



Office of Research, Development, and Technology

**FY 2002  
PERFORMANCE  
REPORT**

**Research that is Essential, Indispensable, and Connected to our Customers.**





# Turner-Fairbank Highway Research Center

FY 2002

## PERFORMANCE REPORT

|  |     |
|--|-----|
| <b>WELCOME</b> .....   | 3   |
| <b>SECTION I: Who We Are and What We Do</b> .....            | 5   |
| <b>SECTION II: The Strategic Framework</b> .....             | 9   |
| Vision and Mission .....                                     | 9   |
| FHWA Goals, “Vital Few,” and Roles .....                     | 10  |
| Corporate Role in Technology and Innovation Deployment ..... | 11  |
| <b>SECTION III: Our Business Results</b> .....               | 12  |
| RD&T Challenges, Commitments, and Achievements .....         | 12  |
| Leadership Council Action Agenda Status .....                | 17  |
| RD&T Research Project Status Summary .....                   | 20  |
| RD&T Research Success Stories .....                          | 20  |
| <b>SECTION IV: RD&amp;T Performance Management</b> .....     | 25  |
| Relevance, Quality, and Performance .....                    | 25  |
| Planning and Priority Setting .....                          | 25  |
| Stakeholder Advisory Activities and Feedback .....           | 26  |
| The Performance Management Team .....                        | 26  |
| The Lab Assessment Process .....                             | 26  |
| The Performance Management Framework .....                   | 27  |
| RD&T Research Benefits Case Studies .....                    | 29  |
| RD&T Annual Quality Self Assessment .....                    | 29  |
| RD&T Organizational Chart .....                              | 31  |
| <b>APPENDICES: Project and Services Status Tables</b> .....  | 32  |
| A: RD&T Research Project Status Tables .....                 | A-1 |
| B: RD&T Services Tables .....                                | B-1 |
| C: RD&T Research and Technology Partnerships .....           | C-1 |
| D: RD&T Educational Outreach Partnerships .....              | D-1 |
| E: List of Abbreviations .....                               | E-1 |





## Welcome

This publication is the Federal Highway Administration's (FHWA) Office of Research, Development, and Technology's (RD&T) first annual performance report. It represents an effort to demonstrate and communicate our commitment to accountability in the programs and initiatives managed at the Turner-Fairbank Highway Research Center (TFHRC), a federally owned and operated research facility in McLean, VA. The report documents our 2002 accomplishments and success stories, and discusses the challenges and strategies we plan to use in addressing them. Additionally, the report highlights some changes in the research and technology (R&T) environment this year and shows how we adapted to changing circumstances by adjusting our practices. This performance report is a companion document to the *2002/2003 Performance Plan and the 2002/2003 Catalog of Products and Services*, both available on the TFHRC Web site. Our organization recently took on the leadership and coordination of the FHWA initiative to "raise the bar" in research, technology, and innovation deployment. Next year's performance report will include a section that communicates FHWA's accomplishments in this particular area.

Our R&T program directly supports the FHWA and Department of Transportation's (DOT) goals. At FHWA, our mission of "Enhancing Mobility through Innovation, Leadership, and Public Service" and our role as "Innovators for a Better Future," reinforce R&T's importance to the Nation's transportation system and our customers. FHWA's research leadership emphasizes information sharing and partnerships with State and local governments, academia, and the private sector to quickly and cost-effectively transform new technologies and concepts, into better transportation systems, processes, and services.

The TFHRC facility contains more than 24 indoor and outdoor laboratories (labs) and support facilities, which provide

advanced research and development (R&D) innovations for U.S. and international highways. TFHRC houses more than 300 Federal and contract transportation researchers, students, and support personnel. The first section of this performance report provides additional insight into our research facility, personnel skill levels, programs, and initiatives that enhance and "give back" to our community. The remainder of the report highlights our contributions to highway research and technology, and our efforts to continually improve our organizational processes. These efforts recently earned RD&T the FHWA Quality Breakthrough Award for making significant progress in quality management practices.



We hope that this report encourages you to learn more about RD&T's people, laboratories, services, and research. Our office undertakes and completes research that is essential, indispensable, and connected to our stakeholders. I sincerely welcome your feedback on this performance report and encourage you to provide comments and improvement suggestions through the TFHRC Web site at <http://www.tfhrc.gov/>. A *Research, Development, and Technology FY 2002 Performance Report* feedback link was added to our home page to encourage and facilitate your input. Thank you for letting us know how we may better serve you.

Dennis C. Judycki

Associate Administrator for Research, Development,  
and Technology



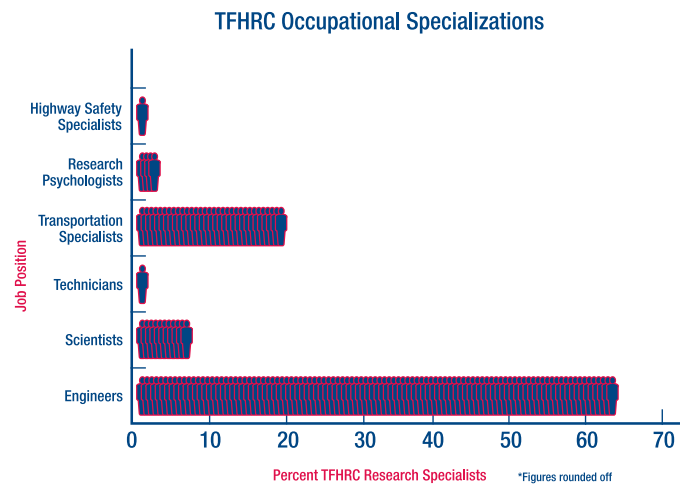
## I. Who We Are and What We Do

TFHRC has six offices involved in research and program support activities. The R&D Office of Safety, Office of Operations, and Office of Infrastructure conduct R&D that continually improves highway safety, operations, and infrastructure, respectively. Our 300 employees and contractors work in a variety of occupations and specialties, and job positions include engineers, scientists, psychologists, and program support specialists from a variety of disciplines. Their activities cover major subject-matter areas such as human centered systems, materials technology, operations and intelligent transportation systems (ITS), pavements, safety, and structures. Fifty percent of RD&T staff has advanced degrees, with 20 percent holding one or more doctoral degrees.

RD&T develops and executes policy, budget, program management, and evaluations that support FHWA's R&T program. The organization serves as the focal point for FHWA participation in cooperative research activities, such as the National Cooperative Highway Research Program (NCHRP) and the Transportation Pooled Fund program. In the 2002 fiscal year (FY), the Transportation Pooled Fund included 115 FHWA-led projects valued at approximately \$38 million, with the average study valued at \$450,000. Additionally, FHWA administered 150 State-led projects valued at approximately \$50 million—with the average study valued at \$575,000. (Each project included five State partners on average.) RD&T also conducts outreach to University Transportation Research Centers and the small business community.

Our approach to research supports FHWA's emphasis on cooperation, information sharing, and formal research agenda development within DOT and across the entire

government. We continually seek to promote partnerships with State and local governments, academia, and the private sector to quickly and cost-effectively transform new technologies and concepts into better transportation systems, processes, and services. Appendices C and D of this report provide an overview of the extensive partnership activities that involve FHWA. Our emphasis on conducting world-class research includes a commitment to improve our business processes and efficiently operate the RD&T facilities, organization, and programs. We saved more than \$1 million by streamlining support contracts, and more than \$85,000 by utilizing an offsite manager for our Web-based operations as part of our cost-saving measures. For additional business process improvement highlights that enabled us to exceed our customers' and partners' expectations, see the "Challenges and Commitments" section of this report and the "Services" tables in appendix B.



*We continually seek to promote partnerships with State and local governments, academia, and the private sector to quickly and cost-effectively transform new technologies, concepts, and ideas into better transportation systems, processes, and services.*



Our organization regularly offers a variety of career development programs, including FHWA's professional development program, the DOT-wide Summer Transportation Intern Program for Diverse Groups (STIPDG), and Federal government-wide programs such as the Executive Leadership Program and the Executive Potential Program. RD&T benefits from the new perspectives and fresh ideas that these program participants offer, and provides new learning opportunities whenever possible. In return, the program creates more participant awareness and a better understanding of the unique highway research challenges. For more information, see appendix D.

In addition to educational outreach, RD&T provides a variety of marketing and communications services that support FHWA technology and innovation deployment initiatives. These services include marketing and communications strategic planning, exhibits, special events planning, and report and periodical publishing, including *Public Roads*, *Research and Technology Transporter*, and *Focus*.

### **"Giving Back" to the Community**

#### **Youth Educational Outreach**

Part of the organizational culture at RD&T is an emphasis on societal responsibility, community involvement, and mentorship. RD&T enthusiastically encourages future transportation professionals and we offer hundreds of students the opportunity



to learn first-hand about the role of research and technology in the Nation's transportation system, and the variety of available transportation career options. These activities support

the educational community at all levels, from research fellow grants to kindergarten through senior high school (K-12) age-appropriate outreach activities. For several years now, our lab research engineers have spoken to and made presentations to local elementary schools to interest students in the engineering profession. Recently, RD&T engineers visited two elementary schools in Prince George's County, MD, and one in Washington, DC, to teach students about the profession and encourage them to explore engineering as a future career path.

Other K-12 educational outreach activities include hosting job shadowing on Groundhog Day and Take Your Son/Daughter to Work Day. RD&T also supports the National Engineer Week's Future City Competition, bringing together seventh- and eighth-grade students and engineers to develop models of



future cities. FHWA sponsors an award to the Future City team that best incorporates transportation elements in its prototypical design. This year, the RD&T staff judged and presented the team award to students from the St. Thomas More School in Baton Rouge, LA, and each winning team member received a \$100 savings bond and a framed recognition certificate.



### Fairfax County Fire and Rescue Training

For the past 5 years, firefighters from two Fairfax County Fire and Rescue Departments, Fairfax, VA, practiced removing



pinned and trapped motorists (using crash dummies) from automobile crash tests at the TFHRC Federal Outdoor Impact Laboratory (FOIL). Normally, these firefighters and rescue workers practice their rescue techniques on junked cars at the Fairfax County Fire and Rescue Academy, Fairfax, VA. However, using crash test vehicles from the FOIL provides them with a more challenging training exercise, since the FOIL better simulates actual crash conditions. As a result, firemen who train at the FOIL improve their equipment skills and their rescue techniques in preparation for real-life emergencies.

### Future Car Congress “Ride and Drive”

To showcase the latest environmentally friendly vehicles, RD&T hosted the “Ride and Drive” event for the Future Car Congress, which enabled attendees to drive state-of-the-art vehicles and gain hands-on experience using the technologies

highlighted during the conference. Sponsored by the U.S. Department of Energy (DOE), the U.S. Council for Automotive Engineers, and The Engineering Society of Detroit, this year’s Future Car Congress hosted more than 800 guests from 16 countries and included government officials, policy makers, analysts, researchers, engineers, industry and academic representatives, news reporters, and FHWA employees.



### Facility Tours

TFHRC conducts facility tours, which create awareness with critical audiences and deliver the message that RD&T research provides innovative, real-world solutions to a number of highway-related problems. Each year, TFHRC offers tours to hun-



dreds of guests such as senior legislative and U.S. DOT decision makers, congressional staffers, international research colleagues, FHWA State and local partners, professional organi-

zation and association members, and others. Guests visit the labs and learn about research projects that benefit our Nation's transportation system.

### **Combined Federal Campaign and Other Outreach Activities**

At TFHRC, we give back to the community through a number of other programs. RD&T supports the annual Combined Federal Campaign (CFC) with fundraising and social events, such as a chili cook-off and bake sales with proceeds this year going to the Oklahoma City Scholarship Fund. Throughout the year, employees also collect donations on various holidays for a senior center in Washington, DC, and they conduct semi-annual blood drives to support the American Red Cross of the National Capital Area. During the September 11 tragedy, personnel organized a special blood drive to support and help save the lives of fellow Americans, who were injured. Other RD&T public outreach activities include exhibits on the National Mall in Washington, DC, for Public Service Appreciation Week and National Transportation Week.



## II. The Strategic Framework

### The FHWA R&T Program

Managing FHWA's R&T program and communicating with our partners are important components of the RD&T mission. Like the R&T program, the RD&T program directly supports FHWA's and DOT's goals. FHWA's research approach emphasizes cooperation, information sharing, and formal research agenda development with State and local governments, academia, and the private sector. The RD&T Performance Plan illustrates RD&T's alignment with the DOT and FHWA vision, mission, and goals; documents the action agenda that will produce results; and lists the RD&T products and services.

### Vision and Mission

The FHWA Leadership Team recently reexamined FHWA's vision, mission, and roles. In the new mission statement, "Enhancing Mobility through Innovation, Leadership and Public Service," FHWA affirms that research and innovation are integral to its mission. In fact, one of FHWA's three primary roles is to be "innovators for a better future." This key rewording of the mission statement reflects R&T's important contribution to enhancing mobility, and it underscores FHWA's commitment to organizationally "raising the bar" on technology and innovation development and deployment.

*FHWA's research approach emphasizes cooperation, information sharing, and developing formal research agendas.*

|   |  |  |
|---|--|--|
| <p><b>DOT Vision</b></p> <p>A visionary and vigilant Department of Transportation leading the way to transportation excellence in the 21st Century.</p>   | <p><b>FHWA Vision</b></p> <p>Improving transportation for a strong America.</p>                          | <p><b>RD&amp;T Vision</b></p> <p>An RD&amp;T organization that is essential, indispensable, and connected to our partners in advancing research and technology.</p>  |
| <p><b>DOT Mission</b></p> <p>Serve the United States by ensuring a fast, safe, efficient, accessible, and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today, and into the future.</p> | <p><b>FHWA Mission</b></p> <p>Enhancing mobility through innovation, leadership, and public service.</p> | <p><b>RD&amp;T Mission</b></p> <p>Leads in developing a nationally coordinated research and technology program; champions the advancement of highway technological innovation in support of FHWA strategic goals and performance objectives; advances knowledge through research, development, testing, and evaluation services; and provides support and assistance throughout FHWA in matters relating to research, development, and technology.</p> |



## FHWA Goals for FY 2002

*Safety*—Improve highway safety.

*Mobility*—Improve the public’s access to activities, goods, and services through preserving, improving, and expanding the highway transportation system, and enhancing its operations, efficiency, and intermodal connections.

*Productivity*—Improve the economic efficiency of the Nation’s transportation system to enhance America’s position in the global economy.

*Human and Natural Environment*—Protect and enhance the natural environment and communities affected by highway transportation.

*National Security*—Improve the Nation’s national defense mobility.

*Organizational Excellence*—Advance FHWA’s ability to manage organizational resources, to improve customer service and satisfaction, and to successfully deploy technologies and innovations.

## FHWA “Vital Few”

*Safety, Congestion Mitigation, and Environmental Stewardship and Streamlining* can best be described as the Agency “to do” list. These goals reflect FHWA’s desire to commit resources in areas where critical performance gaps exist and where the greatest impact can be made. In the next 3 to 5 years, our performance in these areas will define success for FHWA and affirm the need for a Federal role in highway transportation.

## FHWA Roles

Based on discussions at the FHWA annual meeting, the Agency developed a new technology and innovation role statement, which affirms FHWA’s new mission and declares our identity:

- ▶ Innovators for a Better Future—To support the role of “Innovators for a Better Future,” TFHRC leadership commits to:
  - ▶ Coordinating R&D with and for our stakeholders and partners;
  - ▶ Supporting an environment that encourages innovation deployment; and
  - ▶ Creating improved technology and innovation deployment processes.

In light of these guiding principles, the TFHRC provides FHWA, its stakeholders, and customers—the world highway community—with the most advanced research and development related to new highway technologies—focusing on solutions to complex technical problems by developing economical, environmentally sensitive designs; efficient, quality controlled constructions practices; and durable materials, all of which will create a safer, more reliable highway transportation system.

- ▶ Leaders for National Mobility—defining future transportation systems and advocating highway system excellence.
- ▶ Stewards for National Highway Programs—“raising the bar” on performance and ensuring financial accountability.

## Corporate Role in Research and Deployment of Technology and Innovation

In FY 2002, FHWA completed a restructuring assessment to examine the state of its current organizational structure. The restructuring assessment team conducted 160 focus groups and structured interviews, 85 with external stakeholders and 75 with FHWA employees.

FHWA's "raising the bar" initiative supports the Agency's role as "Innovators for a Better Future." The initiative addresses recommendations from the FHWA restructuring assessment, the Transportation Research Board (TRB) Research and Technology Coordination Committee's (RTCC) *TRB Special Report 261, The Federal Role in Highway Research and Technology*, and the recommendations from the Government Accounting Office (GAO) report on highway research. A new position of Director for Research, Technology, and Innovation Deployment was created, reporting to the Associate Administrator for RD&T. The strategy is to develop an FHWA "Corporate Master Plan for Research and Technology and Innovation Deployment." The plan will cover all phases, including setting research agendas, increasing the role of external stakeholders, using "roadmaps" (multiyear plans), evaluating research results, and deploying technology.

*We have developed a lab assessment process that will allow routine expert peer review of the research conducted at TFHRC.*

## III. Our Business Results

### RD&T Challenges, Commitments and Achievements

To guide our business and performance plan, the RD&T Leadership Council's (LC) vision is to conduct research and provide products and services that are *essential, indispensable, and connected to our customers and partners*. We are committed to continuing our quality journey (the process that FHWA uses to regularly assess their management practices); initiating program, process, and quality of work-life improvements; conducting outstanding research; and providing services that exceed performance indicators, strategic goals, and customer and partner expectations. The following is a list of our top challenges and some key achievements related to fulfilling them:



#### I. Effectively Deliver Needed Products and Services

##### 1. Develop quality research products and services that address the needs of our internal customers and external partners in a timely manner.

- ▶ RD&T's performance plan calls for the delivery of more than 86 products in the FY 2002/2003 timeframe. More than 90 percent of research projects are on schedule, and our customer surveys confirm improvements in response and delivery times. RD&T projects span many disciplines and transportation topics, from highway

design, engineering, and maintenance to economic analysis, human factors, travel surveys, outreach, and marketing. See the Project and Services Status Tables for a detailed status listing of FY 2002/2003 products.

##### 2. Improve R&T collaboration, communication, and feedback from the FHWA Resource Centers and Division Offices.

- ▶ The findings from the RD&T annual self-assessment confirmed that there were notable improvements in communications and feedback between RD&T offices and the Resource Centers and Division Offices. Survey results indicated that relationships with our internal and external customers and stakeholders were generally positive, and reflected greater awareness of customer and partner needs and communication improvements, overall. Several RD&T offices also confirmed better response times and better product and service deliveries.
- ▶ RD&T conducted several meetings and conferences with Division Offices and Resource Centers to discuss important strategic and operational issues, in addition to standard communication activities and field office interactions. Highlights include the sessions held at the annual TRB meeting, the technology and innovation delivery conference for the Western States, and the National Research Advisory Committee meetings.



**II. Improve Business and Administrative Processes**

**1. Develop and implement a lab assessment process to provide regular, independent feedback to improve the quality of lab services and lab-based research programs.**

▶ RD&T developed a lab assessment process that will foster routine expert peer review of the research conducted at TFHRC. Planning for a pilot assessment of the Human Centered Systems Lab currently is underway.



▶ An SAIC-prepared RD&T report provided an overview of Federal laboratory assessment best practices. RD&T used this report to develop its approach and shared it with other interested agencies.

**2. Effectively use research resources and ensure efficient RD&T facility, organization, and program operations.**

▶ RD&T recently received the Quality Breakthrough Award, which recognizes organizations within FHWA that are making significant progress in developing clear plans, building sound processes, and achieving measurable results. The award is for the second-of-three milestones in the pursuit of the Quality Journey Award. The first milestone is the Quality Commitment Award, the second is the Quality Breakthrough Award, and the third is the Quality Excellence Award. Each office award recipient was judged using the seven Malcolm Baldrige award criteria for performance excellence. Because it is one of the highest

awards given within FHWA, receipt of a Quality Journey Award is a distinctive honor.



