United States Department of Transportation
Annual Modal Research Plans
Fiscal Year 2017

National Highway Traffic Safety Administration

Office of Vehicle Safety Research
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FY 2017 RD&T Program Funding Details

RD&T Program Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
Crashworthiness	16,800		16,800		
Crash Avoidance	12,300		12,300		
Alternative Fuel	1,400		1,400		
Vehicle Electronic and Emerging Technology	54,850		54,850		
Vehicle Test Center - Ohio	500		500		
Highway Safety Research	11,521		11,521		
Autonomous Vehicle Development	200,000		200,000		
Totals	297,371		297,371		

FY 2017 RD&T Administrative Expenses

Admin Expenses	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
	47,338		47,338		

Instructions for RD&T Funding Details: List all RD&T Programs for FY 2017 along with funding as heading describes. Funding request amounts must be the same as reported in the RD&T Budget Exhibits, all costs, including administrative and other "non-program" expenses must be included. Report funding by Type of Research for all FY 2017 RD&T Programs. Reference OMB Circular No. A-11 for definitions of Basic Research, Applied Research and Development.

FY 2017 RD&T Program Budget Request by DOT Goal(s)

RD&T Program Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
Crashworthiness	16,800	16,800				
Crash Avoidance	12,300	12,300				
Alternative Fuel	1,400	1,400				
Vehicle Electronic and Emerging Technology	54,850	54,850				
Vehicle Research and Test Center (Ohio)	500	500				
Highway Safety Research	11,521	11,521				
Autonomous Vehicle Development	200,000	200,000				
Totals	297,371	297,371				

Instructions for FY 2017 Program Budget Request by DOT Goal(s): Provide FY 2017 RD&T Program Name and Budget Request as described, by DOT Goal(s), as listed.

Crashworthiness

$16,800
($000)

Program Description:

To focus on vehicle safety countermeasures to reduce the number of fatal and serious injuries that occurs in the United States each year. This research program is responsible for developing and upgrading test procedures for evaluating motor vehicle safety and developing the test devices, such as crash test dummies, and appropriate injury metrics. Crashworthiness research encompasses new and improved vehicle design, biomechanics and injury causation, field data collection and analysis of serious injury cases, safety countermeasures and vehicle equipment to enhance occupant safety.

Instructions for FY 2017 Program Descriptions: Provide description of at least a paragraph for each FY 2017 RD&T Program.

Program Objectives:

The purpose of this research program is to investigate the problems of vehicle crash safety and associated factors (e.g. vehicle design, human response/injury tolerance) that contribute to serious injuries and fatalities. The near term goal is to identify fatality and injury trends and to enhance safety requirements and best practices to improve crash occupant outcomes.

Instructions for FY 2017 Program Objectives: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

Continue crash data evaluation, detailed field data collection and analysis, assessment of human injury response and tolerance, and safety test and test device (e.g. test dummy) development through laboratory testing, computer modeling and data evaluation programs. These research programs are designed to leverage private/public partnerships to assess the safety implications of current fleet crash data, vehicle design trends, and ongoing research efforts.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Crashworthiness	NHTSA reviews and uses FMCSA studies on Motorcoach and Heavy truck crashes and fires. NHTSA reviews PHMSA standards on Lithium ion battery safety. NHTSA collaborates with FHWA on developing and conducting crash simulation models.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crashworthiness research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Expected Program Outcomes:

Research in vehicle crashworthiness has shown substantial benefits in several recent rules. Improved roof strength (FMVSS 216) and ejection mitigation technologies (FMVSS 226) have been shown to save several hundred lives per year after full implementation. Current proposed rulemaking for side impact testing and improved ease-of-use of child restraint systems were developed through safety systems research as were the many new test devices (THOR and WorldSID) and test conditions (frontal oblique) being proposed for use in the NCAP program.

The proposed efforts for 2017 will help support agency decisions in fuel economy, frontal and side crash safety, occupant containment, advanced occupant restraint performance. Additionally, 2017 efforts will support NCAP implementation of THOR and WorldSID front

and side impact adult test dummies and associated new injury criteria, development of advanced child dummies, continued detailed field data collection of serious injury cases (CIREN) and publication of cases, research on injury mechanisms/tolerances for vulnerable populations, and the continued development and application of advanced mathematical models of human occupants and pedestrians.

Crash Avoidance
$12,300
($000)

Program Description:

NHTSA has identified the need for an increased emphasis on crash avoidance technologies with significant potential to reduce fatalities and injuries by preventing the crash from occurring, or significantly reducing the severity of crashes by providing timely warnings to the driver to take appropriate action. Such technologies also may support automatic braking or steering interventions to provide additional safety benefits. Further, crash avoidance systems are precursors, and necessary building blocks, for automated vehicles which are beginning to appear in vehicle manufacturers' product development plans—and are even emerging in the marketplace today in early forms.

Instructions for FY 2017 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Program Objectives:

NHTSA will continue to fulfill its mission of saving lives, preventing injuries, and reducing traffic related health care and other economic costs, by facilitating the development, deployment, and evaluation of safety products and systems. Among other things, this involves research into the science of crash avoidance to enable the development and evaluation of safety-enhancing products. The agency will continue to establish the safety goals for crash avoidance technology, develop performance guidelines and specifications for crash avoidance systems, evaluate the safety performance of such systems, and work with industry to demonstrate the most promising ones and to facilitate their deployment in the marketplace. These activities will be accomplished through the combined efforts of NHTSA, the automobile industry, and other technology companies, contractors, and academia working together under cooperative programs and partnerships that are sponsored by NHTSA.

Instructions for FY 2017 Program Objectives: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

The program utilizes several methods and research tools to complete crash avoidance system development and evaluation. These include: development of objective test procedures for characterizing performance of production and/or prototype systems; establishing performance metrics for crash avoidance technologies that ensure a safety benefits are indeed realized; using modeling , simulation, and hardware-in-the-loop evaluation methods to accelerate testing as well as allow for examining system operations and performance under conditions that are either difficult or unsafe to complete using test-track methods; implementing real world field testing of the technologies to better understand system reliability, performance and customer acceptcance aspects; and conducting a variety of market and technology research to better understand future developments and direction of crash avoidance technologies.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes:

This research program directly supports several critical areas of agency rulemaking and policy development related to passenger vehicle crash avoidance. For example, past successful research was completed on Electronic Stability Control (ESC), which supported the agency's rulemaking effort of development and promulgation of the recent safety standard requiring passenger vehicle ESC. These ESC systems are estimated to save as many as 10,000 lives annually. The light vehicle crash avoidance program has completed a large body of research on driver assistance technologies that present safety warnings to drivers, technologies to modify unsafe driving behaviors such as distraction and alcohol impairment, and technologies to enhance the safety of vulnerable and at-risk populations such as teen drivers, older drivers and visually-impaired pedestrians. Most recently, the research conducted within the Crash Avoidance area is used to support decision making related to the potential inclusion of specific technologies in NHTSA's New Car Assessment Program program—thus advancing the deployment of such life-saving technologies within the marketplace.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Crash Avoidance	NHTSA reviews and uses FAA, FRA, and, Maritime research in the areas of automated vehicles (for safety assessment, certification, standards), and cybersecurity (protections, approaches, policies, etc.). NHTSA collaborates with ITS JPO and FHWA on V2V and V2I research, DSRC spectrum testing, Automated Vehicles research (e.g. benefits assessment), and vehicle cybersecurity research (joint investment in NHTSA developing applied capabilities to develop best practices). Collaborates with FMCSA on heavy vehicle crashworthiness research and rulemaking considerations and research for heavy vehicles (e.g. Electronic Stability Control rulemaking for trucks).

