

**Federal Highway Administration Research and Technology Alignment
with the Administration Priorities
April 2021**

Racial Equity and Transportation

Developing and Recruiting a Diverse Workforce

- The Office of Research, Development, and Technology (RD&T) will contribute by ensuring that **recruiting efforts reach a diverse candidate pool** and that we **diversify the pool of NRC Research Associateship Program candidates by engaging Historically Black Colleges and Universities (HBCUs)**. Through the Exploratory Advanced Research Program, the Turner-Fairbank Highway Research Center (TFHRC) is engaging HBCUs and other minority-serving institutions to better understand their capabilities to conduct breakthrough transportation research in cooperation with the Federal Highway Administration (FHWA), State departments of transportation (DOTs), and research institutions and to identify specific actions for increasing cooperation between TFHRC and HBCUs to conduct research.
- The Office of RD&T is creating **training programs around connected and automated vehicles (CAVs) and offering the programs at community colleges and universities**.

Improving Data Collection and Analysis

- The Office of RD&T is conducting research into using FHWA data sets and Census Bureau data to **develop prediction models that show where minorities and other disadvantaged communities are at greater risk for pedestrian fatality and injury**.
- The Office of Policy and Governmental Affairs continues to develop and deploy more efficient and effective **National Household Travel Survey data**-collection methods linking traveler demographical characteristics to travel behavior **aiming to gain timely and quality data to support racial equity** work.
- The Office of Planning, Environment, and Realty is completing a geographic information system project-level screening tool where State DOTs and metropolitan planning organizations (MPOs) can assess data layers that include race and national origin (e.g., using data from the U.S. Census Bureau's American Community Survey). This will provide State DOTs and MPOs with the capability to screen their projects for potential Title VI-covered populations prior to the start of the National Environmental Policy Act process. The screening tool will better inform State DOTs and MPOs of affected populations in their study area and determine early ways to avoid or mitigate potential impacts to those populations.

Incorporating Equity Considerations into Planning and Research

- The Office of Planning, Environment, and Realty is conducting research that will examine how **shared micromobility services** fill unmet travel demand for underserved individuals (including minority populations), how underserved individuals may or do benefit from shared micromobility services, and the extent to which existing policies and programs in local jurisdictions promote or hinder access and mobility for underserved communities and individuals with disabilities.

- The Office of Planning, Environment, and Realty is developing an equity impact assessment that will be applied on the first 10 yrs of the Metropolitan Long-Range Plan and the funding strategies in the Long-Range Statewide Transportation Plan. This assessment will identify the impacts of the plans on the traditionally underserved and low-income and minority populations.

Seeking New Ways to Achieve Diversity

- The Office of Planning, Environment, and Realty intends to conduct a roundtable discussion at the Transportation Research Board’s (TRB’s) Conference on Advancing Transportation Equity to discuss U.S. Department of Transportation (USDOT) research and other activities that promote and advance goals set forth in the Executive Orders on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis ([E.O. 13990](#)), Advancing Racial Equity and Support for Underserved Communities Through the Federal Government ([E.O. 13985](#)), and Tackling the Climate Crisis at Home and Abroad ([E.O. 14008](#)).
- **CARMASM open-source software** tools and fully collaborative research allow inclusive, low-cost entry into field-of-automation research, which promotes diversity by opening the field to less capitalized companies.
- The Office of Planning, Environment, and Realty and USDOT have an opportunity to share innovations as part of the National Academies of Sciences, Engineering, and Medicine’s July event “How We Move Matters: Exploring the Connections between New Transportation and Mobility Options and Environmental Health—A Workshop.” TRB is working with colleagues from other parts of the National Academies to develop a virtual conference to take place July 13, 16, and 21. The conference will explore how the changing landscape of mobility options available in urban/suburban areas is effecting the health of the environment.

Climate Change and Resilience

Incorporating Climate Change in Transportation Planning and Research

- The Office of Planning, Environment, and Realty is conducting an extensive applied research program in partnership with State DOTs and others to **test and apply tools and techniques to enhance the climate resilience of their plans, projects, and programs.**
- The Office of Planning, Environment, and Realty is partnering with other FHWA offices on research efforts to **ensure climate resilience considerations in asset management, hydraulic design, and emergency relief.** They are developing and deploying tools to help **estimate greenhouse gas (GHG) emissions from highway activities and to evaluate the reduction potential of strategies, policies, and programs.**

Preparing for Alternative Fuel and Electric Fleet

- The Office of Planning, Environment, and Realty is leading efforts to **encourage and facilitate the deployment of alternative fuel and electric charging infrastructure,** which is a key component of the Administration’s strategy to reduce GHGs from the transportation sector.

