

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

***Technical
Publications
Catalog***

October 1998–September 2003



U.S. Department of Transportation
Federal Highway Administration

Introduction

The Federal Highway Administration (FHWA) Turner-Fairbank Highway Research Center's *Technical Publications Catalog*, October 1998–September 2003, is a comprehensive listing of more than 300 publications generated from research at our facility. This catalog provides brief product abstracts and location information for technical reports, TechBriefs, application notes, product briefs, fact sheets, and CD-ROMs related to research, development, and technology in subject areas of environment, human factors, operations, pavements, safety, and structures.

Available online at www.tfrc.gov/techpubcat/index.htm and in print, the catalog is an indispensable transportation research resource for engineers, transportation specialists, policymakers, information specialists, and other interested groups. Readers can immediately access the publications online, in most cases, 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 or 202-493-3423.



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Associate Administrator
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1 *Environment*

TechBriefs

Highway Operation Impacts on Fine Particulate Air Contaminant Concentrations

FHWA-RD-99-210

This document provides information on the issue of highway operations impacts on fine particulate air contaminant concentrations. It is aimed at individuals in Federal Highway Administration division offices and State departments of transportation. PDC* Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Technical Reports

A Predictive Approach for Long-Term Performance of Recycled Materials Using Accelerated Aging, Volume I: Final Report

FHWA-RD-01-022

This report analyzes the long-term physical and environmental performance of recycled materials in a highway application. The use of recycled materials in a proposed highway application frequently requires the assessment of physical and environmental performance. Future behavior is often difficult to predict. As alternatives to field demonstrations, strategies to predict long-term physical and environmental performance need to be developed. www.ntis.gov, PB2001-107670

A Predictive Approach for Long-Term Performance of Recycled Materials Using Accelerated Aging, Volume II: Appendices

FHWA-RD-01-023

This report analyzes the long-term physical and environmental performance of recycled materials in a highway application. The use of recycled materials in a proposed highway application frequently requires the assessment of physical and environmental performance. Future behavior is often difficult to predict. As alternatives to field demonstrations, strategies to predict long-term physical and environmental performance need to be developed. This document presents the report's appendices. www.ntis.gov, PB2001-107671

Assessment of Highway Particulate Impacts: Phase I, Task A—Problem Evaluation, Final Report

FHWA-RD-99-180

This report provides an assessment of highway particulate impacts. It evaluates existing knowledge on (1) the sources of particulates, especially those specific to highways; (2) methods of assessing particulate impacts from highway sources; (3) relationships between highway-derived particulates and other particulate sources; (4) particulate instrumentation, measurement, and monitoring methods; (5) assessment of potential public health risks; and (6) control strategies for lessening the impact of highway particulates. www.ntis.gov, PB99-175705

Assessment of Highway Particulate Impacts: Phase I, Tasks B and C—Field Sampling and Evaluation Program, Final Report

FHWA-RD-99-181

This report is the second of two reports developed as part of Phase I of a study on highway particulate impacts. Researchers investigated four sources of highway particulate emissions: (1) emissions from diesel-powered vehicles, (2) emissions from road sanding and salting operations, (3) dust from paved roadways, and (4) emissions from unpaved roadways. www.ntis.gov, PB99-175713

*PDC = Product Distribution Center

Development and Validation of Light-Duty Vehicle Modal Emissions and Fuel Consumption Values for Traffic Models

FHWA-RD-99-068

This report presents a methodology for modal-vehicle emissions and fuel-consumption models. These models are designed for simulations, such as the Federal Highway Administration's TRAF series of traffic simulation models, and are used to evaluate the impacts of roadway design on emissions and fuel consumption.

Library and www.ntis.gov, PB99-155137

Framework for Evaluating the Use of Recycled Materials in the Highway Environment

FHWA-RD-00-140

This report provides a recommended evaluation methodology for determining the suitability of using recycled materials in highway construction. The manual is intended as a reference for highway and environmental engineers interested in using recycled materials in the highway environment.

Library and www.ntis.gov, PB2002-100893

Implementing Bicycle Improvements at the Local Level

FHWA-RD-98-105

This implementation manual is intended for local governments that want to improve conditions that affect bicycling. It is designed to help local public works or transportation departments identify specific problems and deal with them as part of the agency's routine functions. Researchers considered 13 of the most typical situations or factors that impact bicycle use. For each situation or factor, the manual provides a problem overview, solution overview, implementation strategies, objectives, resource requirements, subtasks, schedule, specifications, and references.

www.fhwa.dot.gov/environment/bikeped/web_pub.htm

2 *Human Factors*

TechBriefs

Young Drivers and Highway Design and Operations: Findings and Recommended Research

FHWA-RD-01-120

This document highlights the findings of a project designed to investigate the safety problems of young drivers in relation to highway design and operations. Understanding the influence of design and operations on the driving performance of young drivers would support the development of safety countermeasures. This document also provides recommendations for future research.

www.tfhrf.gov/humanfac/01-120.pdf

Technical Reports

An Investigation of Older Driver Freeway Needs and Capabilities (Summary Report)

FHWA-RD-98-162

This report identifies the problems older drivers experience on freeways and recommends further research to make freeway driving more compatible with the needs and capabilities of older drivers.

www.tfhrf.gov/humanfac/98-162.pdf

Development of Countermeasures for Driver Maneuver Errors

FHWA-RD-00-022

This report describes a project that studied misperceptions of the time available or time required for various driving maneuvers under a range of conditions. In the laboratory experiment, research participants viewed video scenes of a wide variety of situations. A parallel on-the-road experiment, using similar procedures and a subset of the laboratory situations, was used to validate the laboratory findings. The study found a general tendency for people to underestimate the time required to complete a maneuver.

www.fhwa.dot.gov/tfhrf/safety/pubs/00022/intro.htm

Driving Performance After an Extended Period of Travel on an Automated Highway System

FHWA-RD-98-051

This report is part of a series exploring human factors issues related to automated highway systems. Its purpose is to determine whether driving performance is affected by extended travel under automated control at a velocity higher than the speed limit and closer to the vehicles ahead than usual.

www.ntis.gov, PB98-156904

Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians

FHWA-RD-01-051

This report presents updated guidelines and recommendations on accommodating older drivers and pedestrians. It incorporates new research findings, technical developments, and extensive feedback from State, county, and municipal engineers who reviewed and applied recommendations from the 1998 publication on the same topic.

www.tfhrf.gov/humanfac/01105/01-051.pdf

Highway Design Handbook for Older Drivers and Pedestrians

FHWA-RD-01-103

This report provides an updated, revised, and expanded scope of the Older Driver Highway Design Handbook published by the Federal Highway Administration in 1998. The document incorporates new research findings and technical developments; extensive feedback from State, county, and municipal engineers who reviewed and applied recommendations from the earlier version of the handbook; and recommendations with supporting background material for roundabouts and highway-rail grade crossings, two elements not covered in the 1998 publication.

www.ntis.gov and www.tfhrf.gov/humanfac/01103/coverfront.htm

Human Factors Design Guidelines For Advanced Traveler Information Systems and Commercial Vehicle Operations

FHWA-RD-98-057

This handbook summarizes human engineering data, guidelines, and principles for use by creative designers, engineers, and human factors practitioners during the advanced traveler information systems design process.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Identification and Evaluation of Driver Errors: Overview Recommendations

FHWA-RD-02-068

This report analyzes the development of driver error taxonomies, determination of the causes of the identified errors, and collection of data to support the use of these taxonomies in the study of incidents and crashes. It also presents recommendations for improving traffic control devices, roadway delineations, and crash reporting forms based on the study findings.

www.tfhrf.gov/humanfac/02068execsum.htm

In-Vehicle Information Systems Behavioral Model and Design Support: Final Report

FHWA-RD-00-135

This report was produced as part of a contract to develop an in-vehicle information systems behavioral model and design support system. The final report describes the model, how it was developed, and its supporting research and rationale.

The software program resulting from this effort will help designers develop in-vehicle information system user interfaces that demand less of the driver's attention.

www.tfhrf.gov/humanfac/00-135.pdf

In-Vehicle Information Systems Behavioral Model and Design Support: IVIS Demand Prototype Software User's Manual

FHWA-RD-00-136

This user's manual was produced as part of a contract to develop an in-vehicle information systems behavioral model and design support system. The manual describes the purpose of the model and how to use it to predict attention demand. The software program resulting from this effort will help designers develop in-vehicle information system user interfaces that demand less of the driver's attention.

www.tfhrf.gov/humanfac/00-136.pdf

Using an Automated Speed, Steering, and Gap Control System and a Collision Warning System When Driving in Clear Visibility and in Fog

FHWA-RD-98-050

This report analyzes the effect on driving performance of using a speed, steering, and gap control system and a collision warning system. The experiment was conducted in the Iowa Driving Simulator.

www.ntis.gov, PB2000-104191

3 *Operations*

TechBriefs

Advanced Traveler Information Systems (ATIS)

FHWA-RD-99-116

This document describes two projects evaluating the use of advanced traveler information systems (ATIS) in rural areas. One project involved development and testing of a surveillance and delay advisory system, and the other involved evaluation of a satellite communications system for emergency applications.

Library and www.itsdocs.fhwa.dot.gov/JPODOCS/PERIODIC/76N01!.PDF

Automated Geotechnical Information and Design System (AGIDS)

FHWA-RD-03-068

This document describes a comprehensive automated geotechnical information and design system (AGIDS). This system will help bridge engineers evaluate design alternatives and obtain information quickly and economically from a centrally located computer source.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Technical Reports

1996 Atlanta Centennial Olympic Games and Paralympic Games Event Study

FHWA-RD-97-107

This report presents the findings of a study on transportation operations during the 1996 Olympic and Paralympic Games, including system performance, benefits realized, and lessons learned during the events period. The study assesses the performance of the various travel demand management plans used for Olympic Games traffic management. It also presents recommendations on intelligent transportation systems deployment for other cities hosting major events, based on lessons learned from the Atlanta Games transportation operations.

www.tfhr.gov/pubrds/septoct99/recpubs.htm and www.ntis.gov, PB99-142432

1998 Federal Highway Administration Research and Technology Program Highlights

FHWA-RD-99-019

This report highlights the activities and accomplishments of the Federal Highway Administration's (FHWA) research and technology program during fiscal year 1997-98. The report describes the major research and technology projects and programs and the progress made throughout the year by FHWA's research and technology coordinating groups.

Library and www.ntis.gov, PB99-146615

An Investigation of The Use of Differential Global Positioning System (GPS) Technology and its Augmentations within State and Local Transportation Departments (Updated Version)

FHWA-RD-00-093

This report summarizes the results of an investigation conducted by the Federal Highway Administration's Office of Operations, Research, and Development. This investigation targets the evolving character of applications using global positioning system technology and its augmentation for surface transportation, especially highway departments, on the State and local level.

www.tfhr.gov/its/00-093.pdf

Atlanta NAVIGATOR Case Study

FHWA-RD-98-099

This report presents the findings of a case study on NAVIGATOR, the Georgia Department of Transportation's intelligent transportation system (ITS), and documents the lessons learned from its deployment in Atlanta. The case study focuses on the institutional, programmatic, and technical issues and opportunities involved in planning and implementing the deployment.

www.ntis.gov, PB99-146656

Commercial Vehicle Fleet Management and Information Systems, Phase I: Interim Report

FHWA-RD-98-064

This report summarizes the research effort and findings of phase I of a study to determine commercial vehicle fleet management needs that can be met through public-sector involvement in the development of intelligent transportation systems (ITS) technologies and standards. This report also presents conclusions on ITS in the motor carrier industry, potential public-sector services, and specific issues and areas that merit ongoing public-sector attention.

www.ntis.gov, PB98-131113

Development of Human Factors Guidelines for Advanced Traveler Information Systems and Commercial Vehicle Operations: Integration of ATIS and Crash Avoidance In-Vehicle Information—Preliminary Simulator Study

FHWA-RD-99-133

This report presents a study that investigated three issues relevant to advanced traveler information systems (ATIS) design: (1) the influence of an ATIS on driver performance in reduced-visibility conditions, (2) the influence of an ATIS on drivers' reactions to unexpected roadway events, and (3) the interaction of an ATIS with a collision avoidance system.

www.ntis.gov, PB2002-105198

Evaluation of Emergency Vehicle Signal Preemption on the Route 7 Virginia Corridor

FHWA-RD-99-070

This report analyzes the impact of emergency vehicle traffic signal preemption across three coordinated intersections on Route 7 (Leesburg Pike near Landsdowne) in Virginia. The Federal Highway Administration's Traffic Software Integrated System package, which includes the CORSIM simulation model and the vehicle animator TRAFVU, was used for this study.

Library and <http://www.benefitcost.its.dot.gov/ITS/benecost.nsf/7fadc4630913633085256b6f0067857d/70c5d2b41632a8cb852569610051e2d9?OpenDocument>

Guidebook on Methods to Estimate Non-Motorized Travel: Overview of Methods

FHWA-RD-98-165

This two-volume report provides a means for practitioners to better understand and estimate bicycle and pedestrian travel and to address transportation planning needs. The guidebook describes and compares the various methods that can be used to forecast the demand of non-motorized travel and supports the prioritization analyses of non-motorized projects. This volume provides an overview of methods.

Library and www.ntis.gov, PB99-166175

Highway Effects on Vehicle Performance

FHWA-RD-00-164

This report presents a user-friendly model for personal computers called Vehicle/Highway Performance. It was developed to estimate fuel consumption and exhaust emissions related to modes of vehicle operations on highways of various configurations and traffic controls. It is intended for highway designers, planners, and strategists optimizing intelligent transportation systems.

www.tfhr.gov/hnr20/00164.htm

Phenomenology Study of HERMES Ground Penetrating Radar Technology for Detection and Identification of Common Bridge Deck Features

FHWA-RD-01-090

This report documents the findings of a phenomenology study that analyzes the performance of HERMES (High Speed Electromagnetic Roadway Measurement and Evaluation System) ground-penetrating radar technology. HERMES technology was designed to evaluate concrete bridge deck deterioration, with a particular emphasis on detecting corrosion-induced delaminations.

www.tfhr.gov/hnr20/nde/pdfs/01090.pdf

Support of the System Test and Analysis Program for the Nationwide Differential Global Positioning System Modernization Program

FHWA-RD-02-110

This report presents Phase I of the Nationwide Differential Global Positioning System (GPS) Modernization Program. It analyzes the broadcasting GPS observables from a single site in Hagerstown, MD, to aid in determining the appropriate signal structure and compression technique to support long-range carrier phase operations. This report verifies that the accuracy that can be achieved over a long baseline from a single facility is within the estimated 10-centimeter (3.9-inch) (95 percent) horizontal navigation accuracy hypothesized.

www.fhrc.gov/its/ndgps/02110/

The Rural Public Transportation Technologies: User Needs and Applications, Executive Summary

FHWA-RD-98-126

This report presents a study designed to examine the opportunities and challenges of planning and deploying advanced public transportation systems technologies in rural and small urban areas. The purpose of the study was to gain a better understanding of the state of the practice of rural advanced public transportation systems and to determine where the U.S. Department of Transportation could best direct its resources to close the gap between current practice and the state of the art. This volume summarizes the findings in the study's final report.

