

*Turner-Fairbank Highway Research Center  
Research, Development, and Technology*

***Technical  
Publications  
Catalog***

*October 2003–September 2005*



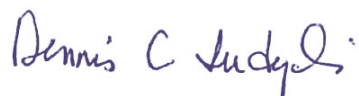
U.S. Department of Transportation  
**Federal Highway Administration**

# Introduction

In 2003, Turner-Fairbank Highway Research Center (TFHRC) published the first comprehensive listing of our research documents. The *Technical Publications Catalog*, October 1998–September 2003, cataloged more than 300 publications generated from research at our facility. Now we are pleased to add the *Technical Publications Catalog*, October 2003–September 2005 to that listing. Two new categories of information are included: Administration and Materials. Sixty new items—fact sheets, flyers, product briefs, reports, summaries, and TechBriefs—are free and available in print from our Federal Highway Administration Product Distribution Center and online at [www.tfhrc.gov/techpubcat/index.htm](http://www.tfhrc.gov/techpubcat/index.htm).

Together, these two catalogs are indispensable transportation research resources for engineers, transportation specialists, policymakers, information specialists, and other interested groups. Readers can immediately access most publications online or order a copy from the source listed.

I hope you find this a useful addition to your reference library. Questions or comments about this publication can be directed to John McCracken at [john.mccracken@fhwa.dot.gov](mailto:john.mccracken@fhwa.dot.gov) or 202-493-3423.



**Dennis C. Judycki**  
**Associate Administrator**  
**Research, Development, and Technology**



# Table of Contents

## 1

### **Administration**

---

Administrative Reports	1
Summaries	1

## 2

### **Environment**

---

Flyers	3
Technical Reports	3

## 3

### **Human Factors**

---

Technical Reports	5
-------------------	---

## 4

### **Materials**

---

Technical Reports	7
-------------------	---

## 5

### **Operations**

---

Fact Sheets	9
Product Briefs	10
Technical Reports	11

## 6

### **Pavements**

---

Product Briefs	13
Summaries	13
TechBriefs	14
Technical Reports	14

## 7

### **Safety**

---

Fact Sheets	17
TechBriefs	17
Technical Reports	18

## 8

### **Structures**

---

Fact Sheets	19
Summaries	19
Technical Reports	20



# 1 Administration

## **Administrative Reports**

### **Fiscal Year 2004/2005 Performance Plan**

**FHWA-RD-03-085**

The Performance Plan for FHWA's Office of Research, Development, and Technology (RD&T) describes the research that the Office will conduct and the products and services the staff will provide in fiscal year 2004/2005. It also serves as a guidepost that will direct efforts for improving operations and enhancing services.

TFHRC Technical Reference Center and [www.tfhrc.gov/about/03085/index.htm](http://www.tfhrc.gov/about/03085/index.htm)

### **Handbook for Expert/Peer Reviews at the Turner-Fairbank Highway Research Center**

**FHWA-HRT-05-033**

The purpose of this handbook is to provide guidance for participants in the TFHRC Laboratory Assessment Program. The primary audience for the handbook is members of the panels serving to review a laboratory. The handbook acquaints panel members with the process and expectations associated with their involvement in the review. It is also a useful source of information about the reviews for laboratory managers and staff as well as the customers and stakeholders of the laboratories being reviewed.

TFHRC Technical Reference Center and [www.tfhrc.gov/services/pubs/05033/](http://www.tfhrc.gov/services/pubs/05033/)

### **Office of Research, Development, and Technology FY 2004 Performance Report**

**FHWA-HRT-05-040**

The Office of RD&T is located at TFHRC, a federally owned and operated research facility in McLean, VA that contains more than 24 indoor and outdoor laboratories and support facilities. RD&T employs more than 300 Federal and contract transportation researchers, students, and support personnel. RD&T coordinates and collaborates extensively with other FHWA and U.S. Department of Transportation offices, State and local government partners, academic organizations, companies in the industry, military research offices, and professional organizations.

TFHRC Technical Reference Center and <http://www.tfhrc.gov/about/05040/index.htm>

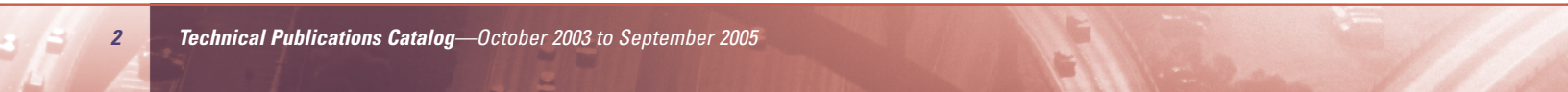
## **Summaries**

### **The Laboratory Assessment Program**

**FHWA-HRT-05-032**

This first report on the Laboratory Assessment Program outlines the program's goals, criteria, and process. It summarizes the first four lab assessments. A lab assessment is an onsite, independent investigation by technical and scientific experts whose knowledge and expertise enable them to make credible and unbiased judgments regarding the conduct of research.

TFHRC Technical Reference Center and [www.tfhrc.gov/services/pubs/05032/index.htm](http://www.tfhrc.gov/services/pubs/05032/index.htm)



# 2 *Environment*

## *Flyers*

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### **Road Weather Management Summary**

**FHWA-HRT-04-101**

From 2001 to 2003, the FHWA Road Weather Management program partnered with the National Weather Service (NWS) to conduct five research projects through the Cooperative Program for Operational Meteorology, Education, and Training (COMET). This document summarizes the five research projects, including research results and lessons learned. It concludes with general recommendations for all State departments of transportation (DOT) to inform future collaborative research efforts.