- ▶ RD&T improved its account coordination and reconciliation and identified corrections for FHWA R&T funds. The office used this information to develop FHWA-wide reports for all R&T funds. For contracting and procurement planning, RD&T staff developed training, which FHWA is now using for contracting officer's technical representative (COTR) refresher training requirements. RD&T staff are piloting an advanced acquisition planning system that will be adopted by the Agency.
- ▶ Technology facilitation action plans (TFAPs) are important mechanisms to ensure organizational R&T product and service delivery to our customers. RD&T and the entire Agency are using TFAPs to track research product development and deployment.
- ▶ Small Business Innovation Research (SBIR) Process Improvement—RD&T led the development and implementation of a multifaceted process improvement initiative. It established procedures for evaluating SBIR proposals and ensuring that funded projects support critical FHWA research priorities and strategic objectives. The process also provided FHWA office directors with direct roles for determining the SBIR proposals that most closely meet mission priorities. The process helps develop closer and more effective working relationships between Volpe (the organization responsible for overseeing the DOT SBIR initiative) and FHWA. Finally, the process encourages more realistic decisions regarding the number of Phase I-funded projects, given budgetary trends.

**3. Define and implement methodologies/tools to evaluate projects and conduct a performance measurement of TFHRC research.**

- ▶ RD&T developed and adopted a performance management framework based on FHWA's corporate management strategies. The framework was well received within the performance measurement community and obtained a favorable mention in TRB Special Report 261 and in a recent NCHRP report on performance measures.
- ▶ RD&T staff provided key recommendations to DOT for developing the Office of Management and Budget's (OMB) criteria for Federal investment in research, based on relevance, quality, and performance. The revised criteria are a variation of the original recommendations of the National Academies' Committee on Science, Engineering, and Public Policy.
- ▶ RD&T participated in the FHWA "catchball" initiative to draft performance objectives directly related to FHWA's Vital Few goals. Catchball is an FHWA goal-setting process that uses input and participation from all levels of the organization. Employees at all levels were involved in designing strategic objectives, activities, and measures for accomplishing and being held accountable for specific goals. The catchball process encouraged RD&T employees and managers to focus performance plans at the office and individual levels for achieving results in specific project areas.
- ▶ TFHRC established a performance management team with representatives from all six RD&T offices. The team's charter is to advise and assist the RD&T leadership in developing, coordinating, and implementing organizational



performance and productivity improvements. Performance management efforts currently underway include:

- ▶ Developing performance goals, measures, strategies, and initiatives to improve performance management in RD&T offices and laboratories;
- ▶ Monitoring measurement results, and analyzing performance management information;
- ▶ Conducting the annual RD&T self-assessment process and applying results;
- ▶ Developing and conducting RD&T customer satisfaction surveys;
- ▶ Contributing to special projects for RD&T performance management, such as developing and implementing the expert panel assessment process for RD&T laboratories;
- ▶ Assisting in the implementation and review of Agency-wide performance improvement initiatives within RD&T.

**4. Advance the information technologies and systems to address the unique needs of a world-class research organization.**

- ▶ RD&T commissioned an information technology task force consisting of representatives from all of its offices. The task force team's goal is to advance information technologies and systems at TFHRC and to improve computer system communications with our partners and customers.
- ▶ RD&T actively supported FHWA's effort to make unit performance plans accessible to FHWA offices nationwide via the *Shared Unit Performance Plan System* (SUPPS). The current RD&T performance plan, challenges, and commitments are posted in SUPPS. RD&T will use SUPPS not only

for performance planning, but also as a means of tracking Vital Few goal-related activities and resources to support FHWA's performance goals and strategies.

**III. Develop and Recognize Employees**

**1. Mentor and encourage individual development plans (IDP) that build employee skills and add to FHWA research capacities and competencies.**

- ▶ RD&T is serious about training its employees, and we encourage all employees to develop and regularly update IDPs through the *Learning and Development System* (LADS). We also encourage employees to participate in traditional classroom, video, and online training; to perform mentoring; and to actively share research ideas and results. Office directors at RD&T received training at The Federal

Executive Institute and Management Development Centers, American Association of State Highway and Transportation Officials' (AASHTO) Executive Leadership Program, and the Eno Transportation Foundation.

- ▶ The Technical Career Track (TCT) program provides an opportunity for RD&T to promote and retain employees with technical excellence in FHWA. An employee at GS-13 or GS-14 grade level in non-supervisory technical delivery position may be considered for promotions based on current accomplishments, degree of technical expertise, and current position relative to the Agency's overall goals. In 2001, FHWA promoted six RD&T employees under the TCT program, and in 2002, promoted nine RD&T employees.

**2. Improve the award and recognition program to value achievements, link directly to team accomplishments, and advance the RD&T Leadership Council Action Agenda.**

RD&T developed a list of potential new awards for TFHRC personnel. The Leadership Council has agreed to review the list and to discuss, revise, and approve new monetary and non-monetary methods for recognizing TFHRC personnel.

**IV. Communicate the FHWA R&T Story and Future Agenda**

**1. Improve the state of FHWA R&T initiatives and focus areas.**

- ▶ The FHWA R&T Initiatives report discusses our work with a wide range of organizations to implement innovative technologies and progressive programs that will yield impressive returns in safety, mobility, productivity, natural environment, and national security. It also describes initiatives in 12 priority areas: advanced research, asset management, environment, intelligent transportation systems,





pavements, safety, structures, operations, policy, planning and real estate, international, and partnerships.

- ▶ To better communicate Leadership Council goals and accomplishments and increase awareness throughout FHWA about RD&T activities and initiatives, we recently established the “RD&T InfoLink,” the FHWA StaffNet intranet Web site. The InfoLink site contains easily accessible information, such as Leadership Council meeting minutes, the Leadership Council Action Agenda, and the checkpoint review progress-tracking calendar.

**2. Collaborate with FHWA headquarters and field offices to gather and disseminate achievements in FHWA technology and innovation delivery.**

- ▶ The first annual report on achievements in technology transfer was published in February 2002. The *Technology and Innovation Delivery Activities for Fiscal Year 2001* report compiles the technology and innovation delivery activities of all the FHWA field and headquarters offices for the previous fiscal year. FY 2001 was the first year that the 52 FHWA Division Offices received discretionary funding to implement technologies and apply innovations for individual States’ particular needs. The report details the wide variety of activities initiated with State and local partners.
- ▶ The data in this report will provide a valuable baseline to track and assess FHWA’s technology and innovation implementations in future years. The largest expenditure was for showcase projects, followed by testing and evaluation, and specifications, design guides and tools, while smaller amounts were spent on training, outreach, and communication.
- ▶ RD&T continues to document and highlight R&T success stories in *Public Roads* and other publications. The RD&T Success Stories section of this report contains some examples of key research conducted at TFHRC.

**3. Identify national research program priorities, resources, and funding needs with our partners.**

- ▶ The National Partnership Initiative was unprecedented in terms of outreach—hundreds of individuals and more than 170 organizations participated. The partnership initiative may become a model for involving external stakeholders as part of a national highway R&T agenda. Convened by the FHWA, AASHTO, and TRB, the partnership engages the entire highway transportation community in identifying R&T needs and examining potential benefits of partnerships formed to fulfill those needs. The partnership initiative established five working groups: safety, infrastructure renewal, policy analysis and systems monitoring, operations and mobility, and planning and environment. A report reflecting the view of the working groups and incorporating the Surface Transportation-Environment Cooperative Research Program (STECRP) findings was published in April 2002.
- ▶ FHWA is supporting interim work to develop more detailed work plans for the Future Strategic Highway Research Program (FSHRP). Program liaisons on each of the FSHRP technical panels will help ensure that the proposed work complements FHWA’s R&T program.

**4. Build a common advocacy to enhance the national R&T program and legislative agenda.**

- ▶ In preparation for reauthorization, FHWA Executive Director Frederick “Bud” Wright and the Associate Administrator for RD&T, Dennis Judycki, testified about FHWA’s R&T program at a Senate Committee on Environment and Public Works’ roundtable. Several senators made supportive comments about the FHWA R&T program, and many partners witnessed and provided strong support for FHWA R&T activities and leadership. AASHTO, TRB, and ten other organizations testified on behalf of FHWA’s key role in highway research.

- ▶ A surface transportation reauthorization Web site was established for reauthorization outreach, which also enables the public to make comments directly into the docket. The Web site is available at: <http://www.fhwa.dot.gov/reauthorization/index.htm>

## RD&T Leadership Council Action Agenda

The Leadership Council oversees the RD&T Quality Journey and implements FHWA's corporate management strategies. The council also identifies key processes and measures for RD&T; analyzes results of RD&T-wide measures; identifies

information gaps; serves as a forum for sharing best practices and lessons learned; and develops and implements action plans. The council uses the annual office self-assessment process to obtain important customer and employee feedback in each of the seven Baldrige categories. This input then is compiled into a crosscutting list of organizational priorities and focus areas for the upcoming FY.



*Leadership Council and team leaders*

### Leadership Council Action Agenda Status & Milestones

| Action Item  | Office   | Status   |
|--|--|--|
| <b>A. Leadership</b>   |  |  |
| 1. Develop and implement R&T legislative agenda and strategy   | Office of Program Development and Evaluation (HRPD)                      | -Completed-  |
| 2. Prepare a concept paper and work plan for advanced research | Offices of Safety, Infrastructure, and Operations R&D (HRDS, HRDI, HRDO) | -Completed-  |
| 3. Prepare a white paper on the FHWA role in R&T               | HRPD   | -Completed-<br>Note: An implementation plan was prepared in response to the TRB Special Report 261, The Federal Role in Highway R&T. |
| <b>B. Strategic Planning</b>                                   |  |  |
| 1. Mobility  | See RD&T Research Project Status Summary for FY 2002                     | 25 projects completed to support the mobility goal in FY 2002.   |
| 2. Safety  | See RD&T Research Project Status Summary for FY 2002                     | 12 projects completed to support the safety goal in FY 2002.   |
| 3. Productivity  | See RD&T Research Project Status Summary for FY 2002                     | 5 projects completed to support the productivity goal in FY 2002.  |

| <b>Leadership Council Action Agenda Status &amp; Milestones (continued)</b>                    |  |   |
|--|--|---|
| <b>Action Item</b>   | <b>Office</b>  | <b>Status</b>   |
| <b>B. Strategic Planning (continued)</b>   |  |   |
| 4. Human and natural environment   | See RD&T Research Project Status Summary for FY 2002 | 3 goal-related projects completed in FY 2002 (See Infrastructure project listing).  |
| 5. Security  | See RD&T Research Project Status Summary for FY 2002 | RD&T worked with the AASHTO Transportation Security Task Force to develop a prioritized list of research projects. FHWA is planning to participate in three studies:<br>1) Rapid Bridge Replacement and Bridge Design;<br>2) Construction and Retrofit Strategies; and<br>3) State-of-the-Art Bridge Surveillance Technologies. |
| <b>C. Human Resources Development and Management</b>   |  |   |
| Provide a forum for outreach on work systems, training, security, and morale                   | Office of Resource Management (HRRM)                 | -Completed-<br>HRRM developed a list of potential new awards for TFHRC personnel. The LC agreed to review the list and discuss, revise, and approve new monetary and non-monetary methods for recognizing TFHRC personnel.  |
| <b>D. Customer and Partner Focus</b>   |  |   |
| 1. Communicate the FHWA R&T Story  | HRTS   | -Redefined for FY 2003-   |
| 2. Update and maintain technology facilitation, strategy and action plans                      | HRDI/HRDS/HRDO                                       | -Continued in FY 2003-  |
| 3. Communicate RD&T Activities (Profiles report, success stories, Innovation Connection, etc.) | HRTS   | -Continued in FY 2003-<br>Note: Will be redefined and moved to Process Management.  |
| 4. Develop a customer feedback plan for RD&T   | HRPD   | -Completed-   |
| <b>E. Information &amp; Analysis</b>   |  |   |
| Improve the RD&T Web site to enhance customer access and service                               | HRTS   | -Completed-   |

**Leadership Council Action Agenda Status & Milestones (continued)**

| Action Item   | Office     | Status  |
|---|------------|---|
| <b>F. Process Management</b>  |            |   |
| 1. Administrative key processes   |            |   |
| 1. Review procurement planning process, evaluate results, and document improvements       | HRRM       | HRRM will continue to participate in the HAAM pilot.  |
| 2. Review administrative processes, evaluate results, and document improvements           | HRRM       | -Completed-   |
| 2. Business Processes   |            |   |
| 1. Replace technology and innovation process, evaluate results, and document improvements | HRTS       | -Will be redefined for FY 2003-<br>Note: Discontinue and replace the Technology Innovation Network (TIN) effort with "Raising the Bar" agency-wide initiative.  |
| 2. Develop a TFHRC lab assessment process   | HRPD       | -Continued in FY 2003-  |
| 3. Complete a process management improvement for FHWA participation in the SBIR process   | HRPD/ HRRM | -Completed-   |
| <b>G. Business Results (Metrics)</b>  |            |   |
| 1. Develop and implement an RD&T performance evaluation program                           | HRPD       | -Completed-<br>See section on Our Business Results—RD&T Challenges, Commitments, and Achievements. Items II.1 (lab assessment), and II.3 (benefits evaluations). See also—Performance Management Framework. |
| 2. Establish and support RD&T information technologies team                               | HRRM       | -Completed-<br>Note: RD&T information technology needs analysis will continue in FY 2003 under Information and Analysis.  |
| 3. Outreach for Work life Issues  | HRRM       | -Completed-   |



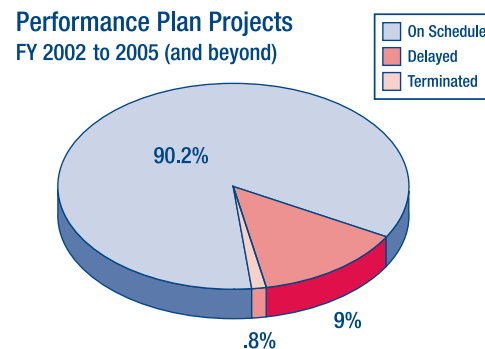
## Research Project Status Summary

More than 90 percent of the research projects listed in the 2002/2003 plan currently are on schedule. RD&T will complete more than 70 percent of the projects listed in the plan by the end of 2003.

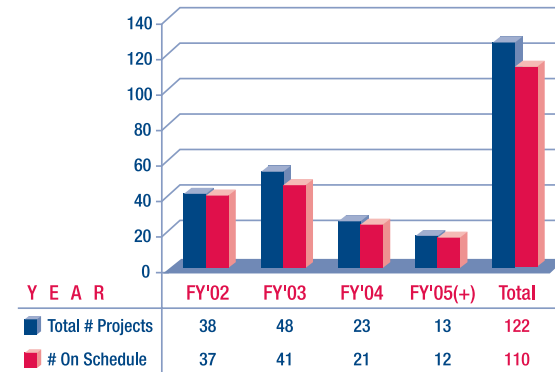
Of the projects originally scheduled for FY 2002, 37 of 38 were completed. One project on functional requirements for microsimulation-based surrogate safety measures at intersections was cancelled. The use of intelligent snowplows project was rescheduled for FY 2003 because of inadequate snowfall last winter.

Because of external and/or internal factors, 8.6 percent of projects were delayed, overall. Factors contributing to delay include:

| Factor                         | # of Occurrences |
|--------------------------------|------------------|
| Equipment-related problems     | 3                |
| Budget-related issues          | 1                |
| Contractor or technical issues | 3                |
| Project technical issues       | 2                |
| Regulatory issues              | 2                |



RD&T Research Products



Details regarding specific projects and project statuses are available in the Project and Services Status Tables.

## RD&T Success Stories

RD&T successfully completed 37 projects during FY 2002 and delivered more than 50 products during FY 2001 to 2002 that support DOT's strategic goals and FHWA's performance goals. The following highlights showcase research implemented by FHWA and State DOTs.

### Safety

- ▶ **Interactive Highway Safety Design Model (IHSDM)**  
Every year, States redesign or modify about 3 million miles of two-lane roads. IHSDM helps State and other highway planners and designers assess the safety effects of specific geometric design decisions and alternative road improvements. IHSDM was developed over several years. Initial efforts focused on two-lane rural highways, since they are the largest highway class in the United States, representing approximately two-thirds of all Federal-aid highways. Beta

versions of the Policy Review and the Design Consistency modules are currently available for testing.

▶ **Rumble Strips**

Rumble strips help prevent roadway departure crashes, which account for 38 percent of all fatal crashes. As part of its R&T program, FHWA is communicating the benefits and costs of using rumble strips to all States. A survey of 8 States using rumble strips shows 18 to 72 percent in crash reductions, with a 30-to-1 benefit-to-cost ratio (with some State ratios as high as 60-to-1).

▶ **Highway Safety Information Systems (HSIS)**

HSIS is a multistate information system that contains accident data for more than 5-million crashes, information about traffic volumes, and roadway inventory data covering approximately 165,000 miles of State highway systems. FHWA staff, contractors, university researchers, and others use HSIS to study current highway safety issues, to direct research efforts, and to evaluate the effectiveness of accident countermeasures. Through HSIS, FHWA works closely with States and other partners to gather data and improve our ability to analyze roadway safety challenges. HSIS enables FHWA to direct investments to specific projects and programs that will deliver the most value in terms of saving lives and minimizing injuries.

▶ **Pedestrian and Bicycle Crash Analysis Tool (PBCAT)**

FHWA developed a crash-typing software product, PBCAT, to assist State and local pedestrian and bicycle coordinators, planners, and engineers with improving walking and bicycling safety. The Orlando Metropolitan Area used PBCAT to identify appropriate countermeasures for 10 “hot spots” that accounted for 169 crashes and 22 fatalities.

▶ **Roundabouts Information Guide**

FHWA developed *Roundabouts: An Informational Guide*, to help communities improve safety and mobility by placing

roundabouts in appropriate areas. Experiences in the U.S. show that roundabouts reduce crashes by 37 percent, and decrease crashes involving injuries by 51 percent.

▶ **Highway Design Handbook for Older Drivers and Pedestrians**

Based on the characteristics of older drivers and pedestrians, this resource provides practitioners with practical information for incorporating specific roadway features into highway design, operations, and traffic-engineering. The handbook showcases tools that address issues that enhance older driver and pedestrian safety and mobility.

**Infrastructure**

▶ **Superpave®**

The United States spends more than \$15 billion each year to construct and resurface roads with hot-mix asphalt (HMA). This annual investment requires at least 500-million tons of HMA, held together by about 30-million tons of liquid asphalt binder. Initially developed under the Strategic Highway Research Program (SHRP), the Superpave system is the primary mechanism used by State highway agencies to purchase liquid asphalt binder and design asphalt mixtures. In close partnership with TRB, FHWA continues its leadership role in refining the Superpave specifications and testing procedures. Recent innovations include modifying the low-temperature binder specification and incorporating an FHWA-developed device to increase laboratory mixture compaction uniformity in the gyratory.

▶ **Partnering to Save Time and Money on a Critical Infrastructure Project**

During the foundation construction for the new Woodrow Wilson Bridge, a tremie concrete seal dislodged from one of the main piers and fell to the bottom of the river. Although this had no immediate effect on the structural stability or integrity of the main pier (the tremie concrete enabled

dewatering for construction of the pier cap), there was concern about the long-term scour effects of the thicker tremie seal that was originally proposed as a solution to the problem. The Maryland Division Office, the Eastern Resource Center, and FHWA's hydraulics laboratory provided technical assistance to the Maryland State Highway Administration. FHWA tested physical models of the new pier configuration in the flume at TFHRC to estimate the long-term scour effects. The tests confirmed that bridge safety was not affected by the change, and this major project continued on schedule.

▶ **Report Estimates Cost of Corrosion in U.S.**

FHWA published the *Corrosion Cost and Preventive Strategies in the United States* report that provides a comprehensive and current estimate of the total economic effect of metallic corrosion in the United States and identifies national strategies to minimize corrosion's impact. Corrosion's total direct cost is estimated at \$276 billion per year. FHWA analyzed the effects of corrosion in 26 industrial sectors and extrapolated these results for a nationwide cost estimate. Sectors were divided into five major categories: infrastructure, utilities, transportation, production and manufacturing, and government. The conservative estimate of the indirect cost is equal to the direct cost of corrosion. The report is widely referenced as the most authoritative, comprehensive, and current study of corrosion cost in the U.S. Further information is available at <http://www.corrosioncost.com>.

▶ **Serving Internal Customers: The Office of Infrastructure R&D Delivers a New Tool to FHWA Bridge Engineers**

This project developed a Web-based system to access the National Bridge Inventory (NBI); with search and analysis capabilities that enable FHWA bridge engineers to better understand the relationship between bridges, bridge conditions and capacities, and bridge performance in the national transportation system. Web-NBI is the Web-based NBI

system that engineers may use to access and analyze NBI data. Its functionality includes the:

- ▶ Ability to download NBI files in Microsoft® Access or ASCII text format for any State;
- ▶ Ability to create dynamic queries, browse the results, and download the results;
- ▶ Ability to perform dynamic cross-tab queries and browse the results;
- ▶ Ability to generate dynamic NBI bar charts or to generate bar charts from query results;
- ▶ Access to standard queries—graphs and maps are preformatted and are readily available for browsing or downloading;
- ▶ Partial support to map bridge records from NBI queries and display significant bridge environment features such as roads, rivers, and rail lines;
- ▶ Dynamic thematic map generation that displays bridge information such as the number of deficient bridges by county; and
- ▶ Ability to generate structure inventory and appraisal reports.