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crash avoidance research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Alternative Fuels Vehicle Safety
$1,400
($000)

Program Description:

Recently introduced vehicle engine technologies including hydrogen and advanced lithium ion battery vehicles are evolving at a fast rate. Additionally, the recent increase in Compressed Natural Gas (CNG) fueled heavy trucks has fueled concerns regarding the safety of these vehicle systems. NHTSA intends to continue the introduction new requirements to address the unique safety considerations for these evolving vehicle types. Federal safety regulations have not kept pace with the introduction of the more established lithium ion battery and CNG fueled vehicles. These technologies present new safety considerations not previously addressed in the Federal motor vehicle safety standards. The Alternative Fuels Vehicle Safety program supports the Department's Environmental Sustainability goals.

Instructions for FY 2017 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Program Objectives:

NHTSA is developing objective safety performance tests to support the development of a global technical requirement for electric vehicles. NHTSA completed preliminary test procedure development for lithium-ion electric vehicles in FY 2015 and plans additional test refinement for FY 2016 and FY 2017. Once objective tests are developed, the agency must conduct fleet testing to assess the safety implications and to establish baseline safety performance. Additionally, Compressed Natural Gas (CNG) vehicles have cost advantages over gasoline, especially for fleet operations. NHTSA research is required to update our existing standards to ensure the highest levels of safety for future CNG vehicles. These research and rulemaking efforts will also be applied to hydrogen vehicles which use similar storage containers and have similar potential risks. NHTSA must be at the forefront of research to assess the safety of these alternative fuel vehicles, and to develop safety performance requirements to support potential future rulemaking.

Instructions for FY 2017 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

To Continue fleet safety validation testing and data acquisition for analysis of high voltage traction battery systems in support of harmonized requirements, Thermal Propagation testing at full vehicle level to gather data for establishment of pass/fail criteria in regulation, Battery Management System performance, Environmental exposure testing of Li-ion Battery Systems based on the NaCl immersion procedure developed in FY 2016, Continue the development of the "Integrated Impedance Based Systems Diagnostics Technology" scaling up to pack level architecture, Complete development of post-crash battery Stranded Energy assessment and stabilization procedures, Continue battery crash performance modeling program to support assessment of functional safety requirements for battery physical environment and management systems, Complete test requirements for the electric vehicle charging safety, Finalize updated safety performance test procedures for compressed natural gas and hydrogen gas containers. Support development of new safety standards for hydrogen fuel cell vehicles and assist in the upgrade of the existing standards for compressed natural gas vehicles and Continue Liquid Propane Gas (LPG) vehicle system level safety performance research.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes:

The focus of this effort will be to develop research findings and data to support and facilitate the safe operation and deployment of highly automated vehicles, address cybersecurity issues resulting from increased connectivity of advanced technology vehicles, and identify new hazards that may arise in emerging vehicle electronics before they are in production. Through advanced, proactive and collaborative research, these challenges will be addressed in a timely manner such that transformative automated vehicle technologies with proven safety benefits can be introduced sooner. Funding for this program area may also be used to investigate potential defects in electronics and software, and assist in recall or other consumer complaint issues. Thus, NHTSA expects to apply results from this program to meet critical agency near-term goals. Agency data gathering and strategic planning efforts as well as incoming research results will continue to guide agency research in this area.

Vehicle Electronic and Emerging Technology
$54,850
($000)

Program Description:

Provide overall planning, direction, and control for the increased use of electronic controls and connectivity to enhance transportation safety and efficiency. This program advances NHTSA's expertise in vehicle electronics and engineering to address safety and security of emerging electronics and software technologies and their implications to the safety of the motorists and other vehicle occupants. In this program area, research focus is on challenges related to the technical, human factors, safety assurance, testing and validation of road vehicles and their automation in addition to activities that support agency decisions on safety and cybersecurity requirements for vehicle control systems.

Instructions for FY 2017 Program Descriptions: Provide description of at least a paragraph for each FY 2017 RD&T Program.

Program Objectives:

Given the rapid, accelerated pace of vehicle technology advancement and the related issues that result such as cybersecurity, this program conducts the critical research activities that are necessary to maximize the safe deployment of highly automated vehicles and ensure that key electronics issues such as cybersecurity are addressed.

In FY 2017, the Vehicle Electronics and Emerging Technologies program will build upon research completed in FY 2016 and initiate new projects to close identified gaps in support of agency decisions on automated vehicles, as well as electronics reliability and cybersecurity.

Instructions for FY 2017 Program Objectives: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

In FY 2017 additional funding of $51.2 million above the FY 2016 enacted level allows this program to address critical additional research activities such as:

- **Automation and Emerging Technologies:**
- Continued and expanded research supportive of safety performance requirements for highly automated vehicles

- New research to develop novel simulation methods, tools, and testbeds needed to test and evaluate highly automated vehicle systems
- New research to assess artificial intelligence (AI) capability needs for varying levels and concepts of automation.
- New field operational tests to assess user acceptance, new driver training needs, system performance, and safety benefits of highly automated vehicles.
- Support the development of test procedures for new crash avoidance technologies that support automation
- Continued and expanded research to increase the resiliency and functional safety of automotive electronics systems used in automated vehicles, including software
- Research to support human factors requirements for automated vehicles to ensure safe driver transitioning between manual and automated driving modes
- New research to develop data capture needs for technologies that support vehicle automation
- Support for establishing and running a new Federal Advisory Committee (FACA) on automated vehicles.
- Support collaborative research with international stakeholders and governments to leverage research data from the international community to establish stronger basis for global standards and methods
- **Cybersecurity:**
- Continue research to evaluate the effectiveness of cybersecurity countermeasures and methods to harden vehicles against malicious attacks. This would include (but may not be limited to): secure boot, hardware security modules, intrusion detection systems, advanced firewalls and gateways as well as securing over the air updates.
- Develop and evaluate “red team” test procedures that can be used by the agency and others to evaluate vehicle cybersecurity.
- Support research and testing at NHTSA’s Vehicle Research and Test Center including developing and refining the agencies capability to perform vehicle penetration testing to assist in validating the robustness of industry cybersecurity systems.
- Provide support to perform collaborative research with other government agencies (e.g. NIST) to evaluate the robustness of industry guidelines
- Initiate research into extended data logging needs to capture electronic system data to support investigation and analysis of incidents and events to differentiate between malfunctions, system faults, hacking attempts, and user errors
- Research the feasibility and challenges of using formal methods (mathematical proofs) intended to eliminate intentional (or unintentional) software coding errors or modifications.
- Fund a new National Academies review of NHTSA’s cybersecurity efforts
- Support additional research for any remaining regulatory issues related to the cybersecurity of V2V communication interfaces
- Expand research of heavy-vehicle (HV) cybersecurity to address unique HV issues