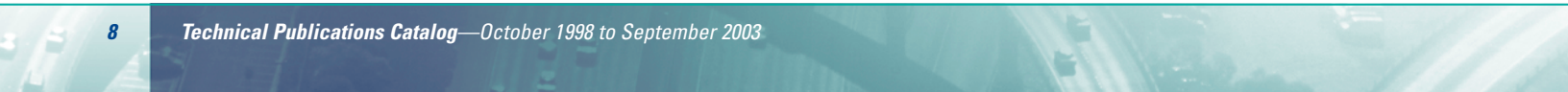
www.ntis.gov, PB99-146763

The Rural Public Transportation Technologies: User Needs and Applications, Final Report

FHWA-RD-98-125

This report presents a study designed to examine the opportunities and challenges of planning and deploying advanced public transportation systems technologies in rural and small urban areas. The purpose of the study was to gain a better understanding of the state of the practice of rural advanced public transportation systems and to determine where the U.S. Department of Transportation could best direct its resources to close the gap between current practice and the state of the art.

www.ntis.gov, PB99-142648



4 Pavements

Application Notes

LTPP Distress Identification Manual Sets a Standard for States: Illinois, Michigan, Mississippi, Missouri, Nevada, and Oklahoma Use Manual as a Baseline for Identifying and Quantifying Distresses

FHWA-RD-02-052

This document describes how States are using the Long-Term Pavement Performance (LTPP) program's *Distress Identification Manual* to plan and implement pavement products. The manual uses drawings, text, and color photographs to show common types of distress found in asphalt cement, jointed portland cement concrete, and continuously reinforced concrete pavements.

www.tfhr.gov/pavement/ltp/pdf/02052.pdf

LTPP Findings Pay Off for Pennsylvania: Change in Pavement Joint Design Standard Saves Pennsylvania Money and Reduces Construction Problems

FHWA-RD-00-064

This document describes how the Pennsylvania Department of Transportation decided to change its practice of using skewed joints after reviewing the results of a Long-Term Pavement Performance (LTPP) program analysis project. The project analyzed LTPP pavement performance data to identify what did and did not work to control the development of joint faulting.

www.tfhr.gov/pavement/ltp/pdf/00064.pdf

New Software Tool Paves the Way for More Cost-Effective, Durable Roads in Kansas: Kansas Relies on LTPPBind Software to Select Superpave Binder PGs

FHWA-RD-00-019

This document explains how the Kansas Department of Transportation uses LTPPBind to select its Superpave® binder performance grades.

www.tfhr.gov/pavement/ltp/pdf/00019.pdf

CD-ROM

Guide to Developing Performance-Related Specifications for PCC Pavements

FHWA-RD-00-094

This CD-ROM contains a four-volume report presenting model performance-related specifications for portland cement concrete pavements, along with step-by-step procedures for developing and using performance-related specifications.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Product Briefs

DataPave 3.0: User-Friendly Access to LTPP Data

FHWA-RD-02-032

This document describes DataPave, a user-friendly software package that contains most of the data available from the Long-Term Pavement Performance (LTPP) program experiments, including inventory, material testing, pavement performance monitoring, climatic, traffic, maintenance, rehabilitation and seasonal testing data from 2,500 pavement test sections. The program brings LTPP data and a set of tools for searching, viewing, and manipulating the data to the desktop.

www.tfhr.gov/pavement/ltp/pdf/02032.pdf

DataPave Online: Improving Pavement Design through Performance Data Analysis

FHWA-RD-03-079

This document describes DataPave Online, a Web site that simplifies the task of providing worldwide access to the Long-Term Pavement Performance (LTPP) program data. Programmers can update the online database quickly with each new LTPP data release, providing access to the latest data when available. In addition, LTPP reference documents are available on the site for users to download.

www.tfhrf.gov/pavement/ltp/news.htm

DataPave: User-Friendly Access to LTPP Data

FHWA-RD-99-051

This document announces a simple, user-friendly CD-ROM software package that contains most of the data available from Long-Term Pavement Performance program experiments. These data include inventory, material testing, pavement performance monitoring, climatic, traffic, maintenance, rehabilitation, and seasonal testing data from pavement test sections at 900 locations on in-service highways throughout North America.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

LTPPBind: A New Tool for Selecting Cost-Effective Superpave Asphalt Binder Performance Grades

FHWA-RD-99-082

This document describes LTPPBind, a new software tool developed by the Long-Term Pavement Performance program to help highway agencies select the most suitable and cost-effective Superpave® performance grade for a particular site.

www.tfhrf.gov/pavement/ltp/pbriefs.htm

Manuals Provide Information for Pavement Maintenance and Repair

FHWA-RD-00-084

This document summarizes the Long-Term Pavement Performance (LTPP) program's efforts to revise and update the original Strategic Highway Research Program manuals with pertinent long-term performance and cost-effectiveness information generated by its continued monitoring of LTPP test sections.

www.tfhrf.gov/pavement/ltp/pdf/00084.pdf

Rigid Pavement Design Software: A New Tool for Improved Rigid Pavement Design

FHWA-RD-99-129

This document describes the Rigid Pavement Design software program. The software allows engineers to tailor rigid pavement design to site-specific conditions, materials, traffic, and design details. The resulting design is more cost-effective and reliable.

www.tfhrf.gov/pavement/ltp/pdf/99129.pdf

Temperature Prediction and Adjustment Procedures for Asphalt Concrete Pavements

FHWA-RD-01-081

This document describes a model for predicting the temperature in an asphalt layer from surface temperature data collected during routine deflection, along with procedures to adjust deflection testing results for temperature.

www.tfhrf.gov/pavement/ltp/pdf/01081.pdf

Videotapes Explain the How and Why of LTPP's Revised Resilient Modulus Laboratory Tests and Procedures

FHWA-RD-99-162

This document describes videotapes that inform users about a standardized laboratory procedure developed by the Long-Term Pavement Performance program to measure the resilient modulus of subgrade materials, along with a related laboratory startup and calibration verification procedure.

www.tfhrf.gov/pavement/ltp/pdf/99162.pdf

Working With Your FWD Calibration Center Videotape

FHWA-RD-99-163

This document describes a videotape that the Long-Term Pavement Performance (LTPP) program produced in 1997 that explains the how and why of LTPP's falling-weight deflectometer calibration procedures.

www.tfhr.gov/pavement/ltp/99163.pdf

TechBriefs

Accuracy of LTPP Traffic Loading Estimates

FHWA-RD-98-124

This document presents a study that analyzed the effect of varying truck load rates and data-collection plans on equivalent single-axle load (ESAL) estimates at sample sites in the Long-Term Pavement Performance (LTPP) program database. Results of the analysis are documented in a report entitled Results of the Empirical Analysis of Alternative Data Collection Sampling Plans for Estimating Annual Vehicle Loads at LTPP Test Sites. The purpose of this document is to present key findings and products that resulted from the report.

www.tfhr.gov/pavement/ltp/98124.pdf

Adequacy of Rut Bar Data Collection

FHWA-RD-01-027

This document presents information about pavement rutting and data collection. Rutting is a critical distress in flexible pavements that poses a serious safety hazard. The importance of timely corrective action for rutted pavements—coupled with the need for safe and efficient data collection—has led many State highway agencies to use automated survey vehicles to collect the data needed to assess and monitor rutting. Typically, these devices measure the distance from a reference point on the survey vehicle to the pavement surface at three or five points across the pavement width. The data are then used to compute an estimate of the depth of pavement rutting.

www.tfhr.gov/pavement/ltp/01027.pdf

Comparison of Rehabilitation Strategies for AC Pavements

FHWA-RD-00-166

This document summarizes the results of a Long-Term Pavement Performance (LTPP) program SPS-5 experiment, entitled "Performance of Rehabilitated Asphalt Concrete Pavements in the LTPP Experiments—Data Collected Through February 1997." The study documents performance trends of the 17 SPS-5 projects using distress data collected through February 1997.

www.tfhr.gov/pavement/ltp/00166.pdf

Full-Scale Accelerated Testing of Ultra-Thin Whitetopping Pavements

FHWA-RD-99-087

This document presents a study that addresses the effects of overlay thickness, joint spacing, and fiber reinforcement on the performance of ultra-thin whitetopping pavements.

Library

Help With Converting Pavement Smoothness Specifications

FHWA-RD-02-112

This document reveals that pavement smoothness is a key factor in determining highway user satisfaction. To represent drivers' opinions of roadway conditions adequately, many highway agencies are transitioning to the International Roughness Index (IRI) or the Profile Index (PI), using a 0.0-millimeter (mm) blanking band (PI 0.0) rather than the PI using a 5- or 2.5-mm (.2- or .098-inch) blanking band (PI 5-mm or PI 2.5-mm). This change has led to the need for correlation equations to relate the current PI 5-mm or PI 2.5-mm smoothness specification levels to those in the new specifications.

www.tfhr.gov/pavement/ltp/reports/02112/02112.htm

Improved Prediction Models for PCC Pavement Performance-Related Specifications

FHWA-RD-00-154

This document describes a study with the main objective of improving the distress and smoothness prediction models used in the performance-related specifications approach for jointed plain concrete pavements. It also provides guidelines for calibrating these models for local conditions. Both the improved prediction models and the calibration procedures were implemented in the PaveSpec 3.0 performance-related specifications software.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Key Findings from LTPP Distress Data

FHWA-RD-02-031

This document discusses key differences between two approaches to pavement distress data collection within the Long-Term Pavement Performance (LTPP) program—"manual" distress surveys and photographic surveys.

www.tfhr.gov/pavement/ltp/tp/pdf/02031.pdf

Performance Trends of Rehabilitated AC Pavements

FHWA-RD-00-165

This document summarizes the results of a Long-Term Pavement Performance (LTPP) program GPS-6 experiment, entitled "Performance of Rehabilitated Asphalt Concrete Pavements in the LTPP Experiments—Data Collected Through February 1997." The study documents performance trends of the 125 GPS-6 test sections using distress data collected through February 1997.

www.tfhr.gov/pavement/ltp/tp/pdf/00165.pdf

Portland Cement Concrete (PCC) Partial-Depth Spall Repair

FHWA-RD-99-177

This document examines the merits and deficiencies of current spall repair materials and practices. The primary aim of the partial-depth spall repair study was to determine the most effective and economical materials and procedures for placing quality, long-lasting partial-depth patches in jointed concrete pavements. Spalling is a common distress in jointed concrete pavements. It reduces pavement serviceability, and if left unrepaired, it can become hazardous to highway users.

www.tfhr.gov/pavement/ltp/tp/pdf/99177.pdf

Pothole Repair

FHWA-RD-99-202

This document describes a pothole experiment to determine which combinations of materials and patching procedures provide the most cost-effective repair of potholes in asphalt concrete-surfaced pavements.

Library and www.tfhr.gov/pavement/ltp/tp/pdf/99202.pdf

Reducing Roughness in Rehabilitated Asphalt Concrete Pavements

FHWA-RD-98-149

This document presents a summary explanation of how much different rehabilitation treatments reduce roughness in pavements. It is based on a Long-Term Pavement Performance program study on "The Investigation of Development of Pavement Roughness."

www.tfhr.gov/pavement/ltp/tp/pdf/98149.pdf

Resealing Concrete Pavement Joints

FHWA-RD-99-137

This document summarizes publication FHWA-RD-99-137, which describes a study in which 1,600 joints at five test sites were resealed using 12 sealant materials and four installation methods. For 82 months, field performance data on the different sealants and installation methods were collected at each site.

www.tfhr.gov/pavement/ltp/tp/pdf/99137.pdf

Roughness Trends of Flexible Pavements

FHWA-RD-98-132

This document presents information on the changes in roughness of flexible pavements over time and their relationship to design factors, subgrade conditions, and climatic conditions. The results of this study were published in FHWA-RD-97-147, Investigation of Development of Pavement Roughness. This document summarizes those findings.

www.tfhrcc.gov/pavement/ltpm/pdf/98132.pdf

Sealing and Filling Cracks in Asphalt Pavements

FHWA-RD-99-176

This document summarizes a study to address deficiencies in current crack treatment materials, designs, and practices. The Strategic Highway Research Program and the Federal Highway Administration sponsored the most extensive investigation of crack treatment effectiveness ever undertaken. Monitoring and evaluation of these treatments were conducted under the Long-Term Pavement Performance program.

www.tfhrcc.gov/pavement/ltpm/pdf/99176.pdf

Variability of Pavement Distress Data from Manual Surveys

FHWA-RD-00-160

This document presents a study that assesses the variability of the Long-Term Pavement Performance (LTPP) program distress data. The study includes an assessment of manual distress data variability, film-derived distress data variability, and the agreement between manual and film-derived distress data. The full report is contained in *Study of LTPP Distress Data Variability, Volume I* (FHWA-RD-99-074). The focus of this document is variability in manually collected pavement distress data.

Library and www.tfhrcc.gov/pavement/ltpm/pdf/00160.pdf

What Makes Portland Cement Concrete (PCC) Pavements Rough?

FHWA-RD-98-148

This document presents a summary of how and why roughness occurs in pavements. It summarizes the findings of a Long-Term Pavement Performance program study entitled “The Investigation of Development of Pavement Roughness.”

www.tfhrcc.gov/pavement/ltpm/pdf/98148.pdf

Technical Reports

Accelerated Aging of Concrete: A Literature Review

FHWA-RD-01-073

This report provides a review of the literature on accelerated aging of concrete. It was undertaken as part of a research project on predicting the long-term environmental performance of portland cement concrete pavements containing coal fly ash.

www.tfhrcc.gov/pubrds/02mar/newpubs.htm

An Investment Benefiting America's Highways: The Long-Term Pavement Performance Plan

FHWA-RD-01-094

This report describes the value of the research conducted under the Long-Term Pavement Performance (LTPP) program, a 20-year effort with a goal of providing data and products that extend pavement life at a reasonable cost. It describes products that LTPP has developed and the benefits derived during the program's first decade, including falling-weight deflectometer calibration procedures and software for implementing rigid pavement design procedures.

www.tfhrcc.gov/pavement/ltpm/pdf/01094.pdf

Analysis of Time-Domain Reflectometry Data From LTPP Seasonal Monitoring Program Test Sections— Final Report

FHWA-RD-99-115

This report highlights procedures designed to produce good estimates of in situ gravimetric moisture content. All of the time-domain reflectometry (TDR) traces in the Long-Term Pavement Performance (LTPP) program database were processed using the approach described in this report. TDR has become one of the most reliable methods for measuring in situ soil moisture content. TDR sensors developed by the Federal Highway Administration are being used in the LTPP seasonal monitoring program to monitor the in situ moisture content at selected sites.

www.ntis.gov, PB99-146607

Assessment of LTPP Friction Data

FHWA-RD-99-037

This report provides an assessment of the availability, characteristics, and quality of friction data collected as part of the Long-Term Pavement Performance study. Also, researchers assessed the availability of related pavement characteristics data. Library and abstract online: www.tfhr.gov/pavement/ltp/reports.htm

Assessment of Selected LTPP Materials Data Tables and Development of Representative Test Tables

FHWA-RD-02-001

This report documents an evaluation of selected Long-Term Pavement Performance (LTPP) program materials data tables as of January 2000. Issues addressed include the availability, characteristics, and quality of the data in the selected tables. Data anomalies were identified and corrected where possible, and the cleaned-up data were used to develop representative data tables.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Assessment of the SPS-7 Bonded Concrete Overlays Experiment: Final Report

FHWA-RD-98-130

This report presents an assessment of the Long-Term Pavement Performance SPS-7 experiment on bonded concrete overlays. This report provides background material for a meeting of State agencies held to review the status of the SPS-7 experiment. Library and www.tfhr.gov/structur/program.htm

Backcalculation of Layer Parameters for LTPP Test Sections, Volume I: Slab on Elastic Solid and Slab on Dense-Liquid Foundation Analysis of Rigid Pavements

FHWA-RD-00-086

This report documents the results, using deflection-testing data, of backcalculation of layer material properties for rigid pavements included in the Long-Term Pavement Performance program in the United States and Canada.

Library and www.tfhr.gov/pavement/ltp/pdf/00086.pdf

Back-Calculation of Layer Parameters for LTPP Test Sections, Volume II: Layered Elastic Analysis for Flexible and Rigid Pavements

FHWA-RD-01-113

This report documents the procedure and steps used to backcalculate the layered elastic properties (Young's modulus and the coefficient and exponent of the nonlinear constitutive equation) from deflection basin measurements for the Long-Term Pavement Performance (LTPP) program test sections with a Level E data status. The report summarizes the reasons MODCOMP4 was selected for computing and analyzing the deflection data, provides a summary of the results using the linear elastic module (Young's modulus) for selected test sections, and identifies factors that can have a significant effect on the results.

www.tfhr.gov/pavement/ltp/pdf/01113.pdf

Characterization of Transverse Profiles

FHWA-RD-01-024

This report examines several indices used to quantify and qualify the transverse profiles of pavement. These indices were studied to determine typical trends by climate, surface thickness, soil type, and age. This transverse profile data was collected under the Long-Term Pavement Performance project.

<http://ntl.bts.gov/lib/11000/11200/11223/index.html>

Common Characteristics of Good and Poorly Performing AC Pavements

FHWA-RD-99-193

This report documents the analysis and findings of a study conducted to identify the site conditions and design/construction features of flexible pavements that lead to good performance and those that lead to poor performance. Data from the Long-Term Pavement Performance (LTPP) program test sections were used, along with findings from previous and ongoing analyses of LTPP data.

Library and www.ntis.gov, PB2000-102377

Concrete Mixture Optimization Using Statistical Methods: Final Report

FHWA-RD-03-060

This report presents the results of a joint study by the Federal Highway Administration and the National Institute of Standards and Technology to assess the feasibility of using statistical experiment design and analysis methods to optimize concrete mixture proportions. The laboratory phase of the study indicated that both the classical mixture method and the factorial approach could be applied to the problem of optimizing concrete mixture proportions. The factorial approach was used as the basis for developing an Internet-based computer program, the Concrete Optimization Software Tool, in the second phase of this project.

www.ntis.gov, PB2004-100125

Design and Construction

FHWA-RD-98-113

This report evaluates and analyzes portland cement concrete pavements to develop recommendations for the design and construction of long-lived pavements. This volume describes improved pavement distress and roughness prediction models developed as part of the study. A key focus was to develop distress and roughness prediction models that incorporate mechanistic principles, but are still practical for use by State highway agencies.

www.ntis.gov, PB2000-106434

Design and Construction of PCC Pavement, Volume I: Summary of Design Features and Construction Practices that Influence Performance of Pavements

FHWA-RD-98-052

This report evaluates and analyzes portland cement concrete (PCC) pavements to develop recommendations for the design and construction of long-lived pavements. This volume provides a concise summary of the study results. It includes an overview of the engineering and statistical analyses conducted and presents results State highway agencies can use to obtain high-performance PCC pavements.

www.ntis.gov, PB2002-107537

Design and Construction of PCC Pavement, Volume II: Design Features and Practices that Influence Performance of Pavements

FHWA-RD-98-127

This report evaluates and analyzes portland cement concrete pavements to develop recommendations for the design and construction of long-lived pavements. This volume provides information on design features and construction practices that improve pavement performance. A key focus was to develop canonical discriminant functions that can be used to tell groups of pavements apart.

www.ntis.gov, PB99-162661

Determination of Frost Penetration in LTPP Sections, Final Report

FHWA-RD-99-088

This report determines frost penetration at selected seasonal monitoring program sections in the Long-Term Pavement Performance program. As part of the study, an interactive computer program, FROST, was developed to facilitate the interpretation of the electrical resistivity and temperature data. Analysis results include the freeze state at each electrical resistivity sensor and the frost penetration at each site.

