United States Department of Transportation
Annual Modal Research Plans FY 2024
Program Outlook FY 2025

Cover Page

FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION

SEPTEMBER 12, 2023

OFFICE OF RESEARCH AND REGISTRATION
THOMAS KEANE, ASSOCIATE ADMINISTRATOR

OFFICE OF ANALYSIS, RESEARCH, AND TECHNOLOGY
ROBERT KREEB, OFFICE DIRECTOR

Executive Summary

Research & Technology Program Overview

The Federal Motor Carrier Safety Administration (FMCSA) carries out a multiyear Motor Carrier Research & Technology (R&T) Program under the authority of 49 USC 31108. The R&T Program includes in-house, contract, congressionally mandated, and joint-funded initiatives with other U.S. Department of Transportation (USDOT) organizations, the private sector, and academia. FMCSA is authorized to carry out research, development, and technology transfer activities with respect to:

- The causes of crashes, injuries, and fatalities involving commercial motor vehicles (CMVs)
- Means of reducing the number and severity of crashes, injuries, and fatalities involving CMVs
- Improving CMV safety and efficiency through technological innovation and improvement
- Improving CMV safety through driver-centric research including human factors, fatigue, distraction, training, compensation, and related driver issues
- Improving technology used by enforcement officers when conducting roadside inspections and investigations to increase efficiency and accuracy of inspections
- Increasing the safety and security of hazardous materials transportation

FMCSA's mission is to reduce crashes, injuries, and fatalities involving large trucks and buses. In support of this mission, FMCSA's Office of Analysis, Research, and Technology's mission is to reduce the number and severity of CMV crashes and enhance the efficiency of CMV operation by:

- Providing data, producing statistics, and conducting systematic studies directed toward fuller scientific discovery, knowledge, or understanding of motor vehicle safety performance
- Identifying, testing, and supporting technology transfer activities and deployment of CMV safety technologies

The R&T Program provides an empirical basis for answering research questions in support of the Agency's safety mission. By using research to better understand factors associated with crashes, FMCSA can streamline and prioritize its countermeasures development and enforcement efforts, focusing on vital Federal safety oversight functions.

FMCSA's FY 2024 R&T activities align with the DOT's strategic goals, the RD&T Strategic Plan and the objectives set forth in USDOT's Innovation Principles, and the National Roadway Safety Strategy. FMCSA research activities advance the DOT strategic goals of Safety, Economic Strength and Global Competitiveness, Equity, Climate and Sustainability, Transformation, and Organizational Excellence. FMCSA's FY 2024 research portfolio also directly or indirectly supports the principles of the National Roadway Safety Strategy: Safer

People, Safer Roads, Safer Vehicles, Safer Speeds, and Post-Crash Care. FMCSA's research efforts are focused, results-based, measurable, and produce documented findings to support stakeholders involved in improving CMV safety.

Anticipated Outcomes

FMCSA's R&T Program develops the knowledge, practices, and technologies needed to address safety challenges and answer questions that arise in prioritizing enforcement resources and improving the safety of commercial drivers, vehicles, and carriers. Crashes involving CMVs carry significant human costs in the form of injuries and fatalities. These human costs are also economically significant; specifically, in 2020, the estimated cost of all large truck and bus crashes was $143 billion (see Table I), and there were 5,125 fatalities associated with large truck and bus crashes (FMCSA, 2022 Pocket Guide to Large Truck and Bus Statistics).

