

Office of Safety and Operations Research and Development (R&D)

The Federal Highway Administration's (FHWA) Office of Safety and Operations R&D oversees nationally coordinated traffic safety and operations research to reduce highway crashes, fatalities, and injuries and produce next-generation technologies and tools to improve transportation system productivity, efficiency, and performance. The office is structured around the following teams: Safety Data and Analysis, Human Factors, Roadway Safety, Transportation Enabling Technology, and Transportation Operations Applications. Major projects across the various teams include Complete Streets, vulnerable road user safety initiatives, connected and automated vehicles, cooperative driving automation (CDA), and vehicle-to-everything technologies research. (See references 1–5.)

The Office of Safety and Operations R&D coordinates research among its varied teams and laboratories to advance the objectives of the Safe System Approach as described in the U.S. Department of Transportation's *National Roadway Safety Strategy*.⁽⁶⁾ The research pursues the elements of the Safe System Approach: safer people, safer roads, safer vehicles, safer speeds, and post-crash care.⁽⁶⁾ The Office of Safety and Operations R&D's researchers coordinate with professionals across multiple transportation disciplines in the public sector, academia, and industry to attain shared objectives.

ROADWAY SAFETY

The Roadway Safety Team works to keep vehicles on the roadway and minimize the consequences of conflicts between vehicles and nonoccupants on roadways and intersections.

Roadway departure research considers ways to provide better information to drivers about their vehicle's position on the road surface and protect them with proper design and installation of roadside safety hardware when their vehicles are straying toward a potentially dangerous situation.

Intersection safety and design research investigates alternative design solutions for all users, develops short-term safety improvements, and defines and evaluates long-term, higher payoff

strategies to improve intersection and interchange safety.

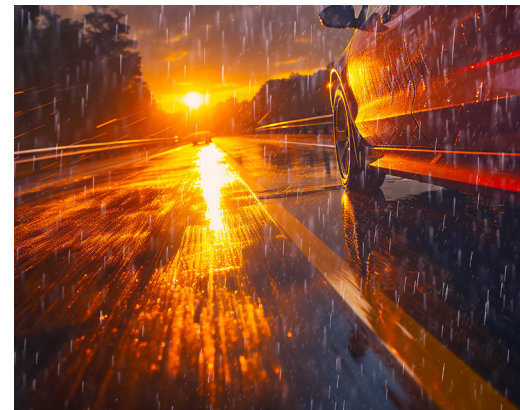
Research into the safety and operational effects of roadway geometric design explores analytical methodologies and new tools to assist with the implementation of the American Association of State Highway and Transportation Officials' *Highway Safety Manual*.⁽⁷⁾

Speed management research promotes safer speeds and focuses on how to set and enforce speed limits through engineering and behavioral strategies.

SAFETY DATA AND ANALYSIS

The Safety Data and Analysis Team works to improve the data quality and analytical tools used to evaluate the effectiveness of

safety improvements. The Safety Data and Analysis Team's mission is to provide knowledge for sound highway safety decisionmaking by researching safety relationships through advanced analysis and evaluation techniques applied to good-quality data. This work includes providing highway safety data stakeholders and others in the



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FACT SHEET



transportation community with training, technical assistance, and access to data and analytical tools used to assess and improve roadway safety performance.

The team seeks to maximize the use of high-value safety datasets, including Naturalistic Driving Study data, the Roadway Information Database, the Highway Safety Information System, the Motorcycle Crash Causation Study database, and the Roadway Lighting database in traffic safety analyses. (See references 8–12.)

The team manages the Development of the Crash Modification Factors (DCMF) program. The DCMF identifies new, effective safety strategies to reduce crashes and promote nationwide Proven Safety Countermeasure installations; develops crash modification factors (CMFs) for low to higher cost safety improvements; conducts benefit-to-cost analyses; explores advanced statistical science for highway safety improvements; and manages the Evaluation of Low-Cost Safety Improvements Pooled Fund Study (ELCSI-PFS).⁽¹³⁾

The ELCSI-PFS is currently the largest pooled fund study (PFS), with 41 participating State departments of transportation. This study, which has been active since 2005, evaluates unproven, low-cost priority safety countermeasures to develop high-quality CMFs that meet the criteria for inclusion in the *Highway Safety Manual*.⁽⁷⁾

HUMAN FACTORS

Human factors studies help researchers better understand

transportation users' needs and limitations. By considering all road users' behaviors and capabilities when designing roadways, human errors can be minimized, and public safety can be enhanced by decreasing crashes and fatalities. Human factors research supports

and 39 stakeholder members, including 33 States.⁽¹⁴⁾ The activities of this consortium include the following: identify human factors, safety, and operational issues related to TCDs; select new and existing TCDs for evaluation; initiate and monitor research projects;

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Current focus areas include vulnerable road user safety and the potential impacts of the deployment of automation in the transportation system.

The Human Factors Team participates in the Traffic Control Device (TCD) PFS, in which FHWA has partnered with the American Traffic Safety Services Association

disseminate results; and facilitate collaboration and information sharing among members.

TRANSPORTATION ENABLING TECHNOLOGIES

The Transportation Enabling Technologies Team focuses on research into new and evolving technologies used in surface transportation, emphasizing improved safety, efficiency, and mobility in the movement of



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people and goods and the resilience of the transportation system.

Areas of study include CDA, advanced modeling and simulation, vehicle-infrastructure integration, and Transportation Systems Management and Operations (TSMO). Through this team, FHWA is leading national efforts to develop, test, and validate concepts for CDA and automated driving systems (ADS).⁽¹⁵⁾ This work uses open-source software to encourage collaboration and participation among a community of engineers and researchers and is based on concepts of operations for new TSMO strategies, such as identifying traffic incident management scenarios that provide new strategies for first responder use cases interacting with ADS.⁽¹⁶⁾ This research will accelerate market readiness and the deployment of cooperative automated driving technology while advancing safety, security, data, and artificial intelligence.

TRANSPORTATION OPERATION APPLICATIONS

The Transportation Operations Applications Team focuses on research related to developing intelligent transportation systems (ITS) and connected and automated vehicle application technologies. Areas of study include developing improved analysis, modeling, and simulation (AMS) tools, applications of advanced technologies for traffic management, and preparing for the next generation of transportation management systems.

Researchers use analysis, modeling, and simulation (AMS) tools to evaluate the performance of novel transportation solutions that leverage emerging technologies, data sources, and alternative designs and strategies to optimize transportation safety and efficiency.

Researchers use AMS tools to evaluate the performance of novel transportation solutions that leverage emerging technologies, data sources, and alternative designs and strategies to optimize transportation safety and efficiency.⁽¹⁷⁾ While AMS will be used to evaluate the potential impacts of connected and automated vehicle (CAV) applications, current activities include defining an AMS framework for CAV applications to adapt and reengineer the existing set of tools available to agencies, validating

these models and tools, and providing a mechanism to share these models and tools with public agencies.⁽¹⁸⁾

The team is working with several States through the Transportation Management Centers (TMC) PFS to develop technical resources and information to support agencies as they plan for and make investments in the capabilities needed to actively manage and operate the next generation of their transportation management systems.⁽¹⁹⁾



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