Library and www.ntis.gov, PB2000-102952 and PB99-17556

Development of a Tire/Pavement Contact-Stress Model Based on Artificial Neural Networks

FHWA-RD-99-041

This report presents the first worldwide tire/pavement contact-stress model based on the artificial neural networks developed by the authors at the Pennsylvania Transportation Institute at Pennsylvania State University. These models represent the first mathematical representation of real, measured contact stress at wide ranges of vertical loads and inflation pressures for two types of tires.

www.ntis.gov, PB2001-103488

Distress Identification Manual for the Long-Term Pavement Performance Program

FHWA-RD-03-031

This manual provides a common language for describing cracks, potholes, rutting, spalling, and other pavement distresses being monitored by the Long-Term Pavement Performance (LTPP) program. Color photographs and drawings illustrate the distresses found in three basic pavement types: asphalt concrete-surfaced, jointed (plain and reinforced) portland cement concrete, and continuously reinforced concrete. Methods for measuring the size of distresses and for assigning severity levels are given. The manual also describes how to conduct the distress survey, from obtaining traffic control to measuring the cracks in the pavement. Sample forms for recording and reporting the data are included.

www.tfrc.gov/pavement/ltp/reports/03031/index.htm

Effects of Wheel-Load Spatial Repeatability on Road Damage: A Literature Review

FHWA-RD-97-036

This report reviews current and past research on vehicle/road interaction. Two of the most pressing issues in the area of heavy vehicle-generated road damage are the spatial repeatability of dynamic wheel loads produced by heavy vehicles and the use of wide-base dual tires. The outcome of this review plays a determining role in assessing heavy-truck suspension systems, tire configurations, and their contribution to pavement damage.

www.ntis.gov, PB99-107435

Estimating Cumulative Traffic Loads, Final Report for Phase 1

FHWA-RD-00-054

This report describes a procedure for obtaining axle load spectra for pavement sections under study in the Long-Term Pavement Performance (LTPP) program. The procedure has been demonstrated and evaluated by applying it to 12 LTPP sections for which different amounts of monitoring traffic data were available.

Library and Abstract online: www.tfrc.gov/pavement/ltp/abstracts/00054.htm

Evaluation of Joint and Crack Load Transfer: Final Report

FHWA-RD-02-088

This report analyzes the load transfer efficiency of cracks and joints, which profoundly affects the performance of concrete pavements. Poor load transfer efficiency may lead to longitudinal cracking and excessive faulting of jointed concrete pavements and could accelerate punchout development in continuously reinforced concrete pavements. These distresses could lead to roughness and poor ride quality.

Library and abstract online: www.tfrc.gov/pavement/ltp/abstracts/00054.htm

Fast-Track Paving: Concrete Temperature Control and Traffic Opening Criteria for Bonded Concrete Overlays, Volume I: Final Report

FHWA-RD-98-167

This two-volume report presents research that focuses on modeling early-age behavior of portland cement concrete (PCC) pavements and bonded concrete overlays subjected to stresses from moisture and thermal changes. It includes the development of a two-part, versatile, comprehensive set of guidelines that provide direction on the proper selection of design and construction variables to minimize early-age damage to PCC pavement and bonded concrete overlay. This document presents the final report.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Fast-Track Paving: Concrete Temperature Control and Traffic Opening Criteria for Bonded Concrete Overlays, Volume II: HIPERPAV User's Manual

FHWA-RD-98-168

This two-volume report presents research that focuses on modeling early-age behavior of portland cement concrete (PCC) pavements and bonded concrete overlays subjected to stresses from moisture and thermal changes. It includes the development of a two-part, versatile, comprehensive set of guidelines that provide direction on the proper selection of design and construction variables to minimize early-age damage to PCC pavement and bonded concrete overlay. This volume is a user's manual for HIPERPAV™.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Fast-Track Paving: Concrete Temperature Control and Traffic Opening Criteria for Bonding Concrete Overlays, Volume III: Addendum to the HIPERPAV User's Manual

FHWA-RD-99-200

This report is an addendum to the user's manual of the HIPERPAV™ (High Performance Paving) software package. This package incorporates the complex models developed and can be used as a stand-alone product to verify the overall effects of specific combinations of design, construction, and environmental inputs on early-age behavior of portland cement concrete pavement and bonded concrete overlay.

www.ntis.gov, PB2002-101746

Fundamental Properties of Asphalts and Modified Asphalts—Volume I: Interpretive Report

FHWA-RD-99-212

This report's objective is to improve understanding of the expected performance of petroleum asphalts under service conditions. These conditions include physical behavior of thin asphalt films in contact with aggregate, rheology and oxidative aging of wet asphalt, behavior of asphalt after extended aging, and propensity of asphalt films to reconsolidate (heal) after microcracking.

www.ntis.gov, PB2002-100073

Fundamental Properties of Asphalts and Modified Asphalts—Volume II: Final Report, New Methods

FHWA-RD-99-213

This report presents 16 new methods that distinguish behavioral characteristics of compositionally diverse petroleum asphalts.

www.ntis.gov, PB2001-108760

FWD Calibration Centers Ensure States Get Quality Data: States Use Falling-Weight Deflectometer (FWD) Data to Develop More Cost-Effective Rehabilitation Strategies

FHWA-RD-02-067

This report addresses the benefits of working with falling-weight deflectometer (FWD) calibration centers in Minnesota, Nevada, Pennsylvania, and Texas. The centers help States collect accurate data, resulting in better decisions on when and where to conduct rehabilitation work, more cost-effective use of budget dollars targeted for rehabilitation projects, and better designs for new pavements and overlays.

www.tfhr.gov/pavement/ltp/pdf/02067.pdf

Guide to Developing Performance-Related Specifications for PCC Pavements, Volume I: Practical Guide, Final Report, and Appendix A

FHWA-RD-98-155

This report, the first of a four-volume set, presents guidelines and recommendations to assist highway agencies in developing and using performance-related specifications for portland cement concrete pavement construction.

Library and www.tfsrc.gov/pavement/pccp/pavespec/vol1/foreword/index.htm

Guide to Developing Performance-Related Specifications for PCC Pavements, Volume II: Appendix B, Field Demonstrations

FHWA-RD-98-156

This report documents three methods used to demonstrate revised performance-related specifications (PRS) for portland cement concrete. In the first method, researchers conducted shadow field trials at four new construction projects. For the second method, researchers developed level 1 specifications for three typical designs used by a State highway agency. For the third method, researchers compared historical pay adjustments to PRS-based price adjustments predicted for the same pavement lots. Each method was used to investigate how practical PRS is and how easily it could be implemented.

Library and www.tfsrc.gov/pavement/pccp/pavespec/vol2/foreword/index.htm

Guide to Developing Performance-Related Specifications for PCC Pavements, Volume III: Appendices C Through F

FHWA-RD-98-171

This report contains the supporting documentation for the research study on developing performance-related specifications for portland cement concrete pavements.

Library and www.tfsrc.gov/pavement/pccp/pavespec/vol3/foreword/index.htm

Guidelines for Detection, Analysis, and Treatment of Materials-Related Distress in Concrete Pavement, Volume I: Final Report

FHWA-RD-01-163

This report's objective is to develop guidelines to provide pavement engineers and field and laboratory personnel with a systematic procedure for identifying, evaluating, treating, and preventing materials-related distress in portland cement concrete (PCC) pavements. The report also points out that well-designed and constructed PCC pavements are inherently durable and are expected to be relatively maintenance free during many years of service.

www.tfsrc.gov/pavement/pccp/pubs/01163/index.htm

Guidelines for Detection, Analysis, and Treatment of Materials-Related Distress in Concrete Pavement, Volume II: Guidelines Description and Use

FHWA-RD-01-164

This report on materials-related stress in concrete pavement is divided into two major sections. The first section addresses the laboratory procedures used to examine concrete specimens and presents a systematic method of data collection, recording, and reporting. The second section presents a systematic approach for interpreting the laboratory data—along with design, construction, field evaluation, and performance data—to diagnose what distress mechanisms may be present.

www.tfsrc.gov/pavement/pccp/pubs/01164/index.htm

Guidelines for Detection, Analysis, and Treatment of Materials-Related Distress in Concrete Pavement, Volume III: Case Studies Using the Guidelines

FHWA-RD-01-165

This report documents the investigation of materials-related distress (MRD) in concrete pavements and the development of systematic guidelines for evaluating MRD. The guidelines cover three major areas of MRD: (1) field distress surveys, pavement sampling, and sample handling; (2) laboratory testing, data analysis, and interpretation; and (3) treatment, rehabilitation, and prevention.

www.tfsrc.gov/pavement/pccp/pubs/01165/index.htm

Guidelines for the Use of Lithium to Mitigate or Prevent ASR

FHWA-RD-03-047

This report provides information and guidance on testing, specifying, and using lithium compounds in new concrete construction, as well as in repair and service life extension applications. This report will be of interest to engineers, contractors, and others involved in the design and specification of new concrete, as well as those involved in mitigating the damaging effects of alkali-silica reaction in existing concrete structures.

www.tfhr.gov/pavement/pccp/pubs/03047

Hot-Mix Asphalt Pavement Construction Report for the 1993-2000 FHWA Accelerated Loading Facility Project

FHWA-RD-99-083

The Federal Highway Administration is conducting studies to validate Superpave® binder and mixture tests using its accelerated loading facility. This report documents the mixture designs, construction procedures, and quality control and quality assurance tests for the asphalt pavement layers.

Library and www.ntis.gov, PB99-155061

Improved Prediction Models for PCC Pavement Performance-Related Specifications, Volume I: Final Report

FHWA-RD-00-130

This report focuses on the improvement of the key distress and smoothness prediction models used in the performance-related specifications (PRS) for jointed plain concrete pavement. The PRS methodology, under development by the Federal Highway Administration for several years, has now reached a level at which it can be implemented by State highway agencies. PRS for highway pavements depend heavily on performance prediction models to determine the impact of varying levels of construction quality. Volume I is the final report.

Library and www.tfhr.gov/pavement/pubs/00130.pdf

Improved Prediction Models for PCC Pavement Performance-Related Specifications, Volume II: PaveSpec 3.0 User's Guide

FHWA-RD-00-131

This report focuses on the improvement of the key distress and smoothness prediction models used in the performance-related specifications (PRS) for jointed plain concrete pavement. The PRS methodology, under development by the Federal Highway Administration for several years, has reached a level at which it can be implemented by State highway agencies. PRS for highway pavements depend heavily on performance prediction models to determine the impact of varying levels of construction quality. Volume II is a user's guide for PaveSpec 3.0.

Library and www.tfhr.gov/pavement/pubs/00131.pdf

Joint Sawing Guideline: The Window of Opportunity

FHWA-RD-98-172

This report presents information about the importance of joint sawing in the construction of jointed concrete pavements. The purpose of sawing joints in new concrete is to create a plane of weakness that will induce cracking at a desired location.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Long-Term Effectiveness of Cathodic Protection Systems on Highway Structures

FHWA-RD-01-096

This report summarizes an evaluation of the protection provided by cathodic protection systems and estimates the expected service life for the anode materials in similar environments. Cathodic protection is the only rehabilitation technique proven to stop corrosion in salt-contaminated bridge decks, regardless of the chloride content of the concrete. This technology is based on the principle of applying an external source of current to counteract the internal corrosion current produced in reinforced concrete components. This report will be of interest to engineers involved in bridge design, maintenance, rehabilitation, and performance evaluation and prediction.

www.tfhr.gov/pavement/ltp/tp/reports/01096.htm

Long-Term Monitoring of Pavement Maintenance Materials Test Sites

FHWA-RD-98-073

This report presents a study that was part of the most extensive pavement maintenance experiment ever conducted. This study provides valuable data on the performance and cost effectiveness of various cold-mix materials and procedures for repairing asphalt concrete-surfaced pavements. The information derived from this study will advance the state of the practice of response-type pothole-patching operations.

Abstract online: www.tfsrc.gov/pavement/ltp/abstracts/98073.htm

Long-Term Performance of Corrosion Inhibitors Used in Repair of Reinforced Concrete Bridge Components

FHWA-RD-01-097

This report describes a Strategic Highway Research Program project (SHRP C-103) that evaluated the effectiveness of using corrosion inhibitors to mitigate corrosion in reinforced concrete bridge components. This project, which concluded in 1993, involved a laboratory study and field validation.

www.tfsrc.gov/pavement/ltp/reports/01097/

LTPP Maintenance and Rehabilitation Data Review: Final Report

FHWA-RD-01-019

This report provides a detailed review of the Long-Term Pavement Performance (LTPP) program maintenance and review data and presents the findings from the review. A total of 757 test sections have undergone some type of maintenance and review activity. Of these test sections, only 23 anomalies were found. These anomalies consist primarily of sections that have patching recorded in the maintenance and review tables, but no increase in patching area or number in the distress surveys.

www.tfsrc.gov/pavement/ltp/pdf/01019.pdf

LTPP Pavement Maintenance Materials: PCC Partial-Depth Spall Repair Experiment, Final Report

FHWA-RD-99-153

This report documents the Long-Term Pavement Performance program study on partial-depth spall repair of portland cement concrete, including the installation of 30 unique repair types at four different test sites, laboratory testing of experimental repair materials, and 7-year performance monitoring of the various partial-depth repairs.

Library and www.ntis.gov, PB2000-100915

LTPP Pavement Maintenance Materials: SHRP Crack Treatment Experiment, Final Report

FHWA-RD-99-143

This report presents the Strategic Highway Research Program (SHRP) H-106 maintenance experiment and the Federal Highway Administration's Long-Term Monitoring of Pavement Maintenance Materials Test Sites program. The project studied two distinct asphalt concrete crack treatments: transverse crack sealing and longitudinal crack filling.

Library and www.ntis.gov, PB2000-102371

LTPP Pavement Maintenance Materials: SHRP Joint Reseal Experiment, Final Report

FHWA-RD-99-142

This report documents a portland cement concrete joint resealing study, including installation of 31 unique joint seal treatments at five different test sites, laboratory testing of experimental sealant materials, and 7-year performance monitoring of the various joint seal treatments. The study evaluated the relative performance of selected sealant materials and the effect of selected sealant installation methods. The study also identified sealant material properties and tests that correlate well with field performance.

Library and www.ntis.gov, PB2000-102370

LTPP Pavement Maintenance Materials: SPS-4 Supplemental Joint Seal Experiment, Final Report

FHWA-RD-99-151

This report documents the entire Long-Term Pavement Performance program SPS-4 supplemental joint seal study, including the installation of 29 unique joint seal treatments, the laboratory testing of experimental sealant materials, and the multiyear performance monitoring of the various joint seal treatments. It also discusses the results of comprehensive statistical analyses conducted on sealant material performance.

Library and www.ntis.gov, PB2000-100914

LTPP Product Plan

FHWA-RD-01-086

This report describes a plan for identifying, developing, and delivering products under the Long-Term Pavement Performance (LTPP) program. It defines LTPP products as ready-to-use guidelines, procedures, protocols, best practices, software, and equipment. Under the plan, LTPP products must pass a means test with specific criteria, including whether the product has a sound technical basis and is supported by formal research results.

www.tfhr.gov/pavement/ltp/p/01086.pdf

Materials and Procedures for Rapid Repair of Partial-Depth Spalls in Concrete Pavements—Manual of Practice

FHWA-RD-99-152

This manual of practice is an updated version of the *1993 Strategic Highway Research Program Spall Repair Manual*. It contains the latest information on the performance of repair materials and methods; the availability and relative costs of repair materials; and the proper ways of planning, designing, constructing, and monitoring the performance of partial-depth spall repair projects. It also provides an updated partial listing of materials and equipment manufacturers.

www.tfhr.gov/pavement/ltp/p/99152a.pdf

Materials and Procedures for Repair of Joint Seals in Portland Cement Concrete Pavements—Manual of Practice

FHWA-RD-99-146

This manual of practice is an updated version of the *1993 Strategic Highway Research Program (SHRP) Joint Seal Repair Manual*. The SHRP H-106 maintenance experiment and the Federal Highway Administration's long-term monitoring project also studied the resealing of joints in concrete pavements. Many different sealant materials and resealing methods were investigated from 1991 to 1998 through test sites installed at five U.S. locations.

www.tfhr.gov/pavement/ltp/p/99146.pdf

Materials and Procedures for Repair of Potholes in Asphalt-Surfaced Pavements—Manual of Practice

FHWA-RD-99-168

This report presents the Strategic Highway Research Program H-106 maintenance experiment and the Federal Highway Administration Long-Term Monitoring of Pavement Maintenance Materials Test Sites project that studied the repair of potholes in asphalt-surfaced pavements. The findings of these combined studies have been merged with standard highway agency procedures to provide the most useful and up-to-date information on the practice of repairing potholes.

