



Research Projects

Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Safety R&D	Advanced Research	Improvement of Digital Highway Measurement System Functional Performance	Develop and implement additional functions, and improve data quality and accuracy, synchronization algorithms, and image processing technologies for the system.	Lee	Kunik	202-493-3491	10/31/ 2008
Office of Safety R&D	Advanced Research	University Transportation Center (UTC) Symposium and Workshop	Coordinate with University Transportation Centers on development of strategic research themes as part of the FHWA Exploratory Advanced Research projects and scanning and convening activities. Conduct separate workshops on the following themes: human factors and visibility; advanced sensing and future telecommunication in ITS; mechanics between the vehicle and the road; and technical feasibility, economic impact, and societal effect of the integrated safety system concept.	Lee	Kunik	202-493-3491	10/31/ 2009
Office of Safety R&D	Advanced Research	Production Digital Highway Measurement (DHM) System Development	Develop software, specifications, and an operational manual for the production of the DHM System, and transfer DHM System technologies or capabilities indirectly, through demonstrations, or directly through licensing, to the commercial data scanning community and to researchers, to advance the state of the art in creating road data inventories for asset management, and to support future highway safety research.	Opiela	Kenneth	202-493-3371	09/30/ 2010
Office of Infrastructure	Bridge Design and	Improved Fracture Toughness	This study will develop standards that take advantage of the inherent high toughness of				12/31/ 2008



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R&D	Construction	Specifications for High Performance Steel (HPS)	HPS. Potential benefits include reducing the need for fracture critical inspections on many structures.				
Office of Infrastructure R&D	Bridge Design and Construction	Foundation Health Monitoring Systems	A series of field investigations are underway to demonstrate foundation monitoring systems and utilize data for enhanced engineering assessment of structural performance. The new I-35W bridge in Minneapolis and the Woodrow Wilson Bridge in Virginia are current test sites.				12/31/ 2008
Office of Infrastructure R&D	Bridge Design and Construction	Performance Data for Ultrahigh Performance Concrete (UHPC) Bridge Elements	Conduct a series of experiments characterizing the benefits of UHPC in bridge applications. These experiments will be performed using standardized materials performance and durability tests as well as full-scale, instrumented load tests in the main structures lab. Performance data will lead to technical reports, and eventually input directly into American Association of State Highway and Transportation Officials guideline documents.				12/31/ 2009
Office of Infrastructure R&D	Bridge Design and Construction	Design for Corrosion Protection	Efforts to greatly enhance the durability of bridges by optimizing the guidance on use of corrosion protection systems				12/31/ 2009
Office of Infrastructure R&D	Bridge Design and Construction	Integrated Steel Bridge Abutment System Using Geosynthetic Reinforced Soil (GRS) Technology	Research and develop a steel bridge superstructure type that can be integrated into GRS abutments to make a joint free bridge. A concept structure will be built in Ohio to evaluate performance of the system.				12/31/ 2009
Office of	Bridge Design	Fire Damage	Perform a synthesis to collect available				12/31/ 2009

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Infrastructure R&D	and Construction	Assessment of Bridge Structures	information relating to bridge performance when subjected to fire. Results will lead to development of a manual for condition evaluation and guidelines for enhancing fire resistance.				
Office of Infrastructure R&D	Bridge Design and Construction	Hybrid Laser Arc Welding (HLAW) for Improved Steel Bridge Fabrication	Develop welding procedures for fabrication of steel orthotropic bridge decks using HLAW and conduct fatigue tests to evaluate performance. This process is being considered for re-decking the Walt Whitman Bridge in Philadelphia.				12/31/ 2009
Office of Infrastructure R&D	Bridge Design and Construction	Fatigue of Galvanized Sign Pole Structures	An experimental study to evaluate the effect galvanizing has on fatigue life. There are numerous reported failures of this type of structure nationally.				12/31/ 2009
Office of Infrastructure R&D	Bridge Design and Construction	Enhanced Use of Shallow Foundations for Accelerated Construction	Conduct an experimental study to determine limits for use of shallow foundations. Study to be initiated in FY 2008 pending availability of funds.				12/31/ 2010
Office of Infrastructure R&D	Bridge Design and Construction	Lightweight Concrete Code Provisions	Conduct an extensive laboratory study to develop code provisions for using lightweight concrete in bridge structures. It is not known if existing code equations are applicable for this new class of material.				12/31/ 2010
Office of Infrastructure R&D	Bridge Design and Construction	Development and Evaluation of a Modular, Rapid Construction Steel Bridge System	A multiyear experimental study to develop, evaluate, and implement a new bridge system for rapid construction. This will include full-scale testing and development of design provisions.				12/31/ 2010

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Optimum Bridge deck Shapes to Minimize Pressure Flow Scour	Characterize streamlines and shear stresses on channel bed for a variety of bridge deck shapes and positions. The result will be a more rational procedure for estimating pressure flow scour with the potential for taking advantage of streamlined shapes.	Duwadi	Sheila	202-493-3106	Aug 2008
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Lift, Drag Forces, and Moments on Bridge decks+	The bridge of the future is likely to be constructed of lighter and more durable high-performance materials, which will lead to more concern about storm surges sweeping the deck off the foundations as occurred on I-10 during the 2004/2005 hurricane season. The proposed study utilizes high tech force measurement techniques to derive drag, lift, and moment coefficients for inundated bridge decks for a variety of approach flow conditions.	Duwadi	Sheila	202-493-3106	Aug 2008
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Pressure Flow Scour Study	The bridge of the future is likely to be one that is inundated from time to time where the flow through the bridge opening is under pressure and causes concerns about amplified scour. The proposed study utilizes particle image velocimetry (PIV) capabilities and a shear force sensor to characterize streamlines and shear stresses on the channel bed for a variety of bridge deck shapes and positions above the bed.	Duwadi	Sheila	202-493-3106	Aug 2008
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Pushover Analysis Software and Users Guide	Pushover analysis is a methodology for seismic design of bridges by force-based design philosophy. It is a useful tool to estimate the capacities of existing bridge bents. This study will result is a software and users guide for use	Duwadi	Sheila	202-493-3106	09/30/ 2008

