

OFFICE OF OPERATIONS R&D

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The Office of Operations R&D is making major contributions to assist FHWA in meeting its mobility, safety, and security goals through completed or planned products and activities with the following strategies:

Implementing an Integrated Intelligent Transportation System (ITS) Infrastructure

ITS Deployment Analysis System (IDAS)

IDAS allows for the assessment of ITS improvements as part of the transportation planning analysis—a step forward in helping ITS deployment. IDAS software is being distributed through the McTrans Software Center. A 2-day IDAS training course has been delivered to each of the four FHWA Resource Centers and is available through the National Highway Institute. Maintenance for the IDAS software is active.

Adaptive Control Systems (ACS)

Three ACS software packages were developed in collaboration with the private sector to automatically generate new signal timing plans to respond to traffic flow changes in real time. Prototype algorithms are being evaluated in Tucson, AZ, and Seattle, WA. Development of an ACS "Lite" architecture, a reduced-scale version of ACS that will support the needs of smaller and rural communities, is also underway.

Advanced Transportation Controller and the Controller Interface Device (CID)

This project developed the next generation of traffic control hardware (Model 2070) that will support multiple advanced transportation applications. In coordination with AASHTO, NEMA, and ITE, specifications for advanced transportation controllers, cabinets, and application program interfaces were completed in FY 2000. The CID was also developed to enhance optimization of new signal timing/phasing on site and is being delivered through the private sector.

Traffic Estimation and Prediction System (TrEPS)

The TrEPS software will provide the predictive information needed for pro-active traffic control and traveler information. TrEPS will facilitate and enhance planning analysis, operational evaluation, and real-time advanced transportation systems operation. Laboratory evaluation of the TrEPS prototypes was completed in March 2000. Field experiments are underway. TrEPS products will be available in 2003.

Strategic Work Zone Analysis Tools (SWAT)

The SWAT program is developing a suite of four tools to facilitate the analysis of work zone strategies to reduce delay to the motorist, identify viable mitigation strategies, consider the costs of various options, and provide guidance on establishing work zone performance-based contracting specifications. The first software tool, QuickZone, is a spreadsheet package available to analyze the traffic impacts of work zones. QuickZone also features partnerships with up to eight jurisdictions, allowing them to customize the software for local needs.

Traffic Software Integrated System (TSIS)

TSIS is a collection of software tools to allow traffic engineers to simulate and evaluate the impacts of a wide range of operational improvements to a network of freeways and surface streets through output measures and animation. An enhanced version of TSIS (version 5.0), with a graphical input editor, is available. Maintenance and support for TSIS will continue in the future, while a new Federal approach to enhance simulation is being developed.

Next Generation Traffic Simulator (NGSIM)

Work on developing new microscopic traffic simulation modeling technologies began in FY 2000. This included a broad Request for Information and stakeholder forums to discuss both technical and non-technical issues with developing these new technologies. As a result, FHWA is taking a new role in simulation development as a market facilitator to stimulate the commercial market in an environment of public-private coordination. NGSIM algorithm work will be under contract in FY 2002.

Traffic Management Tools—Handbooks

Work to update a series of handbooks covering traffic detectors, traffic signal control systems, and freeway management is underway. These handbooks will assist traffic managers and practitioners in working with equipment and other technologies for efficient operation of traffic corridors and networks.

Focusing on Weather, Security, and Lifesaving Technologies

Weather and Security Issues

This paper evaluates a hierarchy of cases: incidents, work zones, special events, weather, and emergency evacuations ranging from non-recurrent congestion to gridlock. It categorizes this range of events, describes the actions usually seen, outlines the effects on the transportation infrastructure, and explores transportation management tools that are under development or newly completed that could help respond and even expedite evacuation.

Generation 0 Field Operational Tests for the Intelligent Vehicle Initiative (IVI)

This project addresses one of the four IVI vehicle platforms—specialty vehicles. It sponsors field operational tests of innovative technologies for improving the safety of vehicles, such as snowplows, police cars, or ambulances, under low-visibility and poor weather conditions. The technologies, primarily focusing on snowplows, include collision warning systems, lateral guidance systems, and an integrated driver-vehicle interface. An independent evaluation of the field operational test will also be conducted to ensure that the value of the technologies can be objectively established.

Intelligent Curve Warning Systems

Intelligent curve warning systems have the potential to reduce roadway departures at curves. FHWA's Highway Safety Information System database will be used to analyze the causes of crashes and to determine the population of highway curves that could benefit from warning systems. Existing warning systems will be reviewed and a conceptual design for an intelligent curve warning system will be defined. Potential benefits and costs of deployment will also be estimated.

Intersection Collision Avoidance

Studies are underway to evaluate infrastructure-based countermeasures to avoid intersection crashes. These systems are ultimately expected to work in cooperative communication with vehicle-based technologies. An Infrastructure Consortium of three states and universities is actively pursuing a 3-year research agenda that will resolve functional requirements and undertake field testing. Concept papers have explored the requirements and concepts for systems operation. The Consortium has coordinated with vehicle manufacturers and looks to expand this interaction.

ITS Applications for Communications

This work provides program support and assistance for developing standards and analyzing the application of Dedicated Short-Range Communication (DSRC) on the 5.9-GHz frequency band to support transportation safety and mobility initiatives. This effort includes the definition of possible uses of DSRC to support vehicle-to-infrastructure communications to enable enhanced intersection collision avoidance systems and cooperative roadway departure systems.

Road Weather Management Program

This effort will develop a functional prototype winter weather Maintenance Decision Support System (MDSS) to improve information systems and provide tools to support better highway operations decisions by maintenance managers. Using the MDSS, they will be able to operate and maintain the highway system better and with greater efficiency under adverse weather conditions. A prototype MDSS will be developed in FY 2002 for release to the private sector for further development.

Developing and Implementing a Reliable Nationwide Differential GPS

Base Stations for NDGPS

This project is converting signal stations transferred from the U.S. Department of Defense into base stations for the Nationwide Differential Global Positioning System (NDGPS). This is providing additional coverage and increased position location accuracy for vehicle-based and stationary NDGPS receivers. NDGPS is an important enabling technology that provides accurate location information for ITS applications such as transit fleet management, in-vehicle navigation, or automated collision notification systems. Seventy

percent of the Nation is currently covered by NDGPS that provides 1- to 3-meter accuracy. Deployment of the complete NDGPS network of 78 towers will be completed by the end of 2004.

High-Accuracy NDGPS

Two NDGPS stations are being instrumented and tested to explore the potential for even higher accuracies in the range of 10 to 20 centimeters.