Library and www.tfhr.gov/pavement/ltp/p/99168.pdf

Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements—Manual of Practice

FHWA-RD-99-147

This manual of practice is an updated version of the *1993 Strategic Highway Research Program Crack Sealing and Filling Manual*. It contains the latest information on the performance of treatment materials and methods; the availability and relative costs of sealant/filler materials; and the proper ways to plan, design, construct, and monitor the performance of crack treatment projects.

www.tfhrcc.gov/pavement/ltp/tp/pdf/99147a.pdf and www.tfhrcc.gov/pavement/ltp/tp/pdf/99147b.pdf

Measurement and Specification of Construction Quality, Volume I: Final Report

FHWA-RD-98-077

This report presents a study that consisted of testing six pavement projects, three hot-mix asphalt concrete and three portland cement concrete. The primary objectives were to (1) determine how quality control test results vary in construction projects and how this variability affects pavement performance, (2) assess the suitability of current methods of quantifying materials and construction quality and quality variability, and (3) develop and improve methods that minimize shortcomings. Volume I of this report contains information about data analysis.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Mechanistic Evaluation of Test Data from LTPP Flexible Pavement Test Sections, Volume I: Final Report

FHWA-RD-98-012

This report analyzes how well some existing asphalt pavement mechanistic-empirical distress prediction models performed when used in conjunction with the data being collected as part of the Long-Term Pavement Performance (LTPP) program. This study shows that, even given the current limitations in the LTPP database, the data can be used successfully to develop better insights into pavement behavior and improve pavement performance.

www.ntis.gov, PB98-146228

Mechanistic Evaluation of Test Data from LTPP Flexible Pavement Test Sections, Volume II: Appendices

FHWA-RD-98-020

This document presents the appendices of a report that analyzes how well some of the existing asphalt pavement mechanistic-empirical distress prediction models performed when used in conjunction with the data being collected as part of the Long-Term Pavement Performance (LTPP) program. This study shows that, even given the current limitations in the LTPP database, the data can be used successfully to develop a better insights into pavement behavior and improve pavement performance.

www.ntis.gov, PB98-131105

Mechanistic Evaluation of Test Data from LTPP Jointed Concrete Pavement Test Sections

FHWA-RD-98-094

This report presents a study conducted to assess how well some mechanistic empirical-based distress prediction procedures for concrete pavement performed when used in conjunction with data collected as part of the Long-Term Pavement Performance (LTPP) program. This study showed that, even with the current limitations in the LTPP database, the data can be used successfully to develop better insights into pavement behavior and improve pavement performance.

Abstract online: www.tfhrcc.gov/pavement/ltp/tp/abstracts/98094.htm

Methodology for Determining Compaction Temperatures for Modified Asphalt Binders

FHWA-RD-02-016

This report documents a Federal Highway Administration study performed to assist asphalt mixture technologists in choosing an appropriate laboratory compaction temperature for asphalt mixture design. This temperature is important because it can affect both the optimum asphalt binder content and the mechanical properties of an asphalt mixture.

www.tfhrcc.gov/pavement/asphalt/pavepubs/02016

Microdamage Healing in Asphalt and Asphalt Concrete, Volume II: Laboratory and Field Testing to Assess and Evaluate Microdamage and Microdamage Healing

FHWA-RD-98-142

This report documents testing in the laboratory and field that provides evidence that microdamage healing in asphalt and asphalt concrete is real, measurable, and has a significant impact on pavement performance.

Library and www.ntis.gov, PB2001-107667

Microdamage Healing in Asphalt and Asphalt Concrete, Volume III: A Micromechanics Fracture and Healing Model for Asphalt Concrete

FHWA-RD-98-143

This report documents the development of a micromechanics fracture and healing model for asphalt concrete. This model can be used to calculate the density and growth of microcracks during repeated direct tensile controlled-strain loading.

Library and www.ntis.gov, PB2001-107668

Microdamage Healing in Asphalt and Asphalt Concrete, Volume IV: A Viscoelastic Continuum Damage Fatigue Model of Asphalt Concrete With Microdamage Healing

FHWA-RD-98-144

This report presents a mechanistic approach to fatigue characterization of asphalt-aggregate mixtures. This approach is founded on a uniaxial viscoelastic constitutive model that accounts for damage evolution under cyclic loading conditions.

Library

OECD DIVINE Element 1: Accelerated Dynamic Pavement Testing

FHWA-RD-97-138

This report reveals that the weight of a truck's load affects the life of pavements and bridges and, therefore, the cost of maintaining and repairing the Nation's roads. The Organisation for Economic Cooperation and Development (OECD) Road Transport Research Programme found that dynamic pavement loading is increasing in OECD countries, resulting in an increase in the rate of road wear. Although researchers recognize the relationship between the weight of a truck's load and wear on a roadway, many questions on the nature and influence of dynamic loading and the interaction between the vehicle and pavements and bridges remain.

www.ntis.gov, PB99-107401

Optimal Procedures for Quality Assurance Specifications

FHWA-RD-02-095

This manual is a comprehensive guide for highway agencies to use in developing new or modifying existing acceptance plans and quality assurance specifications. It provides necessary instruction and illustrative examples to lead agencies through the entire process of acceptance plan development.

www.tfhrcc.gov/pavement/pccp/pubs/02095/

Pavement Smoothness Index Relationships

FHWA-RD-02-057

This report reveals that nearly all State highway agencies use smoothness specifications to ensure that hot-mix asphalt and portland cement concrete pavements are built to high levels of smoothness. Not only is an initially smooth pavement generally indicative of quality workmanship, but it also has been shown to last longer than a pavement built with a rougher level.

www.tfhrcc.gov/pavement/ltp/reports/02057/02057.htm

Performance of Coarse-Graded Mixes at WesTrack—Premature Rutting

FHWA-RD-99-134

This report discusses the work of a forensic team assembled to study the early failures of and make recommendations for revising the Superpave® procedures.

Library and www.ntis.gov, PB99-157984

Performance of Continuously Reinforced Concrete Pavements, Volume V: Maintenance and Repair of CRC Pavements

FHWA-RD-98-101

This report is one of a series prepared as part of a national pooled fund study administered by the Federal Highway Administration to update the state of the art of the design, construction, maintenance, and rehabilitation of continuously reinforced concrete (CRC) pavements. This report, the fifth in the series, presents results on CRC pavement distress and procedures for repair of CRC pavements. Since the most troublesome problems with CRC pavements are punchout distresses and distresses associated with steel rupture, this report emphasizes repairs of these distresses.

www.ntis.gov, PB99-128308

Performance of CRC Pavements, Volume VI: CRC Pavement Design, Construction, and Performance

FHWA-RD-97-151

This report is part of a series prepared in a study sponsored by the Federal Highway Administration. The study was aimed at updating the state of the art of the design, construction, maintenance, and rehabilitation of continuously reinforced concrete pavements.

www.ntis.gov

Portable Changeable Message Sign Handbook

FHWA-RD-03-066

This handbook presents basic guidelines for using portable changeable message signs, traffic control devices capable of displaying a variety of messages to inform motorists of unusual driving conditions. It illustrates the principles of proper portable changeable message sign use.

www.tfsrc.gov/pavement/ltp/reports/03066/

Portland Cement Concrete Rheology and Workability, Final Report

FHWA-RD-00-025

This report describes methods used to determine the workability of freshly mixed portland cement concrete with slumps of less than 51 millimeters (2 inches). They include two moving-object methods, one free-orifice method, and a vibrating-slope method. The report also outlines modifications to these techniques and equipment to permit the measurement of rheological properties at two or more shear rates.

Library and www.tfsrc.gov/pavement/pccp/pdfs/00025.pdf

Prediction of Chloride Penetration in Concrete

FHWA-RD-00-142

This report's objective was to identify or develop a test for predicting chloride penetration in concrete to be used for evaluating new mixes, accepting or rejecting new concrete according to specifications, and evaluating in-place concrete. The test was intended to supplement or replace the use of AASHTO T27-93, "Electrical Indication of Concrete's Ability to Resist Chloride."

Library and www.ntis.gov, PB2002-100056

Preliminary Evaluation and Analysis of LTPP Faulting Data, Final Report

FHWA-RD-00-076

This report presents recommendations for improving the design and construction of new and rehabilitated pavements to make them last longer, a major goal of the Long-Term Pavement Performance (LTPP) study. As part of the condition monitoring of LTPP test sections, joint and crack faulting data are collected regularly at each jointed concrete pavement test site.

Library and www.tfsrc.gov/pavement/ltp/pdf/00076a.pdf and www.tfsrc.gov/pavement/ltp/pdf/00076b.pdf

Preliminary Evaluation of LTPP Continuously Reinforced Concrete (CRC) Pavement Test Sections

FHWA-RD-99-086

This report presents an analysis of data from the Long-Term Pavement Performance GPS-5 test sections. It identifies factors that influence long-term crack spacing in continuously reinforced concrete pavements and determine the effects of crack spacing on pavement performance. In addition, data from the 85 test sections from the GPS-5 experiment were analyzed. Library and www.ntis.gov, PB99-162778

Road Simulator Study of Heavy-Vehicle Wheel Forces

FHWA-RD-98-019

This report investigates the effects of vehicle and road characteristics on dynamic forces applied by heavy vehicles in pavement. The three main areas analyzed are development of equipment necessary for the testing program, performance of the tests, and analysis of the test results. www.ntis.gov, PB99-146730

Study of LTPP Distress Data Variability, Volume I

FHWA-RD-99-074

This report is Volume I of a two-volume set that documents the results of a study to evaluate and quantify the variability of pavement distress data collected in the Long-Term Pavement Performance (LTPP) program. Analyses were performed on both manual and film-derived distress data. General trends of the distress data were first investigated, followed by statistical analyses of repeatability and detection of variability sources.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov, PB01-00588

Study of LTPP Distress Data Variability, Volume II: Appendices A to C

FHWA-RD-99-075

This report is Volume II of a two-volume set that documents the results of a study to evaluate and quantify the variability of pavement distress data collected in the Long-Term Pavement Performance (LTPP) program. Analyses were performed on both manual and film-derived distress data. General trends of the distress data were first investigated, followed by statistical analyses of repeatability and detection of variability sources. This volume presents the appendices.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov, PB01-02373

Study of LTPP Laboratory Resilient Modulus Test Data and Response Characteristics

FHWA-RD-02-051

This report documents the first comprehensive review and evaluation of the resilient modulus test data measured on pavement materials and soils recovered from the Long-Term Pavement Performance (LTPP) program test sections. A total of 2,014 resilient modulus tests have passed all quality control checks and are included in the LTPP database with a Level E data status. By October 2000, 1,639 resilient modulus tests still needed to be performed. In some cases, the missing tests may have been performed but failed to achieve a Level E status (had not passed all quality control checks) in the LTPP database. These test results, however, have not been evaluated in detail.

www.tfhr.gov/pavement/ltp/reports/02051/02051.htm

Superpave Mixture Design Guide

FHWA-RD-01-052

This mixture design guide for Superpave® was prepared by the forensic team to meet the asphalt community's needs. It includes observations on mixture design compaction level determination, performance-graded binder selection, and aggregate selection. It also includes extensive discussion of the mixture design process and a summary of laboratory performance tests for assessing mixture resistance to rutting.

www.tfhr.gov/pavement/1052.pdf

Temperature Predictions and Adjustment Factors for Asphalt Pavement

FHWA-RD-98-085

This report presents the results of an analysis of the deflections and backcalculated asphalt moduli response to pavement temperature. The study used deflection and temperature data from 40 asphalt pavement sites monitored in the seasonal monitoring program of the Long-Term Pavement Performance program.

www.ntis.gov, www.tfhr.gov/pavement/ltp/pdf/98085a.pdf, and www.tfhr.gov/pavement/ltp/pdf/98085b.pdf

The Effects of Higher Strength and Associated Concrete Properties on Pavement Performance

FHWA-RD-00-161

This report presents recommendations for portland cement concrete properties and materials characteristics found in higher-strength jointed plain concrete pavements. It focuses on improved long-term performance, determined by joint spalling and faulting, and transverse slab cracking.

Library and www.tfhr.gov/pavement/pubs/00161a.pdf

Transport Properties and Durability of Concrete: Literature Review and Research Plan

FHWA-RD-00-073

This report reviews the state of the art for measuring transport properties in the laboratory and field, and discusses links between transport properties and models for various deterioration processes relevant to highway concretes. The increased emphasis on life-cycle cost analysis for building projects requires that new attention be focused on the service life and durability of concrete structures.

Abstract online: www.tfhr.gov/pavement/pccp/pubs/00073ab.htm

Understanding the Performance of Modified Asphalt Binders in Mixtures: Evaluation of Moisture Sensitivity

FHWA-RD-02-029

This report documents the effects of polymer-modified asphalt binders on moisture sensitivity. The objective of this report is to determine if asphalt binder performance is captured by the Superpave® asphalt binder specification developed under the 1987-1993 Strategic Highway Research Program. It emphasizes evaluation of the performance of mixtures containing polymer-modified asphalt binders with identical Superpave performance grades but varied chemistries.

www.tfhr.gov/pavement/asphalt/pavepubs/02029/

Understanding the Performance of Modified Asphalt Binders in Mixtures: High-Temperature Characterization

FHWA-RD-02-075

This report's objective is to determine if asphalt binder performance is captured by the Superpave® asphalt binder specification developed under the 1987-1993 Strategic Highway Research Program. It emphasizes evaluation of the performance of mixtures containing polymer-modified asphalt binders with identical Superpave performance grades, but varied chemistries. Although identical performance grades were desired, the high-temperature performance grades of the polymer-modified asphalt binders ranged from 71 to 77.

www.tfhr.gov/pavement/asphalt/pavepubs/02075/index.htm

Understanding the Performance of Modified Asphalt Binders in Mixtures: Low-Temperature Properties

FHWA-RD-02-074

This report documents the effects of polymer-modified asphalt binders on the low-temperature cracking resistance of asphalt mixtures. It emphasizes evaluation of the performance of mixtures containing polymer-modified asphalt binders with identical Superpave® performance grades, but varied modification chemistries.

www.tfhr.gov/pavement/asphalt/pavepubs/02074/index.htm

Understanding the Performance of Modified Asphalt Binders in Mixtures: Permanent Deformation Using a Mixture With Diabase Aggregate

FHWA-RD-02-042

This report documents the effects of polymer-modified asphalt binders on the rutting resistance of a mixture with diabase aggregate. For the materials tested in this study, good correlations were found between asphalt binder properties and laboratory mixture rutting resistance. This indicates that the current Superpave® asphalt binder specification and testing protocols are valid. The Federal Highway Administration will test additional mixtures to verify these findings. This report will be of interest to highway personnel who use polymer-modified asphalt binders and Superpave.

www.tfrc.gov/pavement/asphalt/pavepubs/02042/

Validation of the Superpave Asphalt Binder Fatigue Cracking Parameter, $G^* \sin(\delta)$, Using an Accelerated Loading Facility

FHWA-RD-01-093

This report present information about an accelerated loading facility (ALF) used to validate the Superpave® asphalt binder parameter for fatigue cracking, $G^* \sin(\delta)$. The ALF is a full-scale pavement testing machine that applies one-half of a single rear truck axle load. The speed of the ALF and the applied load were constant in this study.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov



5 *Safety*

TechBriefs

A Review of the Impacts of the Towaway Reporting Threshold on a Highway Safety Program

FHWA-RD-01-114

This summary report reviews the potential impacts of a towaway reporting threshold on the North Carolina Highway Safety Improvement Program listings, and on the locations and types of crash patterns identified on collision diagrams by field engineers. www.hsisinfo.org/pdf/01-114.pdf

Advanced Traveler Information System Capabilities: Human Factors Research Needs

FHWA-RD-98-186

This document summarizes the identified human factors research needs for advanced traveler information systems. www.fhwa.dot.gov/tfhrc/safety/pubs/98-186.pdf

Basic Collision Warning and Driver Information Systems: Human Factors Research Needs

FHWA-RD-98-184

This document summarizes the identified human factors research needs for basic safety and information systems, one of five configurations of in-vehicle safety and driver information systems. www.fhwa.dot.gov/tfhrc/safety/pubs/98-184.pdf

Evaluation of Design Consistency Methods for Two-Lane Rural Highways, Technical Summary

FHWA-RD-99-174

This document pertains to new data on the design consistency module, one of seven modules being developed as part of the Interactive Highway Safety Design Model. www.tfhrc.gov/safety/ihsdm/pdfs/99-174.pdf

GIS-Based Crash Referencing and Analysis System

FHWA-RD-99-081

This document presents information about geographic information systems (GIS), a collection of hardware and software used to edit, analyze, and display geographical information stored in a spatial database. Computerized crash analysis systems in which crash data, roadway inventory data, and traffic operations data can be merged are used in many States to identify problem locations and assess the effectiveness of implemented countermeasures. www.fhwa.dot.gov/tfhrc/safety/pubs/99-081.pdf

GIS Tools for Improving Pedestrian and Bike Safety

FHWA-RD-00-153

This document presents information about geographic information system (GIS) software that turns statistical data such as crashes and geographic data such as roads and crash locations into meaningful information for spatial analysis and mapping. In this project, GIS-based analytical techniques were applied to a series of pedestrian and bicycle safety issues, including safe routes for walking to school, selection of streets for bicycle routes, and high crash zones for pedestrians. <http://safety.fhwa.dot.gov/fourthlevel/pdf/gis.pdf>

Highway Fog Warning System

FHWA-RD-99-110

This document analyzes a study conducted to develop a low-cost, reliable fog sensor. The need for a highway fog warning system has long been internationally recognized. With such a system, motorists could avoid often-fatal pile-up crashes caused by dense or patchy fog. www.itsdocs.fhwa.dot.gov/JPODOCS/PERIODIC//76M01!.PDF

Human Factors Design Research Needs for the Intelligent Vehicle Initiative (IVI) Program

FHWA-RD-98-147

This document summarizes the activities and results of a preliminary human factors review for the Intelligent Vehicle Initiative (IVI) program. The objective of the project was to help the U.S. Department of Transportation identify human factors work that needs to be done early in the life cycle of the IVI program to ensure safe and well-engineered vehicles.

www.fhwa.dot.gov/tfhrc/safety/pubs/98-147.pdf

Integrated Capabilities In Heavy Vehicles: Human Factors Research Needs

FHWA-RD-98-187

This document summarizes the identified human factors research needs for integrated in-vehicle systems for commercial vehicle operations.

www.tfhrc.gov/humanfac/98-187.pdf

Integrated ITS Capabilities In Transit Vehicles: Human Factors Research Needs

FHWA-RD-98-188

This document summarizes the identified human factors research needs for integrated intelligent transportation systems capabilities in transit vehicles.

www.fhwa.dot.gov/tfhrc/safety/pubs/98-188.pdf

Intersection Collision Warning System

FHWA-RD-99-103

This document describes a project on an intersection collision warning system. It was designed to enhance driver awareness of traffic situations at intersections by providing timely and easily understood warnings of vehicles entering the intersection.