[www.tfhrc.gov/its/pubs/04101/index.htm](http://www.tfhrc.gov/its/pubs/04101/index.htm)

## *Technical Reports*

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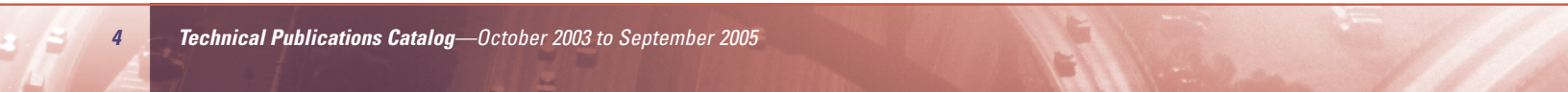
### **Collaborative Research on Road Weather Observations and Predictions by Universities, State DOTs and National Weather Service Forecast Offices**

**FHWA-HRT-04-109**

The FHWA Road Weather Management program partnered with the NWS to sponsor five research projects through COMET. The goal was to create teams of personnel from State DOTs, NWS weather forecast offices, and universities to foster collaborative and productive relationships between meteorological and transportation agencies. These teams were to use data from Road Weather Information Systems to improve the utilization of these data in both weather and transportation operations and to create new predictive algorithms for use in road maintenance activities. Such advances in road weather management ultimately will improve mobility on the roads and State DOT productivity in operations.

[www.tfhrc.gov/its/pubs/04109/index.htm](http://www.tfhrc.gov/its/pubs/04109/index.htm)







# 3 *Human Factors*

## ***Technical Reports***

### **In-Vehicle Display Icons and Other Information Elements: Volume II: Final Report**

**FHWA-RD-03-063**

This is one of a series of reports produced as part of a contract to develop precise and detailed human factors design guidelines for in-vehicle display icons and other information elements. The contractual effort consists of three phases: analytical, empirical, and integrative. This report summarizes the analytical, empirical, and integrative phases of the “In-Vehicle Display Icons and Other Information Elements” project. It is an overview of the process used to meet the primary goal of the project: to provide designers of in-vehicle technologies with a set of design guidelines for in-vehicle display icons and other information elements.

[www.tfrc.gov/safety/pubs/03063](http://www.tfrc.gov/safety/pubs/03063)

### **In-Vehicle Display Icons and Other Information Elements Volume I: Guidelines**

**FHWA-RD-03-065**

Because of the speed with which in-vehicle information system devices are entering the automotive marketplace, many research issues associated with the design of in-vehicle visual symbols and other information elements have not been adequately addressed. The overall goal of the “In-Vehicle Display Icons and Other Information Elements” project has been to provide the designers of these in-vehicle technologies with a set of design guidelines for in-vehicle display icons and other information elements.

TFHRC Technical Reference Center and [www.tfrc.gov/safety/pubs/03065/index.htm](http://www.tfrc.gov/safety/pubs/03065/index.htm)



# 4 *Materials*

## ***Technical Reports***

### **Evaluation of LS-DYNA Soil Material Model 147**

**FHWA-HRT-04-094**

This report documents the evaluation of a new soil material model intended for roadside safety simulation applications using the nonlinear finite-element code LS-DYNA. This report concentrates on the 18 parameters required for the soil material. The focus is on obtaining the appropriate parameter values, providing an engineering understanding of the parameters, and providing bounds for the effects of varying the parameters.

TFHRC Technical Reference Center and <http://www.tfhrc.gov/safety/pubs/04094/index.htm>

### **Manual for LS-DYNA Soil Material Model 147**

**FHWA-HRT-04-095**

This is the final report for the development of the FHWA's soil model implemented into LS-DYNA. This report is in three sections: (1) the research plan, (2) the user's manual, and (3) examples that show the expected results of the model.

TFHRC Technical Reference Center and <http://www.tfhrc.gov/safety/pubs/04095/index.htm>

### **Evaluation of the Particulate Additive Test**

**FHWA-HRT-04-110**

The objective of this study is to acquire and/or develop commercially available equipment for conducting the Particulate Additive Test and Laboratory Stability Test (LAST). These tests were developed under the National Cooperative Highway Research Program (NCHRP) Project 9-10 entitled "Protocols for Modified Asphalt Binders." In the course of the study, the established protocols were evaluated and methods for improving the test were explored. Based on the results, recommendations were presented to the Superior Performing Asphalt Pavements (Superpave®) Binder Expert Task Group regarding the utility of these tests.

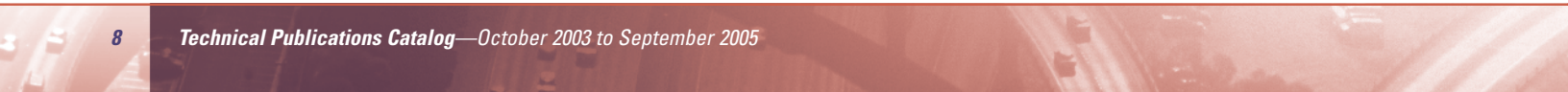
[www.tfhrc.gov/pavement/pubs/04110](http://www.tfhrc.gov/pavement/pubs/04110)

### **Evaluation of the Laboratory Asphalt Stability Test**

**FHWA-HRT-04-111**

LAST was proposed by NCHRP 9-10 program researchers as a possible new method to evaluate the storage stability of modified asphalts. The test involved exposing the binders with and without mechanical agitation at elevated temperatures for extended lengths of time to assess the thermal stability of the binders. FHWA was assigned the responsibility for evaluating the LAST. The task involved (1) procuring a commercial version of the LAST, (2) correcting perceived deficiencies, and (3) evaluating the test method thoroughly.