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes:

The focus of this effort will be to develop research findings and data to support and facilitate the safe operation and deployment of highly automated vehicles, address cybersecurity issues resulting from increased connectivity of advanced technology vehicles, and identify new hazards that may arise in emerging vehicle electronics before they are in production. Through advanced, proactive and collaborative research, these challenges will be addressed in a timely manner such that transformative automated vehicle technologies with proven safety benefits can be introduced sooner. Funding for this program area may also be used to investigate potential defects in electronics and software, and assist in recall or other consumer complaint issues. Thus, NHTSA expects to apply results from this program to meet critical agency near-term goals. Agency data gathering and strategic planning efforts as well as incoming research results will continue to guide agency research in this area.

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Vehicle Electronic and Emerging Technology	NHTSA will continue to collaborate with ITS JPO, FHWA and FMCSA on V2V, Automated Vehicles (Human Factors research, standards research), and cybersecurity. We also plan to collaborate with FMCSA on cybersecurity best practices for heavy vehicle aftermarket devices.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crash avoidance research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Vehicle Research and Test Center - Ohio
$500
($000)

Program Description:

The Vehicle Research and Test Center (VRTC) is NHTSA's in-house research, development, test and evaluation facility located in East Liberty, Ohio. Activities conducted at VRTC support agency programs including safety defect investigations, updates to Federal Motor Vehicle Safety Standards, test procedure development for new regulatory actions and agency consumer information programs, test dummy development, injury criteria development, advanced research into cutting edge technologies, and safety issues that require quick reaction. The full range of testing and research capabilities available to NHTSA at VRTC allows the agency to address emerging technologies and safety issues and access to world class testing facilities similar to those used by automotive suppliers and manufacturers.

Instructions for FY 2017 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Program Objectives:

Modern vehicles have evolved greatly over the last 35 years, and the advent of modern electronic controls, alternative fuels, and electric powertrains will drive that evolution even farther in the very near future. NHTSA has recognized the need to enhance the capabilities

at VRTC for testing and analyzing emergent advanced technologies and other vehicle electronic systems. While enhancement of research capability in several areas has been identified, the most near term critical areas are in cyber security, electronics reliability, and automated driving that span all of the agency's vehicle safety programs. Enhancement of capabilities for material composition and failure analysis, particularly of electronic components, is also critical. With this FY 2017 funding, NHTSA will work with the General Services Administration (GSA) to finalize a long-term lease that may include additional testing and vehicle preparation space. Funding will cover expenses associated with GSA's development of the lease, any architectural drawings, and etc. Equipment needed to conduct research and analysis of advanced emergent technologies, electronics, cyber security and reliability assessments for establishment of performance requirements and defect investigations will also be procured. In addition, with alternative fuel systems of varying types and new sophisticated electronic control systems emerging in the market, NHTSA needs to maintain a well-equipped and dedicated center to test, monitor and investigate these and other new technologies.

Instructions for FY 2017 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

High priority research programs that will be conducted at VRTC in FY 2017 include:

- Occupant protection research including Supporting a final rule for updating the frontal impact child safety requirements.
- Ttest procedure development for advanced technology and control systems (such as vehicle-to-vehicle communications)
- Automated vehicle research,
- Cyber security research,
- Defect investigations.
- Test dummy development and injury criteria research

- Procurement of critical test equipment: Necessary procurements include equipment for defect investigations, safety assessment and procedures development of automated vehicles, cyber-security, and new sophisticated electronic control systems emerging in the market. Considerations for upgrading testing capabilities include instrumentation, hardware, software and equipment for the following:Material and component composition/failure analysis,
- Advanced technology and controls,
- Automated vehicles,
- Cyber security, and
- Electronics reliability.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes:

The expertise and technical capability of NHTSA's Vehicle Research and Test Center has been well demonstrated during the past 38 years. Numerous high profile programs have been successfully completed by the Center in an expeditious and thorough manner. However, providing the capability of advanced testing of emergent technologies is necessary to maintain pace with the rapid appearance of new electronics and advanced technologies. This program will provide the equipment and state-of-the-art facilities necessary to assess and investigate the rapid emergence of advanced automotive electronics technologies to assure the highest level of automotive safety for the American public.

Highway Safety Research

$11,521

($000)

Program Description:

Highway Safety Research directly supports the Department and agency goals of reducing traffic crashes, fatalities and injuries by providing the scientific basis for the development of effective behavioral countermeasures to reduce the occurrence of traffic crashes. Behavioral Safety Research focuses on unsafe driving behaviors that contribute significantly to death and injury from crashes on our highways. Evaluation research documents the relative effectiveness of programs to reduce fatalities and injuries on our highways, and is critical to achieving further progress toward meeting national goals and performance targets. The results of the Highway Safety Research program assess existing and emerging highway safety problems and are disseminated to the States to use to identify effective traffic safety countermeasures for implementation through the highway safety formula grant (Section 402) funds and incentive grant funds (Section 405). Our highway safety research studies can be found at: www.nhtsa.gov/Driving+Safety/Research+&+Evaluation.

Program Objectives:

This research program is designed to find ways to change the behavior of drivers and other roadway users so increase safe behavior (seat belt use, child seat use, protective gear use

by motorcycle riders, etc.) and reduce unsafe behaviors (alcohol and drug impaired driving, texting, speeding, etc.) that are critical to achieving further reductions in motor vehicle crashes, deaths and injuries. Behavioral research provides an evidence-based foundation for State and community traffic safety programs. Research is needed to identify more effective and efficient countermeasures for existing traffic risks such as alcohol- impaired driving, drugged driving, speeding and non-use of seat belts, and to develop new solutions for emerging and resurgent problems such as pedestrian and bicyclist safety, motorcycle safety, driver fatigue and distracted driving.

Instructions for FY 2017 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities: During FY 2017 the Highway Safety Research Program will continue to build on the accomplishments of FY 2016. Below are examples of research activities planned for FY 2017:

Impaired Driving – The alcohol impaired driving research program will complete research on the effectiveness of different intensities of high visibility enforcement on drinking and driving behavior, complete an examination of the utilization of ignition interlock data for offender monitoring and offender rehabilitation, complete a study to identify promising underage drinking and driving countermeasures based on available information, and complete an evaluation of a demonstration of the "Community Oriented Policing" model as applied to alcohol-impaired driving enforcement.

Drug Impaired Driving – The drug impaired driving research program will continue research to develop a field test to detect drivers who have recently used marijuana (THC), continue a large scale study of the role of drugs and alcohol in fatal and serious injury crashes, complete a series of critical research investigations to determine the effects of different policies related to marijuana and the prevalence of drug-impaired driving in selected States and a study on the different State policies related to marijuana control and driving safety, and initiate a study of the role of marijuana use by drivers involved in crashes in which failures of executive function, cognition and reaction time appeared to have played a role.

