarding Intelligent Work Zone (IWZ) technologies as well as track deployments in 2013. While there is a wide range of technologies and strategies for ITS in work zones, ENTERPRISE focused its efforts in this project on the following:

- Dynamic merge (e.g. late and early merge messages);
- End of queue warning systems;
- Information describing conditions on alternate routes through work zones; and
- Variable speed limits within work zones.

The ENTERPRISE members recognize that there has been considerable research and documentations of IWZ. The overall objective of this project is to, based on the results of the initial project, continue to track IWZ efforts during the 2014 construction season for the four IWZ applications described above and document the best practices and lessons learned of additional IWZ technologies or approaches (e.g. construction vehicle warnings, temporary ramp metering).

Scope of Work with Task Descriptions:

Task 1: Project Focus
Research in Task 1 will identify the focus of the project. ENTERPRISE members will review the results of the first phase of the project "Intelligent Work Zones Synthesis of Best Practices" to determine if tracking 2014 IWZ deployments of the four technologies (dynamic merge, queue warning, alternate routes, variable speed limits) is needed. ENTERPRISE members will also identify additional IWZ applications to document best practices and lessons learned. Efforts in Task 1 will also review FHWA IWZ efforts (e.g. May 21 and 22, 2013 Work Zone ITS Peer Exchange).

Task 2: Document IWZ Approaches
Task 2 will follow the format developed in the first phase of this project "Intelligent Work Zones Synthesis of Best Practices" to document the uses, configurations and lessons learned for selected IWZ deployments identified in Task 1.   Activities in Task 2 will a literature search of related documented IWZ applications and work the ENTERPRISE members to identify active deployments to track during the 2014 construction season. Final reports and applicable information will be categorized by IWZ deployment and linked on the project website (similar to Phase 1) to provide members with one location for related

projects. Information collected in Task 2 may include, but not limited to: project goals, location, technologies used, thresholds, sign messages, sign configurations, configuration changes, evaluation, and observed results.

Task 3: Syntheses of Best Practices

Task 3 will follow the format developed in the first phase of this project "Intelligent Work Zones Synthesis of Best Practices" to summarize the information gathered in Task 2. Task 3 will develop a draft report for review and input and then based on comments complete a final synthesis of best practices.

Task 4: Prepare Best Practices for Inclusion in Agency Guidance Documents

Task 4 efforts will work with an ENTERPRISE agency or agencies to prepare the document created in Task 3 in a format (or formats) that can be incorporated into specific agencies' IWZ guidance documents (e.g. design guidelines, IWZ manuals, or other documentation formats.) Task 4 efforts will prepare applicable sections that describe best practices for IWZ applications.

Project Schedule at the Task Level:

It is anticipated that it will take 12 months to complete this project.

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Project Focus	▬											
Task 2: Document IWZ Approaches	▬▬▬▬▬▬▬											
Task 3: Synthesis of Best Practices							▬▬▬▬▬					
Task 4: Best Practices for Inclusion in Agency Guidance Documents										▬▬▬▬		

Project Deliverables:

Deliverable 1 – Technical Memorandum Describing Project Focus

Deliverable 2 – Summary of IWZ Approaches

Deliverable 3 – Syntheses of Best Practices Report

Deliverable 4 – Best Practices Documentation for Inclusion in selected agencies' guidance documents

Project Cost:

Deliverables	Cost
Deliverable 1: Technical Memorandum Describing Project Focus	$5,000
Deliverable 2: Summary of IWZ Approaches	$25,000
Deliverable 3: Synthesis of Best Practices Report	$10,000
Deliverable 4: Best Practices Documentation for Inclusion in Selected Agencies' Guidance Documents	$10,000
Total Cost	**$50,000***

***The original scope for Project 6 was reduced from $70,000 to $50,000. The first task for this project is to define the project focus which will take into account the available budget.*

Relationship to Similar Activities and Projects If Known:

- [ENTERPRISE Intelligent Work Zones – Synthesis of Best Practices](#)

Project Participants (Agencies):

TBD

Project Champion:

Jon Jackels, Minnesota DOT