[www.tfhrc.gov/pavement/pubs/04111](http://www.tfhrc.gov/pavement/pubs/04111)





# 5 Operations

## Fact Sheets

### Traffic Research Laboratory Fact Sheet

**FHWA-HRT-04-088**

This fact sheet presents the purpose, description, mission, special capabilities, laboratory composition, products and services, and expertise of the Traffic Research Laboratory (TReL).

TFHRC Technical Reference Center and [www.tfhrc.gov/about/trel.htm](http://www.tfhrc.gov/about/trel.htm)

### Office of Operations R&D

**FHWA-HRT-04-120**

The Traffic Analysis Toolbox is a set of documents that provide guidance on the role and use of traffic analysis tools in transportation analyses. “Traffic analysis tools” is a collective term used to describe a variety of software-based analytical procedures and methodologies that support different aspects of traffic and transportation analyses. These include methodologies such as sketch-planning, travel demand modeling, traffic signal optimization, and traffic simulation. Documents currently in the toolbox include Volume I: Traffic Analysis Tools Primer, Volume II: Decision Support Methodology for Selecting Traffic Analysis Tools, and Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software.

[www.tfhrc.gov/its/pubs/04120.htm](http://www.tfhrc.gov/its/pubs/04120.htm)

### I-40 Full Closure Feasibility Assessment

**FHWA-HRT-05-142**

Tennessee Department of Transportation (TDOT) identified a section of I-40 east of downtown Knoxville, TN, as a candidate for major rehabilitation, and in 2004, considered various strategies to perform the needed roadwork, keeping in mind construction costs, project duration, and potential impact to road users. TDOT commissioned a traffic study to predict traffic volumes. The study used QuickZone to identify the likelihood of significant congestion.

TFHRC Technical Reference Center

### I-95 Operational Analysis for Lane Closures at Night

**FHWA-HRT-05-143**

Maintaining roadway capacity is an important aspect in the ongoing Woodrow Wilson Bridge replacement project in the Washington, DC, metropolitan area. QuickZone was used to estimate delay and duration of the construction project.

TFHRC Technical Reference Center

### Responding to Public Concern about Delays During Bridge Repairs

**FHWA-HRT-05-144**

In the spring of 2001, a major structural rehabilitation project started on the Little Bras d’Or bridge in Nova Scotia, Canada. QuickZone enabled the quick testing of a number of alternate phasing plans, and minimized unacceptable delays in a work zone.

TFHRC Technical Reference Center

### Justifying the Additional Cost of Night Work in Nova Scotia

**FHWA-HRT-05-145**

In 2001, the intersection of Reeves Street and Trunk 4 in Port Hawkesbury, Nova Scotia, along a key access route to the Trans-Canada Highway, was slated to be upgraded. QuickZone was used to identify potential queuing and delays through simple intersection analysis, provided the analytical backup to demonstrate the advantages of nighttime construction, and provided estimates of queue length and delays.

TFHRC Technical Reference Center

## **Cost-Effective Construction Phasing in Yosemite Alley**

**FHWA-HRT-05-146**

Yosemite National Park in California is one of the most popular national park destinations in the United States. Due to the shape of Yosemite Valley, public access to the park is limited. Two key roadways are schedule to be under consideration for repaving. QuickZone was used to identify a feasible one-season construction schedule, development of an analytical traffic operations model, and modeling capability of complex geometric changes and traffic control.

TFHRC Technical Reference Center

## **Preparing for Peak Tourist Season During Repaving Operations, Zion National Park**

**FHWA-HRT-05-147**

In 2004, a major rehabilitation of the main road through Zion National Park in Utah was scheduled to take place. QuickZone was used to estimate the length of the queue and number of vehicles in queue for the peak tourist months of June, July, August, September, and October.

TFHRC Technical Reference Center

## **Cumulative Delay Analysis for Successive Work Zones on Beartooth Highway**

**HWA-HRT-05-148**

The Central Federal Lands Highway Division (CFLHD) has been working with the U.S. Department of Agriculture Forest Service and the National Park Service to reconstruct a 30-kilometer (18.6-mile) section of the scenic Beartooth Highway in Montana. A key capability CFLHD needed from QuickZone was the estimate of cumulative delay a motorist would likely encounter from a series of work zones, including localized bottlenecks, flagging operations, and periodic full closures.

TFHRC Technical Reference Center

## **Economic Impact of Work Zones with Lengthy Detours in Wyoming**

**FHWA-HRT-05-149**

Louis Lake Road is located in Fremont County, WY, and links the town of Lander and the Shoshone National Forest. The one-lane gravel road is unsafe for expected traffic increases. Construction to remedy the situation was considered. CFLHD used QuickZone. QuickZone estimated the delay a traveler would face during flagging operations of different lengths and capacities.