These capabilities are now on the desktop of every bridge engineer within FHWA to ensure the safety, reliability, and security of the Nation's highway bridges.

▶ **Long Term Pavement Performance (LTPP)**

The LTPP program is a comprehensive 20-year study of in-service pavements, with more than 1,900 asphalt and Portland Cement Concrete pavement test sections from across the U.S. and Canada. LTPP's goal is to provide the data needed to help the States and Provinces make

decisions that will lead to better-performing and more cost-effective pavements.

Since 1998, States have provided more than \$30 million to FHWA through NCHRP to continue critical, high-payoff research. LTPP data played a significant role in developing the NCHRP 2002 *Guide for the Design of New and Rehabilitated Pavement Structures* as a source for data and test procedures. The LTPP test sections and procedures may play a role in the local calibration/validation of the design guide by States. LTPP research information will continue to play a key role in developing future pavement design guides, and it represents a dynamic example of State and Federal partnerships.

▶ **HIPERPAV™**

Originally developed in 1996, the High-Performance Paving Software (HIPERPAV) is a powerful tool that helps highway organizations build long-lasting concrete pavements. When used in the design and construction phases of a concrete paving project, HIPERPAV can help engineers achieve a high-quality product at minimal cost by optimizing pavement and overlay design, optimizing mix design and temperature characteristics, and reducing long-term performance uncertainties.

With the release of HIPERPAV 3.0, the HIPERPAV modeling capabilities have been expanded to consider early-age behavior of continuously reinforced concrete pavements (CRCP) and longer-term behavior of jointed concrete pavements (JCP), in addition to the early-age JCP and bonded concrete overlay capabilities provided in early versions.

▶ **Cost-Effective Rehabilitation Strategies Using Falling-Weight Deflectometer Calibration Centers**

Billions of dollars are spent on pavement rehabilitation and resurfacing annually. To make the best possible decisions about where and when to conduct pavement rehabilitation

work, State DOTs need extensive data on the pavement's structural condition. These data are obtained by using accurately calibrated equipment. FHWA calibration centers provide a critical resource to the States, which rely on consistent and accurate data to properly assess the structural condition of our Nation's highways and allocate limited resources in the most effective manner.

▶ **High-Performance Concrete (HPC) Contributes to Rapid Bridge Reopening**

The successful rapid replacement of an I-65 bridge in Birmingham, AL, demonstrated what was achieved by using innovative practices and materials developed by FHWA R&T. After closure from an accident, the bridge was replaced and traffic capacity restored in a record 67 days.

▶ **COST (Concrete Optimization Software Tool)**

High-performance concrete offers tremendous potential for improving the highway infrastructure. However, that potential relies on the correct mix components in the proper proportions for each project. COST is an online design and analysis system that enables concrete producers, engineers, and researchers to determine optimal concrete mixture proportions. COST makes the highly complex mix design process more efficient and more manageable. Available online at <http://ciks.cbt.nist.gov/cost/>, COST is the culmination of a highly-successful joint research effort by members of the Portland Cement Concrete Pavement (PCCP) team and researchers from the National Institute of Standards and Technology.

## Operations

▶ **QuickZone**

The recently released QuickZone software is a work zone delay estimation software, which will provide a more complete and realistic view of total construction costs.

QuickZone is a key component of FHWA's Strategic Work Zone Analysis Tools (SWAT) program.



The QuickZone partnership program enables users to take advantage of open source code to customize the software, thus providing State and local agencies with a tool that best meets their needs. With QuickZone, State highway agencies can evaluate a broad range of alternative work zone design and mitigation strategies in a relatively short time frame, resulting in better decisionmaking for highway construction projects. A recent QuickZone benefits study verified this important aspect of the program—traffic engineers were able to better predict the traffic effects of various work zone design strategies and more accurately stage their projects, thus saving money and time (see RD&T Research Benefits Case Studies).

▶ **Nationwide Differential Global Positioning System (NDGPS)**

NDGPS can pinpoint a person or vehicle's position to within 3 meters. The NDGPS directs emergency responders to the exact location of a crash, makes it easier for highway agencies to monitor and respond to hazardous pavement conditions, provides drivers with in-vehicle route guidance, and contains a host of other transportation applications. NDGPS sites will form part of a nationwide operational GPS meteorological observing system that will enable the National Weather Service to provide more accurate weather forecasting.

▶ **High Accuracy Nationwide Differential Global Positioning System (HA-NDGPS)**

As part of its ongoing research efforts, RD&T modified an existing NDGPS facility to broadcast corrections that achieve 10-centimeter horizontal accuracy. Initial testing of the HA-NDGPS indicates the new broadcast is accurate to within 10 centimeters and better in many areas. Further research is underway to modify an additional NDGPS facility to achieve faster and even more accurate navigation solutions.

## IV. Performance Management

### Relevance, Quality, and Performance

The OMB recently adopted relevance, quality, and performance as their investment criteria in Federal research. The criteria were established to conform to the Government Performance and Results Act (GPRA) and to reflect the inherent challenge of measuring research outcomes. R&D

*RD&T recently received the Quality Breakthrough Award, which recognizes organizations within FHWA that are making significant progress in developing clear plans, building sound processes, and achieving measurable results.*

investment criteria are designed to help improve R&D program management, funding decisions, and public understanding of the potential benefits of investing in Federal research. The OMB expects agency R&D managers to demonstrate the extent to which their programs meet the following three tests:

**Relevance.** R&D programs must be able to articulate *why* this investment is

important, relevant, and appropriate. Programs must have well conceived plans that identify program goals and priorities and identify linkages to national and customer needs.

**Quality.** R&D programs must justify *how* funds will be allocated to ensure quality R&D. Programs allocating funds through means other than a competitive, merit-based process must justify these exceptions and document how they maintain quality.

**Performance.** R&D programs must be able to monitor and document *how well* this investment is performing. Program managers must define appropriate outcome measures and

milestones that can be used to track progress toward goals, and assess whether to increase or redirect funding. Descriptions of performance should not, however, be limited only to quantitative measures.

RD&T made considerable progress over the past year in areas directly related to the OMB's recommendations, most notably by developing a lab assessment process that will incorporate expert peer reviews to improve TFHRC laboratories' quality and performance. Several retrospective RD&T benefit studies were conducted to identify key performance measures and collect data that will be used to track progress and identify the research contribution to FHWA goals and outcomes. This information will be important as we better define the link between research activities and program outcomes.

### Planning and Priority Setting

FHWA's Office of RD&T coordinates the research and technology program and supports FHWA and U.S. DOT strategic goals for the Nation's transportation system. The *FY 2002/2003 RD&T Performance Plan* outlines FHWA research priorities and strategies and shows a clear link between research program goals and FHWA and DOT strategic plans. Research highlighted in the FHWA RD&T plan focuses on providing solutions to complex technical problems by developing economical, environmentally-sensitive designs; efficient, quality-controlled construction practices; and durable materials. The result will be a safer, more reliable highway transportation system.

*The R&D investment criteria are designed to help improve R&D program management, inform funding decisions, and increase public understanding of the potential benefits of investment in Federal research.*

## Stakeholder Advisory Activities and Feedback

### The Research and Technology Coordinating Committee (RTCC)

The RTCC reviews, guides, and advises FHWA on research activities and provides policy-level recommendations on the overall direction of the program. The RTCC committee consists of 18 members including top-level administrators, researchers, and practitioners from the States, academia, and private sector. The committee recently examined national highway R&T needs and roles, and in October 2001 released the *TRB Special Report 261* urging FHWA to focus on long-term, fundamental research, address gaps and emerging issues, conduct policy research, and engage in technology transfer activities. The report also recommends more substantive stakeholder involvement in making decisions, setting priorities, and allocating resources for FHWA's research program to ensure that the program addresses the needs of those building, maintaining, and using the Nation's highways.

### The National R&T Partnership Initiative

The national partnership initiative was unprecedented in terms of outreach and participation—with hundreds of individuals and more than 170 organizations. Five working groups were established: Safety, Infrastructure Renewal, Policy Analysis and Systems Monitoring, Operations and Mobility, and Planning and Environment. A report reflecting the views of the working groups was released in April 2002 and is expected to form the basis of a national highway research agenda.

### Performance Management Team

The primary purpose of the performance management team is to assist the RD&T leadership developing, coordinating, and implementing organizational performance improvement

efforts. Performance management efforts currently underway include:

- ▶ Developing performance goals, measures, strategies, and initiatives to improve organizational performance management in RD&T offices and laboratories;
- ▶ Monitoring results of measures and analyzing performance management information;
- ▶ Conducting the annual RD&T self-assessment process and implementing solutions to issues raised during the process;
- ▶ Developing and conducting RD&T customer satisfaction surveys;
- ▶ Contributing to special projects related to RD&T performance management, such as developing and implementing the expert panel assessment process for RD&T laboratories; and
- ▶ Assisting in conducting and reviewing agency-wide performance improvement initiatives within RD&T.



### Lab Assessment

RD&T laboratory assessments will be unbiased, independent expert or peer reviews of the technical and scientific merit of research conducted at TFHRC. The assessment process is designed to:

- ▶ Enhance laboratory performance and quality by providing feedback to laboratory managers;
- ▶ Create a vehicle that will increase the opportunities for customer and stakeholder input to research activities; and

- ▶ Provide a credible, professional, and objective assessment that further improves stakeholder confidence in the value of the work performed and outcomes produced.

## Performance Management Framework

One of the conclusions of *NCHRP Synthesis 300, Performance Measures for Research, Development, and Technology Programs* was that “different types of evaluation methods are appropriate for different types of research projects.” This holds true across organizational functions, as well. The RD&T

Performance Management Framework chart identifies existing performance measures and assessment mechanisms used by unit managers. It integrates these measures and mechanisms across management functions using FHWA’s Baldrige-based corporate management strategies. This approach enables RD&T to manage, analyze, and integrate information obtained from a variety of sources. It also helps organize the various dimensions of program results analyses, such as financial performance, customer feedback, and business results. The RD&T Leadership Council uses this framework as a tool to assess unit performance measurement activities and to identify measurement gaps.

| RD&T Performance Management Framework |  |  |   |
|---------------------------------------|--|--|---|
| CMS                                   | Definition   | Related RD&T Performance Measures  | Methodology   |
| <b>Leadership</b>                     | Leadership focuses on how senior leaders guide the organization. It describes how leaders set direction and high-performance expectations, project a strong customer focus, and communicate clear and visible values to employees. | <ul style="list-style-type: none"> <li>▶ Leadership Effectiveness Inventory (LEI) results</li> <li>▶ Action items completed</li> <li>▶ Performance plan items fulfilled</li> <li>▶ Self-assessment score</li> </ul>  | <ul style="list-style-type: none"> <li>▶ 360-degree feedback</li> <li>▶ Action agenda</li> <li>▶ Performance plans</li> <li>▶ Quality self-assessments</li> </ul>   |
| <b>Strategic Planning</b>             | Strategic planning examines how the organization sets strategic goals and develops key action plans.   | <ul style="list-style-type: none"> <li>▶ Action items completed</li> <li>▶ Self-assessment score</li> <li>▶ Progress made on goals established</li> </ul>  | <ul style="list-style-type: none"> <li>▶ Performance plans and action agenda</li> <li>▶ Quality self-assessment</li> <li>▶ Lab assessments</li> </ul>   |
| <b>Customer/ Partner Focus</b>        | Customer and partner focus examines how the organization determines customer and market requirements and expectations.   | <ul style="list-style-type: none"> <li>▶ Percent of satisfaction with RD&amp;T products and services</li> <li>▶ Number of technology facilitation plans in place</li> <li>▶ Self-assessment score</li> <li>▶ Lab assessment results (TBD)</li> <li>▶ RD&amp;T customer survey results (TBD)</li> </ul> | <ul style="list-style-type: none"> <li>▶ American Customer Satisfaction Index (ACSI)</li> <li>▶ Technology Innovation Network (TIN)</li> <li>▶ Technology Facilitation Action Plan (TFAP)</li> <li>▶ Quality self-assessments</li> <li>▶ Lab assessments</li> <li>▶ Customer surveys</li> </ul> |



| <b>RD&amp;T Performance Management Framework (continued)</b> |   |  |   |
|--|---|--|---|
| <b>CMS</b>   | <b>Definition</b>   | <b>Related RD&amp;T Performance Measures</b>   | <b>Methodology</b>  |
| <b>Information and Analysis</b>                              | Information and analysis examines the management, effective use, and analysis of data and information to support key organization processes, to include the organization's objectives   | <ul style="list-style-type: none"> <li>▶ Performance measurement framework</li> <li>▶ Response level and content of feedback mechanisms</li> <li>▶ Self-assessment score</li> <li>▶ Lab Assessment results (TBD)</li> </ul>  | <ul style="list-style-type: none"> <li>▶ Performance measurement framework</li> <li>▶ ACSI, TIN</li> <li>▶ Quality self-assessments</li> <li>▶ Lab Assessments</li> </ul> |
| <b>Human Resource Development</b>                            | Human resource development and management examines how the organization enables its workforce to develop to its full potential and how the workforce is aligned with the organization's objectives  | <ul style="list-style-type: none"> <li>▶ Self-assessment score</li> <li>▶ Percent of employee satisfaction survey rating</li> <li>▶ Percent of payroll spent on training and development</li> <li>▶ Number of IDP's in place and in LADs</li> <li>▶ Number of "priority 1" training needs met</li> <li>▶ Number of vacancies filled</li> <li>▶ Number of days positions are vacant</li> <li>▶ Number of student interns (Number of Grant for Research Fellowships (GRF), STIPDG, etc.)</li> <li>▶ Number of outreach activities</li> </ul> | <ul style="list-style-type: none"> <li>▶ Quality self-assessments</li> <li>▶ Employee satisfaction survey</li> <li>▶ LADS</li> </ul>                                      |
| <b>Process Management</b>                                    | Process Management examines aspects of how key production, delivery, and support processes are designed, managed, and improved.   | <ul style="list-style-type: none"> <li>▶ Number of process improvements documented</li> <li>▶ Lab Assessment (TBD)</li> <li>▶ Number of contracts on time and on budget</li> <li>▶ TIN (TBD)</li> <li>▶ SBIR (TBD)</li> </ul>  | <ul style="list-style-type: none"> <li>▶ Quality self-assessments</li> <li>▶ Lab assessments</li> <li>▶ Project tracking system</li> <li>▶ ACSI</li> </ul>                |
| <b>Business Results</b>                                      | Business results show the organization's performance and improvement in its key business areas: customer satisfaction, financial and marketplace performance, human resources, supplier and partner performance, and operational performance. The category also examines how the organization performs relative to competitors. | <ul style="list-style-type: none"> <li>▶ Percent of project completion</li> <li>▶ Number of success stories</li> <li>▶ Research benefit (TBD)</li> </ul>   | <ul style="list-style-type: none"> <li>▶ Track project and services delivery</li> <li>▶ RD&amp;T success stories</li> <li>▶ Pilot and case studies</li> </ul>             |

## RD&T Research Benefits Case Studies

RD&T conducted studies to identify quantifiable and articulable research benefits that demonstrate their strategic links to FHWA goals and outcomes. We are conducting these evaluations with the understanding that a combination of evaluation methods within a unified framework is needed. The recent *NCHRP Synthesis 300* report supports this conclusion. RD&T benefit assessments are largely retrospective analyses and will require data collection throughout the product development and delivery cycles to produce meaningful conclusions. In the short term, RD&T benefit studies will provide a workable taxonomy for data collection and performance measurements that can be applied to a cross-section of RD&T products—ultimately resulting in customer focus improvements, broader programmatic analyses, and more effective business results reports.

### Highway Safety Information System

HSIS is a multistate information system that improves highway safety and design. The HSIS performance assessment goal was to provide value indicators for the system. These indicators will be used to develop a broader framework to assess the benefits of research databases and information tools. Value indicators developed for the study included measurements of HSIS value to internal and external safety research communities, and State and local engineers and planners. Examples of HSIS indicators included bibliometric usage data, expert peer review data, and user survey results.

### QuickZone

QuickZone's evaluation results revealed several useful product benefit measures for State DOT planners. The combination of customer survey data and user cost and benefit modeling proved particularly useful and resulted in immediate improvements to the product's input modules and analysis options. The metric results from the study have a broader application potential in determining research benefits for similar RD&T products.

### Infrastructure R&D

The RD&T Office of Infrastructure R&D is conducting a study that will examine RD&T research benefits in the areas of national design and data standards, new technologies, and new materials developments. The study results will be synthesized and used to develop a more robust measurement methodology for RD&T performance in these areas.

A synthesis report covering lessons learned from the pilot studies will be forthcoming. Highlights will be included in the next RD&T performance report.

## RD&T Annual Quality Self Assessment

This year's self-assessment process contained more approach variations, compared with those done in previous years. Variations in RD&T office size and complexity, plus logistical scheduling issues for employees, facilitators, and customer involvement led to several offices seeking a more flexible, abbreviated format. This did not, however, diminish the process effectiveness. Participants agreed that the experience was still very valuable for providing an opportunity to review and capture the year's achievements, to refocus on FHWA's goals, and to supply a forum for employees to discuss organizational concerns.

Comments related to RD&T offices' relationships with customers and stakeholders were generally positive and reflected a greater awareness of their needs and improved communication, overall. Roughly **90 percent of research projects are on schedule** at this point in the year, and customer surveys conducted by several RD&T offices confirmed **better timeliness of response and delivery**. There also is a recognition that RD&T's role is expanding. Several offices' comments support this conclusion and were centered on the need for more joint planning, better customer survey processes, additional face-to-face contact (meetings, visits, etc.), and greater outreach activities.

Although several offices listed the increased need for joint planning as an area for improvement, RD&T accomplished much in this area over the past year. Many RD&T offices introduced **initiatives** such as the Infrastructure Long Range Vision, the advanced acquisition planning system, the FHWA security product team, the Western Resource Center technology transfer conference, the advanced research program, and efforts aimed at Title V reauthorization—just to name a few. These achievements link directly to the RD&T “Challenges and Commitments” established last year.