Occupant Protection – The occupant protection research program will complete research to demonstrate less resource intensive programs designed to maintain high seat belt usage rates, complete a study of part-time or occasional seat belt use using naturalistic driving data that will examine a variety of factors in determining when and where occasional users

wear their seat belts, develop and test new strategies to increase seat belt use in rural areas and other locations with low seat belt use.

Pedestrian and Bicycle Safety – The pedestrian and bicycle research program will complete a study on the involvement of distraction in pedestrian crashes, develop a pedestrian and bicyclist countermeasure primer for highway safety professionals and conduct a follow-up study of the long-term impacts of high visibility enforcement on driver compliance with pedestrian right-of-way laws.

Motorcycle Safety – The motorcycle safety research program will complete a study that examines factors that may contribute to higher motorcycle helmet use rates in some States without universal helmet laws, release initial results of a naturalistic riding study

designed to better understand motorcycle riding behavior, risk taking, and willingness to engage in unsafe riding behaviors, and complete and release a State of the Knowledge report regarding motorcycle safety for use by State highway safety offices.

Speeding – The speeding research program will complete a study using data from the SHRP-2 Naturalistic Driving Data to better understand a number of questions related to speed-related behavior, including the relationship between speeding and crashes and near crashes and complete and release a new National Traffic Speeds Survey that measures travels speed on a representative sample of U.S. roadways and look at the trends in driving speeds across the country by roadway type and location.

Older Drivers – The older driver research program will complete a naturalistic study of changes in older drivers' driving habits after the State imposes restriction on their driver licenses, initiate a study of older drivers' self-regulation and driving exposure that will focus on the extent to which older drivers change their driving habits as their functional skills (vision, cognition, reaction time, and other aspects of driving performance decline with aging).

Young and Novice Drivers – The young and novice driver research program will complete a study of monitoring and alerting technologies designed to assist novice drivers in improving their driving performance, complete a field test of hazard perception training to determine whether it reduces subsequent crashes for novice drivers.

Distracted Driving – The distracted driving research program will complete and release a new national survey of attitudes and behavior toward distracted driving by the public, continue research on how to convince drivers of the risks of multitasking while driving and continue to assess ways to measure and mitigate the lack of attention to the driving task (e.g., mind wandering).

Driver Fatigue – The driver fatigue research program will continue to develop and test countermeasures for high risk populations that include public safety personnel and other drivers exposed to shiftwork, and strategies for reaching high- risk populations will be developed.

EMS Research – The EMS research program will continue research to monitor and evaluate the adoption of evidence based guidelines currently under development that are designed to provide EMS systems with scientifically validated and more effective pre-hospital care to the American public, and continue research into the scope and nature of the fatigue problem in delivery of EMS services, along with evidenced based guidelines on how to reduce the incidence of ambulance crashes and patient treatment errors in which fatigue played a role.

Expected Program Outcomes:

The results of NHTSA's Highway Safety Research program are used to develop guidance for state and local highway safety programs. The research develops the data that help states and others prioritize their efforts toward the larger contributors to traffic crashes and identifies new trends they should be aware of, while the results of our research and program evaluations help guide them toward spending scare resources on programs with demonstrated effectiveness at reducing crashes, deaths and injuries and the cost of traffic crashes. While we make publicly available at no charge research reports for most individual research and program evaluation projects, this information is summarized bi-annually in a guidance document: Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices (follow this link to see the latest edition: http://www.nhtsa.gov/staticfiles/nti/pdf/812202-CountermeasuresThatWork8th.pdf

For a more extensive list of research and program evaluation reports (with hyperlinks) we put periodically put out a compendium of NHTSA's traffic safety research and evaluation project reports that covers hundreds of studies. The latest version of this compendium can be accessed by following this link: http://www.nhtsa.gov/staticfiles/nti/pdf/811847.pdf

FY 2017 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Highway Safety Research	NHTSA also benefits from research FHWA and FMCSA does in terms of driver behavior. Specifically, FHWA's Advanced Exploratory Research Program has been helpful to NHTSA. NHTSA also collaborates with FHWA and FMCSA on speeding related issues (the three agencies have an intermodal speed team that meets periodically to share project information and occasionally to more formally collaborate on joint projects). NHTSA shares responsibility for pedestrian and bicyclist safety in partnership with FHWA. We have funded a number of focus city grants (along with OST and FHWA) to address pedestrian and bicyclist safety. NHTSA works with the OST Office of Drug & Alcohol Policy & Compliance to ensure the accuracy of alcohol testing performed for the 60,000+ employee's who work in safety sensitive positions, and to provide expert information on drug use by vehicle operators.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct Highway Safety research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Autonomous Vehicle Research
$200,000
($000)

Program Description:

The 21st Century Clean Transportation Plan Investments build on the FAST Act, taking the next steps to reform funding streams and encourage better planning and projects at the State and regional levels through increased investment in various areas and in a series of new, multimodal programs that increasingly cut across traditional siloes, in support of more comprehensive regional strategies that connect communities and support climate and greenhouse gas reduction goals. Autonomous Vehicle Research program is an element of this plan and focuses on deploying safe and climate smart autonomous vehicles to create better, faster, cleaner urban and corridor transportation networks. The Autonomous Vehicle Research Program requests $200 million in FY 2017 and $3.9 billion over 10 years.

Instructions for FY 2017 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Program Objectives:

To accelerate the development and adoption of autonomous vehicles, this program would fund large-scale deployment pilots to test connected vehicle systems in designated corridors throughout the country; and work with industry to ensure a common multi-state interoperability framework for connected and autonomous vehicles.

Instructions for FY 2017 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Anticipated Program Activities:

Over the multi-year period of this program, specific activities will focus on:

> **Development of national policy for safe deployment of automated vehicles:** The FY 2017 funding will build on a range of current efforts in FY 2016, including work within NHTSA to support the real world testing for connected and autonomous vehicles, the development of a national policy on licensing, testing, and information sharing among States and the Federal government.

> **Conduct research in support of safety performance measurement:** Funding will also support the development of tools necessary to measure safety performance of highly automated vehicles including the performance of vehicles electronics.

> **Pilot Deployments:** NHTSA will work with the ITS-JPO to lead multiple pilot deployments of Level 4 automated light duty and heavy duty vehicles researching different approaches to automation in different places.

> **Making Automation Safe From Hacking Through Research on Cybersecurity:** NHTSA will lead a multidisciplinary research effort in ensuring a high cybersecurity posture for Automated Vehicles.

> **Research Grants to Universities To Discover Human-Centered Mobility Solutions:** NHTSA will work with OST-R on a grant program that will address many questions about how automated vehicles should interact with other road users and how they will impact society and urban design.

> **Development of Open Data Sets for Understanding Traffic Situations:** NHTSA will collaborate with and provide funding support for an FHWA-led effort to develop data sets on real world driving situations.