TFHRC Technical Reference Center

## ***Product Briefs***

### **Introducing ProVAL 2.0**

**FHWA-RT-04-154**

What's New in ProVAL 2.0? The improved Graphical User Interface (GUI) is new. The ProVAL 2.0 GUI has been redesigned to improve usability. Extensive profile data utilities (distance adjustment and event markers) are provided in the "Edit Data" window. Analysis types are now easily accessible via the menu, "Analysis," when the "Analysis" window is active. The most significant GUI improvement is to provide the profile data selector in both the "Profiles" (viewer) and "Analysis" windows. The profile data selector in the "Analysis" window for each analysis type is independent and it can provide users with maximum flexibility for the data analyst.

[www.tfsrc.gov/pavement/ltpa/reports/04154/index.htm](http://www.tfsrc.gov/pavement/ltpa/reports/04154/index.htm)



## ***Technical Reports***

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### **Identifying and Assessing Key Weather-Related Parameters and Their Impacts on Traffic Operations Using Simulation**

**FHWA-HRT-04-131**

The objectives of this study were to identify how weather events impact traffic operations, assess the sensitivity of weather-related traffic parameters in the CORridor SIMulation (CORSIM) traffic microsimulation model, and develop guidelines for using the CORSIM model to account for the impacts of adverse weather conditions on traffic operations.

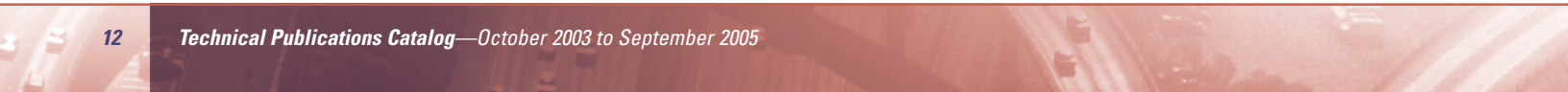
[www.tfrc.gov/its/pubs/04131](http://www.tfrc.gov/its/pubs/04131)

### **High Accuracy-Nationwide Differential Global Positioning System Test and Analysis Phase II Report**

**FHWA-HRT-05-034**

The High Accuracy-Nationwide Differential Global Positioning System (HA-NDGPS) program focused on developing compression and broadcast techniques to provide users over a large area with very accurate radio navigation solutions. The goal was to achieve 0 cm (0 inches) in real time over 322-kilometer (200-mile) baselines. The focus of the Phase II effort was on several aspects of HA-NDGPS to refine the navigation solution and demonstrate its usefulness. To that end, this report provides a description and analysis of these tasks as well as conclusions reached.

[www.tfrc.gov/its/pubs/05034](http://www.tfrc.gov/its/pubs/05034)





# 6 Pavements

## Product Briefs

### Seasonal Monitoring Program—One Stop Shopping!

**FHWA-HRT-04-153**

As the temperature and moisture content of paved roads change over the course of a day and course of a year, the structural characteristics of the pavement layers also change. Those changes affect how well the pavement responds to traffic loads and how long the pavement will last. However, the magnitude of those changes and the relationships involved are not well understood, making them difficult to address with any degree of confidence when designing and evaluating pavements. To overcome this limitation, the Strategic Highway Research Program established a seasonal monitoring program (SMP) within its LTPP program. The report states that the objective of the SMP, as established in the early 1990s, was to “provide data needed to attain a fundamental understanding of the magnitude and impact of temporal variations in pavement response and material properties due to the separate and combined effects of temperature, moisture and frost/thaw variations.”

[www.tfhrc.gov/pavement/ltp/reports/04153/index.htm](http://www.tfhrc.gov/pavement/ltp/reports/04153/index.htm)

## Summaries

### Office of Infrastructure Research and Development (R&D) Pavements

**FHWA-RD-03-090**

FHWA's Office of Infrastructure R&D conducts research that improves the design, construction, operation, and management of pavements and structures. Located at the Turner-Fairbank Highway Research Center (TFHRC), the office has an active outreach program that identifies future targets of opportunity and researchers who pursue advanced initiatives that drive innovative programs to serve customers' needs.

[www.tfhrc.gov/pavement/pubs/03090/index.htm](http://www.tfhrc.gov/pavement/pubs/03090/index.htm)

### LTPP: Year in Review 2004

**FHWA-HRT-04-125**

In 2004, the LTPP program continued working toward optimizing the public's investment in the highway system by providing the information, data, and products that highway engineers and managers need to design, build, maintain, and manage cost-effective and better performing roads. This report outlines LTPP's 2004 program area accomplishments and how the Transportation Equity Act for the 21st Century (TEA-21) extension impacted the LTPP program.

[www.tfhrc.gov/pavement/ltp/reports/04125](http://www.tfhrc.gov/pavement/ltp/reports/04125)

### The Concrete Pavement Road Map, Long-Term Plan for Concrete Pavement Research and Technology, An Executive Summary

**FHWA-HRT-05-047**

The Concrete Pavement (CP) Road Map is a comprehensive and strategic plan for concrete pavement research that will guide the investment of research dollars for the next several years. It will result in technologies and systems that help the concrete pavement community meet the paving needs of today, and the as-yet unimagined paving challenges of tomorrow. In short, the CP Road Map will result in a new generation of concrete pavements for the 21st century.

[www.fhwa.dot.gov/pavement/pccp/pubs/05047/](http://www.fhwa.dot.gov/pavement/pccp/pubs/05047/)

## ***TechBriefs***

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### **Achieving a High Level of Smoothness in Concrete Pavements without Sacrificing Long-Term Performance**

**FHWA-HRT-05-069**

This document is a technical summary of the report *Achieving a High Level of Smoothness in Concrete Pavements Without Sacrificing Long-Term Performance* published by FHWA in June 2005.

