Background

To be consistent with the Federal Highway Administration (FHWA)’s final Rule on work zone safety and mobility, the Federal Lands Highway (FLH) agency needs to implement a policy for the systematic consideration and management of work zone impacts associated with Federal land road projects. In addition, the Federal land management agencies are concerned with the impact of work zones on visitor use and experience and the potential impact on the local economy.

Although ITS technologies have been widely and successfully deployed to support strategies for improving mobility and safety in work zones, it has been recognized by the FLH agency that current ITS resources (e.g., guidance, best practices, case-studies, cross-cutting studies) are not directly relevant to the context and environment of maintaining travel, or for protecting travelers and workers on Federal lands road projects. Given the unique characteristics of Federal land projects (e.g., narrow roadway, remoteness, concern for visitor experience), existing work zone ITS systems may or may not be applicable to such projects. In light of this, it is of importance to explore potential ITS technologies that can be applied to work zones and work zone impact areas on Federal lands.

Major Research Tasks

1. **State-of-the-Art and Practice Review.** To help in refining survey design and developing fact sheets for various work zone ITS systems on Federal lands.
2. **Field Reconnaissance.** To identify the unique characteristics and challenges that may be encountered on Federal land road projects.
3. **Survey to Federal Land Management Agencies (FLMA).** To gather information about ITS technologies used on Federal land road projects.
4. **Survey to Transportation Agencies (e.g., State DOTs).** To help identify work zone ITS systems that may be considered for use on Federal land road projects.
5. **Development of Fact Sheets.** To develop a fact sheet for each identified ITS system that is feasible for use on Federal land road projects.

State-of-the-Art and Practice Review

Many work zone ITS systems were identified through a comprehensive review of the state of the art and practice. These systems include:

- **Travel Time System**
- **Expected Delay Information System**
- **Dynamic Lane Merge System (DLMS)**
  - Early Merge System
  - Late Merge System
- **Speed Management System**
  - Variable Speed Limit (VSL) System
  - Speed Feedback Display System
  - Speed Advisory System
- **Automatic Speed Enforcement (ASE) System**
- **Stopped or Slowing Traffic Warning System**
- **Alternate Route Information System**
- **Overheight / Overwidth Warning System**
- **Work Intrusion Warning System**
- **Trucks Merging / Crossing / Exiting Traffic Warning System**
- **Hazardous Roadway Warning System**
- **Low-Tech Work Zone Systems / Devices**
  - Portable Changeable Message Sign / Highway Advisory Radio
  - Automatic Flag Assistance Device

Lessons Learned from Existing Studies

A variety of issues and lessons have been learned from existing practices, case studies, and cross-cutting studies, as summarized in the following figure.

Survey to FLMA and Transportation Agencies

A survey instrument was developed and will be distributed to FLMA and state DOTs. The survey questionnaire mainly includes the following aspects:

- Work zone ITS systems deployed
- Work zone ITS applications
- System components
- Effectiveness of the deployed systems
- Conditions for the use of systems
- System benefits
- Challenges, issues, and / or lessons learned

Next Step

The research team will coordinate with Federal Lands Highway and distribute survey to FLMA and state DOTs. Also, field visits and review will be conducted at sites with work zone ITS systems on Federal lands.

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Research Objectives

This research project has two distinct objectives:

1. Synthesize existing work zone ITS technologies and identify those applications that are more appropriate on Federal land road projects; and
2. Provide guidance for the consideration and implementation of work zone ITS systems. The results of this project will help FLH to improve work zone safety and mobility as well as improve visitor experience on Federal lands.