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			by State departments of transportation in analyzing their structures for seismic events using 'pushover' methodology.				
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Survey and Review of Wind Load Criteria for Cable-Supported Structures	This research will serve as a basis for later development of consistent procedures for establishing design wind loads.	Duwadi	Sheila	202-493-3106	09/30/ 2008
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Measurement of Dynamic Properties of Cables on New Cable-Stayed Bridges	Perform full-scale vibration tests on the cables of several new cable-stayed bridges to establish a database of representative dynamic cable properties for use in developing design criteria for the aerodynamic design of bridge stay cables.	Duwadi	Sheila	202-493-3106	09/30/ 2008
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Scour in Cohesive Soils	Scour for cohesive soils is a very complex phenomenon that is not completely understood. The research study will study the incipient motion of cohesive soils and the influence of turbulence on the erodibility of soils, which could significantly enhance the scour prediction.	Duwadi	Sheila	202-493-3106	09/30/ 2009
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Ex Situ Scour Testing Device	The intent of this study is to develop an Ex situ Scour Testing Device (ESTD) that can be used for estimating bridge scour in cohesive soils. The ESTD technology can determine the erosion rate of soil samples, which are used to transfer the soil test results to the bridge pier scour computations. The ESTD technology is capable to simulate pressure fluctuations that are associated with the extreme turbulence that occurs around a bridge pier.	Duwadi	Sheila	202-493-3106	09/30/ 2009

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Validation of Numerical Modeling and Analysis of Steel Bridge Towers Subjected to Blast Loadings	This study will lead to a better understanding of analytical modeling and numerical analysis capabilities of steel bridge towers subjected to air blast and lead to development of retrofit schemes for the towers verified through large scale experimental testing.	Duwadi	Sheila	202-493-3106	09/30/ 2009
Office of Infrastructure R&D	Bridge Safety, Reliability and Security	Development of Guidelines for Bridges Built Near Fault Lines	Near source ground motion can affect structures close to fault zones. This study will develop design and retrofit guidelines for such structures.	Duwadi	Sheila	202-493-3106	12/31/ 2009
Office of Operations R&D	Enabling Technologies	High Accuracy NDGPS	Provide the capability to broadcast corrections to the global positioning system over long ranges to achieve a better than 10-centimeter (3.94-inch) accuracy throughout the coverage area.	McHale	Gene	202-493-3275	12/31/ 2007
Office of Operations R&D	Enabling Technologies	Perceptible Water Vapor for Weather Forecasting	This is a research program to develop and evaluate a perceptible water vapor algorithm, which will help improve weather forecasting.	McHale	Gene	202-493-3275	12/31/ 2007
Office of Operations R&D	Enabling Technologies	NDGPS Reference Station Modernization	This project involves research to define existing global positioning system capability area.	McHale	Gene	202-493-3275	12/31/ 2008
Office of Operations R&D	Enabling Technologies	DSRC/Wireless Access for Vehicular Environment	Develop telecommunications technology to include spectrum allocation from the Federal Communications Commission, licensing rules, standards, prototypes, and initial deployment.	McHale	Gene	202-493-3275	12/31/ 2008
Office of Operations	Enabling Technologies	Telecommunication s Interface Model	Develop and evaluate an ionospheric model to predict interference levels to	McHale	Gene	202-493-3275	12/31/ 2008

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R&D		for Predicting Ionospheric Changes	telecommunications systems.				
Office of Operations R&D	Enabling Technologies	Global Positioning System (GPS) Surface Observation System Installation for Integrated Perceptible Water Vapor (IPWV)	The installation of GPS Surface Observation System (GSOS) meteorological sensors at NDGPS sites provides useful weather observations and the information needed to calculate atmospheric water vapor.	McHale	Gene	202-493-3275	12/31/ 2009
Office of Operations R&D	Enabling Technologies	National Environmental Policy Act Environmental Investigations in support of NDGPS	The NDGPS program serves transportation, public safety, and scientific applications. As part of this effort, FHWA presently is gathering information to prepare documentation to support a Finding Of No-Significant Impact (FONSI) as outlined in the NDGPS Environmental Assessment (PEA), which was prepared for the entire NDGPS Program.	McHale	Gene	202-493-3275	12/31/ 2009
Office of Infrastructure R&D	Infrastructure Inspection and Management	Bridge Inspectors Nondestructive Evaluation (NDE) Showcase	Complete a training course to provide bridge inspectors with NDE tools to supplement standard visual inspection practices.	Hartman n	Joey	202-493-3059	05/31/ 2008
Office of Infrastructure R&D	Infrastructure Inspection and Management	Long-Term Bridge Performance Program Bridge Sampling	As part of the Long-Term Bridge Performance Program, identify the relevant sample of bridges for the pilot study. Interim report will be available.	Hartman n	Joey	202-493-3059	09/30/ 2008
Office of Infrastructure	Infrastructure Inspection	Long-Term Bridge Performance	In collaboration with both internal and external partners, a research roadmap highlighting short-	Hartman n	Joey	202-493-3059	10/31/ 2008