Table I. Estimated Costs of Large Truck and Bus Crashes, 2017-2020

Year	Fatal Crashes	Injury Crashes	Property-Damage-Only (PDO) Crashes	All Large Truck and Bus Crashes
2017	$60 Billion	$62 Billion	$29 Billion	$151 Billion
2018	$61 Billion	$65 Billion	$33 Billion	$158 Billion
2019	$62 Billion	$68 Billion	$34 Billion	$163 Billion
2020	$60 Billion	$58 Billion	$25 Billion	$143 Billion

Notes: A large truck is defined as a truck with a gross vehicle weight rating (GVWR) greater than 10,000 pounds. A bus is defined as a vehicle with seats for at least nine people, including the driver. Costs may not sum to the totals due to rounding. Changes to past years are the result of updating for inflation and changes in guidance from the Office of the Secretary of Transportation on how to value fatalities and injuries. Estimates are based on fatal crash data from the Fatality Analysis Reporting System (FARS) and injury crash and property-damage-only (PDO) crash data from Crash Report Sampling System (CRSS). Data Sources: T. Miller, E. Zaloshnja, and R. Spicer, Revised Cost of Large Truck and Bus Involved Crashes (2002), adjusted to current dollars, and a year 2020 value of a statistical life (VSL); National Highway Traffic Safety Administration (NHTSA), FARS, and CRSS.

In general, research conducted by FMCSA contributes to (1) development of safety technologies for use by State enforcement entities (principally highway patrol and law enforcement departments), as well as by commercial carriers, and (2) recommending best practices to improve driver performance and the safe operation of CMVs by motor carriers, thus contributing to a reduction in crashes. Through the R&T Program's research activities, FMCSA will:

- Better understand the causes and impacts of CMV crashes thereby supporting efforts to develop safety countermeasures to reduce crashes and remove unsafe drivers, vehicles, and carriers from the Nation's roads.
- Support continued progress in the development and testing of CMV safety technologies including advanced driver assistance systems (ADAS) and driver monitoring technologies, as well as advanced braking, tires, steering, lighting, and mirror systems.

- Better understand the safety impacts associated with the adoption of automated CMVs, identify carrier best practices for operating ADS-equipped CMVs, and develop evaluation methods for assessing carrier's safety plans for operating ADS-equipped CMVs.
- Assess the safety impacts of advanced electric and hydrogen-powered CMVs and identify how roadside inspection and evaluation procedures may be impacted.
- Identify, develop, and assess technologies used by enforcement officers when conducting roadside inspections and investigations to increase efficiency and accuracy of vehicle inspections.
- Investigate application of advanced remote and wireless-based concepts for completing vehicle and driver inspections at highway speeds.
- Advance the industry knowledgebase related to driver issues impacting safety such as fatigue, distraction, drug and alcohol use, training, overall health and wellness issues, enforcement actions, and issues related to driver compensation.
- Continue to identify and refine carrier best practices for maintaining and operating CMVs as well as for training and monitoring driver safety performance.
- Assess road network and infrastructure issues impacting CMV safety, including issues related to truck parking.
- Advance the Department's strategic goals through mission-specific research.

Ultimately, FMCSA's R&T efforts will contribute to the Agency's mission of reducing the number and severity of CMV-involved crashes on the Nation's highways, saving lives and reducing associated economic costs.

Evaluation and Performance Measurement

FMCSA's R&T Program focuses on (1) supporting the safety goals and regulatory priorities of the Agency's other program offices, and (2) directives from other Federal organizations (e.g., Congress, the Government Accountability Office (GAO), etc.). The R&T Program has specific annual performance goals, which demonstrate the program's outputs and impact across multiple research areas in support of FMCSA's safety mission and the Department's strategic goals. To ensure continuing integration with Departmental objectives, and to prevent duplicative research, the R&T Program participates in OST-R biannual research reviews.

The R&T Program evaluates its own performance across the categories of mission support, successful deployments of technologies by State partners funded by the Innovative Technology Deployment (ITD) Grant Program, publication of research reports, and customer feedback. These categories inform internal processes for measuring, sustaining, and improving performance.

The R&T Program establishes performance baselines, both at the program level and at the project level. Project statements of work establish deliverables, milestones, and monitoring plans. Contracted research teams submit monthly reports detailing progress and R&T Program staff continually monitor these projects to ensure baselines are met.