*“90 percent of research projects are on schedule.”*

—Business Results

*“Customer surveys confirmed better timeliness of response and delivery.”*

—Customer Focus

*“These achievements link directly to the RD&T Challenges and Commitments.”*

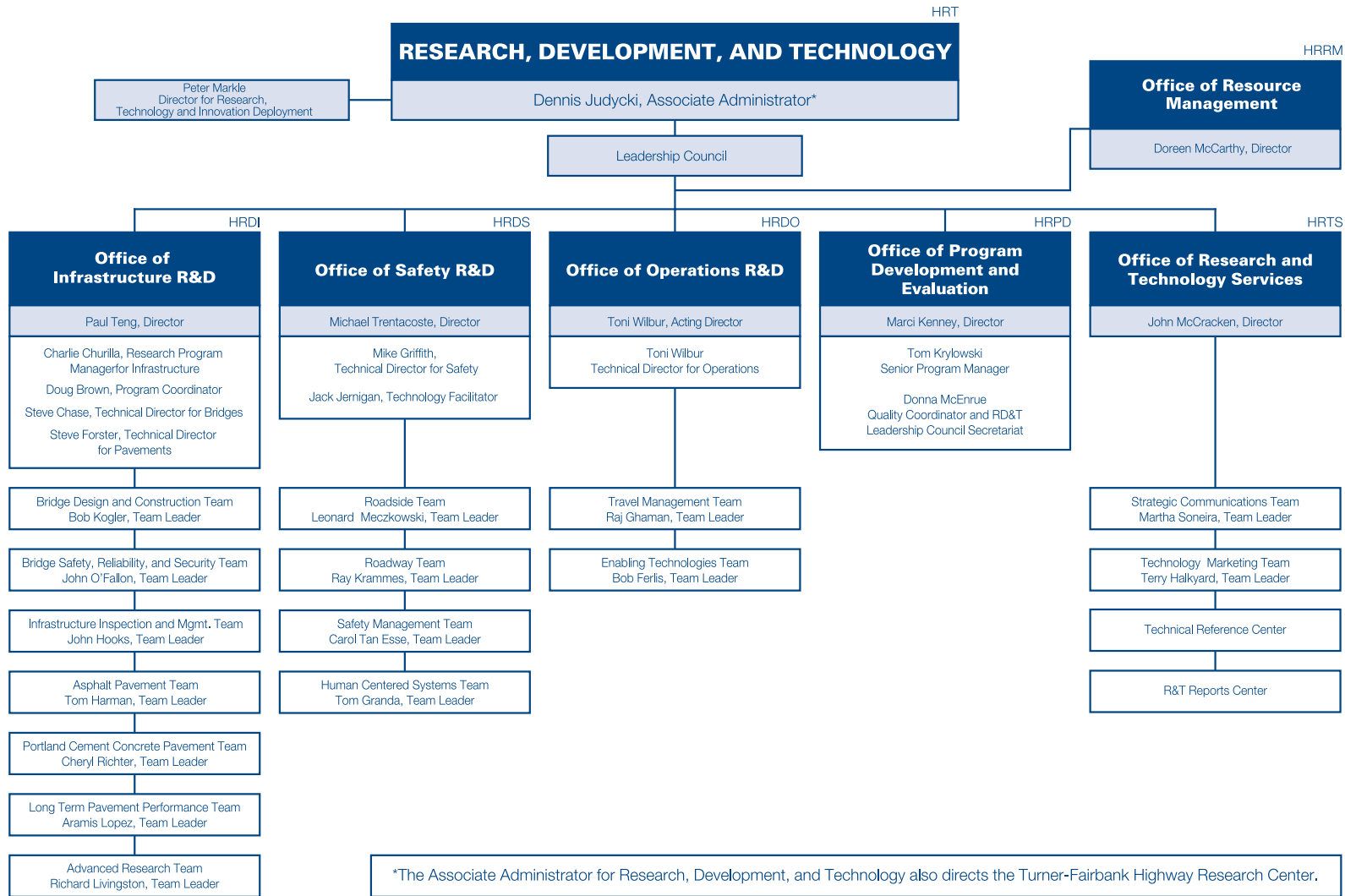
*“The Technical Career Track program is a success, and RD&T was well represented this year.”*

—Human Resource Development

**Perceptions of employee development and work-life issues were positive.** Offices reported strengths in areas such as flexible work scheduling; work environment; support for training and participation in professional associations; awards and incentives; and relationships with management. The updated technical career track program was an overwhelming success,

and RD&T research offices were well-represented in the program this year.

Finally, several key process management improvements were made this year because of input from the previous year’s assessment. These include the updated Leadership Council Action Agenda checkpoint tracking system and improved council meeting format; an advanced acquisition planning system pilot that will be adopted FHWA-wide; the development of a State planning and research (SP&R) handbook for FHWA Field Offices, and the completion of the SP&R (CFR Part 420) rule revision to reflect current practices, conform to plain language standards, and facilitate the overall State planning and research administration processes.





# APPENDICES

# APPENDICES

## Appendix A: RD&T Research Project Status Tables

The following charts detail TFHRC research and identify the goals that this research supports. The charts also indicate which projects were completed in FY 2002 and which ones are still ongoing for 2003 and beyond. The comment column provides reasons behind changes or deviations from the unit plan and schedule. Additionally, we included new projects that were not identified at the time the *FY 2002/2003 Performance Plan* was published.

| Office of Infrastructure R&D  |   |                       |                                     |    |    |     |             |                        |  |
|---|---|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|--|
| Project   | Technical Contact                         | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments   |
|   |   |                       | 25                                  | 50 | 75 | 100 |             |                        |  |
| <b>Pavements/Asphalt</b>  |   |                       |                                     |    |    |     |             |                        |  |
| FHWA Dynamic Angle Validation (DAV) Kit                               | Tom Harman<br>HRDI-11<br>202-493-3072     | Mobility              |                                     |    | X  |     | Yes         | Oct-2003               | Improved identification with Superpave gyratories compliance issues.<br>Funded by NCHRP, in partnership with the TRB.                          |
| A State-of-the-Practice Report in the Design of Crumb Rubber Material | Kathy Petros<br>HRDI-11<br>202-493-3154   | Mobility              |                                     |    | X  |     | No          | Mar-2003               | Updated information on the design of crumb rubber asphalt.<br>The contractor had a health setback, which will delay completion of the project. |
| Evaluation of the Particle Additive Test (PAT) Report                 | Jack Youtcheff<br>HRDI-11<br>202-493-3090 | Mobility              |                                     |    | X  |     | Yes         | Dec-2002               | New tool for assessing modified binder's compatibility with the Superpave binder spec.<br>Funded by NCHRP, in partnership with the TRB.        |
| Evaluation of the Laboratory Asphalt Stability Test (LAST) Report     | Jack Youtcheff<br>HRDI-11<br>202-493-3090 | Mobility              |                                     |    |    | X   | Yes         | Complete               | New tool for assessment of storage stability of modified binders.<br>Funded by NCHRP, in partnership with the TRB.                             |

| Office of Infrastructure R&D (continued)  |   |                       |                                     |    |    |     |             |                        |   |
|---|---|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact                         | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |   |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Pavements/ Portland Cement Concrete (PCC)</b>  |   |                       |                                     |    |    |     |             |                        |   |
| Vibrating Slope Apparatus to Measure PCC Workability, Equipment and Test Method                                     | Marcia Simon<br>HRDI-12<br>202-493-3071   | Mobility              |                                     |    | X  |     | Close       | Dec-2002               | More meaningful assessment of concrete paving mixtures workability. Some delays in fabrication have pushed back testing by 2-3 months.  |
| Guidelines to Detect, Analyze, Treat, and/or Prevent Materials-Related Distress                                     | Steve Forster<br>HRDI-04<br>202-493-3070  | Mobility              |                                     |    |    | X   | Yes         | Complete               | Improved PCCP forensic analysis. Reports in printing. Technology Transfer (T <sup>2</sup> ) package received. The results should provide for more systematic forensic analysis of PCCP. |
| Updated Version of HIPERPAV Software Used to Prevent Early-Age Cracking of (Jointed Plain Concrete Pavement (JPCP)) | Fred Faridazar<br>HRDI-12<br>202-493-3076 | Mobility              |                                     |    | X  |     | Yes         | Jan-2003               | Improved performance of PCCP. Contract was revised to add software refinements and an expand product delivery effort (workshops and technical support). Work is 92 percent complete.    |
| Guidelines to Select Curing Materials and Procedures  | Steve Forster<br>HRDI-04<br>202-493-3070  | Mobility              |                                     |    |    | X   | Yes         | Complete               | Guidelines for improved PCCP Curing. A draft final report has been completed and is under review.   |
| Petrography Manual  | Steve Forster<br>HRDI-04<br>202-493-3070  | Mobility              |                                     |    | X  |     | Yes         | Dec-2002               | State-of-the-art petrographic manual for PCC. Adding new techniques, including scanning electron microscope analysis.   |
| Guidelines on the Use of Recycled PCCP as Aggregate in New PCCP   | Steve Forster<br>HRDI-04<br>202-493-3070  | Mobility              |                                     |    | X  |     | No          | Dec-2002               | Research designs which consider recycled aggregate. Principal investigator is no longer with the contractor. This may delay delivery of the final report.                               |

| Office of Infrastructure R&D (continued)                           |   |                       |                                     |    |    |     |             |                        |   |
|--|---|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project  | Technical Contact                       | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|  |   |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Pavements/ Portland Cement Concrete (PCC) (Continued)</b>       |   |                       |                                     |    |    |     |             |                        |   |
| Guidelines to Develop Statistical Quality Assurance Specifications | Peter Kopac<br>HRDI-12<br>202-493-3051  | Mobility              |                                     |    | X  |     | Yes         | Nov-2002               | Enhanced quality and uniformity of State QA specifications.<br>Project is 95 percent complete; final reports are being prepared.  |
| Freeze-Thaw Durability of Concrete Report                          | Marcia Simon<br>HRDI-12<br>202-493-3071 | Mobility              |                                     |    | X  |     | No          | Dec-2002               | Enhanced understanding of the freeze-thaw durability of concrete having "marginal" air contents.<br>Laboratory testing delayed by equipment problems.                                 |
| <b>Pavements/LTPP</b>  |   |                       |                                     |    |    |     |             |                        |   |
| LTPP Database, Data Releases                                       | Aramis Lopez<br>HRDI-13<br>202-493-3145 | Mobility              |                                     |    |    | X   | Yes         | Complete               | Make LTPP database available to the public. Two data releases completed during FY 2002 (In Jan. and July).<br>The January 2002 data is available at the LTPP customer support office. |
| Dynamic Test System Protocol                                       | Aramis Lopez<br>HRDI-13<br>202-493-3145 | Mobility              |                                     |    |    | X   | Yes         | Complete               | Develop a new procedure to evaluate close-loop equipment.<br>Report completed and awaiting publication and 508 conversion.  |
| DATAPAVE 3.0, CD-ROM Software Package                              | Aramis Lopez<br>HRDI-13<br>202-493-3145 | Mobility              |                                     |    |    | X   | Yes         | Complete               | National software distribution to facilitate LTPP database usage.<br>National distribution was made during TRB, and the software was used during a FHWA professor training workshop.  |



| Office of Infrastructure R&D (continued)                   |  |                       |                                     |    |    |     |             |                        |   |  |
|--|--|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|--|
| Project  | Technical Contact                        | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |  |
|  |  |                       | 25                                  | 50 | 75 | 100 |             |                        |   |  |
| <b>Pavements/LTPP (continued)</b>                          |  |                       |                                     |    |    |     |             |                        |   |  |
| Improved Specifications for Weigh-In-Motion (WIM)          | Larry Wiser<br>HRDI-13<br>202-493-3079   | Mobility              |                                     |    |    | X   | Yes         | Complete               | Improved WIM technology. The WIM specifications and guideline are available on the LTPP Web page.                                     |  |
| Estimating Cumulative Traffic Loads Report                 | Larry Wiser<br>HRDI-13<br>202-493-3079   | Mobility              |                                     |    |    | X   | Yes         | Complete               | Study of State DOTs using the new axle load spectra procedures. Report completed and is under technical and editorial review.         |  |
| Joint and Crack Load Transfer in LTPP Test Sections Report | Aramis Lopez<br>HRDI-13<br>202-493-3145  | Mobility              |                                     |    |    | X   | Yes         | Complete               | Improve the understanding of PCCP joint and crack load transfer. Report completed and awaiting publication and 508 conversion.        |  |
| Verification of LTPP Virtual Weather Stations Report       | Aramis Lopez<br>HRDI-13<br>202-493-3145  | Mobility              |                                     |    |    | X   | Yes         | Complete               | To determine accuracy and factors affecting virtual weather stations. Report completed and awaiting publication and 508 conversion.   |  |
| <b>Pavements/Models</b>                                    |  |                       |                                     |    |    |     |             |                        |   |  |
| Mechanistic Pavement Models                                | Bill Kenis<br>HRDI-10<br>202-493-3149    | Mobility              |                                     |    |    | X   | Yes         | Complete               | Tools for mechanistic design of pavements. Alpha systems for JSLAB & Vesys pavement models available for use in designing pavements.  |  |
| <b>Pavements/Surface Analysis</b>                          |  |                       |                                     |    |    |     |             |                        |   |  |
| Measuring and Evaluating PCCP Warp and Curl                | Dennis Sixbey<br>HRDI-10<br>202-493-3078 | Mobility              |                                     |    |    | X   | Yes         | Complete               | Methods for evaluating and mitigating PCC warping. Proof of concept study; conference paper (Best Paper Award); software development. |  |

| Office of Infrastructure R&D (continued)                              |  |                       |                                     |    |    |     |             |                        |  |  |
|---|--|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|--|--|
| Project   | Technical Contact                        | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments   |  |
|   |  |                       | 25                                  | 50 | 75 | 100 |             |                        |  |  |
| <b>Structures/Steel</b>   |  |                       |                                     |    |    |     |             |                        |  |  |
| Designers Guide for High-Performance Steel Bridges (HPS)              | Bill Wright<br>HRDI-06<br>202-493-3053   | Mobility/<br>Safety   |                                     |    |    | X   | Yes         | Complete               | Provide consistent accurate design guidance. Developed in cooperation with Western Resource Center (WRC).  |  |
| Improved Fracture Toughness Specifications for High-Performance Steel | Bill Wright<br>HRDI-06<br>202-493-3053   | Mobility/<br>Safety   |                                     |    | X  |     | Yes         | Dec-2003               | Maximize the design and performance benefits of advanced steels. Performance properties of HPS provide significant advantages in resistance to critical fracture not presently accounted for in design guidance. |  |
| Curved Girder Bridge Strength Prediction Equation                     | Bill Wright<br>HRDI-06<br>202-493-3053   | Mobility/<br>Safety   |                                     |    | X  |     | Yes         | Dec-2003               | Provide design guidance to AASHTO. Critical input to design protocol for curved steel structures.  |  |
| Corrugated Web Plates for Steel Girders                               | Bill Wright<br>HRDI-06<br>202-493-3053   | Mobility              |                                     | X  |    |     | Yes         | Dec-2003               | Maximize bridge efficiency of design and capacity and maximize the efficiency of design for steel structures.  |  |
| <b>Structures/Concrete</b>  |  |                       |                                     |    |    |     |             |                        |  |  |
| High-Performance Concrete (HPC) Data Base                             | Joey Hartmann<br>HRDI-06<br>202-493-3059 | Mobility              |                                     | X  |    |     | Yes         | Dec-2003               | Analyze the effectiveness of new generation concrete structural materials. Documenting the performance improvements obtained through the use of high performance concrete.                                       |  |
| <b>Structures/Timber</b>  |  |                       |                                     |    |    |     |             |                        |  |  |
| Design Guidance for Composite Timber Bridges                          | Sheila Duwadi<br>HRDI-07<br>202-493-3106 | Mobility/<br>Safety   |                                     | X  |    |     | Yes         | Dec-2003               | Provide guidance and assistance in fiber-reinforced polymer (FRP) and glulam composite bridge design and construction.   |  |

| Office of Infrastructure R&D (continued)  |  |                       |                                     |    |    |     |             |                        |   |
|---|--|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact                            | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |  |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Structures/Advanced Materials</b>  |  |                       |                                     |    |    |     |             |                        |   |
| Specifications for Highway Bridge Applications Using FRP Composites                     | Eric Munley<br>HRDI-06<br>202-493-3046       | Mobility              |                                     |    | X  |     | Yes         | Jun-2003               | Provide design guidance for state highway bridge engineers.   |
| Materials Spec-Accelerated Test-Based Specification                                     | Eric Munley<br>HRDI-06<br>202-493-3046       | Mobility              |                                     | X  |    |     | Yes         | Dec-2003               | Provide information regarding expected performance of FRP materials.  |
| FRP Prestressing for Highway Bridges  | Eric Munley<br>HRDI-06<br>202-493-3046       | Mobility              |                                     | X  |    |     | Yes         | Dec-2003               | Provide engineering option that improves strength and eliminates corrosion.   |
| Performance Specification and Acceptance Tests for FRP Bridge Decks and Superstructures | Eric Munley<br>HRDI-06<br>202-493-3046       | Mobility/<br>Safety   |                                     |    | X  |     | Yes         | Dec-2003               | Provide specification for the proper use of advanced materials.   |
| Performance Specification and Acceptance Tests for FRP Bridge Decks and Superstructures | Eric Munley<br>HRDI-06<br>202-493-3046       | Mobility/<br>Safety   |                                     |    | X  |     | Yes         | Dec-2003               | Provide specification for the proper use of advanced materials.   |
| <b>Applied Engineering Hydraulics</b>   |  |                       |                                     |    |    |     |             |                        |   |
| Effects of Debris on Bridge Pier Scour  | J. Sterling Jones<br>HRDI-07<br>202-493-3043 | Mobility/<br>Safety   |                                     |    |    |     | Yes         | Jun-2004               | Experiments to account for debris in the pier scour equation.<br>Start was deferred to accommodate other requirements for the hydraulics flume.   |
| Culvert Installation Provisions for AASHTO Bridge Specifications                        | John O'Fallon<br>HRDI-07<br>202-493-3051     | Mobility              |                                     |    |    | X   | Yes         | Complete               | Verified durability of aluminized coatings for metal pipe.<br>Proposed provisions provided to the Office of Bridge Technology. Also, presentation made at AASHTO Culvert Committee Meeting. |

| Office of Infrastructure R&D (continued)                                   |  |                       |                                     |    |    |     |                 |                        |   |
|--|--|-----------------------|-------------------------------------|----|----|-----|-----------------|------------------------|---|
| Project  | Technical Contact                            | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule     | Target Completion Date | Comments  |
|  |  |                       | 25                                  | 50 | 75 | 100 |                 |                        |   |
| <b>Applied Engineering Hydraulics (continued)</b>                          |  |                       |                                     |    |    |     |                 |                        |   |
| Improved Culvert Entrance Loss Prediction                                  | J. Sterling Jones<br>HRDI-07<br>202-493-3043 | Mobility              | X                                   |    |    |     | Yes             | Aug-2003               | Provide design guidance for standard culvert inlets used by highway agencies.<br>Completed experiments on stepped down culvert diameters in series. Currently testing prefabricated versus cast-in-place (CIP) culvert inlets and multiple barrel hydraulics. |
| <b>Applied Engineering/Aerodynamics</b>                                    |  |                       |                                     |    |    |     |                 |                        |   |
| Mean Wind Force Coefficients for Hexagonal, Uniform, and Tapered Cylinders | Hal Bosch<br>HRDI-07<br>202-493-3031         | Mobility/<br>Safety   |                                     | X  |    |     | Slightly behind | Dec-2003               | Provide more realistic coefficient for calculating wind load.<br>This study is slightly delayed due to rehabilitation of the wind tunnel and the slow fabrication and delivery of tapered models.   |
| Stochastic Methods for Simulating 3-D Wind Flow Around Bridges             | Hal Bosch<br>HRDI-07<br>202-493-3031         | Mobility/<br>Safety   |                                     | X  |    |     | No              | Dec-2003               | Provide new tool for simulation and analysis of wind effects on bridges.<br>This study has been put on hold due to budget cuts and limited access to the principal investigation.   |
| <b>Applied Engineering/Seismic</b>   |  |                       |                                     |    |    |     |                 |                        |   |
| Seismic Retrofitting Manuals: Part III: Special Bridges                    | Phil Yen<br>HRDI-07<br>202-493-3056          | Mobility/<br>Safety   |                                     | X  |    |     | Yes             | Dec-2004               | Provide nationally applicable seismic design and retrofitting guidelines for special bridges.   |



| Office of Infrastructure R&D (continued)  |  |                       |                                     |    |    |     |             |                        |   |
|---|--|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact                      | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |  |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Applied Engineering/Seismic (Continued)</b>  |  |                       |                                     |    |    |     |             |                        |   |
| A Risk-Based Methodology For Assessing the Seismic Performance of Lifeline Systems Report | Phil Yen<br>HRDI-07<br>202-493-3056    | Mobility/<br>Safety   |                                     |    | X  |     | Yes         | Dec-2004               | Tool to assist State bridge engineers in assessing loss estimation of earthquake damage.<br>A computer program was completed and a report published. This tool has been calibrated and validated by a demonstration project (Northridge earthquake case study). |
| Improved Seismic Design Provisions for AASHTO Bridge Specifications                       | Phil Yen<br>HRDI-07<br>202-493-3056    | Mobility              |                                     |    | X  |     | Yes         | Dec-2003               | Provide recommended seismic design specifications for highway bridges.<br>Recommended seismic design specifications completed and proposed to AASHTO. More work required to adopt the specifications.   |
| <b>Applied Engineering/Geotechnology</b>  |  |                       |                                     |    |    |     |             |                        |   |
| Micropile Technology for Bridges  | Al DiMillio<br>HRDI-06<br>202-493-3035 | Mobility              |                                     | X  |    |     | Yes         | Dec-03                 | Provide design and retrofit guidance for the use of micropiles.<br>Particularly critical technology for retrofit of existing structures and structures with limited access for equipment.   |
| Non-Nuclear Compaction Control Equipment  | Mike Adams<br>HRDI-06<br>202-493-3025  | Mobility              |                                     |    | X  |     | Yes         | Feb-2003               | Provide a more user-friendly compaction test method.<br>A means of accurately measuring construction compaction of soil without the need for a nuclear device.  |