> **Conducting and Funding Advanced Research on Automation Technologies**: Funding through this initiative will yield the development of an advanced research plan for the purpose of keeping the United States in the lead of the development of artificial intelligence and automation technologies.

> **Connected vehicle technology demonstration**: Additional NHTSA research would focus on demonstrating and quantifying the added value of connected vehicle technology.

Instructions for FY 2017 Anticipated Program Activities: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

Expected Program Outcomes:

Automation technologies have enormous potential to save lives, save time and save fuel. These technologies need to be incorporated quickly and safely into our transportation networks by developing interoperable standards that keep all users safe, staying ahead of cybersecurity threats, and ensuring safety standards can adjust to the speed of innovation.

These activities will also build consumer confidence in highly automated vehicle features through the proposed large scale deployment tests with connected and highly automated

vehicles; expedite safe deployment of life-saving technologies; and ensure United States to retain its leadership position in Automated Vehicle technology development.

Instructions for FY 2017 Expected Program Outcomes: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Program.

RD&T Projects
($5.0M or greater)
Fiscal Year 2017

FY 2017 RD&T Project Funding Details

RD&T Project Name	FY 2017 Pres. Budget ($000)	FY 2017 Basic	FY 2017 Applied	FY 2017 Development	FY 2017 Technology
DADDS	$5,400,000		X		
Totals	$5.400,000				

Instructions for RD&T Funding Details: List all RD&T Projects funded at $5.0M or greater for FY 2017 as heading describes. Funding amounts must be the same as reported in the RD&T Budget Exhibits, all costs, including administrative and other"non-program" expenses must be included. Report funding by Type of Research for all FY 2017 RD&T Projects. Reference OMB Circular No. A-11 for definitions of Basic Research, Applied Research and Development.

FY 2017 RD&T Project Budget Request by DOT Goal

RD&T Project Name	FY 2017 Pres. Budget ($000)	Safety	State of Good Repair	Economic Competitiveness	Quality of Life in Communities	Environmental Sustainability
	$5,400,000	X				

Totals						

Instructions for FY 2017 Project Budget Request by DOT Goal: Provide FY 2017 RD&T Project Name and Project Budget Request by DOT Goal, as listed.

Driver Alcohol Detection System for Safety

$5,400,000

October 1, 2017 – September 30, 2018

Project Description:

The Driver Alcohol Detection System for Safety, or DADSS, program is a collaborative research partnership between the Automotive Coalition for Traffic Safety (ACTS), representing 17 automobile manufacturers in the U.S., and the National Highway Traffic Safety Administration to assess and develop alcohol-detection technologies to prevent vehicles from being driven when a driver's blood alcohol concentration (BAC) BAC exceeds the legal limit of 0.08 percent. From its inception, the DADSS program has been, and continues to be, a voluntary, non-regulatory effort. The purpose is to explore the feasibility, the potential benefits of, and the potential challenges associated with a more widespread use of in-vehicle technology to prevent alcohol-impaired driving.

Instructions for FY 2017 Project Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2017 RD&T Project.

Project Objectives:

The goal is to develop a system that can accurately and reliably detect when a driver is above the legal alcohol limit and that could be offered as original equipment in new cars on a voluntary, market-driven basis. The automatic system would be enabled every time the car starts, but unobtrusive so it would not pose an inconvenience to the non-intoxicated driver.

Instructions for FY 2017 Project Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Project.

- **Anticipated Project Activities:**
- Continue research of the breath-based and touch-based sensors by optimizing all critical components for in-vehicle use.
- Accelerate research through new technology innovation such as the use of swept laser in the touch-based sensor and Interband Cascade Laser (ICL) for breath-based sensor
- Initiate the pilot field operational trial for both touch and breath-based sensors

Instructions for FY 2017 Anticipated Project Activities: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Project.

Expected Project Outcomes:

One or more technologies that can could be offered as original equipment in new cars that can accurately and reliably detect when a driver is above the legal alcohol limit**.**

Instructions for FY 2017 Expected Project Outcomes: Provide descriptions of <u>at least</u> a paragraph for each FY 2017 RD&T Project.

FY 2017 Collaboration Partners (Internal DOT)

Project Name	Name of Collaboration Partner(s) (Internal DOT)
	N/A

Instructions for FY 2017 OA Collaboration Partners (Internal DOT): List all collaboration partners between your OA and other DOT OAs.

United States Department of Transportation
Annual Modal Research Plans
Fiscal Year 2018

National Highway Traffic Safety Administration

Office of Vehicle Safety Research
Associate Administrator, Nathanial Beuse

Office of Behavioral Safety Research
Associate Administrator, Jeff Michael
February 2018

FY 2018 RD&T Program Funding Details

Crashworthiness

Program Description:

To focus on vehicle safety countermeasures to reduce the number of fatal and serious injuries that occurs in the United States each year. This research program is responsible for developing and upgrading test procedures for evaluating motor vehicle safety and developing the test devices, such as crash test dummies, and appropriate injury metrics. Crashworthiness research encompasses new and improved vehicle design, biomechanics and injury causation, field data collection and analysis of serious injury cases, safety countermeasures and vehicle equipment to enhance occupant safety.

Program Objectives:

To reduce the number of fatal and serious injuries that occurs in the United States each year through improved vehicle crash safety countermeasures. This research program is responsible for developing crash test dummies and the test procedures used for evaluating motor vehicle safety. The research program includes studying the biomechanics of human injury and to assess the potential for injury using human surrogates. These crash test dummies are then used to develop test methods to assess vehicle safety and improved vehicle countermeasures. The results of the research are assessed through analysis of field crash data and trauma hospital records. Analysis of new vehicle designs, safety equipment and injury trends are used to predict future concerns to continue to enhance occupant safety.

Instructions for FY 2018 Program Objectives: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities:

The purpose of this research program is to investigate the problems of vehicle crash safety and associated factors (e.g. vehicle design, human response/injury tolerance) that contribute to serious injuries and fatalities. The near term goal is to identify fatality and injury trends and to enhance safety requirements and best practices to improve crash occupant outcomes.