Improving Infrastructure Resiliency

- The Office of RD&T's Hydraulics Research Program produces tools and guidelines toward improved infrastructure resiliency by **considering evolving climatic conditions in the design of new and rehabilitated highway infrastructure.**
- FHWA—through its Office of International Programs and Office of Planning, Environment, and Realty—is facilitating peer-to-peer exchanges on the application of nature-based solutions (NBS) to enhance the resilience of highway transportation assets. The exchanges are between the technical staff of the Netherlands' Rijkswaterstaat (RWS), FHWA, and two State DOTs: Washington State and North Carolina. Both the United States and the Netherlands face flood hazards that can damage and disrupt highway infrastructure. RWS has significant experience in the analysis, design, and application of NBS to address both coastal and riverine flooding. FHWA and State DOTs can learn from the Netherlands on NBS, techniques, and methods to address climate change and extreme weather resilience for transportation assets.
- FHWA—through its Office of International Programs and Office of Planning, Environment, and Realty—and its counterparts in South Korea are sharing information on how each approaches climate change resilience, with an emphasis on geohazards, and including other types of projects and analyses (vulnerability assessments and climate change effects analyses). The interaction includes the exchange of climate and geohazards research efforts and experiences in mitigation and adaptation efforts to develop a resilient transportation system, discussion of new innovations and technologies for various geohazards and climate applications and visits to project sites, presentation of research results during joint workshops and meetings, and discussion of analytical methods.

Mitigating the Adverse Impacts of Highway Transportation

- The Office of RD&T's **research programs contribute to slowing climate change by reducing the carbon footprint of highway infrastructure.** For example, work to advance more durable infrastructure materials reduces the frequency of repairs and the emissions arising from construction activities and construction-related highway congestion.
- The Office of RD&T's cooperative driving automation and truck platooning research programs have investigated how **connectivity and automated vehicle technology can be used to reduce fuel use and emissions** while also improving the capacity and safety of existing and new infrastructure.
- The Office of RD&T's Human Factors Truck Platooning Study is examining the behavior of light-vehicle drivers that may disrupt the normal operation of a platoon, such as situations leading to cut-ins or abruptly cutting off a platoon. This research supports safe interactions that are necessary for partially automated truck platoons to achieve environmental benefits, such as fuel savings and emissions reductions, and improved highway safety and highway capacity.
- The Office of RD&T's **innovative intersection designs** like diverging diamond interchanges (DDI) and roundabouts create more capacity for turning movements, thus **reducing the amount of dwell time** a vehicle experiences before completing a maneuver. The **reduced delay inherently**

lessens the amount of greenhouse emissions. Improved traffic-control devices and signing also help to improve traffic flow, minimize delay, and reduce emissions.

- The **Small Business Innovation Research** program awarded funds to **Intelligent Automation, Inc., to develop an artificial intelligence (AI) system to detect and analyze traffic patterns** that traffic management centers can use to improve the efficiency of their road networks. AI is being used to optimize the flow of traffic, including the integration of CAVs and new smart data sources. **More efficient highway systems reduce fuel consumption and, therefore, reduce the amount of GHGs.**
- The Investigating Key Automated Vehicle Human Factors Safety Issues study related to the infrastructure project's first field study is looking at driver behavior when using **eco-drive strategies**. Eco-drive strategies allow the vehicle to either maintain speed to pass through a green light, accelerate to ensure clearing a green light, reduce speed to make it through an upcoming green light, or reduce speed to stop at an upcoming red light. By ensuring driver acceptance of eco-drive strategies, drivers will use these systems to help **reduce their fuel consumption, helping reduce their carbon footprint.**

COVID-19 Response and Recovery

Changes in Driving Patterns

- The Office of RD&T is **researching driving patterns** during Coronavirus Disease 2019 (COVID-19) and, through data analytics, could contribute to departmental knowledge around driving patterns and traffic around COVID-19 testing locations.

