

EDC-8 Innovations of Interest

1. SAFE ARTERIALS FOR EVERYONE THROUGH ROADWAY OPTIMIZATION AND DESIGN STRATEGIES (SAFE ROADS)

Challenge: Across the Nation, non-freeway arterials provide high levels of access, serve multiple modes, and allow for greater mobility and speed. In 2022, 22,074 people were killed on non-freeway arterials, including 4,541 pedestrians—representing 52 percent of all traffic fatalities. State, local, and Tribal agencies have successfully demonstrated the application of strategies and countermeasures that manage speeds and increase road user attentiveness, reduce the complexity of the design of the transportation system, and, most importantly, separate users in space and time. However, there are more than 1 million lane miles of arterials in the United States.

Solution: This initiative will accelerate the implementation of innovative solutions on non-freeway arterials to help States appropriately manage speed and improve the safety and accommodation of all transportation system users by promoting the following approaches:

- Identifying and prioritizing arterials with the most potential for safety improvement.
- Reducing vehicle speeds to mitigate kinetic energy using [speed management](#) practices and tools.
- Separating transportation system users in space and time.
- Retrofitting roadways to accommodate all users using innovative permanent, quick-build, or modular design solutions and [Proven Safety Countermeasures](#).

Benefit: This initiative has the potential to greatly improve safety on non-freeway arterial roadways.

- Comprehensive speed management strategies and tools have been shown to decrease traffic fatalities by 26 percent.
- Road diets (roadway reconfiguration) have been shown to reduce fatal and injury crashes by up to 64 percent on urban and suburban arterials.
- Conversion of two-way, stop-controlled intersections to mini-roundabouts may reduce fatal and serious injuries by 61 percent.

2. SAVE LIVES BY IMPLEMENTING THE SAFE SYSTEM APPROACH

Challenge: The United States continues to be plagued with a public health crisis where more than 40,000 people lose their lives annually while traveling on the transportation network. The U.S. Department of Transportation (DOT) has adopted the Safe System Approach (SSA) as the guiding paradigm to achieve a significant reduction in fatalities and serious injuries. While States support adoption of the SSA, they need assistance on how to put it into practice.

Solution: The SSA can be most effective by institutionalizing implementation throughout the project development process, at all levels of agency leadership, roadway planning and engineering, and across all disciplines that have a hand in supporting roadway safety. There is not a one-size-fits-all approach to implementing the SSA. The approach will vary by each implementing jurisdiction. To advance implementation of the SSA, agencies can:

- Improve organizational safety culture to enable road safety policies and practices.
- Integrate SSA in agency plans, policies, guidance, and manuals, and throughout the transportation project lifecycle.
- Apply frameworks to verify project alignment with SSA principles and equity.
- Work with partner agencies to realize Safe System elements (e.g., post-crash care).

FHWA will support States' efforts to advance implementation of the SSA by providing training and technical assistance to apply recently developed guidance, self-assessment tools and checklists, alignment frameworks, and the design hierarchy in State and local programs and projects.

Benefit: Advancing implementation of the SSA will strengthen safety culture, address our roadway safety crisis, improve safety for all road users, and result in more lives saved.

3. REVOLUTIONIZING INFRASTRUCTURE INSPECTION WITH ADVANCED UNMANNED AERIAL SYSTEMS

Challenge: Building on the success of Every Day Counts round five (EDC-5), which saw the adoption of basic unmanned aerial systems (UAS) operations by all 50 States and two territories, the focus has now shifted to more advanced uses such as work zone lighting, UAS docks for real-time monitoring, and herbicide spraying. However, States face challenges with rapidly evolving UAS hardware, staffing turnover, and managing increasing volumes of data.

Solution: Key areas for growth include remote UAS docks, work zone lighting, precision herbicide application, and enhanced data processing. States can do the following to mature their UAS program:

- Diversify UAS hardware to mitigate risks and ensure support for applications like work zone lighting and herbicide spraying.
- Invest in data infrastructure to manage and share information from inspections, lighting, and herbicide use.
- Explore remote UAS docks, nighttime lighting for work zones, and precision herbicide application for recurrent operations.
- Foster interagency collaboration to enhance data sharing and operational efficiency.