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes:

Continue crash data evaluation, detailed field data collection and analysis, assessment of human injury response and tolerance, and safety test and test device (e.g. test dummy) development through laboratory testing, computer modeling and data evaluation programs. These research programs are designed to leverage private/public partnerships to assess the safety implications of current fleet crash data, vehicle design trends, and ongoing research efforts.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Crashworthiness	NHTSA reviews and uses FMCSA studies on Motorcoach and Heavy truck crashes and fires. NHTSA reviews PHMSA standards on Lithium ion battery safety. NHTSA collaborates with FHWA on developing and conducting crash simulation models.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crashworthiness research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Instructions for FY 2018 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Crash Avoidance

Program Description: *NHTSA has identified a continuing need for emphasis on crash avoidance technologies with significant potential to reduce fatalities and injuries by preventing the crash from occurring, or significantly reducing the severity of crashes by providing timely warnings to the driver to take appropriate action. Such technologies also may support automatic braking or steering interventions to provide additional safety benefits. Further, crash avoidance systems are precursors, and necessary building blocks, for automated vehicles which are beginning to appear in vehicle manufacturers' product development plans—and are even emerging in the marketplace today in early forms.*

Program Objectives:

NHTSA will continue to fulfill its mission of saving lives, preventing injuries, and reducing traffic related health care and other economic costs, by facilitating the development, deployment, and evaluation of safety products and systems. Among other things, this involves research into the science of crash avoidance to enable the development and evaluation of safety-enhancing products and systems. The agency will continue to establish safety goals for crash avoidance technology, develop performance guidelines and specifications for crash avoidance systems, evaluate the safety performance of such systems, and work with industry to demonstrate the most promising ones and to facilitate their deployment in the marketplace. These activities will be accomplished through the combined efforts of NHTSA, the automobile industry, and other technology companies, contractors, and academia working together under cooperative programs and partnerships that are sponsored by NHTSA. Research to be completed includes development of objective test procedures; performance metrics; and system effectiveness evaluations. These research products support possible regulatory (FMVSS) or voluntary adoption (NCAP) programs from the Agency to advance the deployment of crash avoidance technologies.

Instructions for FY 2018 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities:

The program utilizes several methods and research tools to complete crash avoidance system development and evaluation. These include: development of objective test procedures for characterizing performance of production and/or prototype systems; establishing performance metrics for crash avoidance technologies that ensure a safety benefits are indeed realized; using modeling , simulation, and hardware-in-the-loop evaluation methods to accelerate testing as well as allow for examining system operations and performance under conditions that are either difficult or unsafe to complete using test-track methods; implementing real world field testing of the technologies to better understand system reliability, performance and customer acceptance aspects; and conducting a variety of market and technology research to better understand future developments and direction of crash avoidance technologies. Program activities will also include an examination of human factors issues, driver acceptance, and possible unintended long term consequences associated with crash avoidance technologies

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes: This research program directly supports several critical areas of agency rulemaking and policy development related to passenger vehicle crash avoidance. For example, past successful research was completed on Electronic Stability Control (ESC), which supported the agency's rulemaking effort of development and promulgation of safety standards requiring light and heavy vehicle ESC. More recently, NHTSA completed research to develop objective test procedures for advance braking technologies including collision imminent braking (CIB) and dynamic brake support (DBS). NHTSA then examined the performance of several commercial systems to develop performance requirements in support of adding these technologies to the Agency's New Car Assessment Program (NCAP). The light vehicle crash avoidance program has completed a large body of research on driver assistance technologies that present safety warnings to drivers, technologies to modify unsafe driving behaviors such as distraction and alcohol impairment, and technologies to enhance the safety of vulnerable and at-risk populations such as teen drivers, older drivers and visually-impaired pedestrians. NHTSA is continuing to research additional and more advanced crash avoidance safety technologies such as pedestrian detection and automatic braking for possible inclusion in the NCAP program.

Instructions for FY 2018 Expected Program Outcomes: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Crash Avoidance	NHTSA reviews and uses FAA, FRA, and, Maritime research in the areas of automated vehicles (for safety assessment, certification, standards), and cybersecurity (protections, approaches, policies, etc.). NHTSA collaborates with ITS JPO and FHWA on V2V and V2I research, DSRC spectrum testing, Automated Vehicles research (e.g. benefits assessment), and vehicle cybersecurity research (joint investment in NHTSA developing applied capabilities to develop best practices). Collaborates with FMCSA on heavy vehicle crashworthiness research and rulemaking considerations and research for heavy vehicles (e.g. Electronic Stability Control rulemaking for trucks).

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crash avoidance research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Alternative Fuels Vehicle Safety

Program Description:

Recently introduced vehicle engine technologies including hydrogen and advanced lithium ion battery vehicles are evolving at a fast rate. Additionally, the recent increase in Compressed Natural Gas (CNG) fueled heavy trucks has fueled concerns regarding the safety of these vehicle systems. NHTSA intends to continue the introduction new requirements to address the unique safety considerations for these evolving vehicle types. Federal safety regulations have not kept pace with the introduction of the more established lithium ion battery and CNG fueled vehicles. These technologies present new safety considerations not previously addressed in the Federal motor vehicle safety standards. The Alternative Fuels Vehicle Safety program supports the Department's Environmental Sustainability goals.

Instructions for FY 2018 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Program Objectives:

NHTSA is developing objective safety performance tests to support the development of a global technical requirement for electric vehicles. NHTSA completed the negotiations for a global technical requirement for hydrogen fuel vehicles and are conducting demonstration testing to support the implementation of harmonized standards. Additionally, Compressed Natural Gas (CNG) vehicles have cost advantages over gasoline, especially for fleet operations. NHTSA research is required to update our existing standards to ensure the highest levels of safety for future CNG vehicles. These research efforts will support future rulemaking efforts.

Instructions for FY 2018 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities:

To continue safety test development for electric vehicle charging, both AC and DC, also to develop test procedures to provide real time diagnostics for large lithium ion traction battery system and to evaluate their safety in water submersion events. NHTSA anticipates to conduct further Thermal Propagation testing at full vehicle battery systems to assess the feasibility of standardizing the safety assessment. NHTSA hopes to continue battery crash performance modeling program to support assessment of functional safety requirements for battery physical environments. Continue the assessment of safety performance test procedures for compressed natural gas hydrogen gas containers. Support development of new safety standards for Liquid Propane Gas (LPG) vehicle systems

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes:

NHTSA expects to support the development of a global technical requirement for lithium ion vehicle battery systems. We will also develop new test procedures for inclusion in a second round of technical requirements for battery systems. NHTSA will complete evaluation of test procedures for high pressure gas containers and will also complete preliminary evaluation of test procedures for liquefied natural gas vehicles systems.

Vehicle Electronic and Emerging Technology

Program Description:

Provide overall planning, direction, and control for the increased use of electronic controls and connectivity to enhance transportation safety and efficiency. This program advances NHTSA's expertise in vehicle electronics and engineering to address safety and security of emerging electronics and software technologies and their implications to the safety of the motorists and other vehicle occupants. In this program area, research focus is on challenges related to the technical, human factors, safety assurance, testing and validation of road vehicles and their automation in addition to activities that support agency decisions on safety and cybersecurity requirements for vehicle control systems.

Instructions for FY 2018 Program Descriptions: Provide description of at least a paragraph for each FY 208 RD&T Program.

Program Objectives:

Given the rapid, accelerated pace of vehicle technology advancement and the related issues that result such as cybersecurity, this program conducts the critical research activities that are necessary to maximize the safe deployment of highly automated vehicles and ensure that key electronics issues such as cybersecurity are addressed.

In FY 2018, the Vehicle Electronics and Emerging Technologies program will build upon research completed in FY 2017 and initiate new projects to close identified gaps in support of agency decisions on automated vehicles, as well as electronics reliability and cybersecurity.

Instructions for FY 2018 Program Objectives: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities:

With the additional funding given in FY 2017; NHTSA will continue to address critical research automation and emerging technologies. NHTSA will also continue research on cybersecurity.