TFHRC Technical Reference Center and <http://www.tfhrc.gov/pavement/pubs/05069/index.htm>

## ***Technical Reports***

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### **Structural Factors of Jointed Plain Concrete Pavements: SPS-2—Initial Evaluation and Analysis Jointed Plain Concrete Pavements**

**FHWA-RD-01-167**

The SPS-2 experiment, Strategic Study of Structural Factors for Jointed Plain Concrete Pavements (JPCP), is one of the key components of the Long-Term Pavement Performance (LTPP) program. The main objective of this experiment is to determine the relative influence and long-term effectiveness of JPCP design features (including slab thickness, PCC flexural strength, base type and drainage, and slab width) and site conditions (traffic, subgrade type, climate) on performance. This report documents the first comprehensive review and evaluation of the Specific Pavement Studies (SPS)-2 experiment. Thirteen SPS-2 projects have been constructed with one additional site under construction. At each site, there are 12 core sections plus various numbers of supplemental sections.

[www.fhwa.dot.gov/pavement/ltp/01167/](http://www.fhwa.dot.gov/pavement/ltp/01167/)

### **Guide for Curing of Portland Cement Concrete Pavements, Volume I**

**FHWA-RD-02-099**

This document provides guidance on details of concrete curing practice as they pertain to construction of portland cement concrete (PCC) pavements. The guide is organized around the major events in curing pavements: curing immediately after placement, curing during the period after final finishing, terminating curing, and evaluating effectiveness of curing. Information is presented on selection of curing materials and procedures, analysis of concrete properties and jobsite conditions, and on ways to adjust curing practice to account for specific project conditions.

TFHRC Technical Reference Center and [www.fhwa.dot.gov/pavement/pub\\_details.cfm?id=344](http://www.fhwa.dot.gov/pavement/pub_details.cfm?id=344)

### **Estimating Cumulative Traffic Loads, Volume II: Traffic Data Assessment and Axle Load Projection for the Sites with Acceptable Axle Weight Data, Final Report for Phase 2**

**FHWA-RD-03-094**

In 1998, FHWA sponsored a study to estimate traffic loads on LTPP sites. This report contains findings of the second phase of the study. Phase 2 includes the assessment of the overall quality of traffic data for all 890 LTPP traffic sites, and the projections of axle loads for all LTPP sites with adequate traffic data. Also included are the distribution of comprehensive traffic data reports to all participating agencies and the incorporation of comments regarding traffic projections received from the agencies.

TFHRC Technical Reference Center

## **Incremental Costs and Performance Benefits of Various Features of Concrete Pavements, Final Report**

**FHWA-HRT-04-044**

This report presents a methodology for quickly assessing the relative costs and benefits of incorporating various design features in PCC pavements. That methodology has been incorporated into an analytical software tool that can be used by pavement design engineers who are interested in investigating the cost versus performance tradeoffs associated with the selection of different design features during the PCC pavement design process. The tool is not intended to provide absolute answers on the effect of different design features, but rather to provide insight into general performance and cost trends associated with the use of those design features.

[www.tfhrc.gov/pavement/pubs/04044/index.htm](http://www.tfhrc.gov/pavement/pubs/04044/index.htm)

## **Characteristics of Emerging Road Users and Their Safety**

**FHWA-HRT-04-103**

This study was undertaken to clarify the operational characteristics of an increasingly diverse group of trail and other nonmotorized transportation users. Three “Ride for Science” data collection events were conducted to obtain the physical dimensions, turning capabilities, lateral operating space, acceleration, speed, and stopping sight distance of trail users. The results confirmed the great diversity in the operating characteristics of various road and trail user types.

TFHRC Technical Reference Center

## **Computer-Based Guidelines for Concrete Pavements, Volume I: Project Summary**

**FHWA-HRT-04-121**

This report documents enhancements incorporated in the (High PERFORMANCE PAVing) HIPERPAV II software. Enhancements made within this project include the addition of two major modules: a module to predict the performance of JPCP as affected by early-age factors and a module to predict the early-age behavior and early life of continuously reinforced concrete pavement. This report summarized the work conducted to enhance the HIPERPAV concrete pavement design guidelines. This is the first volume in a series of three volumes.

TFHRC Technical Reference Center and [www.ntis.gov](http://www.ntis.gov), PB2005105417

## **Computer-Based Guidelines for Concrete Pavements, Volume II: Design and Construction Guidelines and HIPERPAV II User's Manual**

**FHWA-HRT-04-122**

This report documents enhancements incorporated in the HIPERPAV II software. Enhancements made within this project include the addition of two major modules: a module to predict the performance of JPCP as affected by early-age factors and a module to predict the early-age behavior and early life of continuously reinforced concrete pavement (CRCP). This volume provides a comprehensive set of guidelines useful in designing and constructing both JPCP and CRCP concrete pavements. This is the second volume in a series of three volumes.