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R&D	and Management	Program Road Map	term goals of the Long-Term Bridge Performance Program will be developed.				
Office of Infrastructure R&D	Infrastructure Inspection and Management	Long-Term Bridge Performance Program Newsletter	Update Web site and establish a Long-Term Bridge Performance Program newsletter to ensure efficient and effective communication with key stakeholders and the remainder of the bridge community.	Hartman n	Joey	202-493-3059	12/31/ 2008
Office of Infrastructure R&D	Infrastructure Inspection and Management	In-Depth Laboratory Evaluation of Fatigue Cracks in Steel Bridges	As part of the Steel Bridge Testing Program, complete laboratory testing comparing capabilities of state-of-the-art nondestructive evaluation technologies for the detection of growing cracks in steel girders.	Hartman n	Joey	202-493-3059	09/30/ 2009
Office of Infrastructure R&D	Infrastructure Inspection and Management	Steel Bridge One-Coat Paint Study	This project will identify durable and economically viable commercial one-coat paint system(s) applicable to steel bridges. Interim reports will be available in late 2008.	Hartman n	Joey	202-493-3059	09/30/ 2009
Office of Infrastructure R&D	Infrastructure Inspection and Management	Steel Bridge 100-Year Coating Study: Phase 1	This project will evaluate existing polymeric and metallic coating materials, which have demonstrated possibilities of providing 100-year, maintenance-free, service life on steel bridges.	Hartman n	Joey	202-493-3059	09/30/ 2009
Office of Infrastructure R&D	Infrastructure Inspection and Management	Corrosion Monitoring of New York Suspension Bridges	Develop suitable monitoring sensors for suspension bridges to assess the corrosion of steel cables. The development work is in progress and developed sensors evaluated in the laboratory will be utilized to retrofit some of the cables in the Manhattan Bridge (suspension bridge) for continuous corrosion monitoring. The interim report will be available.	Hartman n	Joey	202-493-3059	09/30/ 2009

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Office of Infrastructure R&D	Infrastructure Inspection and Management	Nondestructive Evaluation (NDE) Web Manual	Development of a basic framework of a Web-based manual, comparing NDE capabilities for bridges, pavements, and other ancillary structures.	Hartman n	Joey	202-493-3059	12/31/ 2009
Office of Infrastructure R&D	Infrastructure Inspection and Management	Alkali-Silica Reaction (ASR) Research and Deployment Program	Elucidate the ASR mechanism, develop accelerated reliable laboratory methods and nondestructive evaluation methods for field use and methodology for rehabilitation of structures affected with ASR with cost effective techniques. Interim progress reports on various objectives as outlined above will be available.	Hartman n	Joey	202-493-3059	09/30/ 2010
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Wireless Magnet Work Zone System - SBIR Phase II	This project will develop a work zone collision warning system using low-cost magnetic sensors and wireless technology. In this phase, a functional integrated system will be developed based on the major components developed in Phase I.	McHale	Gene	202-493-3275	11/30/2008
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Small Business Innovation Research: 3-66 Signal Transition Logic—Phase II	Implement the National Cooperative Highway Research Program research 3-66 signal transition logic into a real-world, advanced transportation controller (ATC). Signal transition logic utilizes dynamic programming algorithms to choose the next series of signal states to arrive in a desired state to minimize both delay and other criteria when faced with unusual traffic sensor inputs such as trains, fire trucks, police, ambulances, funeral processions, and tractor trailers. Current technologies only allow	McHale	Gene	202-493-3275	01/31/2010

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			non-optimal processing of these items as preempts.				
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Real-Time Linux Operating System for Advanced Traffic Controllers	The purpose of this project is to connect the Linux real-time operating system to advanced transportation controllers. This will provide the support necessary for faster detector polling and information processing, which is required for CICAS and vehicle-infrastructure integration (VII) research. Phase I and II are complete. A draft final report for Phase II is under review. Phase III will develop a version of the software suitable for on street use by traffic signal vendors. The software is undergoing lab test in Los Angeles. After completion of lab testing, the field-testing phase will begin. An initiative for transfer of the technology to the signal vendors was planned but currently is unfunded.	McHale	Gene	202-493-3275	03/31/ 2008
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Quick Highway Incident Detection and Warning System - Phase I	Develop a quick highway incident detection system using low-cost sensors and wireless communication. The system can detect an incident quickly and warn upstream traffic to avoid secondary collisions automatically.	McHale	Gene	202-493-3275	10/31/ 2008



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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Transportation Management Center (TMC) National Pooled Fund Study Results	This is a study of the operational and human-centered issues common among agencies that manage and operate TMCs. States contribute to this project on a yearly basis and select projects on an ongoing basis depending on the availability of funds. Current projects include: Driver use of Real-Time En Route Travel Time Information. Integration of TMC and Law Enforcement: Needs Assessment. TMC Clearinghouse Support Services: Phase 2. Developing Travel Time Information. Requirements and Position Descriptions for TMC Support Staff. Techniques for Managing Service Patrol Operations. For more detailed information about current projects and joining the TMC pooled fund, please visit the Web site: http://tmcdfs.ops.fhwa.dot.gov/index.cfm	McHale	Gene	202-493-3275	12/31/ 2008
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Traffic Control Device Consortium Pooled Fund Study	Evaluate innovative traffic control devices and disseminate the results for incorporation into the <i>Manual on Uniform Traffic Control Devices</i> (MUTCD). A consortium of State, regional, and local entities, FHWA, and other partners will work in conjunction with the Human Centered Systems Laboratories on this task.	McHale	Gene	202-493-3275	12/31/ 2009
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human	Speed, Signature, Acceleration and Jerk - Loop Sensor	This project utilizes provides one of the sensor tools needed to provide information to the signal transition logic on the actual composition of the traffic flow approaching an intersection, ramp, traffic circle, arterial section, or freeway section.	McHale	Gene	202-493-3275	01/31/2010

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
	Centered Systems Related Research						
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Nondestructive Evaluation of Loop Sensor Installation	This project utilizes Ground Penetration Radar (GPR) to analyze the loop wire and sealant around inductive loop installations. It measures the locations and sizes of cracks, the sealant, the loop wire, and the pavement. This should allow determination of whether the loop was installed correctly in accord with specifications and whether it needs maintenance.	McHale	Gene	202-493-3275	01/31/2010
Office of Operations R&D	Intersection Collision Avoidance (ICA) and Human Centered Systems Related Research	Cooperative Intersection Collision Avoidance Systems (CICAS) Supported by the Infrastructure Consortium (IC)	Partnering with automobile manufacturers, the IC will design, develop, and test prototype CICAS technologies in support of the U.S. Department of Transportation's CICAS Initiative. Following testing of prototype systems, the IC will support field operational testing of the CICAS technologies.	Davis	Gregory	202-493-3367	08/31/2010
Office of Safety R&D	Intersections	Interchange Safety Analysis Tool	Produce estimates of crash frequencies for typical freeway interchanges in both rural and urban areas.	Bared	Joe	202-493-3314	01/31/2008
Office of Safety R&D	Intersections	Surrogate Safety Assessment Model (SSAM)	Produce a software tool that computes surrogate safety measures from vehicle trajectories that were tested with several widely used traffic simulation models and validated with real crash data.	Bared	Joe	202-493-3314	Aug 2008