The R&T Program also has several mechanisms in place for analyzing emergent trends and evaluating the benefits created through USDOT-sponsored research. First, the R&T Program collaborates closely with other USDOT modes, participating in multiple working groups and coordinating joint research efforts when developing annual research plans. By participating in the USDOT RD&T Planning Team, the R&T Program works to harmonize its efforts with those of other USDOT modes, ensuring cross-modal collaboration and efficient use of Federal resources.

Next, the Agency's Research Executive Board (REB) review process includes discussion of the justification for each research initiative; if REB members are aware of other research efforts being conducted by other Federal or State agencies, or private organizations, the research idea is re-evaluated and/or removed from the budget request. The REB considers the potential benefits and risks of funding proposed research projects and makes recommendations accordingly.

The R&T Program also works closely with State governments and agencies and external stakeholders (e.g., industry associations and research institutes) to ensure the Agency's research and technology portfolio addresses current needs in the transportation safety environment. By maintaining regular communication with the States, independent committees, and industry stakeholders, FMCSA stays apprised of non-agency-funded research efforts and uses that knowledge to inform its research plans.

Table 1 - FY 2024 RD&T Program Funding Details

RD&T Program Name	FY 2024 President's Budget Request* ($000)	Applied ($000)	Technology Transfer ($000)	Facilities ($000)	Experimental Development ($000)	Major Equipment, R&D Equipment ($000)
Research & Technology	$41,083	$12,478	$400	$460	$3,745	$0
Totals	$41,083	$36,478	$400	$460	$3,745	$0

The AMRP reflects funding as found in the annual President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The enacted numbers will be posted as part of the President's budget request for the ensuing fiscal year.

Table 2 - FY 2024 RD&T Program Budget Request by DOT Strategic Goal

RD&T Program Name	FY 2024 President's Budget Request* ($000)	Safety ($000)	Economic Strength and Economic Competitiveness ($000)	Equity ($000)	Climate and Sustainability ($000)	Transformation ($000)	Organizational Excellence ($000)
Research & Technology	$41,083	$34,077	$378	$324	$649	$4,255	$1,400
Totals	**$41,083**	**$34,077**	**$378**	**$324**	**$649**	**$4,255**	**$1,400**

The AMRP reflects funding as found in the annual President's budget request per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning. The enacted numbers will be posted as part of the President's budget request for the ensuing fiscal year.

Chapter 1 – FY 2024 RD&T Programs
Program Name: Research & Technology
($41,083)

Program Description:

The FMCSA R&T Program provides scientific safety research on driver behavior, vehicle and carrier operations, and relevant technology. These contributions have proven critical in supporting Agency safety rulemakings, identifying enforcement priorities, and facilitating technology transfer to the marketplace. Program activities include developing enhanced enforcement technologies, promoting safe rest habits for drivers, evaluating the safety implications of automated and semi-automated vehicles, and improving database depth and utilization. These projects provide foundations for the Agency's rulemaking and enforcement priorities. The R&T Program is mandated under 49 USC 31108. It advances FMCSA focus areas and DOT strategic goals of Safety, Economic Strength and Global Competitiveness, Equity, Climate and Sustainability, Transformation, and Organizational Excellence.

Major Program Objectives:

- **Produce Safer Drivers:** Develop driver-based safety countermeasures to reduce crashes.
- **Improve Safety of Commercial Motor Vehicles (CMVs):** Improve truck and motorcoach safety through vehicle-based research and the deployment of CMV safety technologies.
- **Produce Safer Carriers:** Improve motor carrier safety by compiling and communicating best management practices to motor carriers and working with industry to accelerate adoption of safety-enhancing technology.
- **Advance Safety and Research through Information-Based Initiatives:** Support Agency research efforts by: (1) evaluating existing research to highlight areas for additional study, (2) investigating the overall business, economic, and technical trends in the CMV industry, and (3) evaluating potential bases for studying crash data and setting safety goals.
- **Enable and Motivate Internal Excellence:** Ensure the relevance, quality, and performance of research and technology activities and develop efficient methods to respond quickly and flexibly to Departmental and Agency needs.