Library and www.fhwa.dot.gov/tfhrc/safety/pubs/its/ruralitsandr&d/tb-intercollision.pdf

Roundabouts: An Informational Guide

FHWA-RD-00-068

This document presents information on roundabout intersections based on established international and U.S. practices and supplemented by recent research. The guide is comprehensive in recognition of the diverse needs of transportation professionals and the public for introductory material through design detail, as well as the wide range of potential applications of roundabout intersections.

www.tfhrc.gov/safety/00068.pdf

Rural ITS

FHWA-RD-99-102

This document presents information about rural intelligent transportation systems (ITS) that focuses on travelers' and operators' needs in non-urban areas of the United States. Rural ITS infrastructure aims to improve the quality of life for rural residents and travelers by facilitating safer, more secure, and more efficient movement of people and goods.

www.fhwa.dot.gov/tfhrc/safety/pubs/its/ruralitsandr&d/tb-ruralits.pdf

Safety Effectiveness of Intersection Left- and Right-Turn Lanes

FHWA-RD-02-103

This document summarizes the findings of a report called *Safety Effectiveness of Intersection Left- and Right-Turn Lanes* (FHWA-RD-02-089). The report presents the results of research on the safety effectiveness of providing left- and right-turn lanes for at-grade intersections.

www.tfhrc.gov/safety/pubs/02089/02089techbrief.htm

Safety Effects of the Conversion of Rural Two-Lane Roadways to Four-Lane Roadways

FHWA-RD-99-206

This summary report analyzes the issue of conversion of rural roadways from two lanes to four lanes, which is of increasing importance to State and local transportation agencies, the Federal Highway Administration, and the public. Interest also is increasing in better defining the safety effects of such conversions, since conversions often become highly politicized. www.hsisinfo.org/pdf/99-206.pdf

The Bicycle Compatibility Index: A Level of Service Concept

FHWA-RD-99-127

This document describes the Bicycle Compatibility Index, a model for evaluating roadways to determine geometric and operational requirements to allow efficient operation of both bicycles and motor vehicles. It was developed under the Federal Highway Administration's Pedestrian and Bicycle Safety Research Program, which focuses on identifying problem areas for pedestrians and bicycles, developing analysis tools that allow planners to target problem areas, and evaluating countermeasures to reduce crashes involving pedestrians and bicyclists. Library and <http://safety.fhwa.dot.gov/fourthlevel/pdf/TechBriefJul99.pdf>

The Effects of Airbags on Severity Indices for Roadside Objects

FHWA-RD-98-056

This summary report analyzes collisions with roadside objects and measures the average severity of their impacts, which will aid in determining where best to spend roadside improvement funds. Airbags have been shown to reduce the severity of driver injury in roadside crashes, and this report uses a large sample of airbag-equipped vehicles and a multi-State database for analyzing and validating the effectiveness of airbags. www.hsisinfo.org/pdf/98-056.pdf

Using GIS in the Analysis of Truck Crashes

FHWA-RD-99-119

This summary report presents computerized crash analysis systems in which crash data, roadway inventory data, and traffic operations data are merged and used in many States and municipalities to identify problem locations and assess the effectiveness of implemented countermeasures. Integrating this traditional system with a geographic information system offering spatial referencing capabilities and graphical displays can result in a more effective crash analysis program. www.fhwa.dot.gov/tfhrc/safety/pubs/99-119.pdf

Technical Reports

1994 Ford Explorer XLT Broadside Collision With a Narrow Fixed Object: FOIL Test Number 98S005

FHWA-RD-98-150

This report contains the test procedures, setup, and results from the first of three broadside crash tests conducted at the Federal Highway Administration's Federal Outdoor Impact Laboratory. The three vehicles used for these tests were a 1994 Ford Explorer XLT (covered in this report), a 1994 Toyota pickup truck, and a 1995 Honda Accord LX. www.ntis.gov, PB99-130296

1994 Toyota Pickup Broadside Collision With a Narrow Fixed Object: FOIL Test Number 98S006

FHWA-RD-98-151

This report contains the test procedures, setup, and results from the second of three broadside crash tests conducted at the Federal Highway Administration's Federal Outdoor Impact Laboratory. The three vehicles used for these tests were a 1994 Ford Explorer XLT, a 1994 Toyota pickup truck (covered in this report), and a 1995 Honda Accord LX. www.ntis.gov, PB99-130304

1995 Honda Accord LX Broadside Collision With a Narrow Fixed Object: FOIL Test Number 98S007

FHWA-RD-99-024

This report describes the test procedures, setup, and results from the last of three broadside crash tests conducted at the Federal Highway Administration's (FHWA) Federal Outdoor Impact Laboratory. The National Highway Traffic Safety Administration enlisted FHWA to aid in developing laboratory test procedures to be used in an amended version of Federal Motor Vehicle Safety Standard (FMVSS) 201.

www.ntis.gov, PB99-130312

A Comparative Analysis of Bicycle Lanes Versus Wide Curb Lanes: Final Report

FHWA-RD-99-034

This report provides a description of the research methodology, data collection procedures, and analysis used in a study to compare the safety and operations of bicycle lanes and wide curb lanes.

www.ntis.gov, PB2000-101611 and www.tfhr.gov/safety/pedbike/pubs/99034.pdf

A Safety Evaluation of UVA Vehicle Headlights

FHWA-RD-99-074

This report investigates the safety of using ultraviolet-activated (UVA) fluorescent technology in vehicle headlights. The major project activities involved determining changes in driver performance and visibility of roadway delineation and pedestrians, and assessing the effects on safety. In addition, a cost/benefit analysis was conducted that compared the expense of installing and maintaining fluorescent materials to any savings achieved from the reduction in highway crashes.

www.tfhr.gov/safety/pubs/99074/introset.htm

A Safety Evaluation of UVA Vehicle Headlights

FHWA-RD-99-079

This report discusses research designed to investigate the safety and cost/benefits possible from the use of ultraviolet-activated (UVA) fluorescent technology for vehicle headlights. The major project activities involved determining changes in driver performance and visibility of roadway delineation and pedestrians, and assessing the effects on safety.

www.tfhr.gov/safety/pubs/99074/preface.htm

Accident Models for Two-Lane Rural Roads: Segments and Intersections

FHWA-RD-98-133

This report describes the collection, analysis, and modeling of crash and roadway data pertaining to segments and intersections on rural roads in Minnesota (1985-1989) and Washington State (1993-1995). The segments are on two-lane roads, and the intersections are three- and four-legged intersections that are stop-controlled on the minor legs. Data were acquired from the Highway Safety Information System, photologs, construction plans, and State databases. More than 1,300 segments and 700 intersections are included in the final samples on which the modeling is based.

www.ntis.gov, PB99-142713 and www.tfhr.gov/safety/98133/index.html

Advanced Traveler Information Systems and Commercial Vehicle Operations Components of the Intelligent Transportation Systems: On-Road Evaluation of ATIS Messages

FHWA-RD-99-132

This report describes the results of an on-road study that examined how advanced traveler information systems (ATIS) information influences driver behavior. The objective of the study was to develop ATIS design guidelines, primarily for in-vehicle signing and information systems and in-vehicle safety advisory and warning systems, to define the amount and format of information that can safely be displayed in an ATIS.

www.fhwa.dot.gov/tfhr/safety/pubs/99132/99132.html

Alternative Design Consistency Rating Methods for Two-Lane Rural Highways, Final Report

FHWA-RD-99-172

This report investigates alternatives that could be used in the design consistency module of the Interactive Highway Safety Design Model.

www.ntis.gov, PB2001-102932

An Evaluation of High-Visibility Crosswalk Treatment—Clearwater, Florida

FHWA-RD-00-105

This report examines the effect of a novel overhead illuminated crosswalk sign and high-visibility ladder-style crosswalk in Florida. This was part of a larger Federal Highway Administration research study investigating the effectiveness of innovative engineering treatments on pedestrian safety.

<http://www.tfhr.gov/safety/pedbike/pubs/0105.pdf>

An Evaluation of Illuminated Pedestrian Push Buttons in Windsor, Ontario

FHWA-RD-00-102

This report evaluates the effects of illuminated push buttons on pedestrian behavior. This was part of a larger Federal Highway Administration research study investigating the effectiveness of innovative engineering treatments on pedestrian safety.

<http://www.tfhr.gov/safety/pedbike/pubs/0102.pdf>

Applying Vehicle Dynamics Analysis and Visualization to Roadway and Roadside Studies

FHWA-RD-98-030

This report describes the application of vehicle dynamic modeling and visualization to highway safety design within the Interactive Highway Safety Design Model. This concept is intended to allow highway engineers to test roadway designs by computer simulation of vehicle encounters with roadway geometry and to assess roadway alignment and visibility features using three-dimensional graphical visualization.

www.ntis.gov, PB99-162786

Bicycle Lanes Versus Wide Curb Lanes: Operational and Safety Findings and Countermeasure Recommendations

FHWA-RD-99-035

This report describes results of an investigation of the long-standing issue of whether bicycle lanes or wide curb lanes are preferable. The study indicated that both bicycle lanes and wide curb lanes can and should be used to improve riding conditions for bicyclists.

www.ntis.gov, PB2000-101612 and www.tfhr.gov/safety/pedbike/pubs/99035.pdf

Capacity Analysis of Pedestrian and Bicycle Facilities: Recommended Procedures for the “Bicycles” Chapter of the Highway Capacity Manual

FHWA-RD-98-108

This report contains new and revised procedures for analyzing various types of exclusive and mixed-use bicycle facilities. These procedures, based on research on domestic and international bicycle operations conducted to date, are recommended to determine the level of service for bicycle facilities. This document addresses procedures for streets, roads, and intersections with designated bicycle facilities.

www.fhwa.dot.gov/tfhr/safety/pubs/98-108/cover.htm

Capacity Analysis of Pedestrian and Bicycle Facilities: Recommended Procedures for the “Pedestrians” Chapter of the Highway Capacity Manual

FHWA-RD-98-107

This report contains new and revised procedures for analyzing various types of exclusive and mixed-use pedestrian facilities. These procedures are recommended to determine the level of service for pedestrian facilities on the basis of a summary of available U.S. and international literature, as described in the Federal Highway Administration document, Literature Synthesis for Chapter 13, “Pedestrians,” of the *Highway Capacity Manual*, by the same authors.
www.fhwa.dot.gov/tfhrc/safety/pubs/98-107/title.htm

Capacity Analysis of Pedestrian and Bicycle Facilities: Recommended Procedures for the “Signalized Intersections” Chapter of the Highway Capacity Manual

FHWA-RD-98-106

This report describes the effects of pedestrians and bicyclists on the capacity of signalized intersections. It incorporates the results of a multiregional data-collection effort that confirms the validity of a conflict zone occupancy approach to analyze pedestrian and bicycle effects on signalized intersection capacity. These procedures augment the existing signalized intersection level of service procedures in the *Highway Capacity Manual* for locations with substantial pedestrian and/or bicycle traffic conflicting with vehicular turning movements.
www.fhwa.dot.gov/tfhrc/safety/pubs/98-106/title.htm

Characteristics and Needs for Overhead Guide Sign Illumination From Vehicular Headlamps

FHWA-RD-98-135

This report covers a literature review to determine the minimum luminance value needed and an overview of the equipment developed for field studies of vehicle headlamp illuminance. It also includes the results of a small laboratory study to determine minimum luminance of highway guide signs, field studies to determine illuminance values from a sample of the fleet of vehicles on highways, and a study of illuminance values obtained from the headlamps of 50 known vehicles of varying ages and types.
www.ntis.gov, PB99-175549

Commercial Vehicle Driver Survey: Assessment of Parking Needs and Preferences

FHWA-RD-01-160

This report measures truck driver parking needs and preferences. Through a nationwide survey of truck drivers, the study sought to determine how truck drivers plan for and address their parking needs, how they select when and at which facilities to park, and what they think of the adequacy of current parking facilities.
www.tfhrc.gov/safety/pubs/01160/

Crash Models for Rural Intersections: Four-Lane by Two-Lane Stop-Controlled and Two-Lane by Two-Lane Signalized

FHWA-RD-99-128

This report describes the collection, analysis, and modeling of crash and roadway data for intersections on rural roads in California and Michigan from 1993 to 1995. Three classes of intersections are considered: (1) three-legged intersections with major road four-lane and minor leg two-lane stop controls, (2) four-legged intersections with major road four-lane and minor legs two-lane stop controls, and (3) signalized intersections with two-lane major and minor roads. Data were acquired from the Highway Safety Information System, State and Federal photologs, and field work at all intersections.
Library and www.ntis.gov, PB2000-102367

Development of Human Factors Guidelines for Advanced Traveler Information Systems (ATIS) and Commercial Vehicle Operations: An Examination of Driver Performance Under Reduced Visibility Conditions When Using an In-Vehicle Signing and Information System

FHWA-RD-99-130

This report presents a study to determine the benefits realized by drivers using an in-vehicle signing and information system. Three measures of driver performance were collected, along with subjective preference data. The results indicated that the use of the in-vehicle signing and information system display led to more appropriate speeds and greater reaction distances for all drivers.

www.fhwa.dot.gov/tfhrc/safety/pubs/99130/99130.html

Development of Human Factors Guidelines for Advanced Traveler Information Systems (ATIS) and Commercial Vehicle Operations: Driver Response To Unexpected Situations When Using an In-Vehicle Information System

FHWA-RD-99-131

This report presents a study that investigated advanced traveler information systems (ATIS) and commercial vehicle operations applications, and their effect on driver behavior and performance. A field experiment was conducted to investigate the benefits and drawbacks of using an in-vehicle information system when the driver is confronted with unexpected situations.

www.fhwa.dot.gov/tfhrc/safety/pubs/99131/99131.html

Development of Prototype Driver Models for Highway Design

FHWA-RD-99-069

This report addresses the development of the Interactive Highway Safety Design Model (IHSDM). The goal of the IHSDM research program is to develop a systematic approach that will allow highway designers to explicitly consider the safety implications of design decisions from the planning stage through the final design stage.

www.fhwa.dot.gov/tfhrc/safety/pubs/99-069.pdf

Dynamic Evaluation of the New FOIL Instrumented Rigid Pole: FOIL Test Numbers 96F008 Through 96F015

FHWA-RD-99-026

This report contains the test procedures, setup, and results from seven frontal full-scale vehicle crash tests conducted at the Federal Highway Administration's Federal Outdoor Impact Laboratory. This series of seven crash tests served multiple purposes. Its main objective was to make the new larger-capacity rigid pole operational.

Library and www.ntis.gov, PB99-130270

Effects of a Towaway Reporting Threshold on Crash Analysis Results (Summary Report)

FHWA-RD-98-114

This report analyzes procedures such as problem identification, countermeasures identification, and countermeasures evaluation commonly conducted by users of crash data when establishing policy, developing programs, and creating new roadway designs to enhance highway safety.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Estimating Roadside Encroachment Rates with the Combined Strengths of Accident- and Encroachment-Based Approaches, Final Report

FHWA-RD-01-124

This report assesses the consistency of estimating vehicle roadside encroachment rates using accident-based prediction models. The research used two data sets developed from the Federal Highway Administration's Highway Safety Information System. These data are more recent than those reported in previous assessments. By synthesizing the models developed from this and previous studies, a roadside encroachment rate estimation model was recommended. The model allows encroachment rates to be estimated by average annual daily traffic volume, lane width, horizontal curvature, and vertical grade for undivided, two-lane rural roads.

www.tfhr.gov/library/01124.pdf

Evaluation of Automated Pedestrian Detection at Signalized Intersections

FHWA-RD-00-097

This report evaluates the safety effects of microwave and infrared detectors used in conjunction with standard pedestrian push buttons. This study was part of a larger Federal Highway Administration research study investigating the effectiveness of innovative engineering treatments on pedestrian safety.

www.tfhr.gov/safety/pedbike/pubs/00-097.pdf

Evaluation of Design Consistency Methods for Two-Lane Rural Highways, Executive Summary

FHWA-RD-99-173

This report provides a speed-profile model that can be incorporated into the design consistency module of the Interactive Highway Safety Design Model. The model can be used to evaluate the design consistency of the roadway or develop a speed profile for an alignment.

www.ntis.gov, PB2001-102933

Evaluation of the Blue Bike-Lane Treatment Used in Bicycle-Motor Vehicle Conflict Areas in Portland, Oregon

FHWA-RD-00-150

This report documents a 1997-1999 study by the city of Portland, OR, on the use of colored markings and a novel signing system to delineate selected conflict areas. The University of North Carolina Highway Safety Research Center analyzed the project data and found that most behavior changes were positive.

www.walkinginfo.org/pdf/r&d/bluelane.pdf

Expert Systems for Crash Data Collection: Final Report

FHWA-RD-99-052

This report discusses the demand for better-quality crash data to meet a wide variety of needs. The goal of the Federal Highway Administration's Expert Systems for Crash Data Collection Program was to use expert systems technology to improve the accuracy and consistency of police-reported data. The program included the development and evaluation of three expert systems: (1) seat belt use derivation; (2) vehicle damage rating, including extent of deformation; and (3) roadside barrier problem identification.

www.fhwa.dot.gov/tfhr/safety/pubs/99-052.pdf

Full-Coverage Collision Warning: Human Factors Research Needs

FHWA-RD-98-185

This report summarizes the identified human factors research needs for a full 360-degree collision warning coverage, one of five configurations of in-vehicle safety and driver information systems.

www.fhwa.dot.gov/tfhr/safety/pubs/98-185.pdf

Full-Scale Crash Evaluation of a Modified Eccentric Loader Terminal, Final Report

FHWA-RD-99-031

This report presents the results of four of five National Cooperative Highway Research Program Report 350-type crash tests conducted on a modified eccentric loader terminal system for W-beam guardrails. All vehicles used in this test were 1990 and 1991 year models.

www.ntis.gov, PB2000-100277

Guidebook on Methods to Estimate Non-Motorized Travel: Supporting Documentation

FHWA-RD-98-166

This two-volume report provides a means for practitioners to better understand and estimate bicycle and pedestrian travel and to address transportation planning needs. The guidebook describes and compares the various methods that can be used to forecast the demand of non-motorized travel and supports the prioritization analyses of non-motorized projects. This volume provides supporting documentation.