Benefit: Dock-based UAS can provide persistent monitoring of hazardous conditions without the need for staff to be placed at risk, resulting in substantial safety benefits. UAS-based lighting reduces operational costs and fuel usage while providing better work zone lighting. Herbicide application with UAS reduces the amount of herbicide used, limits overspray, and better protects wetlands. Better management of UAS data will provide more timely information, resulting in cost savings and reduced lane closures.

4. SUBSURFACE UTILITY ENGINEERING

Challenge: Utility relocations have been cited for the past two decades as a leading cause of highway project construction cost-and-time overruns. Part of the utility coordination process includes knowing where utilities are located so that they can be avoided or relocated. One reason why utility conflicts are unknown and thus increase project risk is that few State DOTs methodically use subsurface utility engineering (SUE) as a common practice.

Solution: SUE is a branch of engineering practice that involves managing certain risks associated with utility coordination, utility mapping at appropriate quality levels, utility conflict analysis, utility relocation design and coordination, utility condition assessment, communication of utility data to concerned parties, and more. Proper use of this cost-effective professional engineering service will eliminate many of the utility problems typically encountered on highway projects.

Benefit: Implementing a SUE program using a risk-based approach will eliminate many of the utility problems typically encountered on highway projects, including:

- Delays to projects caused by redesign due to unexpected utility conflicts.
- Delays to contractors during highway construction caused by cutting, damaging, or discovering previously unknown utility lines.
- Claims by contractors for delays resulting from unexpected encounters with utilities.
- Deaths, injuries, property damage, and releases of product into the environment caused by cutting previously unknown utility lines.

5. ACCELERATING DEPLOYMENT OF SEPARATED BICYCLE LANES TO IMPROVE SAFETY AND ACCESS

Challenge: The climate crisis is encouraging a shift toward sustainable modes of transportation, and we must reduce fatalities and serious injuries for all road users. Both of these goals are advanced if Separated Bicycle Lanes (SBLs) are more widely deployed. State and local transportation agencies are increasingly deploying this [Proven Safety Countermeasure](#), but the extent of facilities still lags far behind the need and demand.

Solution: Successful deployments of SBLs require planning for bicycle facility networks, policies and processes to identify contexts where SBLs are appropriate, standardizing designs, and integrating deployment into a variety of project delivery programs. A State DOT-focused emphasis on deploying SBLs can take advantage of an array of new design and guidance tools available to encourage these measures. Relevant resources include FHWA’s 2020 Bicycle Facility Design web-based course, the 2024 [“Separated Bike Lanes on Higher Speed Roadways: A Toolkit and Guide”](#) publication, the [2019 Bikeway Selection Guide](#), and the forthcoming AASHTO Guide to the Development of Bicycle Facilities.

Benefits: Mainstreaming deployment of SBLs through State DOTs would result in greater numbers of SBLs across the Nation and into land use contexts where SBLs are not currently common. This will in turn provide safer, more complete active transportation networks, expand equitable mobility connections to key destinations, and help to reduce greenhouse gas emissions.

6. INTEGRATING DESIGN-BUILD AND OTHER ALTERNATIVE CONTRACTING METHODS WITH ENVIRONMENTAL REVIEW REQUIREMENTS

Challenge: Almost every State has approved design-build (D-B) or other alternative contracting legislation. The National Environmental Policy Act (NEPA), FHWA regulations, and environmental permitting are requirements that must be included as part of any project development process that includes Federal funding. Integrating alternative contracting methods, including D-B, with environmental process requirements presents many challenges to the project delivery process, such as meeting NEPA

and permitting statutory timeframes, writing an environmental document that other Federal agencies can adopt, and providing sufficient project design details to enable permit decisions.

Solution: Seamlessly integrating the environmental permitting process with alternative contracting methods can accelerate the delivery of projects to the public. Tools such as illustrating how project sponsors and Federal agencies can effectively merge alternative contracting schedules with the NEPA and permitting process will be demonstrated, including:

- Delivering the NEPA and Federal permitting phases within the required timeframes.
- Creating a NEPA document that can be adopted by Federal agencies.
- Obtaining necessary Federal permits early in the design process.