Anticipated Program Activities:

FMCSA's Research and Technology (R&T) Program provides scientific research on driver, vehicle, and carrier issues impacting CMV safety. The R&T program also conducts cross-cutting research related to safety data collection and information sharing. FMCSA R&T activities support the Department's National Roadway Safety Strategy (NRSS) and the Department's FY 2022-2026 Strategic Plan.

Driver-related research impacts safety performance in a variety of areas, including, but not limited to distraction, drowsiness, medical conditions, drug and alcohol use, in-cab

human factors, hours-of-service rules, and factors impacting attainment and revocation of a commercial driver's license (CDL).

Vehicle research focuses on the application of technologies, systems, and operating concepts to reduce crash risk and includes research on advanced driver assistance systems (ADAS) and automated driving systems (ADS), as well as improvements in traditional vehicles safety system such as brakes, steering, mirrors, and lighting. In addition to addressing safety concerns, vehicle research is an opportunity to advance the Department's climate change goals, for example, research related to emergence of alternative fuels and electric/battery powered CMVs, and potential efficiency and environmental benefits associated with the implementation of "connected vehicle" technology. Research on leveraging advanced monitoring and diagnostic technologies to improve motor vehicle screening by State CMV enforcement agency partners at the roadside is also included with a focus on improving both the thoroughness and efficiency of safety screening processes.

Carrier-related research focuses on evaluating, refining, and developing new and existing carrier safety assessment tools, methods, and data management systems utilized in carrying out the Agency's carrier oversight responsibilities. The R&T program also conducts research to identify industry best practices for a variety of carrier-based management responsibilities and functions that impact safety including driver compensation plans and practices; driver training and retention issues; and vehicle maintenance and inspection practices.

Cross-cutting research completed under the R&T program often focuses on enhanced data collection and information sharing activities, as well as on technologies and oversight processes with the potential to positively impact safety across multiple dimensions involving driver, vehicle, and carrier safety.

For FY 2024, the R&T program will continue its emphasis on research related to enhancing the safety of drivers, vehicles, and carriers, while expanding research in automated driving systems, electric vehicles, and roadside screening technologies, as well as driver employment, licensing, and fitness. While the R&T program is primarily directed at improving safety, projects and programs often address other DOT strategic goals. For each activity highlighted in the following sections, its contribution to one or more of DOT's strategic goals is noted.

Safer Drivers

- **Driver Fitness:** The Federal Motor Carrier Safety Regulations define the medical and physical conditions required to obtain the Commercial Driver's License (CDL) Medical Certification. Past research evaluated the standards for vision, diabetes, and seizures to determine if they are consistent with the latest medical research

and provide recommendations for updates. Future research will examine other areas of the medical certification regulations, such as hypertension and length of the certification, to ensure CMV driver examinations and certifications stay current with the evolving field of medicine. (DOT Strategic Goals supported: ***Safety, Equity***)

- **CDL Qualifications:** FMCSA will continue research into CDL violation topics including driver disqualification, convictions, and proper adjudication processes to ensure CMV drivers are properly licensed to operate and drivers with violations are properly detected and/or disqualified by law enforcement personnel. (DOT Strategic Goals supported: ***Safety, Economic Strength***)
- **CMV Driver Fatigue** will remain an important area of focus for the R&T program. Support will continue for the North American Fatigue Management Program to ensure the content of the training courses and materials keeps pace with the latest understanding of task monotony and fatigue/hypo-vigilance, also known as passive fatigue. In addition, two Phase II Small Business Innovative Research (SBIR) projects will proceed with creation of prototypes for two different Driver Readiness Assessment technologies that will determine the level of driver alertness prior to the start of a driving shift. (DOT Strategic Goals supported: ***Safety, Equity, Transformation***)