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Office of Safety R&D	Intersections	Innovative Speed Reduction Treatment	Evaluate the effectiveness of speed-reduction treatments applied on approaches to high-speed rural two-way stop-controlled intersections.	Bared	Joe	202-493-3314	09/30/ 2008
Office of Safety R&D	Intersections	Human Factors Evaluation of Continuous-Flow Intersection	Conduct human factors evaluation of, and develop improved guidance for, signage and markings for the continuous-flow intersection.	Bared	Joe	202-493-3314	12/31/ 2008
Office of Safety R&D	Intersections	Nontraditional Intersections/Interchanges: Informational Report	Develop design, safety, and operational information on four novel intersections and two interchanges that are expected to be more efficient in terms of capacity and improved safety in comparison to conventional intersections.	Bared	Joe	202-493-3314	Apr 2009
Office of Safety R&D	Intersections	Field Evaluation of Continuous-Flow Intersection and Diverging Diamond Interchange	Conduct safety and operational field evaluations of continuous-flow intersections in Louisiana and Utah and a diverging diamond interchange to be constructed in Kansas City, Missouri.	Bared	Joe	202-493-3314	12/31/ 2009
Office of Infrastructure R&D	Long Term Pavement Performance	Long-Term Pavement Performance Benefit Study	The Long-Term Pavement Performance Benefit Study will assess and document the economical benefits associated with the outcomes from the 20-year Long-Term Pavement Performance research program.	Lopez	Aramis	202-493-3145	10/31/ 2008
Office of Infrastructure R&D	Long Term Pavement Performance	Standard Data Release	The Long-Term Pavement Performance Program will make the world's largest pavement performance database available annually to the public in Microsoft® Access® database format. The Standard Data Release	Lopez	Aramis	202-493-3145	01/31/2009

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			(SDR) may be obtained through Long-Term Pavement Performance Customer Support Services at; e-mail: ltppinfo@fhwa.dot.gov ; telephone: 202-493-3035; or fax: 202-493-3161.				
Office of Infrastructure R&D	Long Term Pavement Performance	Falling Weight Deflectometer (FWD) Calibration Center and Operational Improvements	Update the FWD Calibration system and protocols and existing American Association of State Highway and Transportation Officials protocols, as well as the component specifications, facility requirement guidelines, and the calibration software. Manufacture and install additional calibration systems to support new facilities in CA and MT. Develop an updated video to demonstrate the new FHWA/Long-Term Pavement Performance FWD Calibration system and procedure, and inform FWD owners and operators about what they need to know before arriving at a calibration center and the importance of calibration to data quality.	Lopez	Aramis	202-493-3145	03/31/ 2009
Office of Infrastructure R&D	Long Term Pavement Performance	Long-Term Pavement Performance 20-Year Report	This report will document the research and analytical activities undertaken by FHWA in the conduct of the Long-Term Pavement Performance program. This document will provide an overview of the 20-year Long-Term Pavement Performance Program.	Lopez	Aramis	202-493-3145	09/30/ 2009
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Measuring the Effectiveness of State Construction Quality Assurance Programs	Develop a procedure for measuring the effectiveness of State construction quality assurance programs and provide guidelines for use of the procedure.	Petros	Katherine	202-493-3154	11/30/2009

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Office of Infrastructure R&D	Pavement Design and Performance Modeling	Fiber-Reinforced Polymer (FRP) in Concrete Pavement	Develop guidelines for the design and use of second-generation FRP dowels in jointed pavements and FRP reinforcement in continuously reinforced concrete pavements.	Petros	Katherine	202-493-3154	03/31/ 2008
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Concrete Mix Optimization Software	Develop computer-based guidelines for job-specific optimization of paving concrete to help materials engineers and suppliers make day-to-day decisions about how to best proportion a mix to meet their desired criteria.	Petros	Katherine	202-493-3154	03/31/ 2008
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Percent Within Limits Risk Analysis Software	Develop computer program capable of analyzing the risks associated with multi-characteristic acceptance systems and pay schedules based on the percent within limits quality measure.	Petros	Katherine	202-493-3154	Apr 2008
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Alternatives to the Use of Contractor Test Results	Develop guidance for highway agencies that are short-staffed and want to make better use of their inspection and testing personnel.	Petros	Katherine	202-493-3154	09/30/ 2008
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Geosynthetics in Pavements	The objective of this project is to provide a comprehensive reference to the pavement design engineer by presenting state-of-the-art methods and practice on the use of geosynthetics in design and construction of permanent (paved) roadways. A roadmap will be developed to identify additional work needed in terms of testing, modeling and specifications to improve the application of geosynthetic materials to pavement design and construction.	Petros	Katherine	202-493-3154	09/30/ 2008