Benefit: Integrating environmental process requirements with alternative contracting methods, including D-B contracts, will help DOTs meet the permitting and NEPA requirements during a concurrent design process and deliver transportation projects more efficiently to the public.

7. SAVING LIVES WITH CONNECTED CORRIDORS: ACCELERATING THE NATIONAL DIGITAL ROADWAY OPERATIONS ENVIRONMENT

Challenge: Coordination is required to provide drivers with information about hazards and disruptions, as well as roadside services, on routes that go through multiple States (i.e., corridors). While the National Intelligent Transportation System (ITS) Architecture provides a framework for planning ITS deployments, there is no formal way for States to harmonize and deploy common sets of data, or talk in the same digital language, on cross-country corridors.

Solution: Use existing and develop new multi-State corridor partnerships as models to demonstrate digital information connectivity for operations such as:

- Deploying vehicle-to-everything (V2X) technology.
- Implementing interoperable connectivity by using 23 CFR 511's real-time traffic condition requirements and standards to define data elements and sharing protocols .
- Sharing timely, reliable, real-time information through a National Roadway Operations Data Environment (NODE) using innovations such as the Work Zone Data Exchange.
- Coordinating information on roadside services supporting freight routing and movement, including real-time truck parking availability and weigh-in-motion systems.

Participants could join a data exchange initiative, adopt data exchange specifications consistent with the initiative, and start sharing data (if they have the capability to do so).

Benefit: Digital integration of agency information systems along multistate corridors will improve safety and efficiency by sharing real-time information for the traveling public. It will also provide system insights for supply chain and logistics management along with military mobility and emergency response.

8. TRANSPORTATION CYBERSECURITY RESILIENCE

Challenge: Transportation agencies across the United States are experiencing a dramatic increase in cybersecurity threats, compromising their ability to provide safe, reliable, and efficient transportation services. Recent incidents underscore the need for heightened cyber defenses and responses in State and local transportation agencies, many of which lack resources and expertise to fully address emerging threats.

Solution: Promote the most effective and easy-to-implement cybersecurity resilience strategies specifically tailored to transportation agencies to encourage regular cybersecurity threat assessments.

- **Perform a vulnerability assessment:** Vulnerability assessments are essential components of a robust cybersecurity strategy, not merely an exercise. By simulating real-world cyberattacks, agencies can proactively identify weaknesses, test their response capabilities, and assess the effectiveness of their security measures.
- **Prioritize continuous monitoring and detection:** Encouraging employees to communicate regularly with information technologies professionals fosters strong collaboration. Continual engagement helps to leverage advanced monitoring tools and techniques so an agency can proactively detect and respond to potential cyber threats in real time.
- **Adopt the Cybersecurity Framework (CSF):** CSF offers significant benefits in safeguarding critical infrastructure and ensuring the continuity of transportation services. The CSF also establishes ITS cybersecurity framework core values that define incident response plans to minimize disruption to transportation services and facilitate recovery. This will also strengthen supply-chain security as it accelerates the incorporation of the National Transportation Communications for ITS Protocol for field devices.

Benefit: Cybersecurity measures will help transportation agencies be more cyber-resilient through reduced vulnerability to cyber incidents, faster incident response, and enhanced staff skills.

In addition to the proposals described above, other FHWA offices suggested the following topics for consideration:

- Understanding Environmental Laws on Emergency Repair Projects
- Building a Digital Foundation from the Ground Down: Standardizing Geotechnical Data for Federated Building Information Modeling (BIM) and Asset Management Workflows
- Incorporating Artificial Intelligence (AI) into Asset Management
- Enhancing Pedestrian Crossings/Walkways with Luminous Projection Technology
- Indefinite Delivery and Indefinite Quantity (ID/IQ) Contracting
- Continuous Galvanized Reinforcement
- Fiber-Reinforced Polymer Bridge Technologies
- Concrete Waterproofing for Bridge Preservation
- Reflective Post Sleeves
- Safety in All Projects
- Putting Work Zones on the APP
- Project Scheduling Tools
- Artificial Intelligence in Transportation
- Addressing Homeless/Unhoused Population Use of Highway Right-of-Way (ROW)
- Progressive Practical Design for Shoulders