Rural Transportation: Technology Now!

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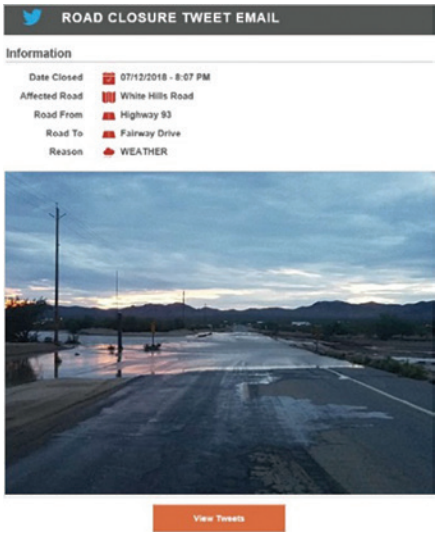
Another Way to Become Engaged

ITE is launching a new group in the ITE e-Community for **Rural and Small Community Transportation.** This is a forum for discussing relevant experiences and resources about technology, safety, operations, planning, transit, and engineering for travel in rural areas, small communities, parkland, and tribal lands. This is a place to come and share information, research, applications, and innovative practices. Visit https://www.ite.org/rural/.

Rural Track at ITE Annual Meeting

Visit the ITE Annual Meeting schedule at www.iteannualmeeting.org/schedule-at-a-glance and filter by "Rural/NRITS" to see the sessions offered this year.



Road Closure Application.

Do more with less. More traffic and traveler monitoring, management, and control. More accuracy and performance consistency. But in rural, remote areas with limited resources and services? You bet! Because technology makes it possible. It delivers reliable, efficient performance through automation and connectivity—the formula for robust rural transportation management and operations.

Rural transportation management focuses more on safety and mobility access and less capacity and quality of flow. The technology realm centers on control, monitoring, and messaging applications sans continuous, intensive human support. It includes active traffic control devices, traveler information, and road weather response.

Active Traffic Control Devices. A common plug-and-play technology application, active traffic control devices (TCDs) break the *driver psyche phenomena*: driver's state-of-mind less focused on the driving task. They include electronic traffic control signs and illuminated pavement markers. Active TCDs offer impressive safety effectiveness in performance. For instance, an Arizona LED raised pavement marker (RPM) installation and study found LED RPMs achieved statistically significant crash rate reduction—at 84 percent through a two-lane rural highway curve—as well as effective speed management. The finding enabled access to Federal Highway Safety Improvement Program funding for expanded installation on priority rural highway curves.* Traffic-actuated or driver-feedback signs—from curve warning to regulatory speed limit signs—positively impact speed management, particularly on rural roads carrying greater share of visitor traffic. Flashing LED stop signs have proven increasingly popular at rural intersections. Active TCDs connect and refocus drivers, and with future, expanded installation and study, active TCDs may promote more refined standard practices for use toward reducing intensity of static TCDs.

Traveler Information. Availability as well as timing and accuracy of real-time system status and traffic condition information reflect longstanding challenges in rural area transportation systems management. Portable changeable message signs with remote message programming continue as common road appurtenances for driver information given operator ability—albeit under limited resources—to relocate to and monitor target road construction, incident, weather, special event, hotspots, etc..

Mobile sourced traveler information leads today's technology breakout that fills a critical coverage and performance gap in rural areas. It comprises third-party provider digital information mainstream and delivers consistent sources of pre-trip and enroute information to transportation system users. Rural area transportation operations benefit from blanket road network coverage and general reliability of traffic condition estimation from crowdsourced traffic data that better pinpoints demand surges and bottlenecks on rural roads with baseline low volume-to capacity. Rural transportation operators gain efficiency from mobile sourced network coverage, providing practical level of incident detection to enable pivoting to localized planned and unplanned event response and management through agency resources.

Mobile communications permit operators and service providers to develop and execute custom applications for real-time updates and information. For example, (para)transit agencies may incorporate their automatic vehicle location system into an application for user pre-trip planning and tracking of transit vehicle location and timing status. Another custom application allows agency road maintenance crews to issue social media and email notifications of road closures as crews effect in the field.

* "An Eyes-On-Road Approach to Reducing Lane Departure Crashes", *APWA Reporter*, August 2024.

Road Weather Response. Road Weather Information Systems (RWIS) function autonomously for continuous atmospheric and road surface condition monitoring with automated response capabilities. This technology attends to broad road hazards including snow/ice, fog, and blowing dust. It integrates with flood alert and wildfire detection systems protecting overland areas. Ideal for rural isolated areas, RWIS may communicate status and alerts to agencies and 511 travel information portals, activate flashing warning signs, and deploy anti-icing road surface treatment through expert system decision support.

Future Forward

The emerging realm of Connected Intelligent Transportation Systems (C-ITS) gives transformative opportunities for connected vehicle technologies deployment across rural areas. A prime and potentially expansive application includes fully automated roadside units performing vehicle-to-infrastructure (V2I) function via Cellular Vehicle-to-Everything (C-2VX) direct wireless communication for purposes of rendering in-vehicle dashboard alert of road operations, conditions, and hazards. For example, alerting drivers of traffic signal phases, speed limits, and work zones. It extends to traffic actuated functions such as alerting drivers encountering highway curves at too high a speed. By 2026, Mohave County, Arizona, will have constructed one of the earliest pilot projects for rural V2I in deploying a network of stop sign gap assist units for future in-vehicle driver alert of detected, impending intersection traffic conflict.

Smart highways capture ongoing technology proliferation as their own quasi-road functional class, aggregating legacy ITS and transportation technology with mobile sourced and C-ITS technology applications along supported facilities. Smart highways have an essential place in rural areas, elevating active traffic management and control as well as enhancing traveler safety through automated and connected applications. Smart highways shift from traditional TCDs expressing passive warning and control to technology enabled active control capable of hazard-avoidance alerts, achieving marked reduction in traffic crash frequency and severity.

Outreach

ITE—through the National Rural Intelligent Transportation Systems Steering Committee (NRITS)—champions a vision and awareness that traveler's complete trips are integrated and enabled through use of ITS and transportation technology in rural areas. Though Annual Meeting sessions, webinars for professional capacity building, and member-led peer exchanges, NRITS—together with the USDOT ITS Joint Program Office—continually work to assist rural transportation practitioners in facilitating ITS technology solutions. It collaboratively functions to vet and promote technical exchange on grant funding opportunities, innovative purchasing mechanisms, public-private partnerships, proven transportation technology strategies, operation and maintenance approaches, and architecture and standards as applied to rural areas while recognizing the commonality of limited rural agency resources.

Consider ITS and transportation technology as pillars to efficiency and performance in traffic operations and traveler trips. Their flexibility and adaptability enable incremental buildout as well as cross-connectivity. Think of grouped technology applications for specific task functions as well as broader, integrated transportation management objectives. Practitioners have flexibility in developing and deploying any technology application. They should pursue systematic buildout per agency interests and capabilities with confidence that future buildout can achieve preferred configurations and connections. Technology now! **itej**

V2I Dashboard Alert of Speed Limit and Road Condition on A23 Motorway in Vienna, Austria.

ITE Annual Meeting Workshop

Advancing Rural Transportation: Challenges, Opportunities, and Solutions
Sunday, August 10
9:00 a.m.–5:00 p.m.
Location: Celebration 7/8

Outreach Efforts

For more information on how to get involved, please contact Douglas E. Noble, P.E., PTOE, Senior Director – Transportation Engineering and Operations at ITE (dnoble@ite.org).