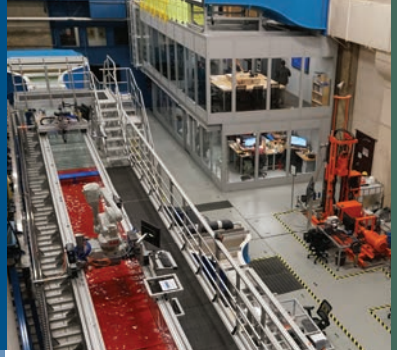

INFRASTRUCTURE

Research and Development R&D

Turner-Fairbank Highway Research Center

The Office of Infrastructure Research and Development (R&D) conducts and administers infrastructure R&D programs and projects for the Federal Highway Administration (FHWA) that address problems of national priority within the U.S. highway system. This work directly supports the goals and mission of the U.S. Department of Transportation and the *FHWA Strategic Plan*.[1,2]

GOALS

FHWA's Office of Infrastructure R&D conducts research to develop knowledge, guidelines, analytical and physical tools, and test methods and procedures addressing the following FHWA Infrastructure Research and Technology Objectives:

- Improve the sustainability of highway infrastructure.
- Achieve and sustain a state of good repair of pavements, bridges, and tunnels.
- Implement and enhance the effectiveness of transportation performance management.

In addition, the office provides specialized technical assistance to address infrastructure issues of national importance requiring research capabilities and technical expertise uniquely available within the Office of Infrastructure R&D.

PRIORITY RESEARCH AREAS

The Office of Infrastructure R&D focuses on important research and development where there is an appropriate Federal role by virtue of national need, scope, duration, or risk. Current priority research areas are as follows.

Designing Infrastructure for Safety, Durability, and Resiliency

Safe, durable, sustainable, and resilient highway infrastructure is essential to maintain the commercial and personal mobility that supports the U.S. economy and way of life. Advances in materials, tools, technologies, test methods, specifications, and guidance are needed to support cost-effective designs for bridges, tunnels, pavements, and other structures. Specific challenges that need to be addressed include the following:

- Design innovations to better meet highway infrastructure needs, including accelerated project delivery.
- Prediction, prevention, and mitigation of damage due to climate conditions and natural hazards.
- Test methods and guidance to support performance-related selection, design, and specification of infrastructure and infrastructure materials, whether new or recycled.
- Optimal use of new and/or innovative materials to effectively address infrastructure design challenges, and minimize environmental impacts.
- Integration of lifecycle engineering methodologies to consider both economic and environmental considerations into decisionmaking processes.
- Integration of infrastructure safety considerations into design, construction, maintenance, and assessment decisionmaking.
- Methods and tools to assess/quantify the safety, durability, sustainability and resiliency of infrastructure design decisions.

Infrastructure Performance Management

Advancements in infrastructure performance management tools, technologies, and guidance are needed to maximize the benefits achieved through implementation of the Moving Ahead for Progress in the 21st Century Act-mandated performance management regulations. Specific challenges to be addressed include the following:

- Understanding/prediction of long-term infrastructure performance, including, but not limited to, the impacts of both traffic loads and the environment through the Long-Term Pavement Performance and Long-Term Bridge Performance programs.
- Guidance, tools, and technologies to support sound characterization of asset condition and

safety in support of lifecycle planning and cross asset trade-off analysis.

- Methodologies, tools, and guidance to support risk-based asset management.
- Guidance and decision support tools to support target setting and sustained achievement of the desired state of good repair over the full asset lifecycle, at minimum practicable costs.
- Guidance and tools to enable effective consideration of the linkages among planning, design, construction, operation and maintenance in life cycle planning; identification and development of next generation performance measures.

Infrastructure Construction, Preservation, and Rehabilitation

As highway agencies strive to maintain our nation's highways in a state-of-good-repair, the need for improved construction, preservation and rehabilitation practices that result in economical, long-lasting bridges, pavements, tunnels, and other structures has never been greater. Challenges and needs to be addressed include the following:

- Overcoming impediments to efficient, rapid construction, preservation and rehabilitation while achieving high quality.
- Guiding the selection, timing, and application of preservation treatments for maximum effectiveness.
- Appropriately balancing risk among the public and private sector organizations involved in both traditional and innovative contracting processes.

COLLABORATION

In pursuing the R&D program described herein, the FHWA Office of Infrastructure R&D works closely and collaboratively with other FHWA offices and with the broader community of highway stakeholders to ensure that the program does the following:

- Addresses agency goals, mission, and requirements.
- Recognizes the work of other agencies and organizations and coordinates its work accordingly.
- Delivers outcomes in the form of readily implementable products at the earliest appropriate time.
- Moves products into practice as quickly as possible to achieve maximum possible benefits.

BENEFITS

The outcomes delivered through our research will benefit the American public by enabling improvements in the safety, performance, and cost effectiveness of the Nation's highway infrastructure while minimizing the environmental impacts of highway construction, maintenance, and rehabilitation. The results will reduce highway congestion, improve highway safety, and enhance the overall driving experience.

FHWA is charged with ensuring minimum standards of safety for the public as it travels on the Nation's roads and highways. While there are many other organizations and agencies that conduct highway research, the FHWA Office of Infrastructure R&D is uniquely positioned to address the continuum of highway infrastructure research from high-risk, exploratory, and advanced research through the highly applied, problem-specific research that is necessary to address current issues and immediate problems. This broad range of research capability provides a high likelihood of success that is critical for sustaining the Nation's economy.

REFERENCE

1. Federal Highway Administration. (2014). *FY 2018/19 Strategic Implementation Plan*. Federal Highway Administration, Washington, DC. Obtained from: http://staffnet.fhwa.dot.gov/strategic/suggestions_2018_sip/index.htm
2. U.S. Department of Transportation. (2016). FY 2014 Performance Report and *FY 2016 Performance Plan*, U.S. Department of Transportation, Washington, DC. Obtained from: https://www.transportation.gov/mission/budget/fy2016-annual-performance-plan

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