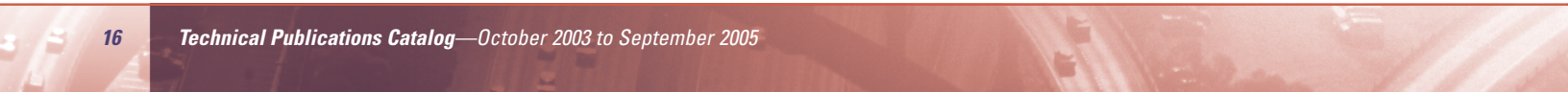
TFHRC Technical Reference Center and [www.tfhrc.gov/pavement/pccp/pubs/04122/index.htm](http://www.tfhrc.gov/pavement/pccp/pubs/04122/index.htm)

## **Quantification of Smoothness Index Differences Related to LTPP Equipment Type**

**FHWA-HRT-05-054**

The LTPP program was designed as a 20-year study of pavement performance. A major data collection effort at LTPP test sections is the collection of longitudinal profile data using inertial profilers. Three types of inertial profilers have been used since the inception of the LTPP program.

TFHRC Technical Reference Center





## Fact Sheets

### Office of Safety R&D

**FHWA-HRT-04-119**

The FHWA safety goal is to continually improve highway safety. FHWA contributes to the U.S. Department of Transportation (USDOT) safety improvement goal; the performance measurements over the next 10 years for this goal are: (1) a 20 percent reduction in fatalities, (2) a 20 percent reduction in injuries, and (3) a 50 percent reduction in truck-related fatalities. The Office of Safety R&D is making major contributions to help FHWA meet its performance objectives through activities and accomplishments in the following six priority areas: run-off-road, intersections, pedestrian and bicycle, safety-management, speed management, and human centered systems.

[www.tfsrc.gov/safety/pubs/04119.htm](http://www.tfsrc.gov/safety/pubs/04119.htm)

### IHSDM Resource List

**FHWA-HRT-04-152**

A product of FHWA's Safety R&D Program, the IHSDM is a suite of safety analysis tools to evaluate the safety and operational effects of geometric design decisions on two-lane rural highways. This fact sheet lists resources available to individuals considering or using IHSDM.

[www.tfsrc.gov/safety/ihsdm/pubs/04152/index.htm](http://www.tfsrc.gov/safety/ihsdm/pubs/04152/index.htm)

### Safety Evaluation of Red-Light Cameras--Executive Summary

**FHWA-HRT-05-049**

The objective of this research was to determine the effectiveness of RLC systems in reducing crashes. The study involved an empirical Bayes before-and-after research using data from seven jurisdictions across the United States to estimate the crash and associated economic effects of RLC systems. The study included 132 treatment sites, and specially derived rear-end and right-angle unit crash costs for various severity levels. There was an aggregate crash cost benefit of RLC systems. Analysis found that greatest economic benefits are associated with factors of the highest total entering average annual daily traffic, the largest ratios of right-angle-to-rear-end crashes, and with the presence of protected left-turn phases. There were weak indications of a spillover effect.

TFHRC Technical Reference Center and <http://www.tfsrc.gov/safety/pubs/05049/index.htm>

## TechBriefs

### Characteristics of Emerging Road Users and Their Safety

**FHWA-HRT-04-104**

While additional research is needed to determine which devices should be used to set specific design criteria, the findings suggest that design guidelines might need to be revised to incorporate the needs of emerging trail users. The results of this study can be used to help design professionals adequately design roadway and shared-use path facilities to meet the operational and safety needs of this growing and diverse group of users.

[www.tfsrc.gov/safety/pubs/04104](http://www.tfsrc.gov/safety/pubs/04104)

### The Safety Impacts of Differential Speed Limits on Rural Interstate Highways

**FHWA-HRT-04-156**

The Surface Transportation and Uniform Relocation Assistance Act (STURAA), enacted on April 2, 1987, permitted individual States to raise speed limits from the previously mandated national speed limit of 88 kilometers per hour (km/h) to 105 km/h (55 miles per hour (mi/h) to 65 mi/h) on rural interstate highways. With more than a decade having elapsed since the passage of the STURAA, FHWA sponsored a long-term study to investigate the effect of Uniform Speed Limits and Differential Speed Limits on vehicle speeds and crashes on rural interstates nationwide.

[www.tfsrc.gov/safety/pubs/04156/index.htm](http://www.tfsrc.gov/safety/pubs/04156/index.htm)

## ***Technical Reports***

### **Validation of Accident Models for Intersections**

**FHWA-RD-03-037**

This report describes the results of validation and calibration of motor vehicle crash models for rural intersections. Both the validation and recalibration activities were conducted in pursuit of one overriding research objective, which was to make marginal improvements to an existing set of statistical models for predicting crashes at two- and four-lane intersections, with the primary intent to be used in the Interactive Highway Safety Design Model (IHSDM).

TFHRC Technical Reference Center

### **Signalized Intersections: Informational Guide**

**FHWA-HRT-04-091**

This guide provides a single, comprehensive document with methods for evaluating the safety and operations of signalized intersections and tools to remedy deficiencies. The treatments in this guide range from low-cost measures such as improvements to signal timing and signage, to high-cost measures such as intersection reconstruction or grade separation. Topics covered include fundamental principles of user needs, geometric design, and traffic design and operation; safety and operational analysis techniques; and a wide variety of treatments to address existing or projected problems, including individual movements and approaches, pedestrian and bicycle treatments, and corridor techniques.