Library and www.fhwa.dot.gov/tfhrc/safety/pubs/vol2/title.htm

Highway Safety Information Systems Guidebook for the Minnesota State Data Files: Volume I

FHWA-RD-01-058

This guidebook contains Minnesota State data files for the Highway Safety Information System, a multistate database that contains crash, roadway inventory, and traffic volume data. The purpose of the guidebook is to provide sufficient information for both the analyst and the programmer to use the system effectively. This is Volume I of the guidebook, containing a basic description of the State data system, an alphabetized listing of all available variables, and definitions of each category within each variable.

www.hsisinfo.org/pdf/01-058.pdf

Highway Safety Information Systems Guidebook for the Minnesota State Data Files: Volume II

FHWA-RD-01-059

This guidebook contains Minnesota State data files for the Highway Safety Information System, a multistate database that contains crash, roadway inventory, and traffic volume data. The purpose of the guidebook is to provide sufficient information for both the analyst and the programmer to use the system effectively. This is Volume II of the guidebook, containing single-variable tabulations for a large number of key variables in each file. The tables include data covering 5 years.

www.hsisinfo.org/pdf/01-059.pdf

Highway Safety Information Systems Guidebook for the Utah State Data Files: Volume I

FHWA-RD-01-056

This guidebook contains Utah State data files for the Highway Safety Information System, a multistate database that contains crash, roadway inventory, and traffic volume data. The purpose of the guidebook is to provide sufficient information for both the analyst and the programmer to use the system effectively. This is Volume I of the guidebook, containing a basic description of the State data system, an alphabetized listing of all available variables, and definitions of each category within each variable.

www.hsisinfo.org/pdf/01-056.pdf

Highway Safety Information Systems Guidebook for the Utah State Data Files: Volume II

FHWA-RD-01-057

This guidebook contains Utah State data files for the Highway Safety Information System, a multistate database that contains crash, roadway inventory, and traffic volume data. The purpose of the guidebook is to provide sufficient information for both the analyst and the programmer to use the system effectively. This is Volume II of the guidebook, containing single-variable tabulations for a large number of key variables in each file. The tables include data covering 5 years.

www.hsisinfo.org/pdf/01-057.pdf

Honda Accord LX Broadside Collision With a Narrow Fixed Object: FOIL Test Number 97S003

FHWA-RD-98-008

This report documents the test procedures, setup, and results from the first of five broadside crash tests between a 1995 Honda Accord LX four-door sedan and the Federal Outdoor Impact Laboratory 300K instrumented rigid pole.
www.ntis.gov, PB98-131204

Honda Accord LX Broadside Collision With a Narrow Fixed Object: FOIL Test Number 97S004

FHWA-RD-98-009

This report documents the test procedures, setup, and results from the second of five broadside crash tests between a 1995 Honda Accord LX four-door sedan and the Federal Outdoor Impact Laboratory 300K instrumented rigid pole.
www.ntis.gov, PB98-131733

Honda Accord LX Broadside Collision With a Narrow Fixed Object: FOIL Test Number 97S005

FHWA-RD-98-010

This report documents the test procedures, setup, and results from the third of five broadside crash tests between a 1995 Honda Accord LX four-door sedan and the Federal Outdoor Impact Laboratory 300K instrumented rigid pole.
www.ntis.gov, PB98-131675

Honda Accord LX Broadside Collision With a Narrow Fixed Object: FOIL Test Number 97S006

FHWA-RD-98-011

This report documents the test procedures, setup, and results from the fourth of five broadside crash tests between a 1995 Honda Accord LX four-door sedan and the Federal Outdoor Impact Laboratory 300K instrumented rigid pole.
www.ntis.gov, PB98-131709

IHSDM Intersection Diagnostic Review Model Knowledge Base Report

FHWA-RD-02-045

This report documents the results of a study on the development of an expert system for the Interactive Highway Safety Design Model (IHSDM). The objective was to develop software to perform a diagnostic review of intersections on rural two-lane highways, referred to as the Intersection Diagnostic Review Model (IDRM). The report focuses on documenting the knowledge base developed for the IDRM software. It also documents the knowledge structure, problem definitions, models, decision algorithms, formulas, and parameter values implemented in the software.
www.tfrc.gov/safety/ihsdm/pubs/02045/index.htm

Implementation of GIS-Based Highway Safety Analyses: Bridging the Gap

FHWA-RD-01-039

This report's goal is to discuss geographic information systems (GIS) and safety integration in terms that can be understood by both safety engineers and GIS specialists, and to describe issues and solutions involved in the integration of GIS into safety-related analysis efforts. The report is intended to serve as an educational document for both safety engineers and GIS professionals and to initiate a common dialogue. It is designed to bridge the gap between the desire to implement GIS highway safety analysis in an organization and the development of a geographic information systems for transportation (GIS-T) infrastructure to support that effort.
www.tfrc.gov/safety/pubs/1039.pdf

Influence of a Trailer's Axle Arrangement and Loads on the Stability and Control of a Tractor/Semitrailer

FHWA-RD-97-123

This report reveals the safety-related dynamic performance effects of varying a trailer's axle arrangement (tandem versus tridem), suspension type (steel versus air), tire type (dual versus wide-base single), and axle loading level. Typical five- and six-axle tractor/semitrailers (483-centimeter (188-inch) tractor and 14.6-meter (48-foot) van-semitrailer) were used in this study. Vehicle safety-related dynamic performance was examined, using a recent version of the constant-speed yaw/roll model developed by the University of Michigan Transportation Research Institute.
www.ntis.gov, PB99-107385

Injuries to Pedestrians and Bicyclists: An Analysis Based on Hospital Emergency Department Data

FHWA-RD-99-078

This report presents a descriptive analysis of data collected over a year at eight hospital emergency departments in California, New York, and North Carolina. Information was gathered on 2,509 persons treated for injuries incurred while bicycling or walking. The emergency department data were examined in conjunction with statewide hospital discharge and motor vehicle crash data in an attempt to better define the overall scope and magnitude of the pedestrian and bicyclist injury problem.
www.tfhr.gov/safety/pedbike/research/99078/99-078.htm

In-Vehicle Display Icons and Other Information Elements: Literature Review

FHWA-RD-98-164

This report on a study of in-vehicle icons describes the objectives, methods, and findings associated with performing a literature review. The purpose was to conduct a review of relevant symbols and research, including the use of symbols by manufacturers and after-market vendors for existing and planned in-vehicle systems.
www.fhwa.dot.gov/tfhr/safety/pubs/98164/98164.html

In-Vehicle Display Icons and Other Information Elements: Preliminary Assessment of Visual Symbols

FHWA-RD-99-196

This report on in-vehicle display icons describes the methods and results associated with the study's preliminary assessment of visual symbols. The purpose of the assessment is twofold: (1) identify credible procedures, heuristics, and principles for the joint use of visual, auditory, and tactile information to present in-vehicle messages; and (2) define message characteristics that should guide symbol design.
www.fhwa.dot.gov/tfhr/safety/pubs/99196/99196.html

Model Development for National Assessment of Commercial Vehicle Parking

FHWA-RD-01-159

This report summarizes activities and research undertaken as part of a study mandated by the Transportation Equity Act for the 21st Century. The report also describes the development, calibration, and application of the model used to estimate truck parking demand. This model estimates parking demand for a highway segment rather than a single parking facility and incorporates a variety of factors known to affect the demand for truck parking. The report presents a step-by-step method for selecting analysis segments, data requirements, parameter values, and a sample model application.
www.tfhr.gov/safety/pubs/01159/

Modeling Intersection Crash Counts and Traffic Volume

FHWA-RD-98-096

This report explores the feasibility of using available exposure measures to model crash counts at intersections. The basic purpose of exposure is to serve as a size factor to allow comparison of crash counts among populations of different sizes. In the context of highway crash studies, vehicle-miles of travel appears to be a natural exposure measure at first glance. It is closely related to traffic density, however, raising doubts about whether it can serve the intended purpose of an exposure measure.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

National Model: Statewide Application of Data Collection and Management Technology to Improve Highway Safety

FHWA-RD-99-140

This report presents findings on how two Iowa State agencies collaborate to improve highway safety. Iowa is a model for the Nation on how agencies can work together to define new business processes and streamline the flow of safety information. The Iowa agencies use an integrated approach to safety management. The Iowa Department of Transportation leads efforts involving computer hardware and software technology and the Iowa Department of Public Safety leads the communications component, which uses the State's fiber-optic network. Fiber optics make it possible to move high volumes of data and images.

www.tfhr.gov/safety/national/index.htm

Pedestrian Crosswalk Case Studies: Richmond, Virginia; Buffalo, New York; Stillwater, Minnesota

FHWA-RD-00-103

This report focuses on the effect of crosswalk markings on both pedestrian and driver behavior at unsignalized intersections. Crosswalks are among the treatments used to help pedestrians cross streets safely. This was part of a larger Federal Highway Administration research study investigating the safety effectiveness of crosswalks for pedestrians.

www.tfhr.gov/safety/pedbike/pubs/0103.pdf

Pedestrian Safety in Australia

FHWA-RD-99-093

This report is one in a series of pedestrian safety synthesis reports prepared for the Federal Highway Administration to document pedestrian safety in other countries. This report describes Australia's use of traffic-calming techniques, innovative traffic signals, Puffin and Pelican crossings, and a "safe routes to school" program.

www.ntis.gov, PB2002-104282

Pedestrian Safety in Sweden

FHWA-RD-99-091

This report is one in a series of pedestrian safety synthesis reports prepared for the Federal Highway Administration to document pedestrian safety in other countries. This report reviews pedestrian safety research in Sweden and concludes that a need exists either to guarantee complete separation between pedestrians and vehicular traffic, or to create good conditions for proper interaction between pedestrians and drivers, such as restricting vehicle speeds to 30 kilometers per hour.

www.ntis.gov and <http://www.hsrb.unc.edu/pdf/pedbike/99091.PDF>

Prediction of the Expected Safety Performance of Rural Two-Lane Highways

FHWA-RD-99-207

This report presents an algorithm for predicting the safety performance of a rural two-lane highway. The crash prediction algorithm consists of base models and crash modification factors for both roadway segments and at-grade intersections on rural two-lane highways.

www.ntis.gov, PB2001-102166 and abstract online: www.tfhr.gov/safety/99207.htm

Rest Area Forum: Summary of Proceedings

FHWA-RD-00-034

This report presents a summary of the Rest Area Forum held in Atlanta, GA, in June 1999. More than 70 representatives from Federal and State departments of transportation, the motor carrier industry, the private truck stop industry, commercial drivers, and safety advocates attended the forum. The purpose of the meeting was to identify issues and find solutions to provide adequate, safe parking for commercial drivers and their vehicles.

Library and www.tfsrc.gov/safety/00034.pdf

Roundabouts: An Informational Guide

FHWA-RD-00-067

This report presents information on roundabout intersections based on established international and U.S. practices and supplemented by recent research. The guide is comprehensive in recognition of the diverse needs of transportation professionals and the public for introductory material through design detail, as well as the wide range of potential applications of roundabout intersections.

www.tfsrc.gov/safety/00068.htm

Safety Effectiveness of Intersection Left- and Right-Turn Lanes

FHWA-RD-02-089

This report presents the results of research that performed a before-and-after evaluation of the safety effects of providing left- and right-turn lanes for at-grade intersections. Geometric design, traffic control, traffic volume, and traffic crash data were gathered for a total of 280 improved intersections, as well as 300 similar intersections that were not improved during the study period. The types of improvement projects evaluated included installation of added left-turn lanes, added right-turn lanes, and extension of the length of existing left- or right-turn lanes.

www.tfsrc.gov/safety/pubs/02089/

Safety Performance Testing of a Modified Oregon Multidirectional Slip-Base Sign Support: FOIL Test Numbers 98F002 and 98F004

FHWA-RD-98-111

This report contains the test procedures, setup, and results from two crash tests performed at the Federal Highway Administration's (FHWA) Federal Outdoor Impact Laboratory (FOIL). The objective of these tests was to evaluate the safety performance of a small sign support system provided by the Oregon Department of Transportation (DOT) and to provide FHWA finite element model simulation engineers with data on the performance of a slip-base sign support. This report also documents the results from two crash tests using the FOIL bogie vehicle and Oregon DOT's 3X3 TBB sign support.

www.ntis.gov, PB99-129959

Speed Prediction for Two-Lane Rural Highways, Final Report

FHWA-RD-99-171

This report provides a speed profile model that can be incorporated into the design consistency module of the Interactive Highway Safety Design Model. The model can be used to evaluate the design consistency of the roadway or to develop a speed profile for an alignment. The model considers both horizontal and vertical curvature and the acceleration or deceleration behavior as a vehicle moves from one feature to another.

www.ntis.gov, PB2001-103175

Statistical Models of At-Grade Intersection Accidents—Addendum

FHWA-RD-99-094

This report is an addendum to FHWA-RD-96-125, titled *Statistical Models of At-Grade Intersection Accidents*. The objective of both reports is to develop crash prediction models relating total intersection accidents to highway design elements.

www.ntis.gov, PB2000-106046 and www.tfsrc.gov/safety/99-094.pdf

Study of Adequacy of Commercial Truck Parking Facilities

FHWA-RD-01-158

This report documents the findings of a study to investigate the adequacy of commercial truck parking facilities throughout the Nation. This report describes the technical details of the analyses the Federal Highway Administration considered in preparing a report to the U.S. Congress in response to Section 4027 of the Transportation Equity Act for the 21st Century. www.tfhrc.gov/safety/pubs/01158/

Surrogate Safety Measures From Traffic Simulation Models

FHWA-RD-03-050

This project investigates the potential for deriving surrogate measures of safety from existing microscopic traffic simulation models for intersections. The process of computing the measures in the simulation, extracting the required data, and summarizing the results is called the surrogate safety assessment methodology. These surrogate measures could be used to support evaluation of traffic engineering alternatives for safety at signalized and unsignalized intersections. www.tfhrc.gov/safety/pubs/03050

Synthesis of Safety Research Related to Speed Management

FHWA-RD-98-154

This report presents a synthesis of research findings on the safety effects of speed, speed limits, enforcement, and engineering measures to manage speed. The report updates a similar synthesis published in 1982 and highlights the results of significant safety research related to speed completed since then. www.fhwa.dot.gov/tfhrc/safety/pubs/speed/spdtpoc.htm

Testing and Evaluation of a Portable Work Zone Sign Support: FOIL Test Numbers 98F008 and 98F009

FHWA-RD-98-183

This report contains the test procedures, setup, and results from two crash tests performed at the Federal Highway Administration's (FHWA) Federal Outdoor Impact Laboratory. FHWA will use this report and other information to determine the portable work zone sign support's level of safety. Library and www.ntis.gov, PB99-130288

Testing of State Roadside Safety Systems, Volume IV: Appendix C—Crash Testing and Evaluation of a Pennsylvania Transition Design

FHWA-RD-98-039

This report presents studies conducted to crash test and evaluate new or roadside modified safety hardware and, where necessary, redesign the devices to improve their impact performance. This document presents Appendix C on evaluating a Pennsylvania transition design. Library and www.ntis.gov, PB99-155103

Testing of State Roadside Safety Systems, Volume XI: Appendix J—Crash Testing and Evaluation of Existing Guardrail Systems

FHWA-RD-98-046

This report presents studies conducted to crash test and evaluate new or modified roadside safety hardware and, where necessary, redesign the devices to improve their impact performance. The three major areas addressed in this study are the impact performance of bridge railings, transitions from guardrails to bridge railings, and end treatments for guardrails and median barriers. Library and www.ntis.gov, PB99-155111

Testing of State Roadside Systems, Volume I: Technical Report

FHWA-RD-98-036

This report presents studies conducted to crash test and evaluate new or modified roadside safety hardware and, where necessary, redesign the devices to improve their impact performance.

www.ntis.gov, PB99-155079

The Bicycle Compatibility Index: A Level of Service Concept, Final Report

FHWA-RD-98-072

This report describes a methodology for deriving a bicycle compatibility index (BCI) for use by bicycle coordinators, transportation planners, traffic engineers, and others to evaluate the capability of specific roadways to accommodate both motorists and bicyclists. The BCI methodology was developed for urban and suburban roadway segments (i.e., midblock locations exclusive of intersections) and incorporated variables that bicyclists typically use to assess the “bicycle friendliness” of a roadway (e.g., curb lane width, traffic volume, and vehicle speeds).