| Office of Infrastructure R&D (continued)  |   |                       |                                     |    |    |     |             |                        |   |
|---|---|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact                       | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |   |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Applied Engineering/Corrosion</b>  |   |                       |                                     |    |    |     |             |                        |   |
| Knowledge-Based Tools for Bridge Coatings Maintenance Decision Making                       | Bob Kogler<br>HRDI-06<br>202-493-3080   | Mobility              |                                     |    | X  |     | Yes         | Jun-2003               | Provide coating assessment tools to resident bridge engineers.<br>Supplies a tool for conveniently assessing the condition of a coating on steel and provides options for repair. |
| <b>Applied Engineering/Nondestructive Evaluation</b>  |   |                       |                                     |    |    |     |             |                        |   |
| Thermal Imaging System for Crack Detection  | Glenn Washer<br>HRDI-10<br>202-493-3082 | Mobility              |                                     | X  |    |     | Yes         | Sep-2003               | Method to detect cracks and prevent failure of steel structures.  |
| HERMES II Ground Penetrating Radar System   | Glenn Washer<br>HRDI-10<br>202-493-3082 | Mobility              |                                     |    |    | X   | Yes         | Oct-2002               | Tools to rapidly survey concrete decks for deficiencies.<br>System delivered; testing completed; report 99 percent complete.  |
| Ultrasonic Methods for Health Monitoring of Prestressing Tendons                            | Glenn Washer<br>HRDI-10<br>202-493-3082 | Mobility              | X                                   |    |    |     | Yes         | Sep-2004               | Technology to prevent failures due to corrosion or tendon fracture.<br>Prototype sensors built and tested; patent application being completed.                                    |
| Automated Ultrasonic Inspection Methods   | Glenn Washer<br>HRDI-10<br>202-493-3083 | Mobility              |                                     |    | X  |     | Yes         | Jan-2003               | Develop automated ultrasonic methods for quality assurance.<br>Field testing is currently ongoing.  |
| <b>Applied Engineering/ Bridge Management</b>   |   |                       |                                     |    |    |     |             |                        |   |
| WebNBI: Internet-Based Query and Analysis System for the National Bridge Inventory Database | John Hooks<br>HRDI-10<br>202-493-3023   | Mobility              |                                     |    |    | X   | Yes         | Complete               | Provide basis for effective bridge preventive maintenance and preservation.<br>WebNBI query system active and in use by FHWA HQ and field bridge engineers and planning staff.    |

| Office of Infrastructure R&D (continued)                       |  |                       |                                     |    |    |     |             |                        |  |
|--|--|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|--|
| Project  | Technical Contact                            | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments   |
|  |  |                       | 25                                  | 50 | 75 | 100 |             |                        |  |
| <b>Projects Not Reflected in 2002-2003 Plan</b>                |  |                       |                                     |    |    |     |             |                        |  |
| Risk-Based Countermeasure Selection for Scour Critical Bridges | J. Sterling Jones<br>HRDI-07<br>202-493-3043 | Mobility              |                                     |    | X  |     | Yes         | Mar-2003               | Provide logical basis for prioritizing limited resources to protect scour in critical bridges.<br>Presented the concept at the 2002 Annual TRB meeting. Logic has been coded as an extension of the HYRISK model and is being evaluated by two Resource Centers. The HYRISK model is keyed to the NBI database and is currently being revised to include a switch between data based on 1995 and 2002 coding guides. |
| Infrared Thermography for Infrastructure Inspection            | Glenn Washer<br>HRDI-10<br>202-493-3082      | Mobility              |                                     |    | X  |     | Yes         | Jun-2003               | Technology for detecting delamination in bridge members.<br>System built; field testing underway.  |
| Technical Expertise on Grout Issues                            | Glenn Washer<br>HRDI-10<br>202-493-3082      | Mobility              |                                     | X  |    |     | Yes         | Sep-2003               | Technical assistance for inspection of post tensioned.<br>Ongoing consultation and project development   |
| Management of Highway Runoff in Karst Areas                    | Howard Jongedyk<br>HRDI-10<br>202-493-3077   | Environment           |                                     |    |    | X   | Yes         | Complete               | Techniques to prevent damage to sensitive geologies.   |
| Air Pollution Models for Complex Site Geometries               | Howard Jongedyk<br>HRDI-10<br>202-493-3077   | Environment           |                                     |    |    | X   | Yes         | Complete               | Techniques to evaluate impacts of toxic spills.<br>Model for dispersion of exhaust gases and toxic gases from chemical spills or terrorist attacks; applicable to complex urban sites and tunnels. Report printed.   |

| Office of Infrastructure R&D (continued)  |  |                       |                                     |    |    |     |             |                        |  |
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| Project   | Technical Contact                          | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments   |
|   |  |                       | 25                                  | 50 | 75 | 100 |             |                        |  |
| <b>Projects Not Reflected in 2002-2003 Plan (Continued)</b>                                     |  |                       |                                     |    |    |     |             |                        |  |
| Diffusion of Airborne Highway Pollutants  | Howard Jongedyk<br>HRDI-10<br>202-493-3077 | Environment           |                                     |    |    | X   | Yes         | Complete               | Methodology to mitigate impacts of airborne pollutants.  |
| Smoothness Specifications   | Dennis Sixbey<br>HRDI-10<br>202-493-3078   | Mobility              |                                     | X  |    |     | Yes         | Nov-2003               | Improved pavement measurements made at highway speeds.<br>Determine accelerometer requirements for inertial profilers at speeds from 15 to 70 miles per hour.  |
| Warp & Curl Analysis Software   | Dennis Sixbey<br>HRDI-10<br>202-493-3078   | Mobility              |                                     | X  |    |     | Yes         | Nov-2003               | Improved analysis and design of PCC pavements.<br>Software analysis package being developed.   |
| Preliminary Laboratory Investigation of the Performance of Modified Asphalt Binders in Mixtures | Kevin Stuart<br>HRDI-11<br>202-493-3073    | Mobility              |                                     |    |    | X   | Yes         | Complete               | National refinement of Superpave binder specifications to fully capture the benefit of modified binders.<br>Funded by NCHRP, and the TRB Superpave Mix/Aggregate and Binder Expert Task Group (ETG). |
| Evaluation of the Proposed Simple Performance Test  | Kevin Stuart<br>HRDI-11<br>202-493-3073    | Mobility              | X                                   |    |    |     | Yes         | Jun-2003               | New tool to improve the quality and performance of asphalt pavements.<br>Funded by Revenue Aligned Budget Authority (RABA); requested by AASHTO.   |
| Evaluation of GSB-88 Emulsified Sealer  | Kevin Stuart<br>HRDI-11<br>202-493-3073    | Mobility              | X                                   |    |    |     | Yes         | Sep-2003               | Product intended to increase pavement service life.<br>Congressionally-directed research activity.   |



| Office of Infrastructure R&D (continued)   |   |                       |                  |    |    |     |             |                        |  |
|--|---|-----------------------|------------------|----|----|-----|-------------|------------------------|--|
| Project  | Technical Contact                         | Projected Goal Impact | Project Status % |    |    |     | On Schedule | Target Completion Date | Comments   |
|  |   |                       | 25               | 50 | 75 | 100 |             |                        |  |
| <b>Projects Not Reflected in 2002-2003 Plan (Continued)</b>  |   |                       |                  |    |    |     |             |                        |  |
| Full-Scale Accelerated Performance Testing for Superpave and Structural Validation: Phase I - Construction | Terry Mitchell<br>HRDI-11<br>202-493-3147 | Mobility              | X                |    |    |     | Yes         | May-2005               | National Superpave binder spec. refinement to capture fully the benefit of modified binders.<br>Pooled fund study TPF-5(019) in partnership with the TRB Superpave Binder ETG.   |
| Fundamental Properties of Asphalt and Modified Asphalts  | Ernie Bastian<br>HRDI-11<br>202-493-3075  | Mobility              |                  |    | X  |     | Yes         | Sep-2003               | Expanded fundamental knowledge of asphalt and modified asphalts.<br>Congressionally-directed research activity.  |
| Mixture-Specific Test Method for ASR   | Marcia Simon<br>HRDI-12<br>202-493-3071   | Mobility              |                  | X  |    |     | No          | Dec-2003               | Improve performance of PCCP.<br>Prism testing began in July 2002. Lengthy delay in testing due to equipment problems.  |
| COST Web Site and Report   | Marcia Simon<br>HRDI-12<br>202-493-3071   | Mobility              |                  |    |    | X   | Yes         | Completed              | Web-based software to efficiently optimize concrete mix proportioning and achieve multiple performance criteria.<br>Web site is online at <a href="http://ciks.cbt.nist.gov/cost/">http://ciks.cbt.nist.gov/cost/</a>  |
| High-Energy Radiography for Structures   | Glenn Washer<br>HRDI-10<br>202-493-3083   | Mobility              |                  | X  |    |     | Yes         | Jan-2004               | Technology field testing for imaging defects in concrete.<br>Ongoing field testing to evaluate capabilities of the method.   |
| Preliminary Laboratory Investigation of the Performance of Modified Asphalt Binders in Mixtures            | Kevin Stuart<br>HRDI-11<br>202-493-3072   | Mobility              |                  |    | X  |     | Yes         | Dec-2002               | Validation of proposed changes to the Superpave binder spec.<br>Funded by NCHRP and the TRB Superpave Binder and Mix/Aggregate ETG. National refinement of Superpave to fully capture the benefit of modified binders. |

| Office of Operations R&D   |                             |                       |                  |    |    |     |             |                        |   |
|--|-----------------------------|-----------------------|------------------|----|----|-----|-------------|------------------------|---|
| Project  | Technical Contact           | Projected Goal Impact | Project Status % |    |    |     | On Schedule | Target Completion Date | Comments  |
|  |                             |                       | 25               | 50 | 75 | 100 |             |                        |   |
| <b>Intelligent Vehicle Initiative (IVI) &amp; Human Centered Systems Related Research</b>                              |                             |                       |                  |    |    |     |             |                        |   |
| Intersection Collision & Roadway Crash Avoidance / Infrastructure Systems Concepts & Requirements                      | Bob Ferlis<br>202-493-3268  | Safety                | X                |    |    |     | Yes         | Jan-2005               |   |
| Specialty Vehicles Technologies Evaluation   | Bob Ferlis<br>202-493-3268  | Safety/<br>Mobility   |                  |    | X  |     | No          | Mar-2003               | Lack of snow prevented evaluation of MnDOT intelligent snow plows in 2002.  |
| Enhanced Digital Mapping   | Toni Wilbur<br>202-493-3269 | Safety                | X                |    |    |     | Yes         | Apr-2004               |   |
| Guidelines for In-Vehicle Display Icons  | Tom Granda<br>202-493-3365  | Safety/<br>Mobility   |                  |    |    | X   | Complete    | Jun-2002               | Diverse industry working group guided development.  |
| Transportation Management Center (TMC) National Pooled Fund Study Results  | Tom Granda<br>202-493-3365  | Safety/<br>Mobility   |                  | X  |    |     | Yes         | Sep-2006               | Developed several references for TMC operations.  |
| Interactive Icon Evaluation Tool   | Tom Granda<br>202-493-3365  | Safety/<br>Mobility   |                  |    |    | X   | Yes         | Complete               | Diverse industry working group guided development. OEM suppliers expressed interest in the product.   |
| Synthesis of practices addressing consistency in text-based messaging for Advanced Traveler Information Systems (ATIS) | Tom Granda<br>202-493-3365  | Safety/<br>Mobility   |                  | X  |    |     | Yes         | Oct-2002               | Review of ATIS operator practices in selecting, filtering, and assembling dynamic message sign (DMS) messages. Survey of the diverse text message delivery systems to understand the baseline system, the various types of messages being presented, and the decisionmaking processes for those messages. |
| Human Factors Review of ALERT Police Specialty Vehicle System  | Tom Granda<br>202-493-3365  | Safety/<br>Mobility   |                  |    |    | X   | Yes         | Complete               | Developed interface recommendations and a set of lessons learned for police in-vehicle information system (IVIS) designers/integrators.   |

| Office of Operations R&D (continued)   |                                |  |                                     |    |    |     |             |                        |   |  |
|--|--------------------------------|--|-------------------------------------|----|----|-----|-------------|------------------------|---|--|
| Project  | Technical Contact              | Projected Goal Impact                                | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |  |
|  |                                |  | 25                                  | 50 | 75 | 100 |             |                        |   |  |
| <b>Traffic Control &amp; Operations</b>  |                                |  |                                     |    |    |     |             |                        |   |  |
| Adaptive Control Systems (ACS) - Development   | Deborah Curtis<br>202-493-3267 | Mobility   |                                     |    |    | X   | Yes         | Complete               | Weather and evacuation papers prepared; product handoff to Office of Operations done.                 |  |
| ACS - Field Test   | Raj Ghaman<br>202-493-3270     | Mobility   |                                     |    | X  |     | Yes         | Dec-2002               |   |  |
| ACS "Lite" Version Software  | Felipe Luyanda<br>202-493-3368 | Mobility   | X                                   |    |    |     | Yes         | Sep-2003               |   |  |
| Ramp Metering 2000 Software  | Deborah Curtis<br>202-493-3267 |  |                                     |    | X  |     | No          | Mar-2003               | Working with Office of Operations to determine next steps for product. Contract issues were resolved. |  |
| DynaMIT - A Prototype for the Real-Time Traffic Estimation and Prediction System (TrEPS)     | Henry Lieu<br>202-493-3273     | Mobility   |                                     |    | X  |     | Yes         | Dec-2004               | A work plan for implementing DynaMIT in Los Angeles is being developed.                               |  |
| DYNASMART-X - A Prototype for the Real-Time Traffic Estimation and Prediction System (TrEPS) | Henry Lieu<br>202-493-3273     | Mobility   |                                     |    | X  |     | Yes         | Jun-2005               | A work plan for the real-time implementation of DYNASMART-X in Houston is being planned.              |  |
| Traffic Detector Handbook  | Dave Gibson<br>202-493-3271    | Safety/<br>Mobility/<br>Environment/                 |                                     | X  |    |     | Yes         | Dec-2002               | Describes design requirements, installation, and maintenance procedures for transportation sensors.   |  |
| Traffic Control Systems Handbook   | Raj Ghaman<br>202-493-3270     | Mobility   |                                     |    |    |     | Yes         | Dec-2003               | FY 2003 funds to be obligated.  |  |
| Freeway Management Handbook  | Felipe Luyanda<br>202-493-3368 | Mobility/<br>Productivity                            | X                                   |    |    |     | Yes         | Jun-2003               |   |  |
| Winter Weather Maintenance Decision Support Systems  | Rudy Persaud<br>202-493-3391   | Safety/<br>Mobility/<br>Productivity/<br>Environment |                                     |    | X  |     | Yes         | 2003                   |   |  |

| Office of Operations R&D (continued)   |                                |   |                                     |    |    |     |             |                        |  |
|--|--------------------------------|---|-------------------------------------|----|----|-----|-------------|------------------------|--|
| Project  | Technical Contact              | Projected Goal Impact   | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments   |
|  |                                |   | 25                                  | 50 | 75 | 100 |             |                        |  |
| <b>Traffic Control &amp; Operations (Continued)</b>  |                                |   |                                     |    |    |     |             |                        |  |
| Support to Office of Operations on Devices (MUTCD) Signing Issues  | Tom Granda<br>202-493-3365     | Safety/<br>Mobility   |                                     | X  |    |     | Yes         | Nov-2002               | <i>Role of FHWA in In-Vehicle Information</i><br>Revised completion date due to delayed startup by contractor. Percent complete remains the same because only 50 percent was received to date. |
| <b>Traffic Simulation Modeling</b>   |                                |   |                                     |    |    |     |             |                        |  |
| Next Generation Simulation Modeling (NGSIM)  | Gene McHale<br>202-493-3275    | Mobility  |                                     |    |    |     | Yes         | Dec-2007               |  |
| DYNASMART-P - A Prototype for the Traffic Estimation and Prediction System for Operations Planning (TrEPS-P) | Henry Lieu<br>202-493-3273     | Mobility  |                                     |    | X  |     | Yes         | Jan-2004               |  |
| DynaMIT-P - A Prototype for the Traffic Estimation and Prediction System for Operations Planning             | Henry Lieu<br>202-493-3273     | Mobility  |                                     |    | X  |     | Yes         | Dec-2004               |  |
| Strategic Work Zone Analysis Tools (SWAT)  | Deborah Curtis<br>202-493-3267 |   |                                     | X  |    |     | Yes         | Dec-2004               |  |
| QuickZone Work Zone Delay Estimation Tool  | Deborah Curtis<br>202-493-3267 |   |                                     |    | X  |     | Yes         | Dec-2002               |  |
| Nationwide Differential Global Positioning System (NDGPS) Base Stations                                      | Jim Arnold<br>202-493-3265     | Safety/<br>Mobility/<br>Productivity/<br>Environment/<br>Security | X                                   |    |    |     | Yes         | Dec-2005               |  |

| Office of Operations R&D (continued)   |  |   |                                     |    |    |     |             |                        |   |
|--|--|---|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project  | Technical Contact  | Projected Goal Impact   | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|  |  |   | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Traffic Simulation Modeling (Continued)</b>   |  |   |                                     |    |    |     |             |                        |   |
| NDGPS Coverage Verification Test Jig   | Jim Arnold<br>202-493-3265                                 | Safety/<br>Mobility/<br>Productivity/<br>Environment/<br>Security | X                                   |    |    |     | Yes         | Dec-2005               |   |
| GPS Surface Observation System Installation for Integrated Precipitable Water Vapor (IPWV) | Jim Arnold<br>202-493-3265<br>Rudy Persaud<br>202-493-3391 | Safety/<br>Mobility/<br>Productivity/<br>Environment/<br>Security |                                     | X  |    |     | Yes         | Dec-2005               |   |
| <b>Projects Not Reflected in 2002-2003 Plan</b>  |  |   |                                     |    |    |     |             |                        |   |
| Surface Transportation Security and Reliability Information System Model Deployment        | Toni Wilbur<br>202-493-3269                                | Safety/<br>Mobility/<br>Security                                  |                                     |    |    |     | Yes         | Dec-2007               |   |
| Traffic Software Integrated System (TSIS)  | Raj Ghaman<br>202-493-3270<br>Gene McHale<br>202-493-3275  | Mobility  |                                     |    |    | X   | Yes         | N/A                    |   |
| High Accuracy-NDGPS  | Jim Arnold<br>202-493-3265                                 | Safety/<br>Mobility/<br>Productivity/<br>Environment/<br>Security | X                                   |    |    |     | Yes         | Dec-2007               | Research program to evaluate the potential for achieving very high accuracy navigation solutions using existing infrastructure. |
| Unmanned Aerial Vehicle (UAV) for Aerial Surveillance                                      | Dave Gibson<br>202-493-3271                                | Safety/<br>Mobility   |                                     |    | X  |     | Yes         | Dec-2003               | Uses model airplane for traffic surveillance and potential transportation system inspections.                                   |



| Office of Safety R&D  |                                  |                       |                                     |    |    |     |             |                        |   |
|---|----------------------------------|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact                | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |                                  |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Run Off Road: Mitigation</b>   |                                  |                       |                                     |    |    |     |             |                        |   |
| Simulation and Analysis of Vehicle Crashes into Mailboxes                   | Charlie McDevitt<br>202-493-3313 | Safety                |                                     | X  |    |     | Yes         | Dec-2002               | Develop models for analysis of vehicle crashes into vandal-resistant mailboxes.   |
| Finite Element Model of a Tractor-Trailer and Wood Materials for Guardrails | Martin Hargrave<br>202-493-3311  | Safety                |                                     |    | X  |     | Yes         | Dec-2002               | Develop models for use in crash test simulations and analyses.  |
| Rollover Causation Study, Interim Report                                    | Mort Oskard<br>202-493-3339      | Safety                |                                     |    |    | X   |             | Complete               | Identify causal factors that lead up to rollover crashes.   |
| Side Impact Human Injury Methodology for Future Crash Tests                 | Martin Hargrave<br>202-493-3311  | Safety                |                                     |    |    |     |             |                        | Cancelled TRB will include in update to 350.  |
| <b>Run Off Road Prevention: Design</b>                                      |                                  |                       |                                     |    |    |     |             |                        |   |
| Interactive Highway Safety Design Model (IHSDM) - Complete Model Beta Test  | Ray Krammes<br>202-493-3312      | Safety                |                                     |    | X  |     | Yes         | Nov-2002               | This suite of safety evaluation software modules incorporates available knowledge about roadway safety and geometric design into a more useful format for highway planners and designers. |
| IHSDM - Crash Prediction Module Beta Test                                   | Ray Krammes<br>202-493-3312      | Safety                |                                     |    |    | X   | Yes         | Complete               | Beta testing is in progress.  |