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Office of Infrastructure R&D	Pavement Design and Performance Modeling	Impact of Hydraulic Cement Concrete (HCC) Input Parameters on Mechanistic-Empirical (M-E) Pavement Design Guide	Conduct an in-depth sensitivity analysis of several key parameters for HCC that have been identified based on preliminary evaluation of the M-E Pavement Design Guide. This will provide stakeholders with insight regarding their relative importance in the design and construction processes.	Petros	Katherine	202-493-3154	06/30/2009
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Use of Radio Frequency Identification (RFID) Tags in Pavements	This project is exploring the feasibility of incorporating RFID tags in pavements so that construction, materials and pavement management data can be linked together.	Petros	Katherine	202-493-3154	12/31/ 2009
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Precast, Post-tensioned Concrete for Bridge Underpasses	Develop and demonstrate precast technology for use in underpass situations where height limitations do not allow for additional pavement structural thickness under the structure.	Petros	Katherine	202-493-3154	01/31/2010
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Using Falling Weight Deflectometer (FWD) Data with Mechanistic-Empirical Design and Analysis	Review the current state of the practice and art in routine back calculation of FWD data and develop user guidelines and recommendations for advancing FWD data analysis for M-E based rehabilitation evaluation and design Products including case studies, development of user guidelines and recommendations for improvements to FWD data analysis and interpretation.	Petros	Katherine	202-493-3154	03/31/ 2010
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Synthesis on Current State of the Practice in Composite	This study, part of a larger pooled fund study being led by Minnesota Department of Transportation, will develop a synthesis document on the state of the practice and	Petros	Katherine	202-493-3154	12/31/ 2010

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		Pavements	knowledge on the design, construction, and performance of composite pavements. The assessment will include both national and international projects and practices.				
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Definition and Determination of Remaining Service and Structural Life	Develop broad definitions for Remaining Service and Structural Life (RSL) that are consistent, unambiguous, and defensible, review current and future data availability in defining the measures and processes for determining RSL and develop procedures for determining RSL at both the project and network level to meet the current and emerging design, contracting, maintenance, and management practices.	Petros	Katherine	202-493-3154	12/31/ 2010
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Asphalt Performance Related Specification	This project will develop a performance related specification that is founded on viscoelastoplastic continuum damage (VEPCD) performance prediction models. It will include three levels of testing complexity ranging from using the simple performance test to conducting nondestructive testing in the field.	Petros	Katherine	202-493-3154	03/31/ 2011
Office of Infrastructure R&D	Pavement Design and Performance Modeling	Modeling Hot-mix asphalt Compaction	This ongoing project will theoretically relate laboratory and field compaction; document the important parameters in obtaining density without sacrificing performance, and provide recommendations to improve the construction process to obtain the optimum in-place density.	Petros	Katherine	202-493-3154	10/31/ 2009
Office of Infrastructure R&D	Pavement Materials and Construction	Computer Based Curing System	Develop user-friendly, computer-based guidelines for curing portland cement concrete pavements to enable monitoring of paving process in real time and ensure proper curing.	Youtcheff	Jack	202-493-3090	03/31/ 2008

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Office of Infrastructure R&D	Pavement Materials and Construction	Full-Scale Accelerated Performance Testing for Superpave and Structural Validation: Phase III-Evaluation and Recommendations	Refine the national Superpave binder specification to fully capture the benefit of modified binders. This research is being performed under pooled fund study TPF-5 (019).	Youtcheff	Jack	202-493-3090	Aug 2008
Office of Infrastructure R&D	Pavement Materials and Construction	HIPERPAV III—Computer-Based Guidelines for Concrete Pavements	Extension to the HIPERPAV™ software by improving the moisture model and adding Sensitivity Analysis Capabilities. This version of software will more accurately address factors that influence strength development and stress build-up in freshly placed concrete slabs.	Youtcheff	Jack	202-493-3090	09/30/ 2008
Office of Infrastructure R&D	Pavement Materials and Construction	Completion of Accelerated Loading Facility and “67-80” Fatigue and Rutting Characterization	Supplements “Full-Scale Accelerated Performance Testing for Superpave and Structural Validation: Phase III-Evaluation and Recommendations” with expanded series of materials to increase statistical power and support of recommendations using practical and accountable tests targeted for Agency implementation.	Youtcheff	Jack	202-493-3090	09/30/ 2008
Office of Infrastructure R&D	Pavement Materials and Construction	Guidance on the Use of Acid Modification for Asphalt Binders	Provide State agencies with clear guidance on the effective use of acid modification for asphalt binders. Clearly identify inappropriate uses, which can lead to performance issues.	Youtcheff	Jack	202-493-3090	12/31/ 2008
Office of Infrastructure R&D	Pavement Materials and Construction	Intelligent Construction System (ICS)	Develop prototype system, based on high-performance pavement (HIPERPAV™) and curing guidelines, to provide real-time	Youtcheff	Jack	202-493-3090	03/31/ 2009

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
		Computer-Based Field Curing Tool for Concrete Pavement	assessment of curing conditions for the paving contractor.				
Office of Infrastructure R&D	Pavement Materials and Construction	Coefficient of Thermal Expansion (CTE) Research and Test Development	Perform ruggedness tests on the several methods for determining the CTE of concrete cores or molded cylinders and report recommendations to the American Association of State Highway and Transportation Officials Subcommittee on Materials. Continue gathering data on the coefficient of thermal expansion and coarse aggregate type identification for cores taken from portland cement concrete pavements in the long-term pavement performance, with data provided for addition to the Long-Term Pavement Performance database.	Youtcheff	Jack	202-493-3090	April 2009
Office of Infrastructure R&D	Pavement Materials and Construction	Geotextile separation Layer for Aggregate Base Courses	Provide a clear quantification of the long-term benefits a pavement structure can receive focusing specifically on the base and subgrade separation capability of geotextiles.	Youtcheff	Jack	202-493-3090	Aug 2009
Office of Infrastructure R&D	Pavement Materials and Construction	Lithium Technology Research for Mitigation of Alkali-Silica Reactivity (ASR) in Concrete	Conduct and evaluate field trials using lithium-based technologies for the prevention and mitigation of ASR to identify and document the benefits of lithium in transportation structures. Provide guidance to State agencies for use of lithium.	Youtcheff	Jack	202-493-3090	09/30/ 2009
Office of Infrastructure R&D	Pavement Materials and Construction	Concrete Extrusion Workability	Evaluate or develop devices that can be used to determine the workability of paving concrete mixtures. Relate paste and mortar rheology with	Youtcheff	Jack	202-493-3090	10/31/ 2009