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes:

The focus of this effort will be to develop research findings and data to support and facilitate the safe operation and deployment of highly automated vehicles, address cybersecurity issues resulting from increased connectivity of advanced technology vehicles, and identify new hazards that may arise in emerging vehicle electronics before they are in production. Through advanced, proactive and collaborative research, these challenges will be addressed in a timely manner such that transformative automated vehicle technologies with proven safety benefits can be introduced sooner. Funding for this program area may also be used to investigate potential defects in electronics and software, and assist in recall or other consumer complaint issues. Thus, NHTSA expects to apply results from this program to meet critical agency near-term goals. Agency data gathering and strategic planning efforts as well as incoming research results will continue to guide agency research in this area.

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Vehicle Electronic and Emerging Technology	NHTSA will continue to collaborate with ITS JPO, FHWA and FMCSA on V2V, Automated Vehicles (Human Factors research, standards research), and cybersecurity. We also plan to collaborate with FMCSA on cybersecurity best practices for heavy vehicle aftermarket devices.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct crash avoidance research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.

Vehicle Research and Test Center - Ohio

Program Description:

The Vehicle Research and Test Center (VRTC) is NHTSA's in-house research, development, test and evaluation facility located in East Liberty, Ohio. Activities conducted at VRTC support agency programs including safety defect investigations, updates to Federal Motor Vehicle Safety Standards, test procedure development for new regulatory actions and agency consumer information programs, test dummy development, injury criteria development, advanced research into cutting edge technologies, and safety issues that require quick reaction. The full range of testing and research capabilities available to NHTSA at VRTC allows the agency to address emerging technologies and safety issues and access to world class testing facilities similar to those used by automotive suppliers and manufacturers.

Instructions for FY 2018 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Program Objectives:

Modern vehicles have evolved greatly over the last 35 years, and the advent of modern electronic controls, alternative fuels, and electric powertrains will drive that evolution even farther in the very near future. NHTSA has recognized the need to enhance the capabilities at VRTC for testing and analyzing emergent advanced technologies and other vehicle electronic systems. While enhancement of research capability in several areas has been identified, the most near term critical areas are in cyber security, electronics reliability, and automated driving that span all of the agency's vehicle safety programs. Enhancement of capabilities for material composition and failure analysis, particularly of electronic components, is also critical. With this FY 2017 funding, NHTSA will work with the General Services Administration (GSA) to finalize a long-term lease that may include additional testing and vehicle preparation space. Funding will cover expenses associated with GSA's development of the lease, any architectural drawings, and etc. Equipment needed to conduct research and analysis of advanced emergent technologies, electronics, cyber security and reliability assessments for establishment of performance requirements and defect investigations will also be procured. In addition, with alternative fuel systems of varying types and new sophisticated electronic control systems emerging in the market, NHTSA needs to maintain a well-equipped and dedicated center to test, monitor and investigate these and other new technologies.

Instructions for FY 2018 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities: NHTSA will continue research programs that will be a continuation from FY 2017 to include: Occupant protection research, Automated vehicle research, Cybersecurity research, Defects investigations, and Test dummy development etc.,

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes:

The expertise and technical capability of NHTSA's Vehicle Research and Test Center has been well demonstrated during the past 38 years. Numerous high profile programs have been successfully completed by the Center in an expeditious and thorough manner. However, providing the capability of advanced testing of emergent technologies is necessary to maintain pace with the rapid appearance of new electronics and advanced technologies. This program will provide the equipment and state-of-the-art facilities necessary to assess and investigate the rapid emergence of advanced automotive

electronics technologies to assure the highest level of automotive safety for the American public.

Autonomous Vehicle Research

Program Description:

The 21st Century Clean Transportation Plan Investments build on the FAST Act, taking the next steps to reform funding streams and encourage better planning and projects at the State and regional levels through increased investment in various areas and in a series of new, multimodal programs that increasingly cut across traditional siloes, in support of more comprehensive regional strategies that connect communities and support climate and greenhouse gas reduction goals. Autonomous Vehicle Research program is an element of this plan and focuses on deploying safe and climate smart autonomous vehicles to create better, faster, cleaner urban and corridor transportation networks. The Autonomous Vehicle Research Program requests $200 million in FY 2017 and $3.9 billion over 10 years.

Instructions for FY 2018 Program Descriptions: Provide description of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Program Objectives:

To accelerate the development and adoption of autonomous vehicles, this program would fund large-scale deployment pilots to test connected vehicle systems in designated corridors throughout the country; and work with industry to ensure a common multi-state interoperability framework for connected and autonomous vehicles.

Instructions for FY 2018 Program Objectives: Provide descriptions of <u>at least</u> a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities:

Over the multi-year period of this program, specific activities will focus on:

> **Development of national policy for safe deployment of automated vehicles:** The FY 2017 funding will build on a range of current efforts in FY 2016, including work within NHTSA to support the real world testing for connected and autonomous vehicles, the development of a national policy on licensing, testing, and information sharing among States and the Federal government.

> **Conduct research in support of safety performance measurement:** Funding will also support the development of tools necessary to measure safety performance of highly automated vehicles including the performance of vehicles electronics.

> **Pilot Deployments:** NHTSA will work with the ITS-JPO to lead multiple pilot deployments of Level 4 automated light duty and heavy duty vehicles researching different approaches to automation in different places.

> **Making Automation Safe From Hacking Through Research on Cybersecurity:** NHTSA will lead a multidisciplinary research effort in ensuring a high cybersecurity posture for Automated Vehicles.

> **Research Grants to Universities To Discover Human-Centered Mobility Solutions:** NHTSA will work with OST-R on a grant program that will address many questions about how automated vehicles should interact with other road users and how they will impact society and urban design.

> **Development of Open Data Sets for Understanding Traffic Situations:** NHTSA will collaborate with and provide funding support for an FHWA-led effort to develop data sets on real world driving situations.

> **Conducting and Funding Advanced Research on Automation Technologies**: Funding through this initiative will yield the development of an advanced research plan for the purpose of keeping the United States in the lead of the development of artificial intelligence and automation technologies.

> **Connected vehicle technology demonstration**: Additional NHTSA research would focus on demonstrating and quantifying the added value of connected vehicle technology.

Instructions for FY 2018 Anticipated Program Activities: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Expected Program Outcomes:

Automation technologies have enormous potential to save lives, save time and save fuel. These technologies need to be incorporated quickly and safely into our transportation networks by developing interoperable standards that keep all users safe, staying ahead of cybersecurity threats, and ensuring safety standards can adjust to the speed of innovation.

These activities will also build consumer confidence in highly automated vehicle features through the proposed large scale deployment tests with connected and highly automated

vehicles; expedite safe deployment of life-saving technologies; and ensure United States to retain its leadership position in Automated Vehicle technology development.