TFHRC Technical Reference Center and <http://www.tfhrc.gov/safety/pubs/04091/index.htm>

### **Safety Evaluation of Red-Light Cameras**

**FHWA-HRT-05-048**

The objective of this final study was to determine the effectiveness of red-light-camera (RLC) systems in reducing crashes. The study used empirical Bayes before-and-after research using data from 7 jurisdictions across the United States at 132 treatment sites. The purpose of the study was to estimate the crash and associated economic effects of RLC systems and specially derived rear-end and right-angle unit crash costs for various severity levels.

TFHRC Technical Reference Center and [www.tfhrc.gov/safety/pubs/05048/index.htm](http://www.tfhrc.gov/safety/pubs/05048/index.htm)

# 8 Structures

## Fact Sheets

### Structures Laboratory Fact Sheet

**FHWA-HRT-04-089**

This fact sheet presents the purpose, description, major components, accomplishments, current activities, future activities, and partners and customers of the Structures Laboratory at FHWA's TFHRC.

TFHRC Technical Reference Center and [www.tfhrc.gov/about/struct.htm](http://www.tfhrc.gov/about/struct.htm)

### Office of Infrastructure R&D

**FHWA-HRT-04-118**

The Office of Infrastructure R&D continually improves infrastructure-related technology through research, development, and testing; through an outreach process to identify future targets of opportunity; and with the pursuit of advanced research initiatives. This fact sheet discusses Superpave; High-Performance Paving System (HIPERPAV™); high-performance, steel bridge materials; ultrahigh-performance concrete, horizontally curved steel girder bridges, nondestructive evaluation of bridges, earthquake protective systems, national bridge coatings qualification testing program, scour evaluations for Woodrow Wilson Bridge, LTPPBind, DataPave Online, and the Distress Identification Manual for Long-Term Pavement Performance Program (Fourth Revised Edition—FHWA-RD-03-031)

[www.tfhrc.gov/infrastructure/pubs/04118.htm](http://www.tfhrc.gov/infrastructure/pubs/04118.htm)

### Transportation Asset Management System for Roadway Safety: Idaho's Guardrail Management System

**FHWA-HRT-05-055**

The Idaho Transportation Department has implemented a new video logging system using state-of-the-art digital photo imaging data called the "GRail" to address the maintenance and safety of guardrails. This fact sheet explains how the system works.

TFHRC Technical Reference Center and [www.tfhrc.gov/safety/pubs/05055/index.htm](http://www.tfhrc.gov/safety/pubs/05055/index.htm)

### Hydraulics Laboratory Fact Sheet

**FHWA-HRT-05-061**

This fact sheet covers accomplishments, major components, expertise, description, and the purpose of the Hydraulics Laboratory. The laboratory's partners are also listed.

TFHRC Technical Reference Center

### Paint and Corrosion Laboratory Fact Sheet

**FHWA-HRT-05-064**

The mission of the Paint and Corrosion Laboratory is to provide technical support to the Office of Infrastructure Research and Development (R&D) to develop and analyze the effectiveness of innovative coatings test procedures while evaluating the durability of new coating systems, especially environmentally compliant materials for the corrosion protection of steel bridges. Description, special capabilities, accomplishments, and services are listed, along with contact information.

TFHRC Technical Reference Center and [www.tfhrc.gov/about/corros.htm](http://www.tfhrc.gov/about/corros.htm)

## Summaries

### Highway Safety Information System: An Examination of Fault, Unsafe Driving Acts, and Total Harm in Car-Truck Collisions

**FHWA-HRT-04-085**

The Federal Motor Carrier Safety Administration has given high priority to research regarding collisions between large trucks (gross vehicle weight > 4,540 kilograms (10,000 pounds)) and other vehicles on the roadway. This research aims to improve knowledge about the high-risk behaviors of truck and passenger vehicle (car) drivers.

[www.tfhrc.gov/safety/hsis/pubs/04085/index.htm](http://www.tfhrc.gov/safety/hsis/pubs/04085/index.htm)

## **Highway Safety Information System Summary Report: Safety Effects of Using Narrow Lanes and Shoulder—Use Lanes to Increase the Capacity of Urban Freeways**

**FHWA-HRT-05-001**

As traffic volumes grow on urban freeways, highway agencies face an ongoing challenge to maintain efficient traffic operations and acceptable levels of service. Increasing the capacity of a freeway by adding a lane can be difficult and expensive if it involves widening the existing roadbed, regrading roadside areas, and/or acquiring additional rights-of-way. A number of highway agencies, however, have implemented projects in which a travel lane is added on an urban freeway by restriping the traveled way with narrower lanes, converting all or part of the shoulder to a travel lane, or a combination of both. The traffic operational benefits of such conversions are immediate and obvious, but the safety effects are uncertain. This study addresses these safety effects.

[www.tfsrc.gov/safety/pubs/05001/index.htm](http://www.tfsrc.gov/safety/pubs/05001/index.htm)

## ***Technical Reports***

### **Enhanced Abutment Scour Studies for Compound Channels**

**FHWA-RD-99-156**

Experimental results and analyses are given in this report on bridge abutment scour in compound channels. Experiments were conducted in a laboratory flume with a cross section consisting of a wide floodplain adjacent to a main channel. The embankment length, discharge, sediment size, and abutment shape were varied, and the resulting equilibrium scour depths were measured. Water-surface profiles, velocities, and scour-hole contours also were measured. In the report, a methodology for estimating abutment scour is developed that takes into account the redistribution of discharge in the bridge contraction, abutment shape, sediment size, and tailwater depth. The independent variables in the proposed scour formula are evaluated at the approach-channel cross section and can be obtained from a one-dimensional water-surface profile computer program such as the Water-Surface Profile Program (WSPRO). The proposed scour evaluation procedure is outlined and illustrated, including consideration of the time required to reach equilibrium scour. The proposed methodology is applied to two cases of measured scour in the field.