<http://safety.fhwa.dot.gov/fourthlevel/pdf/bcifinalrpt.pdf>

The Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual

FHWA-RD-98-095

This report demonstrates the application of the bicycle compatibility index (BCI) to evaluate the capability of urban and suburban roadway sections to accommodate both motorists and bicyclists. The BCI methodology will allow practitioners to evaluate existing facilities to determine possible improvements and to determine operational and geometric requirements for new facilities.

www.hsrrc.unc.edu/research/pedbike/98095/body_index.html

The Capability and Enhancement of VDANL and TWOPAS for Analyzing Vehicle Performance on Upgrades and Downgrades Within IHSDM

FHWA-RD-00-078

This report documents the results of research on and recommendations for defining and analyzing vehicle performance on upgrades and downgrades on two-lane rural roads. It also provides a comprehensive review of the capabilities of a vehicle dynamics simulation and a traffic flow simulation, and discusses relevant literature that might have an impact on future upgrades.

www.tfhrcc.gov/safety/00-078.pdf

The Effect of Crosswalk Markings on Vehicle Speeds in Maryland, Virginia, and Arizona

FHWA-RD-00-101

This report focuses on the effect of crosswalk markings on vehicle speeds at uncontrolled intersections in Maryland, Virginia, and Arizona. This was part of a larger Federal Highway Administration research study investigating the safety effectiveness of crosswalks for pedestrians.

www.tfhrcc.gov/safety/pedbike/pubs/0101.pdf

The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior

FHWA-RD-00-104

This report documents an evaluation of the effects of selected traffic-calming treatments on both pedestrian and motorist behavior. This was part of a larger Federal Highway Administration research study investigating the effectiveness of engineering treatments on pedestrian and bicycle safety.

<http://www.tfhrcc.gov/safety/pedbike/pubs/0104.pdf>



6 Structures

Fact Sheets

120th Street and Giles Road Bridge, Sarpy County

FHWA-RD-00-121

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the 120th Street and Giles Road Bridge in Sarpy County, NE. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-121.pdf

Eastbound, State Route 18 Over State Route 516, King County

FHWA-RD-00-124

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the eastbound bridge at State Route 18 over State Route 516 in King County, WA. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-124.pdf

Route 104 Bridge Over the Newfound River, Bristol

FHWA-RD-00-119

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the Route 104 Bridge over the Newfound River in Bristol, NH. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-119.pdf

Route 3A Bridge Over the Newfound River, Bristol

FHWA-RD-00-120

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the Route 3A Bridge over the Newfound River in Bristol, NH. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-120.pdf

Route 40 Over the Falling River, Lynchburg District

FHWA-RD-00-122

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the Route 40 Bridge over the Falling River in Brookneal, VA. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-122.pdf

San Angelo Bridge, U.S. Route 67, San Angelo

FHWA-RD-00-117

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the San Angelo Bridge in San Angelo, TX. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfhr.gov/structur/hpc/00-117.pdf

State Route 22 at Milepost 6.57, Guernsey County

FHWA-RD-00-118

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on a bridge on State Route 22 in Guernsey County, OH. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfsrc.gov/structur/hpc/00-118.pdf

U.S. 401 Over the Neuse River, Raleigh

FHWA-RD-00-125

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on a bridge at U.S. 401 over the Neuse River in Raleigh, NC. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfsrc.gov/structur/hpc/00-125.pdf

Virginia Avenue Over the Clinch River, Richlands

FHWA-RD-00-123

This fact sheet is one in a series on a Federal Highway Administration program to showcase bridges constructed with high-performance concrete (HPC), concrete with enhanced durability and strength characteristics. This fact sheet describes the use of HPC on the Virginia Avenue Bridge over the Clinch River in Richlands, VA. The program objective is to advance the use of HPC to achieve economy of construction and long-term performance.

Library and www.tfsrc.gov/structur/hpc/00-123.pdf

TechBriefs

Durability of Geosynthetics for Highway Applications

FHWA-RD-01-050

This document provides a synopsis of the publications on a study on durability of geosynthetics for highway applications (FHWA-RD-97-142, FHWA-RD-97-143, FHWA-RD-97-144, and FHWA-RD-00-157). Various aspects of geosynthetic durability were addressed to develop procedures that could be used to predict long-term strength loss of geosynthetics used in highway applications. This information is essential to designers for allowing tensile capacity for geosynthetics used primarily in mechanically stabilized earth retaining walls, reinforced soil slopes, and stabilized foundations.

www.tfsrc.gov/structur/01-050.pdf

Galvanic Cathodic Protection of Reinforced Concrete Bridge Members Using Sacrificial Anodes Attached by Conductive Adhesives

FHWA-RD-99-113

This document describes the development and testing of a zinc anode/hydrogel for use in galvanic cathodic protection of reinforced concrete bridges.

Abstract online: www.tfsrc.gov/focus/1099focus/techrpt.htm

Magnetic-Based NDE of Prestressed and Post-Tensioned Concrete Members—The MFL System

FHWA-RD-00-027

This document presents the key findings of a Federal Highway Administration study on a magnetic-based nondestructive testing system fully documented in a separate report of the same title with publication number FHWA-RD-00-026. www.tfhrc.gov/structur/00-27.pdf

Permanent Ground Anchor Walls

FHWA-RD-99-071

This document presents a summary of a four-part report based on research done on permanent ground anchor walls. The four volumes include Summary Report of Research on Permanent Ground Anchor Walls, Volume I: Current Practices and Limiting Equilibrium Analyses, Volume II: Full-Scale Wall Tests and a Soil Structure Interaction Model, Volume III: Model-Scale Wall Tests and Ground Anchor Tests, and Volume IV: Conclusion and Recommendations. PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Perspectives on Fuel Consumption and Air Contaminant Emission Rates by Highway Vehicles

FHWA-RD-01-100

This document summarizes a study on highway effects on vehicle performance undertaken at the Volpe National Transportation Systems Center. The main product of this study is a computer program that calculates estimated fuel consumption and exhaust emission rates. www.tfhrc.gov/structur/pdf/01100.pdf

Reliability of Visual Inspection for Highway Bridges Volume I: Final Report and Volume II: Appendices

FHWA-RD-01-105

This document announces the findings of an investigation by the Federal Highway Administration's Nondestructive Evaluation Validation Center on the reliability of visual inspection for highway bridges. www.tfhrc.gov/hnr20/nde/01105.pdf

Technical Reports

A New Development Length Equation for Pretensioned Strands in Bridge Beams and Piles

FHWA-RD-98-116

This report analyzes a 1988 Federal Highway Administration memorandum that outlawed the use of 15.2-millimeter (0.6-inch) diameter strands in bridge beams and piles, restricted the spacing of strands, and applied a multiplier to the American Association of State Highway and Transportation Officials' development length equation. This memo resulted in considerable research on the subject of bond of pretensioned strands in concrete. Forty-one research studies have been undertaken since 1988 to clarify the issues in the memo. www.ntis.gov, PB99-146664

A Quarter Century of Geotechnical Research

FHWA-RD-98-139

This report summarizes the Federal Highway Administration's geotechnical research program and highlights its significant findings and contributions. It gives an overview of the results of three geotechnical research studies. [Library and www.ntis.gov](http://www.ntis.gov), PB99-147365

Adhesion Criteria Between Water-Based Inorganic Zinc Coatings and Their Topcoats for Steel

FHWA-RD-98-170

This report presents the results of a laboratory test program designed to investigate possible causes for failure of water-based inorganic zinc coatings. Failures observed in the field have consisted of either topcoat delamination or the appearance of “freckle rusting” in the cured water-based inorganic zinc primer.

www.tfhr.gov/site/98170.pdf

An Introduction to the Deep Mixing Methods as Used in Geotechnical Applications—Volume III: The Verification and Properties of Treated Ground

FHWA-RD-99-167

This report focuses on the properties of soils treated by the deep mixing method and aspects of quality control, quality assurance, and verification. The deep mixing method is an in situ soil treatment technology in which the soil is blended with cementitious and/or other materials.

Library and www.ntis.gov, PB2002-100376

Calcium Magnesium Acetate at a Lower Production Cost: Production of CMA Deicer From Cheese Whey

FHWA-RD-98-174

This report presents findings on the development of low-cost acetate deicers from cheap feedstocks, such as biomass and industrial wastes, via fermentation. Two methods to produce low-cost acetate deicers from cheese whey were studied. Calcium magnesium acetate deicers produced from cheese whey by fermentation and extraction were tested for their acetate content and deicing properties.

Library and www.ntis.gov, PB99-148991

Characterization of the Environment

FHWA-RD-00-030

This report looks at how the local environment affects the performance of eight coating systems and two weathering steels. It presents data gathered over a 5-year period from seven test sites across the United States. The study on which this report is based compiled data on both accelerated and natural exposure of coating and corrosion test panels and related their deterioration to environmental conditions.

www.ntis.gov, PB2000-108513

Corrosion Cost and Preventive Strategies in the United States, Final Report

FHWA-RD-01-156

This report describes the annual total cost of metallic corrosion in the United States and preventive strategies for optimum corrosion management. The total direct cost of corrosion is estimated at \$276 billion a year, which is 3.1 percent of the 1998 U.S. gross domestic product.

Library and www.ntis.gov

Corrosion Inhibitors in Concrete: Interim Report

FHWA-RD-02-002

The overall objective of this work-in-progress is to assess the effectiveness of corrosion inhibitors for steel in concrete.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Corrosion Protection: Concrete Bridges

FHWA-RD-98-088

This report summarizes the progress of research on reducing premature corrosion of reinforcing steel on concrete bridges. The Federal Highway Administration established corrosion protection for concrete bridges as a high-priority area in its structures research program. The objectives of this research are to (1) to develop effective, economical methodologies for arresting or reducing the extent of steel corrosion from chloride contamination of concrete bridges, reducing bridge maintenance costs and minimizing traffic disruptions; and (2) to develop sound design and construction practices and materials for preventing corrosion of reinforcement in new structures, minimizing future deterioration.
www.tfhrc.gov/structur/corros/foreword.htm

Detection and Sizing of Cracks in Structural Steel Using the Eddy Current Method

FHWA-RD-00-018

This report documents the findings of research on applying the eddy current method to detect cracks in structural steel members of highway bridges. The report also describes the development and application of the eddy current method to detect hydrogen-assisted cracking through paint. The report will be of interest to bridge inspectors, engineers, and designers involved in inspecting and maintaining highway bridges.
www.tfhrc.gov/hnr20/pubs/0018.pdf

Development and Field Testing of Multiple Deployment Model Pile (MDMP)

FHWA-RD-99-194

This report analyzes the Multiple Deployment Model Pile (MDMP), developed as an in situ tool for site investigations. The MDMP instrumentation is capable of monitoring the pile/soil interaction throughout the life cycle of a driven pile. Library and www.ntis.gov, PB2000-107845

Development of Protocols for Confined Extension/Creep Testing of Geosynthetics for Highway Applications

FHWA-RD-97-143

This report is part of a study in which various aspects of geosynthetic durability were addressed to develop procedures that could be used to predict long-term strength loss of geosynthetics used in highway applications. This information is essential to designers for allowing tensile capacity for geosynthetics used primarily in mechanically stabilized earth retaining walls, reinforced soil slopes, and stabilized foundations.
<http://ntl.bts.gov/data/Geosynth.pdf>

Durability Analysis of Aluminized Type 2 Corrugated Metal Pipe

FHWA-RD-97-140

In this report, conclusions from past research, the database, and present field studies are used to evaluate current durability prediction methods for aluminized type 2 corrugated metal pipe. Advantages and disadvantages of various culvert materials are discussed, with correlations drawn from the literature review and field studies.
www.tfhrc.gov/structur/97140/97140.pdf

Effects of Geosynthetic Reinforcement Spacing on the Behavior of Mechanically Stabilized Earth Walls

FHWA-RD-03-048

This report presents the results of numerical analysis on the behavior of mechanically stabilized earth walls with modular block facing and geosynthetic reinforcement. The analysis considers the effects of reinforcement spacing, soil strength, reinforcement stiffness, connection strength, reinforcement length, secondary reinforcement layers, and foundation stiffness. Abstract online: www.tfhrc.gov/pubrds/04jan/newpubs.htm

Effects of Gradation and Cohesion on Bridge Scour, Volume 1: Effects of Sediment Gradation and Coarse Material Fraction on Clear Water Scour Around Bridge Piers

FHWA-RD-99-183

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 1 describes the effects of sediment gradation and coarse material fraction on local clear water pier scour. Library and www.ntis.gov, PB2000-103270

Effects of Gradation and Cohesion on Bridge Scour, Volume 2: Experimental Study of Sediment Gradation and Flow Hydrograph Effects on Clear Water Scour Around Circular Piers

FHWA-RD-99-184

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 2 describes the effects of sediment gradation and flow hydrographs on local clear water pier scour. Library and www.ntis.gov, PB2000-103271

Effects of Gradation and Cohesion on Bridge Scour, Volume 3: Abutment Scour for Nonuniform Mixtures

FHWA-RD-99-185

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 3 describes the effects of sediment gradation and coarse material fraction on local abutment scour. Library and www.ntis.gov, PB2000-103272

Effects of Gradation and Cohesion on Bridge Scour, Volume 4: Experimental Study of Scour Around Circular Piers in Cohesive Soils

FHWA-RD-99-186

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 4 describes the effects of cohesive soils on local pier scour. Library and www.ntis.gov, PB2000-103273

Effects of Gradation and Cohesion on Bridge Scour, Volume 5: Effect of Cohesion on Bridge Abutment Scour

FHWA-RD-99-187

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 5 describes the effects of cohesion on local abutment scour. Library and www.ntis.gov, PB2000-103274

Effects of Gradation and Cohesion on Bridge Scour, Volume 6: Abutment Scour in Uniform and Stratified Sand Mixtures

FHWA-RD-99-188

This report is part of a six-volume series describing laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study on the effects of sediment gradation and cohesion on bridge scour. Volume 6 describes the effects of stratified sand layers on local abutment scour. Library and www.ntis.gov, PB2000-103275

Electrochemical Chloride Extraction: Influence of Concrete Surface on Treatment

FHWA-RD-02-107

This report reveals that electrochemical chloride extraction is capable of removing, in a single application, a significant portion of the chloride ions from a reinforced concrete structure. Prior research has shown that the quantity of chloride ions removed depends on numerous factors, including quantity and spacing of reinforcing steel, applied voltage, and initial chloride concentration. In addition, investigations into chloride binding and competition between other ions as current carriers have helped clarify the probable mechanisms responsible for decreases in current efficiency over time during chloride removal.

www.tfhrc.gov/structur/pubs/02107/

Extrapolation of Pile Capacity From Non-Failed Load Tests

FHWA-RD-99-170

This report analyzes load testing. Load testing a static pile to failure is the ultimate way to examine the capacity and integrity of deep foundations. Since the procedure is expensive and time-consuming, it is often substituted by the application of a load to a certain factor (most often two) times the contemplated design load. This method is not preferred because only a proof test is carried out, while the ultimate capacity and actual factor of safety remains unknown. Therefore, researchers need to find an easier, accurate way to reliably estimate the ultimate bearing pile capacity for non-failed load tests.

Library and www.ntis.gov, PB2000-102368

FHWA Field Manual for Bridge Painting Inspection

FHWA-RD-98-084

This manual is a model for bridge paint inspectors on how to perform inspection duties properly. Given that most bridge paint work is done on existing steel, this manual is geared toward people working in the field on existing steel. Some principles also may apply to shop-painted steel, but shop painting may require additional considerations beyond the scope of this manual.

www.tfhrc.gov/hnr20/bridge/intro.htm

Field Evaluation of a New Aluminum Alloy as a Sacrificial Anode for Steel Embedded in Concrete

FHWA-RD-98-058

This report evaluates the use of sacrificial cathodic protection for reinforced and prestressed concrete bridge members. Cathodic protection using impressed current is an accepted and common method of providing corrosion protection to steel in concrete. This study examined the performance of existing sacrificial alloys in different environments for sacrificial cathodic protection, and developed new sacrificial alloys for protecting steel in concrete.

www.ntis.gov, PB98-147135

Galvanic Cathodic Protection of Reinforced Concrete Bridge Members Using Sacrificial Anodes Attached by Conductive Adhesives

FHWA-RD-99-112

This report investigates the feasibility of using galvanic cathodic protection of reinforced concrete bridge members using sacrificial anodes attached by conductive adhesives.