Highway Safety Research

Program Description:

Highway Safety Research directly supports the Department and agency goals of reducing traffic crashes, fatalities and injuries by providing the scientific basis for the development of effective behavioral countermeasures to reduce the occurrence of traffic crashes. Behavioral Safety Research focuses on unsafe driving behaviors that contribute significantly to death and injury from crashes on our highways. Evaluation research documents the relative effectiveness of programs to reduce fatalities and injuries on our highways, and is critical to achieving further progress toward meeting national goals and performance targets. The results of the Highway Safety Research program assess existing and emerging highway safety problems and are disseminated to the States to use to identify effective traffic safety countermeasures for implementation through the highway safety formula grant (Section 402) funds and incentive grant funds (Section 405). Our highway safety research studies can be found at: www.nhtsa.gov/Driving+Safety/Research+&+Evaluation.

Program Objectives:

This research program is designed to find ways to change the behavior of drivers and other roadway users so increase safe behavior (seat belt use, child seat use, protective gear use by motorcycle riders, etc.) and reduce unsafe behaviors (alcohol and drug impaired driving, texting, speeding, etc.) that are critical to achieving further reductions in motor vehicle crashes, deaths and injuries. Behavioral research provides an evidence-based foundation for State and community traffic safety programs. Research is needed to identify more effective and efficient countermeasures for existing traffic risks such as alcohol- impaired driving, drugged driving, speeding and non-use of seat belts, and to develop new solutions for emerging and resurgent problems such as pedestrian and bicyclist safety, motorcycle safety, driver fatigue and distracted driving.

Instructions for FY 2018 Program Objectives: Provide descriptions of at least a paragraph for each FY 2018 RD&T Program.

Anticipated Program Activities: During FY 2018 the Highway Safety Research Program will continue to build on the accomplishments of FY 2017. Below are examples of research activities planned for FY 2018:

Impaired Driving – The alcohol impaired driving research program will continue to develop programs for law enforcement to reduce the incidence of alcohol impaired driving, study impediments to increased use of ignition interlock devices, complete an effort to document and analyze the current state of practices regarding ignition interlock programs in the states, continue research on the effectiveness of DWI Courts in reducing recidivism, and complete a study of underage drinking and driving countermeasures.

Drug Impaired Driving – The drug impaired driving research program will continue research to develop a field test to detect drivers who have recently used marijuana (THC), continue a large scale study of the role of drugs and alcohol in fatal and serious injury crashes, examine development of model specifications for on-site drug screening devices,.

Occupant Protection – The occupant protection research program will complete continue research to evaluate how to better assist parents and caregivers on the correct installation of child restraint systems, evaluate innovative and sustainable seat belt enforcement programs, collect data on laws requiring rear seat belt use, and study public awareness of the availability of child passenger safety resources in their community and identify barriers to their use.

Pedestrian and Bicycle Safety – The pedestrian and bicycle research program will initiate research to determine the effectiveness of high visibility enforcement on driver and bicyclist compliance with bicycle safety laws.

Motorcycle Safety – The motorcycle safety research program will conduct research to determine whether an exposure measure (vehicle miles traveled or VMT) can be developed in states that have an annual motorcycle safety inspection requirement and will continue research examining barriers to increasing the conspicuity of motorcycles and motorcycle riders.

Speeding – The speeding research program will complete a study of speed feedback signs in reducing excessive speeding behavior, release the results the third national travel speed survey to provide a snapshot of current travel speeds on our nation's roads (that will document the trends in driving speeds across the country by roadway type and location).

Older Drivers – The older driver research program will conduct research on older driver's use of rearview video systems, examine the effectiveness of visual scanning training on older driver's ability to properly scan the roadway environment while driving), complete a study of older drivers' self-regulation and driving exposure that will focus on the extent to

which older drivers change their driving habits as their functional skills (vision, cognition, reaction time, and other aspects of driving performance decline with aging), and complete research into the relationship between older driver physical fitness and driving performance .

Young and Novice Drivers – The young and novice driver research program will initiate a field evaluation of an enhanced hazard perception training program to determine whether it provides a greater reduction in subsequent crashes for novice drivers than a previous short-term program produced.

Distracted Driving – The distracted driving research program will continue research on how to convince drivers of the risks of multitasking while driving and continue to assess ways to measure and mitigate the lack of attention to the driving task (e.g., mind wandering).

Driver Fatigue – The driver fatigue research program will continue to develop and test countermeasures for high risk populations that include public safety personnel and other drivers exposed to shiftwork, and strategies for reaching high- risk populations will be developed.

EMS Research – The EMS research program will continue research to monitor and evaluate the adoption of evidence based guidelines currently under development that are designed to provide EMS systems with scientifically validated and more effective pre-hospital care to the American public, and continue research into the scope and nature of the fatigue problem in delivery of EMS services, along with evidenced based guidelines on how to reduce the incidence of ambulance crashes and patient treatment errors in which fatigue played a role.

Expected Program Outcomes:

The results of NHTSA's Highway Safety Research program are used to develop guidance for state and local highway safety programs. The research develops the data that help states and others prioritize their efforts toward the larger contributors to traffic crashes and identifies new trends they should be aware of, while the results of our research and program evaluations help guide them toward spending scare resources on programs with demonstrated effectiveness at reducing crashes, deaths and injuries and the cost of traffic crashes. While we make publicly available at no charge research reports for most individual research and program evaluation projects, this information is summarized bi-annually in a guidance document: Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices (follow this link to see the latest

edition: http://www.nhtsa.gov/staticfiles/nti/pdf/812202-CountermeasuresThatWork8th.pdf

For a more extensive list of research and program evaluation reports (with hyperlinks) we put periodically put out a compendium of NHTSA's traffic safety research and evaluation project reports that covers hundreds of studies. The latest version of this compendium can be accessed by following this link: http://www.nhtsa.gov/staticfiles/nti/pdf/811847.pdf

FY 2018 Collaboration Partners (Internal DOT)

Program Name	Name of Collaboration Partner(s) (Internal DOT)
Highway Safety Research	NHTSA also benefits from research FHWA and FMCSA does in terms of driver behavior. Specifically, FHWA's Advanced Exploratory Research Program has been helpful to NHTSA. NHTSA also collaborates with FHWA and FMCSA on speeding related issues (the three agencies have an intermodal speed team that meets periodically to share project information and occasionally to more formally collaborate on joint projects). NHTSA shares responsibility for pedestrian and bicyclist safety in partnership with FHWA. We have funded a number of focus city grants (along with OST and FHWA) to address pedestrian and bicyclist safety. NHTSA works with the OST Office of Drug & Alcohol Policy & Compliance to ensure the accuracy of alcohol testing performed for the 60,000+ employee's who work in safety sensitive positions, and to provide expert information on drug use by vehicle operators.

Instructions for FY 2018 OA Collaboration Partners (Internal DOT): List all Collaboration Partners between your OA and other DOT OAs.

How does the Program meet statutory requirements?

We will continue to collaborate with internal agencies on funding and other research programs. The program meets the annual funding appropriations act's requirement to conduct Highway Safety research.

How will the Program incorporate public and stakeholder input into the research planning process?

Broad-based research meeting with automotive manufacturers, suppliers, and other stakeholders.