[www.fhwa.dot.gov/engineering/hydraulics/pubs/99156/](http://www.fhwa.dot.gov/engineering/hydraulics/pubs/99156/)

### **Development and Field Testing of Multiple Deployment Model Pile**

**FHWA-RD-99-194**

A model pile is a calibrated tool equipped with instrumentation capable of monitoring the pile/soil interaction over the pile history. Monitoring includes the installation, pore pressure dissipation combined with consolidation and soil pressure equalization, and ultimately the pile behavior under loading and failure. The model pile installation and soil-structure interaction simulate the actual field conditions of full-scale piles. As such, the obtained information can be utilized directly (e.g., skin friction) or extrapolated (e.g., pore pressure dissipation time) to predict the soil's response during full-scale pile installation.

[www.tfsrc.gov/structur/pubs/99194/index.htm](http://www.tfsrc.gov/structur/pubs/99194/index.htm)

### **Field Observations and Evaluations of Streambed Scour at Bridges**

**FHWA-RD-03-052**

The variability and complexity of site conditions make it difficult to develop methodology for predicting scour at bridges. Laboratory investigations often oversimplify or ignore many complexities common in the field. The U.S. Geological Survey, in cooperation with the Federal Highway Administration (FHWA) and many State highway agencies, has collected and compiled field data on scour at bridges at 79 sites located in 17 States. These data have been analyzed to isolate pier scour, contraction scour, and abutment scour.

TFHRC Technical Reference Center

## **Bridge Scour in Nonuniform Sediment Mixtures and in Cohesive Materials: Synthesis Report**

**FHWA-RD-03-083**

This report presents the summary and synthesis of the various components of the experimental study entitled “Effects of Gradation and Cohesion on Bridge Scour” conducted at Colorado State University from 1991 through 1996.

[www.fhwa.dot.gov/engineering/hydraulics/pubs/03083/](http://www.fhwa.dot.gov/engineering/hydraulics/pubs/03083/)

## **Guidelines for Ultrasonic Inspection of Hanger Pins**

**FHWA-HRT-04-042**

A failed hanger pin initiated the tragic collapse of one span of the Mianus River Bridge in Greenwich, CT on June 28, 1983, resulting in the deaths of three motorists. Following the collapse, there was an immediate increase of interest in the inspection and condition evaluation of bridge hanger pins. Ultrasonic inspection has become the primary method of performing detailed inspection of in-service hanger pins. The document describes the fundamentals of ultrasonic testing and general inspection requirements that can be used by State transportation agencies or by others performing ultrasonic hanger pin inspection. In addition, five hanger pins with known defects were inspected to emphasize and more completely explain some important aspects of ultrasonic hanger pin inspection.

[www.tfsrc.gov/infrastructure/nde/pubs/04042](http://www.tfsrc.gov/infrastructure/nde/pubs/04042)

## **Covered Bridge Manual**

**FHWA-HRT-04-098**

This manual provides guidance to those involved with all aspects of work related to covered bridges, from initial inspection and evaluation, through the engineering of rehabilitation, to construction issues. This manual covers general terminology and historic development of covered bridges. It also addresses loads, structural analysis, connections, and design issues.

TFHRC Technical Reference Center

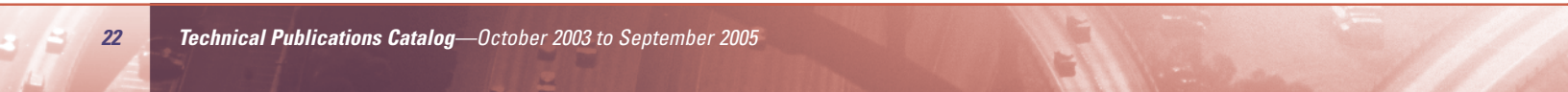
## **Protocol for Selecting ASR-Affected Structures for Lithium Treatment**

**FHWA-HRT-04-113**

This document describes a protocol for evaluating damaged structures to determine whether they are suitable candidates for lithium treatment to address alkali-silica reaction (ASR). A major part of this report deals with the approach/tools that can be used to determine whether ASR is the principal cause or only a contributing factor to the observed deterioration (diagnosis), determine the extent of deterioration due to ASR in the structure, and evaluate the potential for future expansion due to ASR (prognosis). Finally, the report lists items to be included in the proposal that will be submitted for selecting structures for lithium treatment.

[www.tfsrc.gov/pavement/pccp/pubs/04113/index.htm](http://www.tfsrc.gov/pavement/pccp/pubs/04113/index.htm)







## ***Publication Types Referenced in this Catalog***

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**Administrative Report.** Publicizes progress and results for assessing and achieving research goals.

**Fact Sheet.** Provides concise, factual information about a specific topic such as a facility, laboratory, technology, or expertise.

**Product Brief.** Provides additional information on the availability of a product and concise technical information about the product.

**Summaries.** Recaps information from larger works or activities that take place over the course of time.

**Technical Report.** Communicates the full details of an experiment or research project, its results, data collected from analysis, or findings and recommendations.

**TechBrief.** Summarizes an experiment, providing results, data collected from analysis, or findings and recommendations.