| Office of Safety R&D  |                                |                       |                                     |    |    |     |             |                        |   |
|---|--------------------------------|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project   | Technical Contact              | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|   |                                |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Run Off Road Prevention: Design (Continued)</b>                              |                                |                       |                                     |    |    |     |             |                        |   |
| IHSDM - Intersection Diagnostic Review Module Beta Test                         | Ray Krammes<br>202-493-3312    | Safety                |                                     |    | X  |     | Yes         | Nov-2002               | This suite of safety evaluation software modules incorporates available knowledge about roadway safety and geometric design into a more useful format for highway planners and designers. |
| IHSDM - Traffic Analysis Module Beta Test                                       | Ray Krammes<br>202-493-3312    | Safety                |                                     |    | X  |     | Yes         | Nov-2002               | This suite of safety evaluation software modules incorporates available knowledge about roadway safety and geometric design into a more useful format for highway planners and designers. |
| IHSDM - Driver/Vehicle Module Beta Test   | Ray Krammes<br>202-493-3312    | Safety                |                                     |    | X  |     | No          | Sep-2004               | This module needs additional work, which we are deferring to FY 2003/2004. It will not be part of the 2002 release of IHSDM.  |
| Guidelines for Assuring Systemwide Adequacy of Traffic Sign Visibility at Night | Carl Andersen<br>202-493-3366  | Safety                |                                     |    |    |     | Not Started | Sep-2003               | Efforts to finalize the tables of minimum requirements for traffic sign retroreflectivity have slightly delayed the start of this effort.   |
| Updated Minimum Levels for Pavement Marking Retroreflectivity                   | Kenneth Opiela<br>202-493-3371 | Safety                |                                     |    | X  |     | No          | Jun-2003               | Progress was made in verifying and validating past efforts, but the need to revise the sign retroreflectivity values has delayed completion of this effort.                               |
| Night Driving and Lighting Requirements for the Older Driver                    | Kenneth Opiela<br>202-493-3371 | Safety                |                                     |    |    | X   | Yes         | Complete               | The draft final report is expected next month.  |

| Office of Safety R&D (continued)                               |                               |                       |                                     |    |    |     |             |                        |   |
|--|-------------------------------|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project  | Technical Contact             | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|  |                               |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Run Off Road Prevention: Design (Continued)</b>             |                               |                       |                                     |    |    |     |             |                        |   |
| Field Guide for the Use of Portable Changeable Message Signs   | Thomas Granda<br>202-493-3365 | Safety                |                                     |    | X  |     | No          | Dec-2002               | Waiting to determine how proposed changes in the Federal regulations will affect the handbook. Once proposed changes are ratified, it can be completed. |
| Requirements for LED Traffic Signals                           | Carl Andersen<br>202-493-3366 | Safety                |                                     |    |    |     | Yes         | Sep-2003               | Not started. Exploring cooperative agreement with NIST.   |
| Minimum Fluorescent Requirements for Traffic Signs             | Carl Andersen<br>202-493-3366 | Safety                | X                                   |    |    |     | Yes         | Aug-2003               | Delayed due to difficulty in finding specifically configured fluorescent material.  |
| Enhanced Night Visibility Project Follow Up Study Results      | Carl Andersen<br>202-493-3366 | Safety                |                                     |    |    |     | Yes         | Dec-2004               | Initial project extended through 5/31/04.   |
| <b>Pedestrian &amp; Bicyclist</b>                              |                               |                       |                                     |    |    |     |             |                        |   |
| Pedestrian Facilities Safety User Guide                        | Ann Do<br>202-493-3319        | Safety                |                                     |    |    | X   | Yes         | Complete               | Provide information on how to identify the safety and mobility needs of pedestrians within roadway rights-of-way.                                       |
| Recommendations for Future Design of Crosswalk Signals         | Thomas Granda<br>202-493-3365 | Safety                |                                     |    |    | X   | Yes         | Complete               | Research completed and draft report undergoing analysis and review.   |
| Design Criteria Based on the Non-motorists Perception of Speed | Thomas Granda<br>202-493-3365 | Safety                |                                     |    |    | X   | Yes         | Complete               | Submitted report; results were presented at ITE in August.  |

| Office of Safety R&D (continued)   |                               |                       |                                     |    |    |     |             |                        |   |
|--|-------------------------------|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|
| Project  | Technical Contact             | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |
|  |                               |                       | 25                                  | 50 | 75 | 100 |             |                        |   |
| <b>Speed Management</b>  |                               |                       |                                     |    |    |     |             |                        |   |
| Results of Field Tests on Impacts of Setting and Enforcing Rational Speed Limits | Davey Warren<br>202-493-3318  | Safety                | X                                   |    |    |     | Yes         | Dec-2004               | Results from first wave of demonstration projects due 8/28/03.  |
| USLIMITS: A Preliminary Expert System for Speed Zoning                           | Davey Warren<br>202-493-3318  | Safety                |                                     |    |    | X   | Yes         | Aug-2002               | Beta version available for testing.   |
| Recommended Designs for Hump Signs and Markings                                  | Thomas Granda<br>202-493-3365 | Safety                |                                     | X  |    |     | No          | Aug-2002               | Project delayed due to changes in the MUTCD. It now has guidelines for hump signs.  |
| Prototype Variable Speed Limit Systems in Work Zones                             | Davey Warren<br>202-493-3318  | Safety                | X                                   |    |    |     | Yes         | Aug-2003               | Field testing completed in Michigan; testing in Maryland planned for 8/2002; testing in Virginia not to begin until 2003 construction season. |
| Variable Speed Limit Technical Assessment Plan                                   | Davey Warren<br>202-493-3318  | Safety                |                                     | X  |    |     | No          | Jul-2003               | A report on judicial enforcement of variable speed limits was published in March 2002 as <i>Legal Research Digest Number 47</i> .             |
| <b>Intersections</b>   |                               |                       |                                     |    |    |     |             |                        |   |
| Safety and Operational Impacts of Offset "T" Intersections                       | Joe Bared<br>202-493-3314     | Safety                |                                     |    |    | X   | Yes         | Complete               | Traffic safety conference on three continents, Published in TRIS, 2002.   |
| Accident Warrant for Traffic Signals   | Davey Warren<br>202-493-3318  | Safety                |                                     |    |    | X   | Yes         | Complete               | Draft report.   |
| Safety Recommendations for Novel Intersection Designs                            | Joe Bared<br>202-493-3314     | Safety                | X                                   |    |    |     | Yes         | Sep-2003               | Determine and analyze user responses to various alternatives for signage and marking at novel intersections.                                  |
| Driver Selection of Path and Speed Through Roundabouts                           | Thomas Granda<br>202-493-3365 | Safety                |                                     |    |    | X   | Yes         | Nov-2002               | Research completed; draft report undergoing review.   |

| Office of Safety R&D (continued)  |                               |                       |                                     |    |    |     |             |                        |   |  |
|---|-------------------------------|-----------------------|-------------------------------------|----|----|-----|-------------|------------------------|---|--|
| Project   | Technical Contact             | Projected Goal Impact | Project Completion Status (Percent) |    |    |     | On Schedule | Target Completion Date | Comments  |  |
|   |                               |                       | 25                                  | 50 | 75 | 100 |             |                        |   |  |
| <b>Intersections (Continued)</b>  |                               |                       |                                     |    |    |     |             |                        |   |  |
| Functional Requirements for Microsimulation-Based Surrogate Safety Measures at Intersections                | Joe Bared<br>202-493-3314     | Safety                |                                     |    |    | X   | Yes         | Complete               | Surrogate measures and functional specifications are completed. The intersections algorithm is still in progress.   |  |
| Traffic Operations and Safety Comparisons of Single Point Urban Interchange with Tight Diamond Interchange  | Joe Bared<br>202-493-3314     | Safety                |                                     |    |    | X   | Yes         | Complete               | A traffic operational performance analysis paper was presented at the 5th Access Management Conference and will be published in the conference proceedings. The safety analysis is still in progress. |  |
| <b>Human Centered Systems</b>   |                               |                       |                                     |    |    |     |             |                        |   |  |
| Revised Older Driver Design Handbook  | Thomas Granda<br>202-493-3365 | Safety                |                                     |    |    | X   | Yes         | Complete               | Handbook, guidelines, and recommendations are on the TFHRC Web site.  |  |
| <b>Projects Not Reflected in 2002-2003 Plan</b>   |                               |                       |                                     |    |    |     |             |                        |   |  |
| Retroreflective raised pavement markers (RRPM) Research - Highway Driving Simulator (HYSIM) study           | Thomas Granda<br>202-493-3365 | Safety                |                                     |    | X  |     | Yes         | Dec-2002               | Added 7/9/2002, about 90% completed.  |  |
| RRPMs Research - field validation study   | Thomas Granda<br>202-493-3365 | Safety                |                                     | X  |    |     | Yes         | Dec-2002               | Added 7/9/2002.   |  |
| RRPMs Research - second HYSIM study   | Thomas Granda<br>202-493-3365 | Safety                | X                                   |    |    |     | Yes         | Jun-2003               | Added 7/9/2002.   |  |
| <b>Projects conducted in collaboration with other offices</b>   |                               |                       |                                     |    |    |     |             |                        |   |  |
| Intersection Collision & Roadway Departure Crash Avoidance-Infrastructure Systems Concepts and Requirements | Robert Ferlis<br>202-493-3268 | Safety                |                                     |    |    |     |             |                        | Reported by Bob Ferlis in Operations R&D Projects and Services report. See listing in Operations section.   |  |
| Transportation Management Center National Pooled Fund Study Results   | Thomas Granda<br>202-493-3365 | Safety                |                                     |    |    |     |             |                        | Shown on Operations R&D Projects and Services report. See listing in Operations section.  |  |



## Appendix B: Services

The following charts outline accomplishments over the past year in the area of technical and program support for FHWA R&T activities nationwide.

| Office of Infrastructure R&D   |   |   |
|--|---|---|
| Service  | Technical Contact                         | Comments  |
| <b>Structures</b>  |   |   |
| Forensic evaluations of catastrophic failures or risk analysis in the areas of bridges and bridge components                                 | Bill Wright<br>202-493-3053               | Expertise obtained through laboratory and field research is applied to explain the cause of catastrophic structural failures and develop recommendations for remedial action.   |
| Forensic evaluations of catastrophic failures or risk analysis in the areas of hydraulic erosion and bridge and culvert stability            | J. Sterling Jones<br>202-493-3043         | No services provided during FY 2002.  |
| Forensic evaluations of catastrophic failures or risk analysis in the areas of seismic stability, nationally and internationally             | Hamid Ghasemi<br>Phil Yen<br>202-493-3042 | Participated in post-earthquake investigations of the Northridge earthquake (EQ) in the U.S., the Kobe EQ in Japan, the Kocaeli and Duzce EQs in Turkey, and the Chi-Chi EQ in Taiwan. The Turkish KGM (highway agency) requested further assistance from HRD1-07 office in retrofitting damaged and existing bridges.  |
| Forensic evaluations of catastrophic failures or risk analysis in the areas of aerodynamic induced failures of bridges and bridge components | Hal Bosch<br>202-493-3031                 | Continued to monitor the post-retrofit wind response and behavior of the Deer Isle-Sedgwick Suspension Bridge. Evaluated possible cable vibrations on the Chesapeake and Delaware Canal cable-stayed bridge.  |
| Studies to resolve unique or very complex design situations in hydraulic capacity, efficiency and effectiveness                              | J. Sterling Jones<br>202-493-3043         | Flume studies were conducted for: (1) the Wisconsin Division Office to investigate danger to a 96" sanitary sewer from pier scour; (2) the Maryland DOT to investigate a cross vane concept to reduce culvert entrance scour; (3) FHWA to investigate a bridge clearance problem; and (4) Maryland DOT and design consultants for the Woodrow Wilson Bridge to investigate proposed solutions to a construction mishap. Work plans were negotiated with the South Dakota, Alaska, and Maryland DOTs to conduct culvert studies in the Hydraulics Lab. |

| <b>Office of Infrastructure R&amp;D (continued)</b>  |                                   |  |
|--|-----------------------------------|--|
| Service  | Technical Contact                 | Comments   |
| <b>Structures (Continued)</b>  |                                   |  |
| Studies to resolve unique or very complex design situations in aerodynamic stability of bridge and bridge components   | Hal Bosch<br>202-493-3031         | Participated in several meetings about the preliminary design of the Blennerhassett Suspension Bridge. Completed field measurements of a new stay-cable system's dynamic properties on the Charles River Bridge.   |
| Studies to resolve unique or very complex design situations in bridge foundations, abutments, and retaining walls  | Mike Adams<br>202-493-3025        | Provide technical input to FHWA field and State DOT engineers about the use of innovative geotechnical applications, including Geosynthetic Reinforced Soil (GRS) abutments and walls, micropiles, and data from the Geotech Research Database.  |
| Testing new and innovative materials and projects  | Bob Kogler<br>202-493-3080        | Testing and evaluation focuses on high value-added, innovative materials that promise significant benefits over the current materials commonly used for highway applications. Materials such as HPS, ultra-high performance concrete (UHPC), fiber-reinforced polymers, and high-durability corrosion protection materials are investigated. |
| Technical expertise and consultation in bridge coatings and corrosion materials and techniques to other government agencies, States and industry groups            | Shuang-Ling Chong<br>202-493-3081 | Providing advice to States on the reliability and reproducibility of three of the most popular commercial test kits for determining chloride concentration on steel surfaces prior to bridge coating application.  |
| Application, evaluation, and development of specialized instrumentation for nondestructive evaluation, measurement, and long-term monitoring of highway structures | Glenn Washer<br>202-493-3082      | Assist States with technology for the detection of broken wires in cable stayed bridges. Imaging of post-tensioning strands in concrete beams, and detecting voids in the grouted post-tensioned ducts.  |
| Application of bridge management information systems to better understand bridge performance and develop improved performance measures for bridges                 | John Hooks<br>202-493-3023        | Studies involve NBI data mining to develop bridge condition prediction models, isolate causes of bridge deficiencies, develop performance measures, and develop innovative approaches to bridge management.  |

| <b>Office of Infrastructure R&amp;D (continued)</b>   |                              |   |
|---|------------------------------|---|
| Service   | Technical Contact            | Comments  |
| <b>Pavements</b>  |                              |   |
| Forensic evaluations of early performance problems in asphalt and concrete pavements  | Marcia Simon<br>202-493-3071 | Conducted petrographic examination of pavement cores to identify the cause of premature distress (fine aggregate bands resulting from poor mixing) for the Wisconsin DOT.   |
| Laboratory testing of new, innovative, and recycled materials used in pavement construction   | Tom Harman<br>202-493-3072   | Evaluated crumb-rubber material and recycled polyester fiber polymers in the laboratory and in performed full-scale testing.  |
| Technical expertise, assistance, and laboratory testing support for field trials of new pavement materials and procedures   | Tom Harman<br>202-493-3072   | Evaluated polymer-modified materials in the laboratory and in full-scale testing at the FHWA pavement testing facility and in partnership with the National Center for Asphalt Technology.  |
| Technical assistance in the application, testing, evaluation, and problem solving for construction quality control, quality assurance, performance related specifications, and warranties | Peter Kopac<br>202-493-3151  | Analyzed the Pennsylvania DOT air content and compressive strength specifications; provided comments recommending a loosening of air content requirements; and discussed the comments with the FHWA Division Office.  |
| Technical assistance and information on the application, testing, specifications, cost, and performance of recycled pavement materials  | Tom Harman<br>202-493-3072   | Asphalt team continues to provide technical assistance on a National basis to our State partners, industry, and FHWA Federal Lands.   |
| Access to the world's largest and most comprehensive pavement performance database. Technical assistance and consultation in pavement data usage  | Aramis Lopez<br>202-493-3145 | During the first and second quarters of 2002, the group received 378 customer requests for LTPP data and/or information. A detailed report of each request is available. Access methods to the LTPP customer office include e-mail, phone, or fax. OMB granted approval to conduct a yearly customer survey of the LTPP program via the Internet. |
| <b>Services Not Reflected in 2002-2003 Plan</b>   |                              |   |
| Forensic evaluation of concrete material problems   | Marcia Simon<br>202-493-3071 | Evaluated concrete problems in bridge decks for the transportation departments in Pennsylvania, Delaware, and the District of Columbia.   |

| <b>Office of Operations R&amp;D</b>   |                                 |   |
|---|---------------------------------|---|
| Service   | Technical Contact               | Comments  |
| <b>Traffic Analysis &amp; Modeling</b>  |                                 |   |
| Traffic Research Laboratory (TReL) Model Simulation and Problem Solving Studies         | Randy VanGorder<br>202-493-3266 | The TReL provides a support environment to the Advanced Traffic Management Simulator (ATMS) RD&T Team and ITS program. The following is a list of current support efforts: Simulation of Emergency Evacuations (Central Intelligence Agency study), air pollution simulation with Mort Oskard, WESTA (Weigh Station) Model Evaluation (exclusive bus lane simulation for Joint Program Office), Model Evaluation (Paramics, VISSIM, AIMSUN), Dynamic Traffic Assignment, ACS Lite support, railroad grade crossing preemption, demonstration and outreach activities. |
| <b>Communication &amp; Frequency Spectrum Support</b>                                   |                                 |   |
| Dedicated Short Range Communications Program Support for Standards and ITS Applications | Jim Arnold<br>202-493-3265      | Providing technical analysis and general guidance for the development of a dedicated short-range communications standard at 5.9 gigahertz.  |
| Ultrawide-Band Radar Technology Coordination  | Jim Arnold<br>202-493-3265      | Provide technical support for other FHWA offices on spectrum planning and allocation through National Telecommunications and Information Administration (NTIA) and support Office of the Secretary of Transportation (OST) in their efforts to better understand the implications of ultrawide-band radar technology on existing users of the radio spectrum.   |
| Frequency Spectrum Coordination for FHWA  | Jim Arnold<br>202-493-3265      | Support various organizations in FHWA to find appropriate spectrum for specific applications and work with the field and the United States Coast Guard (USCG) to ensure the availability of spectrum for various applications.  |

| Office of Infrastructure R&D   |                              |  |
|--|------------------------------|--|
| Service  | Technical Contact            | Comments   |
| <b>Research Program Support</b>  |                              |  |
| IVI Infrastructure Consortium Coordination & Leadership  | Bob Ferlis<br>202-493-3268   | Provide technical leadership in the development of intersection collision avoidance services.  |
| U.S.-Japan ITS Joint Research Program  | Bob Ferlis<br>202-493-3268   | Identify promising opportunities for collaboration and assemble technical materials to share with Japan.   |
| Cooperative Program for Operational Meteorological Education and Training for Road Weather Forecasting | Rudy Persaud<br>202-493-3391 | This project will create a mesoscale network of hourly weather observations using Roadway Weather Information Systems. Target date is December 2002. |
| High-Speed Rail IDEA (Innovations Deserving Exploratory Analysis) Program Support                      | Dave Gibson<br>202-493-3271  | Review technical proposals on high-speed rail. Receive approximately 20 proposals per year.  |
| SBIR Program Support   | Dave Gibson<br>202-493-3271  | Coordinate submission of project statements to SBIR program.   |
| University Research Program Coordination and Support   | Dave Gibson<br>202-493-3271  | Coordinate projects with Texas A&M and University of Central Florida. Provide feedback to Office of Operations.                                      |



| <b>Office of Safety R&amp;D</b>  |                                |   |
|--|--------------------------------|---|
| Service  | Technical Contact              | Comments  |
| <b>Human Centered Systems</b>  |                                |   |
| Review potential safety effects of electronic billboards on driver attention and distraction   | Thomas Granda<br>202-493-3365  | Report delivered to Office of Real Estate Services (ORES). Customer was pleased and placed the report on their Web site.  |
| <b>Safety Analysis and Management</b>  |                                |   |
| Research methods support and provide HSIS data to requesting parties   | Carol Tan Esse<br>202-493-3315 | Ongoing.  |
| Photometric and radiometric measurements of light sources, including traffic signals, vehicle headlamps and roadway lighting             | Ray Krammes<br>202-493-3312    | Spectro-radiometric measurement of light emitting diode (LED) traffic signal lights for Institute of Transportation Engineers (ITE): support for colorimetric requirements in ITE specification.<br>Spectro-radiometric measurement of high intensity discharge (HID) headlights on hold pending National Highway Traffic Safety Administration (NHTSA) approval of selection of items to be measured.    |
| Photometric and colorimetric measurements (including coefficient of retroreflectivity and fluorescence) of signing and marking materials | Ray Krammes<br>202-493-3312    | Round-robin measurement of weathered sheeting for National Transportation Product Evaluation Program (NTPEP).<br>Round-robin measurement of samples used by Highway Innovative Technology Evaluation Center (HITEC) for evaluation of handheld retroreflectometers.<br>Series of bi-spectral measurements of fluorescent sheeting in support of proposed rule-making Office of Transportation Operations. |

