

## Rural ITS Toolkit Primer

### **Introduction:**

The rural intelligent transportation system (ITS) toolkit (Toolkit) provides users with basic information about a selected set of advanced technology tools, in the form of individual fact sheets. The fact sheets are not intended to be an exhaustive one-size-fits-all resource. Instead, they provide an introductory source of summary information and may help an agency identify opportunities to improve the efficiency and safety of the roadways, public transportation systems, and non-motorized systems that they manage.

By combining these fact sheets into one toolkit, it will be easier for practitioners to learn about recent advancements in ITS technologies, as well as how they are being successfully deployed in rural locations across the country. ITS can help transportation agencies address the unique challenges faced in a rural environment, such as extreme weather events, congestion caused by special events, or seasonal recreational travel that can overwhelm the surface transportation network. In low-density and remote areas, ITS can offer valuable benefits, such as automatic deicing of a bridge, identifying crashes and notifying emergency response, detecting unexpected congestion, or disseminating traveler information.

In addition, in recent years ITS have become more widely available and more cost-effective to deploy. Practitioners who investigated ITS deployments 10 (or even 5 years) ago may have concluded that they were cost-prohibitive, or that they would require expensive communications upgrades. Now, many ITS options are considered low-cost solutions, especially if they are alternatives to major infrastructure rehabilitation or construction projects.

The Toolkit builds on information from a diverse selection of successful rural ITS deployment projects across the country, which researchers identified for this project. These examples offer replicable models, lessons learned, and instructive guidance, so users can learn more about the capabilities of ITS and make informed decisions about selection and use.

# Rural Intelligent Transportation Systems (ITS) Toolkit

## Audience

This Toolkit is designed to provide useful information to a wide range of users who have a role or interest in improving the safety and mobility of transportation in rural areas. Users may include, but are not limited to:

- Departments of Transportation (Local, State, Federal)
- Transit Agencies
- Law Enforcement Agencies (Local, State, Federal)
- Emergency Services
- Hospital/Trauma Centers
- Federal Land Managers
- Insurance Companies
- Wildlife Conservation Entities
- Bicycle Advocacy Groups
- Pedestrian Advocacy Groups
- Vehicle Manufacturers
- Rail Agencies
- Federal Rail Administration (FRA)
- Schools
- Trucking Companies
- Research Institutions
- Tribal Nations
- Federal Motor Carrier Safety Administration (FMCSA)
- General Public/Local Communities
- Media Outlets
- Construction Contractors
- State Motor Vehicle agencies
- Hazardous Materials (HAZMAT) Carriers
- Automatic Collision Notification Services
- Search and Rescue
- Federal Aviation Administration (FAA)
- Department of Homeland Security (DHS)
- Metropolitan/Rural Planning Organization (MPO/RPO)
- National Weather Service (NWS)
- Toll Collection Agencies
- Local Ski Resorts/Recreation
- Local Businesses
- Tourist Destinations
- Event Planners
- Health and Human Service Agencies
- Public/Private Service Agencies
- Private Transportation Data Providers
- Application Providers
- National Resources Conservation Service (Snow Telemetry (SNOTEL) Sites)

## Categories of Tools

This toolkit provides a set of tools that may provide value when deployed in the rural setting. The tools are categorized by seven rural transportation critical need areas detailed in further below:

1. **Crash Countermeasures (CC)** focus on reducing crash frequency and severity.
2. **Traffic Management (TM)** tools facilitate the identification of congestion and the management of traffic.
3. **Operations & Maintenance (OM)** tools facilitate operations, enhance maintenance, or extend the longevity of the transportation assets.
4. **Emergency Services (ES)** tools support, facilitate and expedite emergency response efforts.
5. **Surface Transportation & Weather (STW)** tools monitor weather conditions on the transportation network and mitigate weather-related impacts.
6. **Rural Transit & Mobility (RTM)** tools expand, enhance, and coordinate public transportation.
7. **Tourism & Travel Information (TTI)** tools expand or enhance dissemination about travel conditions and tourism opportunities in the surrounding region.

Each tool is categorized into a rural transportation critical need area selected as the best fit. However, many of these tools would be useful within multiple rural transportation critical need areas.

## USING THE TOOLKIT

The Toolkit has two major components: a summary table to help users identify tools they want to investigate further, followed by a series of individual fact sheets for each tool.

### Rural ITS Summary Table

The summary table provides a “snap-shot” view of the available tools, with the following information:

- Tool number
- Tool name/description
- Rural transportation critical need area(s) (CC, ES, RTM, TM, STW, OM, and TTI)
- Strategies achieved (Road User, Road, Vehicle, Safety Culture, Engineering, Emergency Response, Enforcement, and Education)
- Capital cost(s)
  - Low = less than \$50,000
  - Medium = \$50,000 to \$100,000
  - High = \$100,000 to \$250,000
  - Higher = Above \$250,000
- A hyperlink to connect to the fact sheet directly

### Tool Fact Sheets

Users can link to the fact sheet from the summary table, as described above, or they can browse through facts sheets by category, which is discussed in the next section.

Each fact sheet summarizes key aspects of an individual ITS tool:

- Tool name and number
- Photographic example of the solution
- Rural transportation critical need areas, issues, and strategies that the tool addresses
- A general description of the tool
- The applicability of the tool in a rural context, such as how it can enhance safety or incident response
- Useful tips, such as low-cost deployment opportunities,
- Capital and operational cost ranges with associated examples
- Key components of the tool
- Implementation pros, cons and general considerations
- Coordination and partnerships
- Examples of implementation
- Opportunities for future expansion, particularly as they relate to vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) technologies
- Links to additional resources.

## Important Considerations/Cautions

As previously stated, these fact sheets provide *introductory* information on potential ITS solutions. Agencies proposing the implementation of one of these tools should carefully evaluate other considerations prior to making a final decision on deployment:

- **Problem/site evaluation:** Agencies may have to collect additional information about the problem (i.e. where/how often does it occur) or the site (road geometry, communications access) to determine applicability of a technology tool.
- **Inadvertent impacts:** Does the proposed solution simply shift the problem to another location, or create more work for a different agency?
- **Timeline:** How long will it take to plan and implement the proposed solution?
- **Costs:** Please note that cost information detailed for each tool is estimated based on data available at the time of publication. Cost/financial information is based on 2016 dollars (unless otherwise specified). Also keep in mind that costs will vary based on the size and scope of a project as well as other factors, such as terrain, necessary staff, training, maintenance, and inflation.
- **Lifecycle:** What is the lifecycle of the proposed solution, who will maintain it, and how will it be updated or replaced?
- **Performance Measures:** How will the tool be evaluated to determine if it is effective?

Agencies considering the implementation of one of these tools should review the provided examples, and consult available points of contact. These contacts may provide additional recommendations or ideas that should be considered prior to the implementation of a tool. Agencies may also need specialized design assistance to adapt solutions to site-specific characteristics.

## Conclusion

For many years, rural transportation agencies lacked the resources, technological infrastructure, or in-house expertise to consider deployment of ITS technologies. This toolkit is designed to provide sufficient and updated information to allow practitioners to take a “fresh look” at the capabilities of these systems to enhance safety across their transportation networks, as well as the feasibility of deploying them successfully.

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