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
			concrete workability. Work with National Institute of Standards and Technology, Virtual Cement and Concrete Testing Laboratory.				
Office of Infrastructure R&D	Pavement Materials and Construction	Aggregate Research Investigation	Investigation of properties related to aggregate shape, angularity, and texture; the aggregate interfacial zone and bond in concrete and asphalt mixtures; and ways of quickly identifying deleterious aggregate materials or constituents, including fine aggregate blending and grading in concrete and research on the effect of aggregate interface properties in hot-mix asphalt and warm-mix asphalt.	Youtcheff	Jack	202-493-3090	10/31/ 2009
Office of Infrastructure R&D	Pavement Materials and Construction	New Methods to Identify Oxidized Layers/Durability	Establish a framework with pavement management systems in mind for rapid field and laboratory tests which can capture relationship between asphalt pavement oxidation and embrittlement and the subsequent loss in pavement durability.	Youtcheff	Jack	202-493-3090	03/31/ 2010
Office of Infrastructure R&D	Pavement Materials and Construction	Computer Aided Mix Design: Asphalt Pavements	Development of computer aided mix design tools to provide increased aggregate sensitivity of the Superpave Mix Design to reduce the risk of low durability asphalt mixtures.	Youtcheff	Jack	202-493-3090	03/31/ 2010
Office of Infrastructure R&D	Pavement Materials and Construction	Alkali-Silica Reactivity (ASR) Research to Classify Aggregates and Provide ASR Mitigation in Concrete	Assess the potential of innovative quick chemical tests of aggregates and participate with our partners and customers in developing reliable ASR tests of blends and mixtures in mortar and concrete.	Youtcheff	Jack	202-493-3090	Apr 2010

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Infrastructure R&D	Pavement Materials and Construction	Understanding Moisture Damage in Asphalt Pavements-Phase I	Establish and conduct fundamental research on moisture damage in asphalt pavements.	Youtcheff	Jack	202-493-3090	12/31/ 2010
Office of Infrastructure R&D	Pavement Materials and Construction	Procedure for Identifying Deleterious Materials in Hot-mix asphalt	Develop methods to identify and quantify surface-active clays and other contaminants, which contribute to moisture damage of hot-mix asphalt.	Youtcheff	Jack	202-493-3090	12/31/ 2010
Office of Infrastructure R&D	Pavement Materials and Construction	Full-Scale Aggregate Base Design and Construction	Provide a best practice manual to advance the state-of-the-practice for base course construction based on innovative pavement design and materials characterization, test section construction and instrumentation, and development of relevant pavement models to support pavement design methodology.	Youtcheff	Jack	202-493-3090	10/31/ 2011
Office of Infrastructure R&D	Pavement Materials and Construction	Fundamental Properties of Asphalts and Modified Asphalts	Conduct studies of the fundamental chemical and physical properties of petroleum asphalts and modified asphalts used in highway construction in the United States.	Youtcheff	Jack	202-493-3090	01/31/2012
Office of Infrastructure R&D	Pavement Materials and Construction	Asphalt Mixtures with Improved Oxidative Aging Resistance	Develop methods for tracking the oxidation of asphalt binders by measuring changes in aromaticity, elemental composition, and carbonyl content and link these changes to physical changes in the mix. Data will be used to develop methods for retarding the oxidation process.	Youtcheff	Jack	202-493-3090	Aug 2012
Office of Infrastructure	Pavement Materials and	Procedure for Identifying	Develop accurate, rapid tests using spectroscopic techniques to identify aggregate	Youtcheff	Jack	202-493-3090	12/31/ 2012

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
R&D	Construction	Aggregate/Concrete Mix Potential to Form Alkali-Silica Reaction Gels	components responsible for inducing alkali-silica reaction formation.				
Office of Infrastructure R&D	Pavement Materials and Construction	Increased Use of Fly Ash in Concrete Pavements	Develop new classification for fly ash for use in concrete pavements. Develop techniques to use more fly ash as a replacement for cement in concrete pavements.	Youtcheff	Jack	202-493-3090	12/31/ 2015
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement Design and Performance Modeling	Concrete Pavement Road Map: Mix Design Research Track	Take leadership role in working with the States and industry to accomplish the objectives defined for concrete mix design in the <i>Concrete Pavement Road Map</i> . This will include further evaluation, development, and integration of existing software and guidelines concerning mixture component compatibility, along with the development of improved test methods and guidance.	Youtcheff	Jack	202-493-3090	09/30/ 2011
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement Design and Performance Modeling	Moisture Damage	Determine the affinity of asphalts and modified asphalts to aggregates through evaluation of mechanical and thermodynamic tests. Develop test methods to determine the rates of diffusion of moisture through asphalt binders, mastics, and mixtures. Characterize the mineralogical and chemical properties of the materials.	Youtcheff	Jack	202-493-3090	03/31/ 2012
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement	Fatigue Damage	Develop a fundamental understanding of the material properties and mechanics associated with fatigue through a systematic process of test method development, modeling, and field validation.	Youtcheff	Jack	202-493-3090	03/31/ 2012

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
	Design and Performance Modeling						
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement Design and Performance Modeling	Engineered Materials	Address increasing functional demand on pavements and decreasing sources of funding and virgin materials through engineering. Create pavements designed for specific conditions while optimizing the use of recycled/reused materials and additives.	Youtcheff	Jack	202-493-3090	03/31/ 2012
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement Design and Performance Modeling	Vehicle-Pavement Interaction	Examine the interaction between the rubber and the road, especially as it relates to special design considerations for geometry, safety, and noise. This includes evaluating pavement textures, developing lab test protocols, parametric studies, and building a vehicle dynamics and interface stress distribution database.	Youtcheff	Jack	202-493-3090	03/31/ 2012
Office of Infrastructure R&D	Pavement Materials and Construction and Pavement Design and Performance Modeling	Validation Sites	Test methods and models developed in the consortium research areas will be validated with real materials and pavement test sections. This area involves identifying materials and test sections with known performance suitable for validation. It also involves construction of new test sections to validate new materials.	Youtcheff	Jack	202-493-3090	03/31/ 2012
Office of Safety R&D	Pedestrians	Measures of Pedestrian Exposure to Risk	Develop and test a methodology to quantify pedestrian exposure to risk by identifying previous pedestrian exposure metrics,	Do	Ann	202-493-3319	09/30/ 2009