Safer Vehicles

Recent FMCSA research has documented empirical safety data that commercial fleets using ADAS, such as automatic emergency braking and forward collision warning systems, have experienced significant reductions of CMV rear-end crashes . FMCSA will continue to partner with the motor carrier industry to promote the adoption of ADAS by fleets and drivers and measure deployment growth levels through the Agency's Tech-Celerate Now Program. The R&T program will conduct further research to quantify the safety benefits of newer ADAS such as camera-based mirror systems and automated steering assisting systems. (DOT Strategic Goals supported: ***Safety, Transformation, Climate & Sustainability***)

- Automated vehicles may improve safety and reduce environmental impacts by preventing and mitigating crashes. Some automation applications may also improve fuel efficiency, though studies of real-world effects are still seeking to quantify benefits. R&T's **Automated CMV Evaluation (ACE) Program** will continue track-based proof-of-concept testing of interactions between law enforcement officials and other roadside public safety officials and self-driving trucks using FMCSA's research vehicles. These tests will inform the development of national uniform consensus standards for the safe interaction of roadside truck inspectors, emergency responders, work zone workers, and others with self-driving trucks.

This program will support and prepare State roadway officials. Results from the program shape development of functional specifications for Motor Carrier Safety Assistance Program (MCSAP) and High Priority-Innovative Technology Deployment grant applications. (DOT Strategic Goals supported: ***Safety, Transformation, Climate & Sustainability***)

- The **Commercial Motor Vehicle Roadside Technology Corridor (CMVRTC)** is a collaboration between FHWA and State Departments of Transportation on developing a national framework for sharing standard data elements and following uniform operational procedures to reduce CMV crashes in work zones. These efforts will enable existing connected CMVs and future semi- and fully automated CMVs to safely navigate work zones and be alerted to slow moving traffic ahead due to other incidents and congestion. (DOT Strategic Goals supported: ***Safety, Transformation, Climate and Sustainability***)

Cross-Cutting Activities

- **Level VIII Inspections.** The Certified Highway Electronic Inspections to Enhance Safety and Reduce Large Truck Emissions Project represents FMCSA's answer to Secretary Buttigieg's Climate Challenge Initiative that he issued to all of the Department's modal administrations. Each year, State and local truck inspectors conduct approximately 2.9 million roadside inspections and screen about 100 million CMVs, causing deceleration/acceleration and excessive idling. This project will require or incentivize the implementation of electronic (in-motion) CMV inspections to reduce idling time (and emissions) at State roadside inspection stations. (DOT Strategic Goals supported: ***Safety, Transformation, Climate and Sustainability, Economic Strength***)
- **Information Sharing.** New R&T Program data-related activities in FY 2024 include improved integration of databases, and efforts to expediently disseminate driver, vehicle, and carrier safety information across State and Federal organizations involved with CMV safety oversight. Selected activities include efforts to incorporate new data sources into existing databases and a study to gather crash data not currently widely collected. (DOT Strategic Goals supported: ***Safety, Transformation***)
- FMCSA's participation in the SBIR Program will continue to stimulate technological innovation, utilize small businesses to meet Federal research and development needs, encourage participation by minority and disadvantaged businesses in technological innovation, and increase private sector commercialization of innovations made possible by Federal research funding. This program helps ensure that small businesses continue to play a key role in technological transformation.

(DOT Strategic Goals supported: ***Safety, Transformation, Equity, Economic Strength, Climate and Organizational Excellence***)

Potential Program Outputs, Outcomes, and Impacts on Technologies and Practices:

Research projects provide evidence for the Agency's rulemaking and enforcement priorities. The R&T Program is mandated under 49 USC 31108 and advances DOT's strategic goals. FMCSA's FY 2024 research portfolio also directly or indirectly supports the principles of the NRSS: Safer People, Safer Roads, Safer Vehicle, Safer Speeds, and Post-Crash Care. FMCSA's research efforts are focused, results-based, measurable, and result in documented and communicated findings to support both industry and State government organizations involved in improving CMV safety. In addition, FMCSA's research program surveys and interacts with the technology ecosystem of the CMV industry. FMCSA's active involvement with technology results in the selection of highly relevant, and impactful technology-related research projects. On a periodic basis, FMCSA coordinates with OST-R to scan their entire research and technology profile, as required by regulation, to document the outputs and outcome of research as it relates to the impact on technologies and rule-making.