Library and www.ntis.gov, PB99-175531

Geotechnical Publications

FHWA-RD-00-167

This report presents a list of publications based on research conducted by the geotechnical team in the Federal Highway Administration (FHWA) Office of Infrastructure Research and Development. This report also collates, categorizes, and integrates geotechnical information developed by other FHWA units, and complements and aids in the implementation of geotechnical research outputs.

www.tfhrc.gov/structur/gtr/00-167.pdf

GRS Bridge Piers and Abutments

FHWA-RD-00-038

This report discusses three projects on load testing of geosynthetic-reinforced soil bridge abutments and piers. They include (1) a full-scale bridge-pier load test conducted by the Federal Highway Administration's Turner-Fairbank Highway Research Center in 1996 (referred to as the Turner-Fairbank pier); (2) a full-scale, long-term load test of a bridge abutment and bridge pier conducted by the Colorado Department of Transportation and the University of Colorado at Denver from 1996 to 1997 (referred to as the Havana Yard piers and abutment); and (3) a production bridge abutment load test conducted in Black Hawk, CO, in 1997 (referred to as the Black Hawk abutment).

Library and www.ntis.gov, PB2001-103487

High-Performance Concrete in Washington State SR 18/SR 516 Overcrossing: Interim Report on Girder Monitoring

FHWA-RD-00-070

This report presents results of research on the effectiveness of using high-performance concrete (HPC) on prestressed precast concrete girders on a bridge in Washington State. The Federal Highway Administration established a program to demonstrate the positive effects of using HPC on bridges in the mid-1990s.

www.tfhrc.gov/structur/00-070.pdf

High-Performance Concrete in Washington State SR 18/SR 516 Overcrossing: Interim Report on Materials Tests

FHWA-RD-00-071

This report presents preliminary results from the first year of the materials testing program of the high-performance concrete (HPC) mix used in prestressed precast concrete girders on a bridge in Washington State. The Federal Highway Administration established a program to demonstrate the positive effects of using HPC on bridges in the mid-1990s.

www.tfhrc.gov/structur/00-071.pdf

Highway Bridge Inspection: State-of-the-Practice Survey

FHWA-RD-01-033

This report presents the findings of a survey conducted to determine current policies and practices that may affect the accuracy and reliability of visual inspection of bridges. The objectives of the survey were to compile a state-of-the-practice report for bridge inspection, gather information on bridge inspection management to study how it may influence the reliability of inspections, and gather data on the use of nondestructive evaluation technologies to identify research needs.

Library and www.tfhrc.gov/hnr20/nde/pdfs/01033.pdf

Hydraulics of Dale Boulevard Culverts

FHWA-RD-01-095

This report summarizes model testing performed on a prototype culvert to address an objective of a Federal Emergency Management Agency (FEMA) study to determine the base flood elevation upstream of the culvert. A performance curve was developed for the culvert to increase the accuracy of the FEMA study.

www.tfhrc.gov/structur/hydrlics/pdf/11.pdf

Hydraulics of Iowa DOT Slope-Tapered Pipe Culverts

FHWA-RD-01-077

This report updates the Iowa Department of Transportation design procedures for circular, slope-tapered concrete culverts. The current practice is to use the design coefficients for a square-edged, circular concrete culvert with a headwall in the Federal Highway Administration's Hydraulic Series No. 5 (HDS-5). In this study, new inlet control design constants and entrance loss coefficients were calculated for the slope-tapered culverts and compared with the HDS-5 coefficients. www.tfhrc.gov/structur/pdf/01077.pdf

Infrastructure/Bridge Design and Construction: Volume I, Current Practice and Limiting Equilibrium Analysis

FHWA-RD-98-065

This report is part of a four-volume series. It presents research on improving the design and construction of permanent ground anchor walls. The research focused on tieback soldier beam walls for highway applications. These walls generally are less than 7.6 meters (25 feet) high, and are supported by one or two rows of permanent ground anchors. Volume I presents apparent earth pressure methods for determining the lateral earth load. www.tfhrc.gov/structur/program.htm

Infrastructure/Bridge Design and Construction: Volume II, Full-Scale Wall Tests and Soil-Structure Interaction Model

FHWA-RD-98-066

This report is part of a four-volume series. It presents research on improving the design and construction of permanent ground anchor walls. The research focused on tieback soldier beam walls for highway applications. These walls generally are less than 7.6 meters (25 feet) high, and are supported by one or two rows of permanent ground anchors. Volume II presents the results of research on a 7.6-meter- (25-foot-) high wall constructed in medium-dense sand, and the development of a numerical model to be implemented in a computer program for the design of soldier beams. www.tfhrc.gov/structur/program.htm

Infrastructure/Bridge Design and Construction: Volume III, Model-Scale Wall Tests and Ground Anchor Tests

FHWA-RD-98-067

This report is part of a four-volume series. It presents research on improving the design and construction of permanent ground anchor walls. The research focused on tieback soldier beam walls for highway applications. These walls generally are less than 7.6 meters (25 feet) high, and are supported by one or two rows of permanent ground anchors. Volume III presents the results of research on four model-scale soldier beam and lagging walls constructed in medium-dense sand, and the results of tests performed on 10 hollow-stem-augured ground anchors installed in fine-grain soil. www.tfhrc.gov/structur/program.htm

Infrastructure/Bridge Design and Construction: Volume IV, Conclusions and Recommendations

FHWA-RD-98-068

This report is part of a four-volume series. It presents research on improving the design and construction of permanent ground anchor walls. The research focused on tieback soldier beam walls for highway applications. These walls generally are less than 7.6 meters (25 feet) high, and are supported by one or two rows of permanent ground anchors. Volume IV presents major conclusions, research needs, and recommendations for implementing the research results. www.tfhrc.gov/structur/program.htm

Introduction to the Deep Soil Mixing Methods as Used in Geotechnical Applications, Volume I: Final Report

FHWA-RD-99-138

This report traces the historical development of the various proprietary deep mixing methods for soil and provides a structured summary of applications. The deep mixing method is an in situ soil treatment technology in which the soil is blended with cementitious and/or other materials.

Library and www.ntis.gov, PB2000-103676

Laboratory and Test-Site Testing of Moisture-Cured Urethanes on Steel in Salt-Rich Environment

FHWA-RD-00-156

This report evaluates three-coat, moisture-cured (MC) urethane commercial products formulated for protecting new steel (SSPC-SP 10) and power tool-cleaned steel (SSPC-SP 3) surfaces against corrosion. The total coating film thickness was about 75 microns. Zinc-rich MC-urethane primers were used for SSPC-SP 10 steel surfaces, while the primers for SSPC-SP 3 surfaces contained no or a small amount of zinc. The same midcoats and topcoats were used for both steel surfaces.

<http://isddc.dot.gov/OLPFiles/FHWA/009914.pdf>

Laboratory Evaluation of Waterborne Coatings on Steel

FHWA-RD-03-032

This report presents findings from a Federal Highway Administration in-house study investigating the performance of waterborne acrylic, epoxy, and polyurethane coatings on new steel surfaces. Both cyclic laboratory tests and outdoor marine exposure were used to evaluate the performance of a variety of commercial waterborne products and compare them to zinc-rich coatings. This report also presents the effect of chemical properties of primers on coating performance.

www.tfhr.gov/structur/pubs/03032

Long-Term Durability of Geosynthetics Based on Exhumed Samples from Construction Projects

FHWA-RD-00-157

This report presents the results of mechanical and chemical tests on 24 retrieved geosynthetics from 12 sites across the United States. It provides a baseline databank of the mechanical and chemical properties of many commonly used geosynthetics in transportation applications. The report also provides a summary and synthesis of the results and methods from site retrievals and comments on the significance of laboratory index testing in developing durability design protocols.

Library and www.ntis.gov, PB2001-105580

Magnetic-Based NDE of Prestressed and Post-Tensioned Concrete Members—The MFL System

FHWA-RD-00-026

This report describes a study to develop a nondestructive evaluation system based on the concept of magnetic flux leakage to detect corrosion and fracture of prestressed steel in pretensioned and post-tensioned concrete bridge members.

Library

Materials and Methods for Corrosion Control of Reinforced and Prestressed Concrete Structures in New Construction

FHWA-RD-00-081

Salt-induced reinforcing steel corrosion in concrete bridges is an economic burden to many State and local transportation agencies. The adoption of corrosion-protection measures—such as the use of good design and construction practices, adequate concrete cover depth, low-permeability concrete, corrosion inhibitors, and coated reinforcing steel—is significantly reducing the occurrence of corrosion in new bridges. This report summarizes the results of various studies to develop and evaluate the performance of corrosion protection systems. It describes materials and measures that can be used to control corrosion in new construction of reinforced and prestressed concrete bridge structures.

Library and www.tfhr.gov/structur/00-081.pdf

Model Site-Specific Worker Training/Orientation Program: Bridge Lead Removal and General Site Safety

FHWA-RD-98-179

This report provides a model training program for personnel working on bridges containing lead-coated surfaces. It is designed to ensure that the work is completed in a safe and efficient manner, and that all workers are able to recognize and avoid hazards that can lead to injuries or fatalities.

www.tfhr.gov/hnr20/bridge/model/title.htm

Modern Computational Environment for Seismic Analysis of Highway Bridges

FHWA-RD-99-114

This report describes the architecture, design, and implementation of ALADDIN, a new high-level scripting language and tool kit for interactive matrix and finite element analyses of structures. In ALADDIN, finite element computations are viewed as a specialized form of matrix computation, matrices are viewed as rectangular arrays of physical quantities, and numbers are viewed as dimensionless physical constants.

Library and www.ntis.gov, PB2000-102375

Modification of Highway Air Pollution Models for Complex Site Geometries, Volume I: Data Analysis and Model Development

FHWA-RD-02-036

This report is Volume I of a two-volume study to improve air pollution dispersion models for depressed highway sites. The study assesses limitations of flat terrain and other street-canyon air pollution models. Experimental results from other documented field and atmospheric wind tunnel tests, supplemented by tests conducted during this study, led to improved concepts and quantification of airflow dynamics for depressed sites.

www.tfhr.gov/structur/pubs/02036/02036.htm

Modification of Highway Air Pollution Models for Complex Site Geometries, Volume II: Wind Tunnel Test Program

FHWA-RD-02-037

This report is Volume II of a two-volume study to increase the scope and clarity of air pollution models for depressed highway and street canyon sites. The report presents the atmospheric wind tunnel program conducted to increase the database and improve physical concepts of pertinent movement and mixing of air and its contaminants. Wind tunnel measurements are less costly than field measurements and are sensitive to controlled input variables.

www.tfhr.gov/structur/pubs/02036/02036.htm

Optimization of Concretes and Repair Materials for Corrosion Resistance

FHWA-RD-99-096

This report addresses the three principal rate phenomena that control corrosion-induced deterioration of concrete bridge components: (1) chloride permeation rate, (2) corrosion rate of the steel bar, and (3) deterioration/damage rate.

www.ntis.gov, PB99-175564

Performance Test for Geosynthetic-Reinforced Soil Including Effects of Preloading

FHWA-RD-01-018

This report presents a study undertaken to investigate the behavior of geosynthetic-reinforced soil (GRS) masses under various loading conditions and to develop a simplified analytical model to predict deformation characteristics of a generic GRS mass. Significant emphasis was placed on the effects of preloading. To conduct this study, a revised laboratory test, known as the soil-geosynthetic performance test, was developed.

www.tfhr.gov/structur/gtr/01-018.pdf

Pipe Interaction With the Backfill Envelope

FHWA-RD-98-191

This report summarizes a study of installation practices for buried (culvert) pipes. Current practice was reviewed through a literature search and a survey of users, manufacturers, and others involved in the use of buried pipes.
Library and www.ntis.gov, PB99-153603

Portable Instrumentation for Real-Time Measurement of Scour at Bridges

FHWA-RD-99-085

This report analyzes a portable scour-measuring system developed to meet the requirements of three different applications: bridge inspections, limited-detail data collection, and detailed data collection. Commercially available instruments were evaluated for use in measuring scour at bridges during floods. The systems developed consist primarily of commercially available instruments, which were modified and interfaced to achieve the required functionality.
www.ntis.gov, PB2001-102040

Rehabilitation of Prestressed Concrete Bridge Components by Non-Electrical (Conventional) Methods

FHWA-RD-98-189

This report presents a technology review, field surveys, and laboratory investigations to examine the corrosion of highway bridge elements made from prestressed concrete. Conventional methods used to repair these structures were also addressed.
Library and www.ntis.gov, PB99-148975

Reliability of Visual Inspection for Highway Bridges, Volume I: Final Report

FHWA-RD-01-020

This report provides overall measures of the accuracy and reliability of routine and in-depth visual inspections of highway bridges, the influence of several key factors that affect routine and in-depth inspections, and the differences between State inspection procedures and reports.
www.tfhr.gov/hnr20/nde/01020.htm

Reliability of Visual Inspection for Highway Bridges, Volume II: Appendices

FHWA-RD-01-021

The report provides overall measures of the accuracy and reliability of routine and in-depth visual inspections of highway bridges, the influence of several key factors that affect routine and in-depth inspections, and the differences between State inspection procedures and reports. This document presents the appendices.
www.tfhr.gov/hnr20/nde/01020.htm

Remote Methods of Underwater Inspection of Bridge Structures

FHWA-RD-99-100

This report analyzes a portable trailer-mounted bridge scour inspector. It was developed for inspecting bridge scour in the vicinity of piers from bridge decks and tested under flood conditions.
Library and www.ntis.gov, PB99-157968

Safety and Health on Bridge Repair, Renovation, and Demolition Projects

FHWA-RD-98-180

This report is a reference guide for bridge contractors to use in designing and implementing a safety and health program. It is not a "fill-in-the-blanks" document for contractors to use as a means to claim that a safety and health program is in effect. Instead, it guides contractors through the elements and issues that must be considered in establishing a safety and health program.
www.tfhr.gov/hnr20/bridge/repair/titlepg.htm

Seismic Vulnerability of New Highway Construction, Executive Summary

FHWA-RD-99-098

This executive summary provides an overview of the results from a Federal Highway Administration seismic research program that performed a series of special studies addressing the seismic vulnerability of new highway structures. The studies developed technical information that could form the basis of future specifications for the seismic design of bridges.

Abstract online: www.tfhrc.gov/pubrds/02jul/newpubs.htm

South Dakota Culvert Inlet Design Coefficients

FHWA-RD-01-076

This report summarizes model testing performed on culvert shapes to develop design coefficients for both inlet and outlet control. The cast-in-place culverts feature 30-degree flared wingwalls and a beveled top edge. The precast culverts have a 0-degree flare and a constant 101.6-millimeter (4-inch) bevel (regardless of barrel size) along the top of the wingwalls and the top edge of the culvert entrance. The most efficient configuration tested was the model of the cast-in-place box culvert. www.tfhrc.gov/structur/pdf/01076.pdf

Stress Cracking Potential for HDPE Geogrids

FHWA-RD-97-142

This report describes the development of a testing protocol designed to measure the potential for stress cracking of high-density polyethylene (HDPE) geogrids used for soil reinforcement. The collected data demonstrate that local stress cracking in the unoriented transverse node of HDPE geogrids can occur as a result of construction-induced damage. Undamaged geogrids are not prone to stress cracking at load levels below their 100-year limiting creep load.

PDC Phone: 301-577-0818, Fax: 301-577-1421, report.center@fhwa.dot.gov

Supplemental Reference Appendices for An Introduction to the Deep Mixing Methods as Used in Geotechnical Applications, Volume II: Appendices

FHWA-RD-99-144

This report traces the historical development of the various proprietary deep soil mixing methods and provides a structural summary of applications. It also compares the applicability of the deep mixing method with other competitive forms of ground treatment and improvement. The deep mixing method is an in situ soil treatment technology in which the soil is blended with cementitious and/or other materials.

Library and www.ntis.gov, PB2002-100376

Techniques for Measuring Existing Long-Term Stresses in Prestressed Concrete Bridges, Volume 1: Analytical, Laboratory, and Field Studies

FHWA-RD-99-178

This report summarizes the analytical, laboratory, and field studies performed to evaluate the feasibility of the flat-jack direct stress measurement technique to be used on prestressed concrete bridges. Several strain relief methods, including boring and slitting techniques, were evaluated by performing analytical studies. The flat-jack slitting technique was determined to be the most promising.

Library and www.ntis.gov, PB2000-100278

The November 1999 Duzce Earthquake: Post-Earthquake Investigation of the Structures on the TEM

FHWA-RD-00-146

This report is based on a reconnaissance survey of bridge and tunnel sites along the Trans-European Motorway segment under construction near Bolu, Turkey, after the Duzce Earthquake.

www.tfhrc.gov/structur/00-146.pdf

User's Manual for BRI-STARS (Bridge Stream Tube Model for Alluvial River Simulation)

FHWA-RD-99-190

This user's manual on BRI-STARS (Bridge Stream Tube Model for Alluvial River Simulation) provides a theoretical background on the methodologies used by the model, as well as the formulations of governing flow and sediment routing procedures. Example applications and practical guidelines for using the model are presented.

Library and www.ntis.gov, PB2000-107372

User's Primer for BRI-STARS (Bridge Stream Tube Model for Alluvial River Simulation)

FHWA-RD-99-191

This user's primer provides a brief description of BRI-STARS (Bridge Stream Tube Model for Alluvial River Simulation), installation and operations guidelines, the use of various utility programs in the package, and an example application of the model. BRI-STARS is a generalized, semi-two-dimensional water and sediment routing model with an integrated graphical interface for solving complicated river engineering problems with limited data and resources.

Library and www.ntis.gov, PB2000-107371



Publication Types Referenced in this Catalog

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.

Application/Technical Note. Provides technical information and benefits about an FHWA product or research findings used by an FHWA customer.

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

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

CD-ROM. May supplement existing print material or be used as a stand-alone product. Can contain components of audio, video, text, and animation.