| Office of Resource Management                  |                               |  |
|--|-------------------------------|--|
| Service  | Technical Contact             | Comments   |
| Accountable Property Inventory                 | Denise Seward<br>202-493-3471 | RD&T recently conducted a complete physical inventory of accountable property. The accountable property inventory maintained by the group is valued at 10-million dollars.   |
| Employee Training and Professional Development | Carol Roberts<br>202-493-3185 | Coordinated and provided computer training courses in Microsoft Access, Microsoft Excel, HTML programming, Microsoft FrontPage 2000, and Microsoft PowerPoint.<br>Provided professional development opportunities for employees through college courses on various engineering research subjects, including "Evaluation and Mitigation of Seismic Hazards," "Mathematical Statistics," and "Modeling and Simulation for Intelligent Transportation Systems."<br>31 courses were funded for RD&T employees, in addition to the many FHWA courses given to employees at no cost. |
| Contracts and Procurements                     | Sue Stanton<br>202-493-3480   | Coordinated mandatory COTR refresher training for 75 RD&T employees. Ensured that COTRs took the basic COTR training and the mandatory 4-hour annual refresher training.<br>Coordinated mandatory Ethics Training for RD&T COTR employees. 45 people attended the 8/6/2002 session held at TFHRC.<br>Total active contract actions: 194; contracts: 75; interagency agreements: 27; cooperative agreements: 22; purchase orders: 40; and allocations to the field: 30.   |

| Office of Program Development & Evaluation |                                 |   |
|--|---------------------------------|---|
| Service                                    | Technical Contact               | Comments  |
| SBIR Review and Support                    | John Munro<br>202-493-3469      | FHWA awarded a total of \$3.3 million to 11 small businesses to conduct Phase II research projects as part of the SBIR program, and entered into cooperative agreements with 9 Minority Institutions of Higher Education for transportation research and technology activities valued at \$444,772 (latest figures available 9/5/2002).   |
| Transportation Pooled Fund Program         | Lisa Williams<br>202-493-3376   | <p>HRPD provided administrative assistance to States and sponsoring organizations interested in establishing pooled fund projects by reviewing and processing requests; circulating proposals for technical review; and updating information on the FHWA's transportation pooled fund Web site.</p> <p>115 FHWA-led projects—projects valued at approximately \$38 million; \$20 million remaining available to the projects with an average of 10 partners and the average study valued at \$450,000.</p> <p>150 State-led projects—valued at approximately \$50 million. There was an average of 5 State partners per study with the average study valued at \$575,000.</p> <p>Web site makes the program more efficient and provides interactive, online solicitations, and commitments by project partners. We also disseminate other relevant information through the Web site. Improvements were made in the response times for closing transportation pooled fund study completed projects. As of August 2002, the HRPD advised the Finance Office to close 14 projects.</p> |
| Transportation Research Board              | Bill Zaccagnino<br>202-493-3183 | <p>Contract managed by HRPD to provide technical expertise access to TRB.</p> <p>HRPD support provided for the TRB annual meeting.</p> <p>Coordination done of NCHRP support, balloting, and solicitation of problem statements.</p>  |

| Office of Research and Technology Services   |                              |                              |   |   |  |
|--|------------------------------|------------------------------|---|---|--|
| Service  | Customer                     | Audience                     | Contact                                       | Brief summary of the nature of services performed   | Number frequency of services per FY 02 Estimates |
|  | Internal<br>External<br>Both | Internal<br>External<br>Both |   |   |  |
| Periodical Publications<br>- <i>Public Roads</i><br>- <i>Transporter (monthly)</i><br>- <i>Focus (monthly)</i> | Both<br>Internal<br>Internal | Both<br>Both<br>Both         | Strategic Communications Team<br>202-493-3468 | Develop issue themes and articles to support FHWA research, development, technology transfer, best practices, lessons learned, and outreach.<br>Develop article(s) content and guide writers for appropriate story angle and audience.<br>Cradle-to-final-product publication services; including all writing/editing phases, style guidelines and design layout, other camera-ready preparation services, printing, Web site HTML conversion, distribution list preparation, and initial distribution. | Bimonthly<br>Monthly<br>Monthly                  |
| Strategic Marketing and Communications Plans   | Internal                     | Both                         | Strategic Communications Team<br>202-493-3468 | Work with COTRs and project managers on marketing and/or communications plans to reach goals, including suggesting the appropriate marketing tools for reaching the target audience(s), such as events, public affairs, publications, videos, etc. Set production schedules.  | When needed                                      |
| RD&T Research Reports and other Publications   | Internal                     | Both                         | Strategic Communications Team<br>202-493-3468 | Cradle-to-final-product publication services; including all writing/editing phases, style guidelines and design layout, other camera-ready preparation services, printing, Web site HTML conversion, distribution list preparation, and initial distribution.   | 34   |
| Editing and Printing RD&T Performance Plans, Directories, Brochures, Pamphlets, Laboratory Fact Sheets, etc.   | Internal                     | Both                         | Strategic Communications Team<br>202-493-3468 | Cradle-to-final-product publication services; including all writing/editing phases, style guidelines and design layout, other camera-ready preparation services, printing, Web site HTML conversion, distribution list preparation, and initial distribution.<br>Developing marketing brochure/pamphlet contents.<br>Strategic marketing and communications plans and products.   | 31   |

**Office of Research and Technology Services (continued)**

| Service  | Customer<br>Internal<br>External<br>Both | Audience<br>Internal<br>External<br>Both | Contact   | Brief summary of the nature of services performed  | Number<br>frequency of<br>services per<br>FY 02<br>Estimates   |
|--|--|--|---|--|--|
| Other Publications<br>Wazzup Newsletter<br>Technology Talks (TT)<br>Newsletter | Internal                                 | Internal                                 | Strategic<br>Communications<br>Team<br>202-493-3468 | Develop story ideas. Complete editing and final printing/distribution.   | Quarterly  |
|  | Internal                                 | Internal                                 | Marketing Team<br>202-493-3467                      | Compile TT Newsletter and distribute electronically.   | 36   |
| Full-Service RD&T Web Site<br>Content and HTML<br>Programming Support          | Internal                                 | Both                                     | Strategic<br>Communications<br>Team<br>202-493-3468 | Complete document preparation with HTML coding, and PDF<br>preparation for thousands of pages of RD&T reports, directories,<br>newsletters, brochures, etc.  | - 1,000s of HTML<br>coded text pages<br>(508 compliant)<br>- PDF documents   |
| RD&T Tour Services   | Both                                     | Both                                     | Strategic<br>Communications<br>Team<br>202-493-3468 | Full-service support. Prepare agendas and handout materials for<br>tour groups. Schedule and coordinate tours with RD&T labs,<br>speakers. Arrange for meeting room(s), audio/visual needs,<br>refreshments (i.e., lunches, coffee breaks), etc. | Approximately<br>1,200 individuals   |
| FHWA Exhibit Events<br>Program Support Services                                | Internal                                 | External                                 | Marketing Team<br>202-493-3467                      | Warehouse storage and shipping of FHWA program displays and<br>conference handouts.<br>Full-service support of FHWA program office exhibitions for all of<br>FHWA, and OST.  | Exhibit shipping<br>services for<br>110 events<br>Full-Service<br>support for 10<br>national FHWA<br>cross-cutting<br>events |



| <b>Office of Research and Technology Services (continued)</b>   |                                       |                                       |  |  |   |
|---|---------------------------------------|---------------------------------------|--|--|---|
| <b>Service</b>  | <b>Customer</b>                       | <b>Audience</b>                       | <b>Contact</b>   | <b>Comments</b>  | <b>Number frequency of services per FY 02 Estimates</b> |
|   | <b>Internal<br/>External<br/>Both</b> | <b>Internal<br/>External<br/>Both</b> |  | <b>Brief summary of the nature of services performed</b>   |   |
| FHWA R&T Report Center/TRC  | Both                                  | Both                                  | Marketing Team<br>202-493-3467   | Management of R&T Report Center, distributing hard copy publications, and CD-ROMS to FHWA customers, nationally and abroad.  | Approximately 8,000 mailings                            |
| FHWA Meeting and Conference Support Services  | Internal                              | Internal                              | Marketing Team<br>202-493-3467   | Full-service support for logistics planning and support of FHWA-sponsored meetings for program offices. Services include hotel meeting space rental, meeting invitations and announcements, invitational travel, speaker(s) support, etc.  | 11  |
| Audio/Visual/Computer Marketing Productions<br>Photography, VHS Tape or Digital Filming, Computer Presentation Services, and CD reproductions | Internal                              | Internal                              | Marketing Team<br>202-493-3467<br>Strategic Communication Team<br>202-493-3468 | Multimedia Services for RD&T program offices for still photography, VHS or digital filming services, computer presentations preparation, and compact disk (CD) production or duplication (i.e., photographs, promotional VHS tapes, short movies, Microsoft PowerPoint presentations, CD productions for presentations). | As required.<br>Frequency is often                      |
| Technology and Innovation Deployment<br>"Raising the Bar"   | Both                                  | Both                                  | Marketing Team<br>202-493-3467   | Meetings and other logistical arrangements. Assist with preparing documents and meeting handout materials, purchase and supply TRB reports, and other support activities.  | Full-Support  |

## Appendix C: FHWA Research and Technology Partnerships

FHWA's research approach emphasizes cooperation, information sharing, and formal research agenda development, both within DOT and across the entire government. We promote partnerships with State and local governments, academia, and the private sector to quickly and cost-effectively transform new technologies and concepts into better transportation systems, processes, and services.

The following is just a *partial* listing of different R&T partnerships. Many partnerships may transcend categories, and may often have three or more participants that can represent several categories. There also are several different partnership types offering many opportunities for participation and involvement in FHWA R&T projects. Partnerships generally can be separated into nine categories:

- 1) **Partnerships with other DOT agencies:** ITS Joint Program Office, NHTSA, FTA, RSPA, FMCSA, FAA, FRA, MARAD, USCG, and BTS.
- 2) **Partnerships with other Federal agencies (outside DOT):** NASA, DOD, DOC, DOE, DOS, EPA, HHS, HUD, Interior, U.S. Army Corps of Engineers, U.S. Army Cold Region Research and Engineering Laboratory, and U.S. Navy.
- 3) **Partnerships with States or organizations representing States:** AASHTO, LTPP, National Governor's Association.
- 4) **Partnerships with quasi-governmental organizations:** TRB, NCHRP, and NSF.
- 5) **Partnerships with local governments, MPOs and other organizations representing local and county governments:** National Association of County Engineers, Cities of Los Angeles and Houston (to evaluate CLAIRE).

6) **Partnerships with universities:** UTCs, MIHEs, Summer Transportation Internship Program for Diverse Groups (STIPDG), Dwight David Eisenhower Transportation Fellowship Program, National Summer Transportation Institutes for Secondary Students (NSTI), Recycled Materials Resource Center, National Crash Analysis Center at George Washington University.

7) **Partnerships with industry:** Castle Rock Services, Lockheed Martin, Iteris, Mitretek, GEOPAK Corporation, Innovative Pavement Research Foundation, SBIR.

8) **Partnerships with nongovernmental organizations:** American Society of Civil Engineer's Civil Engineering Research Foundation, Institute of Transportation Engineers, ITS America.

9) **International partnerships:** International Technology Scanning Program, World Road Association (PIARC), Organization of Economic Cooperation and Developments Road and Transport Research Program (OECD/RTR), European Federation of Highway Research Labs (FEHRL), National Highway Research Council of Canada, U.S.- Japan ITS Joint Research Program, The Pan American Institute of Highways, The International Road Federation, The Asia Pacific Economic Cooperation Forum.

### ITS Joint Program Office

The ITS Joint Program Office coordinates ITS activities across the Department of Transportation, including research, technology, and development conducted at TFHRC.

Research is being conducted at TFHRC on the IVI—a government-industry program coordinated by the JPO. IVI's goal is to use enabling technologies to accelerate safety and mobility-enhancing, driver-assistance development and commercialization. Partners include FHWA, Federal Transit Authority, NHTSA, RSPA Volpe Center, Department of Defense, and the National Science Foundation, plus motor vehicle and

trucking industries, fleet operators, State and local transportation and law enforcement agencies, emergency response organizations, universities, other research organizations, and professional societies.

### **The Transportation Pooled Fund Program**

When significant or widespread interest is shown in solving transportation-related problems, research, planning, and technology innovation activities may be jointly funded by several Federal, State, regional, and local transportation agencies, academic institutions, foundations, or private industry as a study under the Transportation Pooled Fund Program. FHWA plays a key role in this process. While FHWA participates and contributes directly to some pooled fund studies, it also encourages States to pool their funds for regional or national problems to avoid research duplication, and to effectively use monies for managing research.

To qualify as a pooled fund study, more than one State transportation agency, Federal agency, other agency such as a municipality or metropolitan planning organization, college/university, or a private company must find the subject important enough to commit funds or other resources to conduct the research, planning, and technology innovation activities. A pooled fund study is intended to address a new area, or complement or advance previous subject matter investigations. All studies receive funding from the States involved. Another pooled fund category involves the NCHRP, and every year FHWA establishes a pooled fund study for the NCHRP contributions from the States.

Federal and State transportation agencies may initiate pooled fund studies and act as the “lead agency” for the study. Local and regional transportation agencies, private industry, foundations, and colleges and universities may partner with any or all of the sponsoring agencies to conduct pooled fund projects. The Transportation Pooled Fund Program is the

successor of the former national and regional pooled fund programs.

The Infrastructure Consortium was organized under a pooled fund program to represent the interests of State and local highway transportation infrastructure providers in developing and deploying advanced highway safety technologies. The members of the Infrastructure Consortium are State departments of transportation. The Consortium is expected to sponsor and support innovative research in cooperative IVI services, serve as a stakeholder for all State and local governments, and promote cost-effective cooperative IVI service deployment. Just as IVI partnered with the vehicle manufacturing industry to jointly conduct precompetitive research, IVI will partner with the Infrastructure Consortium to ensure that the research for infrastructure cooperative systems to avoid intersection collisions will provide results that governments can accept. The Infrastructure Consortium provides a unique opportunity that enables partnerships between the vehicle manufacturing industry and the infrastructure providers so that cooperative vehicle-highway systems can be researched, evaluated, manufactured, deployed, operated, and maintained.

### **Transportation and Sustainable Communities**

The goals of this partnership are to integrate and coordinate existing research agendas to minimize duplication and research gaps while optimizing support for a sustainable transportation system. It also seeks to improve technical tools and models to analyze the impacts of activities on both the natural and the social environment. This partnership will help Federal agencies work with each other and with other levels of government and the private sector to foster sustainability.

Partners include: DOE; DOT (BTS, FAA, FHWA, FRA, FTA); EPA; HHS (CDC); HUD; Interior (National Park Service); OMB; U.S. Army Corps of Engineers, State and local transportation/environmental agencies and organizations;

health agencies; Metropolitan Planning Organizations; mayoral offices; advocates; environmental technology manufacturers and vendors; system designers, engineering and construction firms; materials manufacturers; vehicle and fuel manufacturers; and universities.

### **Small Business Innovation Research (SBIR) Program**

The SBIR program is a research and development program mandated by Congress in 1982 and reauthorized in 1992. Its purpose is to develop technological innovations by using high level of expertise in the small business community throughout the United States. The program aims to stimulate technological innovations; meet the Federal government's needs for research and development by providing opportunities to small businesses; increase private sector commercialization of innovations derived from Federal research and development; and provide opportunities for minority and disadvantaged participation in technological innovations.

One example of an SBIR research partnership is the Visual Freight Database, which is a public/private partnership that provides improved modeling tools for national, State, and MPO freight planning and information that shows county-to-county freight movements by modes and commodity types. The database is available for use throughout the FHWA.

### **International Involvement**

The FHWA promotes the U.S. highway transportation community's objectives through participation in international organizations and their operating committees, including: The Pan American Institute of Highways; the PIARC; the OECD/RTR program; the International Road Federation; and the Asia Pacific Economic Cooperation Forum.

FHWA also fosters cooperation on international R&T activities with our U.S. partners, such as the American Association of State Highway Transportation Officials and the National Cooperative Highway Research Program. The International

Technology Scanning Program accesses and evaluates foreign technologies and innovations, which could significantly benefit U.S. highway transportation systems. This program enables advanced technology to be adapted and implemented much more efficiently without spending scarce research funds to recreate advances that already have been developed by other countries. Twelve scans are conducted over a 2-year period. Additionally, FHWA has a number of bilateral agreements with other countries.

There are also efforts underway to create an R&T partnership with the FEHRL. Frequently, U.S. and the European Union (EU) research priorities are similar; therefore, a partnership with FEHRL helps save money by avoiding duplication of effort and allows optimal use of resources. FHWA will be working with FEHRL to conduct EU-supported research. This cooperation may allow for future common standards.

A new agreement was recently reached with Japan to proceed with a U.S.-Japan ITS joint research program for developing infrastructure cooperative systems to avoid intersection collisions. This involves a continuing, cooperative dialogue on specific research of common interest by routine communication through our Japanese research fellow and annual workshops.

A continuing agreement with France involves our research and testing of a product called CLAIRE, advanced software for adaptive traffic control at intersections. This led to agreements for working together to field test a combination of FHWA- and French-control software in Los Angeles' and Houston's urban environments.

FHWA and the French Road Directorate/Direction des Routes signed a project agreement on highway research and technology transfer September 23, 1993, which falls under the French Ministry of Transport/U.S. DOT Memorandum of Understanding (MOU) framework signed February 14, 1972.

Our agreements are indefinite unless one party chooses to terminate the partnership.

Our road agreement enables participation among “researchers and organizations from all sectors including, universities, national laboratories, and the private sector” based on mutual consent. To select and launch a project under the road agreement, approval of FHWA’s Office of International Programs and the French Road Directorate is required, and both sides must agree to an “implementation agreement.”

Implementation agreements specify the particulars of the project, including subject, procedures, terms of cooperation, entities involved, funding, project managers, and principle investigators.

Possible research areas include: asphalt mixes and asphalt pavement performance modeling; CRCP modeling, polymer modified asphalt specifications; use of LCPC’s accelerated pavement tests results for validation of pavement design of flexible pavements and specifications for binders; Superpave qualification of LCPC’s gyratory shear compactor; surface pavement distress imaging; automatic surface pavement distress images processing; noncontact longitudinal profile measurement high-speed deflectometer; pavement degradations evolution laws; close proximity noise measurement; and use of LCPC’s videogranulometer for aggregate shape characterization.

### **Remote Sensing Technology**

The U.S. DOT has implemented a research program in partnership with leading academic institutions, service providers, and industry for remote sensing in transportation. The program is designed for long-term research to support education and workforce development and near-term transportation practice technology applications. DOT and NASA have entered into an MOU to implement a fully

integrated and coordinated research program that will apply remote sensing to transportation.

The Department of Transportation’s Research and Special Programs Administration (RSPA) administers the program in coordination with the nine additional DOT administrations. The RSPA Office of Innovation, Research, and Education manage the program.

### **U.S. Army Cold Region Research and Engineering Laboratory**

A recent agreement with the U.S. Army Cold Region Research and Engineering Laboratory (CRREL) for three studies is an example of an interagency and pooled fund agreement. The studies are entitled “Extending the Season for Concrete Construction and Repair,” “Pavement Subgrade Study,” and “Asphalt Pavement Damage Related to Tire Pressure.” The projects are partnerships between CRREL, two State funding pools, the National Highway Research Council of Canada, and NCHRP. FHWA will have technical involvement with the projects and will gain technically from the partnership.

Another multiyear project is underway with the CRREL to develop a winter weather Maintenance Decision Support System in coordination with six national research laboratories. System operational testing will follow prototype development. The intent is to bring their expertise to this area of highway operations and to produce accessible products that can improve private vendor products.

### **High Performance Steel**

With a vision of steel bridges that are easier to construct and can reduce fracture and corrosion susceptibility, FHWA developed a new steel grade in partnership with the U.S. Navy. High-performance steel (HPS) combines increased durability with increased strength and other improved properties. HPS for bridge girders is resulting in lower initial costs for many bridges. Tennessee DOT claims they saved up to 10 percent on

one job and now considers using this steel for all medium- and long-span bridges. Fifty-one HPS bridges are being built or planned in 18 States.