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
			developing a new metric that addresses limitations of previous metrics, and testing and refining the new metric in the field.				
Office of Safety R&D	Pedestrians	Real-Time Pedestrian Detection System	Develop a real-time vision system that detects moving or stationary pedestrians on sidewalks and along roadways and would be able to warn drivers of pending crashes. This project is part of the FHWA Exploratory Advanced Research Program.	Do	Ann	202-493-3319	12/31/ 2009
Office of Safety R&D	Pedestrians	Evaluation of Pedestrian/Bicycle Safety Measures	Study the effectiveness of new and innovative countermeasures in reducing pedestrian fatalities, injuries, conflicts, and other surrogate measures.	Do	Ann	202-493-3319	12/31/ 2011
Office of Safety R&D	Roadway Departure	Effects of Terrain on Vehicle Trajectories	Study vehicle dynamics and crash simulations to determine the need for revisions to the criteria for slope traversability in the <i>Roadside Design Guide</i> and highway design manuals. The analysis will consider a range of vehicles, various speeds and angles of departure, different side and back slope conditions, and road types.	Opiela	Kenneth	202-493-3371	02/282009
Office of Safety R&D	Roadway Departure	Cable Median Barrier Design & Placement Analysis	Analyze the effects of barrier placement, number of cables, post spacing, presence of curbs, and other features on safety performance to improve guidelines for the design and placement of cable median barriers. Utilize Finite Element Analysis models of cable barrier systems and vehicle dynamics models to consider both low- and high-tension cable systems for an array of vehicle types, varying	Opiela	Kenneth	202-493-3371	09/30/ 2008

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
			median configurations, and impact conditions.				
Office of Safety R&D	Roadway Departure	Analysis of the Impacts on Existing Roadside Hardware of Updated Crashworthiness Criteria	Determine through crash simulations whether commonly deployed roadside safety hardware will meet the updated safety performance criteria. Update or create new vehicle hardware models to determine if there are practical options to upgrade existing hardware to meet the new criteria.	Opiela	Kenneth	202-493-3371	06/30/2009
Office of Safety R&D	Safety and ITS	Future ITS Development	Determine how advanced crosscutting technologies in the ITS area, such as real-time measurements from multiple sensors and the next generation of telecommunication systems, can contribute to transportation systems that are safer and more efficient.	Lee	Kunik	202-493-3491	12/31/ 2010
Office of Safety R&D	Safety and ITS	Autonomous Driving System Development	Develop methodologies for determining when autonomous driving is not safe due to environment, traffic, or in-vehicle conditions and inform drivers accordingly. This project is part of the FHWA Exploratory Advanced Research Program.	Lee	Kunik	202-493-3491	12/31/ 2010
Office of Safety R&D	Safety Management Systems	Evaluation of Low-Cost Safety Improvements Pooled Fund Study, Phase II	Develop estimates of the effectiveness of safety improvements identified as strategies in the National Cooperative Highway Research Program Report 500 Guides for: 1) offset left-turn lanes; 2) advance street name signing; 3) combinations of shoulder and centerline rumble strips/stripes; and 4) lane width/shoulder width combinations.	Tan	Carol	202-493-3315	11/30/2008
Office of	Safety	Evaluation of Low-	Develop estimates of the effectiveness of safety	Tan	Carol	202-493-	02/29/ 2008

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Safety R&D	Management Systems	Cost Safety Improvements Pooled Fund Study—Phase I	improvements identified as strategies in the National Cooperative Highway Research Program Report 500 Guides through scientifically rigorous before and after evaluations. Phase I evaluations include: 1) STOP signs with increased retroreflectivity; 2) flashing beacons at stop-controlled intersections; 3) STOP AHEAD pavement markings; and 4) two-way, left-turn lanes.			3315	
Office of Safety R&D	Safety Management Systems	Highway Safety Information System (HSIS) Evaluations	Conduct HSIS studies on evaluations of factors contributing to pedestrian and bicycle crashes on rural highways, safety effectiveness of shoulder rumble strips on two-lane rural highways, and transverse rumble strips at stop-controlled intersections.	Tan	Carol	202-493-3315	09/30/ 2008
Office of Safety R&D	Safety Management Systems	SafetyAnalyst	Release software to participating States. The initial suite of state-of-the-art analytical tools is for use in the decisionmaking process to identify and manage a systemwide program of site-specific improvements for enhancing highway safety by cost-effective means.	Tan	Carol	202-493-3315	10/31/ 2008
Office of Safety R&D	Safety Management Systems	Interactive Highway Safety Design Model (IHSDM)	Release updated version of IHSDM—a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on two-lane rural highways.	Tan	Carol	202-493-3315	12/31/ 2008
Office of Safety R&D	Safety Management Systems	Evaluation of Low-Cost Safety Improvements Pooled Fund Study, Phase IV	Develop and conduct driving simulations to evaluate safety strategies for: 1) enhanced shoulder or in-lane delineation and marking for sharp curves; 2) enhanced delineation along the curve; 3) advanced warning of unexpected	Tan	Carol	202-493-3315	06/30/2009