Changes in Street Dynamics

- The Office of Planning, Environment, and Realty is conducting research examining shifting street dynamics with respect to how cities have responded to COVID-19-induced changes in travel demand, including bicyclist and pedestrian needs.

Changes in Engaging the Public

- The Office of Planning, Environment, and Realty is developing public-involvement case studies that will focus on best practices for conducting public hearings and public meetings during the environmental review process, including virtual strategies. Special consideration will be given to strategies (e.g., environmental justice) instituted during emergencies and those that are inclusive of all populations.

Economic Recovery

Improved Materials and Processes

- Assuming a future economic recovery package includes investment in infrastructure, FHWA's research has and continues to produce information, guidelines, and technologies to improve highway infrastructure design, construction processes, rehabilitation practices, durability, and resiliency. For example, ongoing work to develop guidelines to apply **ultra-high performance concrete in bridge preservation and repair** will enable stronger repairs and extended service life of existing highway bridges.

- Researching and developing analysis methods and tools is important to evaluate the safety and operational performance of **infrastructure and traffic management improvements**.

Projects that Produce Positive Economic Outcomes

- Through the Office of Planning, Environment, and Realty, value capture innovation provides technical resources and assistance to local and Tribal governments on techniques that generate funding for projects that support positive economic development outcomes.

Automation and Technology

- In cooperation with other Federal, State, local, and Tribal agencies, academia, and industry, the Office of RD&T is collaboratively developing the concepts and tools required for research on **cooperative driving automation (CDA)**. CDA is envisioned as a key means to transform the surface transportation system by identifying and sharing data and information between automated vehicles, other road users, the infrastructure, and the back office to improve the safety, operational efficiency, equity, and sustainability of the system.
- FHWA, through its Office of International Programs, is undertaking a **global benchmarking study** to learn how Germany and the United Kingdom are successfully using unmanned aerial systems (UAS) in the transportation infrastructure environment. Specifically, the study is **focusing on the use of UAS technology for managing transportation infrastructure** within the areas of design, construction, structural inspection, maintenance, and asset management. The goal of the study is to leverage international experience and lessons learned to help advance the use of UAS technology **to quantify the condition of transportation assets more safely, objectively, and quickly**.

New Innovations to Save Lives

- FHWA's **safety research program aligns with the Vision Zero goals** and produces innovations for pedestrian safety solutions, such as pedestrian hybrid beacons and rectangular rapid-flashing beacons that increase driver attention and pedestrian conspicuity and new geometric designs like DDI and roundabouts that eliminate up to half of the conflict points where vehicles can crash into one another. Examples of projects include the following:
 - *Development of Crash Modification Factors for Different Separated Bike Lane (SBL) Configurations (Phase II)* will develop crash modification factors (CMF) for different SBL configurations and assesses their safety performance. The overall goal is to determine the influence that SBLs have on the total number and severity level of crashes with particular attention to those crashes involving bicycles.
 - *Development of Pedestrian-Intersection Crash Modification Factors* will develop a CMF for corner radius, right-turn speed, and prediction of pedestrian crashes at signalized intersections to determine the safety effectiveness of medium- to low-cost pedestrian countermeasures in reducing nonmotorist fatalities and injuries at controlled and uncontrolled intersections.
 - *Safety Study on Pedestrian Crossing Warning MUTCD W11-2 Sign with Embedded Light Emitting Diodes (LEDs)* evaluates the overall safety performance and develops a CMF for the

MUTCD W11-2 pedestrian crossing warning sign with embedded LEDs that can be applied at uncontrolled pedestrian crossing locations, including mid-block and unsignalized intersections.

- *Evaluation of Aesthetically Treated Crosswalks* will investigate the impact aesthetic treatments (such as rainbow-colored stripes or geometric designs) have on motorists' and pedestrians' recognition and behavior at crosswalks, including pedestrians with low vision, in a closed-course setting. The study will also attempt to determine what conditions or aspects of the aesthetically treated crosswalks impact road user recognition and behavior.
- The **evaluation of low-cost safety improvements** investigates the safety performance and benefit cost of installing low-cost highway safety improvements so that States and local jurisdictions can make data-driven decisions.