Potential Economic or Societal Impacts:

CMV crashes can result in loss of life, debilitating injuries, and significant damage to property and surrounding infrastructure. Since 2009, fatal crashes involving large trucks have steadily increased to 5,199 fatal crashes in 2021, a 74.3 percent increase. Over that same time, non-fatal crashes involving large trucks increased by 76.3 percent to an estimated 499,000 such crashes in 2021. Additionally, from 2009 to 2021 the number of FMCSA regulated motor carriers increased by 46 percent to 757,652, and the number of drivers increased by 38 percent to 5,646,722. FMCSA's research activities help the Agency target its limited resources to the highest-risk carriers and develop programmatic initiatives that address the most important driver, carrier, and CMV safety issues. Ongoing and planned programmatic activities support and improve safety, foster innovation in transportation, and utilize data to justify greater investment.

Potential Progress Made Toward Achieving Modal Strategic Goals:

The research completed by the R&T program has proven critical in supporting Agency safety rulemakings, identifying enforcement priorities, and facilitating technology transfer to the marketplace. Example program activities range from developing enhanced enforcement technologies, promoting safe rest habits for drivers, evaluating the safety implications of automated and semi-automated CMVs, and improving safety-related data sharing systems.

By completing targeted research activities in FY 2025, FMCSA will better understand the causal factors and impacts of CMV crashes and inform efforts to develop safety

countermeasures to reduce crashes and advance the Department's strategic goals. More detailed information about FMCSA's research priorities can be found in Exhibit IV of this document.

Collaboration Partners:

Internal Collaboration Partners

The R&T Program is working with the National Highway Traffic Safety Administration (NHTSA) on a project to improve data availability on CMV crashes by identifying new data sources and analyzing near real-time crash data from State partners. FMCSA is also working with NHTSA to test and evaluate ADAS and ADS technologies. FMCSA works with FHWA and the Intelligent Transportation Systems Joint Program Office (ITS/JPO) to answer research questions related to automated and connected CMVs and associated human factors issues, heavy vehicle crash avoidance and enterprise data, and the accelerated deployment of CMV driver assisting safety technologies. FMCSA also participates in the Department's multimodal intersection safety initiatives including the Department's Intersection Safety Challenge (https://its.dot.gov/isc/) focused on reducing costs of advanced intersection safety technologies, and on the Public Safety Awareness Technology Evaluation (PSATE) program which focuses on identifying and evaluating emerging safety technologies—with an initial focus on technologies that address pedestrians, cyclists and other vulnerable road users (VRUs).

External Collaboration Partners

The R&T Program regularly receives, reviews, and responds to safety-related CMV driver, carrier, and vehicle research and policy recommendations from the National Transportation Safety Board (NTSB), the National Academy of Sciences (NAS), the Transportation Research Board (TRB), the Committee on National Statistics (CNSTAT), the Motor Carrier Safety Advisory Committee (MCSAC), and other organizations. FMCSA evaluates recommendations from these organizations and adjusts the R&T Program's agenda as needed. When appropriate, the R&T Program partners with external organizations—such as the National Institute of Occupational Safety and Health (NIOSH), the Department of Energy, the U.S. Army, and the Commercial Vehicle Safety Alliance (CVSA)—to conduct relevant CMV driver, carrier, and vehicle safety research. The R&T Program also maintains close contact with the motor carrier industry, collaborating with industry associations and motor carriers to advance safety improvement efforts.

Chapter 2 – FY 2025 RD&T Programs

The AMRP FY 2025 outlook year chapter in the annual plan is not developed in alignment with the President's budget request of the same year due to the AMRP development schedule per 49 U.S.C. Chapter 65 Sec. 6501 Research Planning.