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
			changes in horizontal alignment; 4) dynamic curve warning system; and 5) traffic calming at small-town intersections.				
Office of Safety R&D	Safety Management Systems	Evaluation of the Safety Edge Pooled Fund Study	Evaluate the effectiveness of using the Safety Edge (a filleted rather than vertical edge of pavement) to help prevent and reduce the severity of pavement edge drop-off related crashes.	Tan	Carol	202-493-3315	09/30/ 2009
Office of Safety R&D	Safety Management Systems	Motorcycle Crash Causation Study	Conduct major on-scene investigations of motorcycle crashes to identify crash antecedents; identify actions or designs that would prevent or reduce the crash severity outcome. This U.S. Congressionally mandated study is being coordinated closely with the National Highway Traffic Safety Administration (NHTSA) Pilot Motorcycle Crash Causation and Outcome Study.	Tan	Carol	202-493-3315	07/31/2011
Office of Safety R&D	Speed Management	Effect of Urban Street Environment on Operating Speeds	Develop methods for estimating operating speeds based on drivers' perceptions of design features, environmental factors, and operational conditions on low-speed urban roadways.	Zineddin	Abdul	202-493-3369	01/31/2008
Office of Safety R&D	Speed Management	Typology of Speeding-Related Crashes	Analyze crash data to determine concentrations of speed-related crashes and to identify relevant crash characteristics most often associated with such crashes.	Zineddin	Abdul	202-493-3369	12/31/ 2008
Office of Safety R&D	Speed Management	Evaluations of Speed Activated Displays on Curves	Evaluate the effectiveness of low-cost, speed-activated dynamic curve warning systems on speeding and safety on horizontal curves in rural roadways.	Zineddin	Abdul	202-493-3369	09/30/ 2011

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
Office of Operations R&D	Traffic Analysis Tools/ Simulation and Modeling	Incorporating Weather Impacts in Traffic Estimation and Prediction Systems	The objective of this project is to develop weather-sensitive traffic prediction and estimation models and incorporate them in existing traffic estimation and predictions systems.	Ghaman	Raj	202-493-3270	03/31/ 2009
Office of Operations R&D	Traffic Analysis Tools/ Simulation and Modeling	DYNASMART-P: Improve Interfaces with Planning Models	The purpose of this project is to improve the input and output interfaces in DYNASMART-P so that DYNASMART-P can easily interface with general demand models used in the planning process.	Ghaman	Raj	202-493-3270	10/31/ 2009
Office of Operations R&D	Traffic Control and Operations	Pedestrian Stereo Imaging Sensor	Investigate the uses of stereo imaging to detect and trace pedestrians near intersections.	Ghaman	Raj	202-493-3270	09/30/ 2007
Office of Operations R&D	Traffic Control and Operations	Integration of DYNASMART-X, CLAIRE, and RHODES® for Real-Time Traffic Management— Field Test in Houston, TX	Integrate DYNASMART-X, one of the two prototypes for the real-time TrEPS developed under the DTA research project, to provide traffic estimation and predictive information based on real-time traffic data and help traffic engineers at TMCs implement proactive traffic management strategies on freeways in real time.	Ghaman	Raj	202-493-3270	12/31/ 2007
Office of Operations R&D	Traffic Control and Operations	Integrated Corridor Management Initiative (ICM)— Phase III: Pioneer Site Demonstrations	Phase III is underway with eight pioneer sites selected to develop ICM concepts of operations and requirements. The pioneer sites were chosen to expand the probability of generating innovative ideas, and to demonstrate the broadest advancement of the ICM concepts.	Ghaman	Raj	202-493-3270	03/31/ 2008
Office of Operations	Traffic Control and	Integrated Corridor Management (ICM)	Identify and conduct initial ICM operations and systems development activities to support early	Ghaman	Raj	202-493-3270	09/30/ 2008

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Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
R&D	Operations	Initiative - Phase II: Operations and Systems Development	development of ICM management schemes, corridor operational strategies, analysis tools development, systems interfaces, and limited prototype development and field testing.				
Office of Operations R&D	Traffic Control and Operations	Adaptive Control System (ACS) Lite—Phase II	Develop enhancements to the Graphical User Interface (GUI) and improve the adaptive control logic.	Ghaman	Raj	202-493-3270	12/31/ 2009
Office of Operations R&D	Traffic Control and Operations	Clear Roads Pooled Fund Study	Rigorously test winter maintenance materials, equipment, and methods for use by highway maintenance crews. Current projects underway include: National Winter Safety Campaign. Computer based training modules for the Anti-Icing/RWIS CBT package. Development of Standardized Test Procedures for Carbide and Deicing Chemicals. National Winter Maintenance Peer Exchange.	Ghaman	Raj	202-493-3270	12/31/ 2009
Office of Operations R&D	Traffic Control and Operations	High Plains ITS Coalition	The purpose of the coalition is to gather and share information that will help agency personnel in each state make operational decisions-based conditions and actions taking place in the surrounding state. Under this project, a Web-based system will be built that disseminates information about those conditions and actions on the highway system.	Ghaman	Raj	202-493-3270	12/31/ 2009
Office of Safety R&D	Visibility	Mid-Block Crosswalk Lighting Guidelines	Develop guidelines for lighting crosswalks to improve the detection and recognition of pedestrians by drivers.	Andersen	Carl	202-493-3366	05/31/ 2008
Office of Safety R&D	Visibility	Report to Congress on Pavement	Evaluate the durability and cost effectiveness of alternative pavement marking materials, the	Andersen	Carl	202-493-3366	06/30/2009



Office	Team	Title	Project	Last Name	First Name	Phone	Anticipated Completion
		Marking Demonstration Project—Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users Section 1907	impact of wider edge lines on driver performance/safety, and the environmental impact of alternative pavement marking materials. Submit the report to the U.S. Congress by June 2009; and conduct additional field data collection and analysis through 2010.				
Office of Safety R&D	Visibility	Increased Understanding of Driver Visibility Requirements	Develop a hybrid human/computer model of the quantity and quality of visual information needed to navigate certain curves in the roadway safely and effectively at night. This project is part of the FHWA Exploratory Advanced Research Program.	Andersen	Carl	202-493-3366	12/31/ 2009