### **Nationwide Differential Global Positioning System**

TFHRC is part of a DOT-wide program to augment the existing GPS network with systems that will provide differential correction to enhance location accuracy of 1 to 3 meters, compared to the existing 10 to 20 meters. Further research efforts are underway on a site-testing level to investigate the feasibility and benefits of further enhancement to 1 to 2 centimeters accuracy. These outcomes offer significant potential benefits to all modes within the DOT as well as public and private sector users.

### **IHSDM: Improving the Safety of Highway Design**

The Interactive Highway Safety Design Model (IHSDM) is a tool that provides transportation engineers with safety information on the relationships between geometric design elements and traffic accidents. IHSDM is a combination of computer-aided design (CAD) and roadway design software that helps the designer evaluate the safety implications of alternative highway designs. This cooperative agreement with FHWA and GEOPAK Corporation will provide roadway planners with easy-to-use formats in CAD/civil design software and expedite IHSDM's transition from research and development to application. This is a part of FHWA's Cooperative Research and Development Agreement (CRADA).

A technical working group (TWG) helps guide IHSDM development. The TWG includes representatives from seven State departments of transportation (Arkansas, California, Illinois, Minnesota, North Carolina, Washington, and West Virginia) and FHWA Field Offices. The TWG provides periodic input on development, testing, and marketing issues to ensure that IHSDM is responsive to users' needs. FHWA also receives input on IHSDM development through presentations and demonstrations to other State DOTs and engineering consulting firms.

### **Highway Innovation Technology Evaluation Center (HITEC)**

HITEC is an independent not-for-profit organization created to provide a process to impartially evaluate new products, materials, and equipment; and to provide services for which industry standards do not exist. HITEC was conceived and established through a cooperative effort by the American Society of Civil Engineer's (ASCE) Civil Engineering Research Foundation (CERF), in conjunction with AASHTO and FHWA. FHWA has a cooperative agreement with the CERF, which is ASCE's research arm, to operate the HITEC. Under the agreement, CERF operates the HITEC, promotes the HITEC concept, organizes and coordinates expert panels, arranges for and coordinates the technology evaluations, and prepares and disseminates technical evaluation reports.

A nonprofit research organization, CERF was selected because it emphasizes revitalizing the Nation's deteriorating infrastructure by transferring research results into practice. CERF programs are dedicated to enhancing private industry's incentives to invest in highway-oriented R&D; improving the opportunities for bringing new technologies to the marketplace in a timely and efficient manner; and providing prompt, efficient nationally recognized, impartial evaluation of new private sector technologies for use on our Nation's highways.

### **Concrete Pavement Technology Program (CPTP)**

Launched in 1999, the CPTP is a 5-year, \$25 million effort that was charged by the Transportation Equity Act for the 21st Century (TEA-21) with carrying out "research on improved methods of using concrete pavement in the construction, reconstruction, and repair of Federal-aid highways." FHWA and the Innovative Pavement Research Foundation (IPRF), a concrete paving industry consortium, jointly administer the program. The program's partners also include State highway agencies and the TRB. Specifically, the partnership will ensure that the highest-priority concrete pavement technology needs are addressed; the expertise and resources of States, industry,



and FHWA are used effectively and efficiently; and new concrete pavement technology will proceed rapidly from research to implementation.

In addition to the oversight provided by FHWA and the IPRF, the program receives guidance from the TRB Committee for Research on Improved Concrete Pavements. The committee reviews and provides advice on the program's long-range work plan and project tasks, including objectives, appropriateness, and the likelihood of success. The committee has representatives from industry, academia, and State highway agencies, FHWA, IPRF, and AASHTO.

#### **FHWA/ National Highway Traffic Safety Administration (NHTSA) National Crash Analysis Center**

In support of FHWA's strategic objective to reduce fatalities and injuries by 20 percent in 10 years, FHWA/NHTSA NCAC research goal is to maximize safety in crashes. The facilities at NCAC enable researchers to understand and quantify the vehicle's performance and its components, occupants ("crash dummies"), and roadside hardware in crashes, individually and collectively.

In 1998, NHTSA joined FHWA as a full partner in administrating and guiding NCAC. This laboratory, located at George Washington University, Loudon, VA, is an internationally recognized cooperative center for automotive and highway safety research.

The facility's comprehensive ability to analyze roadside hardware designs, simulate crashes, and evaluate occupant injuries through analytical and computer modeling is unique. NCAC produces and serves as a repository for computer vehicles models, ongoing biomechanics models, and progressive roadside hardware models.

NCAC also includes a Vehicle Digitizing and Reverse Engineering Laboratory and a High-Performance Parallel Computing Laboratory. In addition, NCAC maintains a national library of crash-test film and documentation that FHWA and NHTSA have collected over the past two decades.

#### **Curved Structure Test**

There are many partnership-supported research projects taking place at TFHRC. One example, conducted in the TFHRC Structures Laboratory, is a full-scale test on a curved structure to simulate actual bridge conditions. This is the first time this test has ever been attempted. Like many other projects, FHWA formed a major R&T partnership to accomplish this study, with 17 States providing input and resources.

#### **Recycled Materials Resource Center**

The Recycled Materials Resource Center (RMRC) was established under TEA-21 at the University of New Hampshire and is administered through a cooperative agreement between FHWA and the University of New Hampshire. To oversee the center's activities an advisory board was established and members of the board represent FHWA, EPA, New Hampshire DOT, AASHTO, Association of State and Territorial Solid Waste Management Officials, industry, and highway trade associations. The RMRC tests, evaluates, and develops guidelines for recycled materials use, and analyzes long-term performance of highways containing recycled materials, among other projects. The center has initiated research projects that include testing and evaluating guidelines and specifications, performing material-specific investigations, reviewing the economics of recycled and new materials, coming up with innovative technologies, and conducting field trials.

#### **Universities and Grants Programs**

FHWA supports a number of key initiatives under the Universities and Grants Program (U&GP), which is funded separately from the RD&T program. The mission of the U&GP

is to promote transportation education benefits and encourage transportation research pursuits among university students and faculty. The U&GP program works cooperatively with more than 750 universities throughout the U.S. Its primary objectives are to enhance FHWA university-based programs and other academic programs that provide fellowships, internships, and partnerships; conduct workforce analyses related to retention, recruitment, and diversification; and conduct research on DOT's and FHWA's transportation-related academic programs.

### **Dwight David Eisenhower Transportation Fellowship Program (DDETFP)**

DDETFP, initiated in 1991 and re-authorized by the TEA-21, awards fellowships to undergraduate, graduate students, and faculty annually. The program will award \$24 million by 2003 to prospective transportation professionals. Fellowship categories include: Grants for Research Fellowships; Graduate Fellowships; Faculty Fellowships; Historically Black Colleges and Universities; Fellowships; Hispanic Serving Institutions Fellowships; and Tribal Colleges Fellowships.

## Appendix D: FHWA Educational Outreach Partnerships

To encourage a new generation of transportation professionals, TFHRC annually gives hundreds of students the opportunity to learn firsthand, about the career options available to them in transportation research. Outreach programs with local schools and active participation in such programs as the Garrett A. Morgan Technology and Transportation Futures Program, a U.S. DOT-wide initiative, provides opportunities to increase awareness of transportation and related skills among children and adults. Since its inception in 1997, the program has increased awareness of math, science, and transportation technology for two-million children and young adults. Programs like this one find and develop our future workforce.

### **The Summer Transportation Intern Program for Diverse Groups**

Since 1991, the U.S. DOT headquarters has provided 10-week summer college-level STIPDG internships. In 1999, it expanded to include field office placements for a maximum of 100 students each year.

### **The NSTI for Secondary Students**

The Institute has provided 4-week opportunities for 9<sup>th</sup> to 11<sup>th</sup> graders on as many as 35 college campuses since 1993.

### **University Transportation Centers Program (UTCP)**

UTCP funds 33 University Transportation Centers that address transportation issues and attract researchers, resources, and facilities to promote individual initiatives and scientific innovations in a variety of transportation modes and disciplines. The UTCP receives \$227.8 million in funding through the duration of TEA-21. FHWA transfers funds to the RSPA to administer this program.

### **The University Transportation Education Resource Catalog**

This catalog provides information on DOT and FHWA educational initiatives, along with Web site links to transportation-related opportunities.

### **The National Highway Institute (NHI)**

NHI is FHWA's technical training organization, which develops and administers transportation-related training and educational programs that support new technology applications for planning, designing, constructing, maintaining, and rehabilitating our Nation's transportation infrastructure. NHI offers training to Federal, State, and local transportation agencies, and increasingly, to the private sector. NHI provides technical course materials for inclusion in undergraduate and graduate curricula, and collaborates with community colleges, technical schools, and secondary and grade schools to identify the transportation professionals of tomorrow.

### **Minority Institutes of Higher Education (MIHE)**

One of FHWA's goals is to strengthen the ties between the RD&T program and Minority Institutes of Higher Education (MIHE). There are several ways for achieving this goal. For example, we provide research grants and offer summer employment opportunities for MIHE faculty and students. This fosters MIHE RD&T activities that contribute substantially to FHWA's mission and prepare faculty and students at MIHE to participate successfully in the competitive research arena.

### **Competitive Assistance Program**

The Competitive Assistance Program enables MIHE participants to compete solely with one other for cooperative, cost-sharing agreements. This partnership between MIHE and FHWA expands MIHE's research and technology activities while contributing to FHWA's mission.

## Appendix E: List of Abbreviations

The following abbreviations are used within this document. This list is provided for quick reference.

|               |   |
|---------------|---|
| <b>AASHTO</b> | American Association of State Highway and Transportation Officials            |
| <b>ACS</b>    | Adaptive Control Systems  |
| <b>ALERT</b>  | Police Specialty Vehicle System   |
| <b>ASCE</b>   | American Society of Civil Engineers   |
| <b>ATIS</b>   | Advanced Traveler Information System  |
| <b>ATMS</b>   | Advanced Traffic Management Simulator   |
| <b>BTS</b>    | Bureau of Transportation Statistics   |
| <b>CAD</b>    | Computer Aided Design   |
| <b>CD</b>     | Compact Disk  |
| <b>CDC</b>    | Centers for Disease Control   |
| <b>CERF</b>   | Civil Engineering Research Foundation   |
| <b>CFC</b>    | Combined Federal Campaign   |
| <b>CIP</b>    | Cast-in-place   |
| <b>CLAIRE</b> | Expert decision software for real time traffic management developed in France |
| <b>COST</b>   | Concrete Optimization Software Tool   |
| <b>COTR</b>   | Contracting Officer's Technical Representative                                |
| <b>CPTP</b>   | Concrete Pavement Technology Program  |
| <b>CRADA</b>  | Cooperative Research and Development Program                                  |
| <b>CRCP</b>   | Continuously Reinforced Concrete Pavements                                    |
| <b>CRREL</b>  | U.S. Army Cold Region Research and Engineering Laboratory                     |
| <b>DAV</b>    | Dynamic Angle Validation  |

|                    |  |
|--------------------|--|
| <b>DDETFP</b>      | Dwight David Eisenhower Transportation Fellowship Program                                    |
| <b>DMS</b>         | Dynamic Message Sign   |
| <b>DOC</b>         | Department of Commerce   |
| <b>DOD</b>         | Department of Defense  |
| <b>DOE</b>         | Department of Energy   |
| <b>DOS</b>         | Department of State  |
| <b>DOT</b>         | Department of Transportation   |
| <b>DynaMIT</b>     | Prototype for the Real-Time Traffic Estimation and Prediction System TrEPS                   |
| <b>DynaMIT-P</b>   | Prototype for the Traffic Estimation and Prediction System for Operations Planning           |
| <b>DYNASMART-P</b> | Prototype for the Traffic Estimation and Prediction System for Operations Planning (TrEPS-P) |
| <b>DYNASMART-X</b> | Prototype for the Real-Time Traffic Estimation and Prediction System                         |
| <b>EPA</b>         | Environmental Protection Agency  |
| <b>EQ</b>          | Earthquake   |
| <b>ETG</b>         | Expert Task Group  |
| <b>EU</b>          | European Union   |
| <b>FAA</b>         | Federal Aviation Administration  |
| <b>FEHRL</b>       | European Federation of Highway Research Labs   |
| <b>FHWA</b>        | Federal Highway Administration   |
| <b>FMCSA</b>       | Federal Motor Carrier Safety Administration  |
| <b>FOIL</b>        | TFHRC Federal Outdoor Impact Laboratory  |
| <b>FRA</b>         | Federal Railroad Administration  |
| <b>FRP</b>         | Fiber-reinforced Polymer   |
| <b>FSHRP</b>       | Future Strategic Highway Research Program  |

|                  |   |              |   |
|------------------|---|--------------|---|
| <b>FTA</b>       | Federal Transit Administration                                  | <b>HYSIM</b> | Highway driving simulator                   |
| <b>FY</b>        | Fiscal Year   | <b>IDEA</b>  | Innovations Deserving Exploratory Analysis  |
| <b>GAO</b>       | Government Accounting Office                                    | <b>IDP</b>   | Individual Development Plan                 |
| <b>GPRA</b>      | Government Performance and Results Act                          | <b>IPRF</b>  | Innovative Pavement Research Foundation     |
| <b>GRF</b>       | Grant for Research Fellowships                                  | <b>IPWV</b>  | Integrated Precipitable Water Vapor         |
| <b>GRS</b>       | Geosynthetic Reinforced Soil                                    | <b>ISHDM</b> | Interactive Highway Safety Design Model     |
| <b>HAAM</b>      | Office of Acquisition Management                                | <b>ITE</b>   | Institute of Transportation Engineers       |
| <b>HA-NDGPS</b>  | High Accuracy Nationwide Differential Global Positioning System | <b>ITS</b>   | Intelligent Transportation Systems          |
| <b>HERMES</b>    | HERMES is a bridge inspection trailer unit                      | <b>IVI</b>   | Intelligent Vehicle Initiative              |
| <b>HHS</b>       | Human and Health Services                                       | <b>IVIS</b>  | In-Vehicle Information System               |
| <b>HID</b>       | high intensity discharge  | <b>JCP</b>   | Jointed Concrete Pavements                  |
| <b>HIPERPAV™</b> | High-Performance Paving Software                                | <b>JPCP</b>  | Jointed Plain Concrete Pavement             |
| <b>HITEC</b>     | Highway Innovative Technology Evaluation Center                 | <b>JPCP</b>  | Jointed Plain Concrete Pavement             |
| <b>HMA</b>       | Hot-mix Asphalt   | <b>K-12</b>  | Kindergarten through Senior High School     |
| <b>HPC</b>       | High-Performance Concrete                                       | <b>KGM</b>   | Turkish Highway Agency<br>Labs Laboratories |
| <b>HPS</b>       | High-Performance Steel  | <b>LADS</b>  | Learning and Development System             |
| <b>HRDI</b>      | Office of Infrastructure R&D                                    | <b>LAST</b>  | Laboratory Asphalt Stability Test           |
| <b>HRDO</b>      | Office of Operations R&D  | <b>LC</b>    | RD&T Leadership Council                     |
| <b>HRDS</b>      | Office of Safety R&D  | <b>LCPC</b>  | Laboratoire Central des Ponts et Chaussées  |
| <b>HRPD</b>      | Office of Program Development and Evaluation                    | <b>LED</b>   | Light Emitting Diode                        |
| <b>HRRM</b>      | Office of Resource Management                                   | <b>LEI</b>   | Leadership Effectiveness Inventory          |
| <b>HRTS</b>      | Office of Research and Technology Services                      | <b>LTPP</b>  | Long Term Pavement Performance              |
| <b>HSIS</b>      | Highway Safety Information Systems                              | <b>MARAD</b> | Maritime Administration                     |
| <b>HUD</b>       | Department of Housing and Urban Development                     | <b>MIHE</b>  | Minority Institutes of Higher Education     |
| <b>HYRISK</b>    | Software for inspecting bridges                                 | <b>MOU</b>   | Memorandum of Understanding                 |
|                  |   | <b>MPO</b>   | Metropolitan Planning Organization          |
|                  |   | <b>MS</b>    | Microsoft                                   |

|                 |   |                   |  |
|-----------------|---|-------------------|--|
| <b>MUTCD</b>    | Manual on Uniform Traffic Control Devices   | <b>PIARC</b>      | World Road Association   |
| <b>NASA</b>     | National Aeronautics and Space Administration   | <b>QuickZone</b>  | Work Zone Delay Estimation Software  |
| <b>NBI</b>      | National Bridge Inventory   | <b>R&amp;D</b>    | Research and Development   |
| <b>NCHRP</b>    | National Cooperative Highway Research Program   | <b>R&amp;T</b>    | Research and Technology  |
| <b>NDGPS</b>    | Nationwide Differential Global Positioning System   | <b>RABA</b>       | Revenue Aligned Budget Authority   |
| <b>NGSIM</b>    | Next Generation Simulation Modeling   | <b>RD&amp;T</b>   | Research, Development, and Technology  |
| <b>NHI</b>      | National Highway Institute  | <b>RMRC</b>       | Recycled Materials Resource Center   |
| <b>NHTSA</b>    | National Highway Traffic Safety Administration  | <b>Roadmaps</b>   | Multiyear Plans  |
| <b>NIST</b>     | National Institute of Standards and Technology  | <b>RRPM</b>       | Raised Retroreflective Pavement Marker   |
| <b>NSF</b>      | National Science Foundation   | <b>RSPA</b>       | Research Special Programs Administration                                       |
| <b>NSTI</b>     | National Summer Transportation Institutes   | <b>RTCC</b>       | Transportation Research Board's Research and Technology Coordinating Committee |
| <b>NTIA</b>     | National Telecommunications and Information Administration                                | <b>SAIC</b>       | Science Applications International Corporation                                 |
| <b>NTPEP</b>    | National Transportation Product Evaluation Program  | <b>SBIR</b>       | Small Business Innovation Research   |
| <b>OECD/RTR</b> | Organization of Economic Cooperation and Developments Road and Transport Research Program | <b>SHRP</b>       | Strategic Highway Research Program   |
| <b>OEM</b>      | Original Equipment Manufacturer   | <b>SP&amp;R</b>   | State planning and research  |
| <b>OMB</b>      | Office of Management and Budget   | <b>STECRP</b>     | Surface Transportation-Environment Cooperative Research Program                |
| <b>ORES</b>     | Office of Real Estate Services  | <b>STIPDG</b>     | Summer Transportation Internship Program for Diverse Groups                    |
| <b>OST</b>      | Office of the Secretary of Transportation   | <b>Superpave®</b> | Superior Pavement System   |
| <b>PAT</b>      | Particle Additive Test  | <b>SUPPS</b>      | Shared Unit Performance Plan System  |
| <b>PBCAT</b>    | Pedestrian and Bicycle Crash Analysis Tool  | <b>SWAT</b>       | Strategic Work Zone Analysis Tools   |
| <b>PCC</b>      | Portland Cement Concrete  | <b>T2</b>         | Technology Transfer  |
| <b>PCCP</b>     | Portland Cement Concrete Pavement   | <b>TBD</b>        | To Be Determined   |
| <b>PDG</b>      | Pavement Design Guide   | <b>TCT</b>        | Technical Career Track   |
|                 |   | <b>TEA-21</b>     | Transportation Equity Act for the 21st Century                                 |
|                 |   | <b>TFAP</b>       | Technology Facilitation Action Plan  |



|                 |  |
|-----------------|--|
| <b>TFHRC</b>    | Turner-Fairbank Highway Research Center                          |
| <b>TIN</b>      | Technology Innovation Network                                    |
| <b>TMC</b>      | Transportation Management Center                                 |
| <b>TRB</b>      | Transportation Research Board                                    |
| <b>TReL</b>     | Traffic Research Laboratory                                      |
| <b>TrEPS</b>    | Traffic Estimation and Prediction System                         |
| <b>TrEPS-P</b>  | Traffic Estimation and Prediction System for Operations Planning |
| <b>TRIS</b>     | Transportation Research Information Service                      |
| <b>TSIS</b>     | Traffic Software Integrated System                               |
| <b>TWG</b>      | Technical Working Group  |
| <b>U&amp;GP</b> | Universities and Grants Program                                  |
| <b>UAV</b>      | Unmanned Aerial Vehicle  |
| <b>UHPC</b>     | Ultra-high performance concrete                                  |
| <b>USCG</b>     | United States Coast Guard  |
| <b>USLIMITS</b> | Preliminary Expert System for Speed Zoning                       |
| <b>UTC</b>      | University Transportation Center                                 |
| <b>UTCP</b>     | University Transportation Centers Program                        |
| <b>VHS</b>      | Very High Speed  |
| <b>Web-NBI</b>  | Web-based National Bridge Inventory system                       |
| <b>WIM</b>      | Weigh-in-motion  |
| <b>WRC</b>      | Western Resource Center  |





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