Program Name: Research & Technology

Program Description:

The Federal Motor Carrier Safety Administration's (FMCSA) Research and Technology (R&T) Program provides scientific safety research on driver behavior, vehicle and carrier operations, and relevant technology. These contributions have proven critical in supporting Agency safety rulemakings, identifying enforcement priorities, and facilitating technology transfer to the marketplace. Program activities include developing enhanced enforcement technologies, promoting safe rest habits for drivers, evaluating the safety implications of automated and semi-automated vehicles, and improving database depth and utilization. These projects provide foundations for the Agency's rulemaking and enforcement priorities. The R&T Program is mandated under 49 USC 31108. It advances FMCSA focus areas and DOT strategic goals of Safety, Economic Strength and Global Competitiveness, Equity, Climate and Sustainability, Transformation, and Organizational Excellence.

Major Program Objectives:

- **Produce Safer Drivers:** Develop driver-based safety countermeasures to reduce crashes
- **Improve Safety of Commercial Motor Vehicles (CMVs):** Improve truck and motorcoach safety through vehicle-based research and the deployment of CMV safety technologies.
- **Produce Safer Carriers:** Improve motor carrier safety by compiling and communicating best management practices to motor carriers and working with industry to accelerate adoption of safety-enhancing technology.
- **Advance Safety and Research through Information-Based Initiatives:** Support Agency research efforts by: (1) evaluating existing research to highlight areas for additional study, (2) investigating the overall business, economic, and technical trends in the CMV industry, and (3) evaluating potential bases for studying crash data and setting safety goals.
- **Enable and Motivate Internal Excellence:** Ensure the relevance, quality, and performance of research and technology activities and develop efficient methods to respond quickly and flexibly to Departmental and Agency needs.

Anticipated Program Activities:

Data-Driven Activities

Activities from 2024 are anticipated to extend into 2025, continuing to address focus areas such as improving and expanding upon current data collection capabilities. This includes considering research activities to improve linking crash data among existing crash databases, such as the Motor Carrier Management Information System and the Fatality and Analysis Reporting System.

AV Technology Activities

Work zone and incident areas, which are prone to congestion and often feature narrowed shoulders and complex signage, remain a hazardous space for interactions between vehicles, including CMVs. In FY 2025, the R&T Program work with FHWA and State Departments of Transportation on developing a national framework for sharing standard data elements and following uniform operational procedures to reduce CMV crashes in work zones. These efforts will enable existing connected CMVs and future semi- and fully automated CMVs to safely navigate work zones and be alerted to slow moving traffic ahead due to other incidents and congestion.

Electronic screening may provide means of improving the rate of **necessary, targeted inspections of passenger carrier vehicles.** Currently, these vehicles are usually inspected only at waypoints, and potential issues or problems most visible mid-journey may go unaddressed for thousands of miles. Electronic screening methods may enable swift and effective intervention to identify risky vehicles and remove them from the roadway.

Regulatory Activity, Enforcement, and Safety Activities

FMCSA will continue research beginning in FY 2024, including the **Impact of Driver Compensation on Safety and Retention**, the **Impacts of Driver Detention Time on Safety**, and the **SDAP**. In addition, the R&T Program will continue researching the effectiveness of medical exemption programs to support regulatory activities.

Climate Related Activities

FMCSA will continue research on electric vehicles, including considering research on how CMV drivers may need to adjust their operations and training to accommodate charging of electric CMVs during trips. Additionally, FMCSA will continue research on automated enforcement technologies to reduce emissions caused by vehicle idling and waiting.

FMCSA will also undertake research on the potential for Level VIII inspections to enhance safety and reduce truck emissions.

General Technology Activities

The **ITD Program** will continue to foster State agencies' use of advanced technologies to improve their core safety infrastructure, and the **SBIR Program** will continue to promote small business involvement in rolling out new technologies.

For more information on DOT's Research, see: https://researchhub.bts.gov/search