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BRIDGES

Construction

p-2 Seismic Retrofitting Manual for Highway Structures: Part 1-Bridges (*FHWA* January 2006)
Part 1 of this report focuses on highway bridges and is a replacement for the FHWA publication Seismic Retrofitting Manual for Highway Bridges, published in 1995 as report FHWA-RD-94-052. Revisions have been made to include current advances in earthquake engineering, field experience with retrofitting highway bridges, and the performance of bridges in recent earthquakes. It is the result of several years of research with contributions from a multidisciplinary team of researchers and practitioners. (656 pages)
Online: http://ntl.bts.gov/lib/31000/31300/31318/FHWA-HRT-06-032.pdf

p-3 Seismic Retrofitting Manual for Highway Structures: Part 2 – Retaining Structures, Slopes, Tunnels, Culverts, and Roadways(*FHWA* January 2006)
Part 2 of this report includes new procedures for determining the seismic vulnerability of other important highway system structures, namely, retaining, structures, slopes, tunnels, culverts, and roadways. (370 pages)
Online: http://ntl.bts.gov/lib/31000/31300/31319/FHWA-HRT-05-067.pdf

p-3.10 China Earthquake Reconnaissance Report: Performance of Transportation Structures During the May 12, 2008, M7.9 Wenchuan Earthquake (FHWA Dec 2011)
A team of U.S. engineers was invited by the Ministry of Communication of China to study bridge damage from the M7.9 Wenchuan earthquake of May 12, 2008. This report documents the lessons learned from damage caused to the 14 observed bridges and summarizes the team's findings. (49 pages)

p-3.11 Postearthquake Reconnaissance Report on Transportation Infrastructure Impact of the February 27, 2010, Offshore Maule Earthquake in chile (FHWA Oct 2011)
A transportation infrastructure reconnaissance team (TIRT) was organized by the Federal Highway Administration and performed a thorough postearthquake investigation of highway infrastructure from April 4 to 13, 2010. This report presents the preliminary findings of the earthquake's effects on the transportation infrastructure, including bridges and other highway structures that the team visited during the reconnaissance. (214 pages)

p-4 Multiyear Plan for Bridge and Tunnel Security Research, Development, and Deployment (FHWA March 2006)
This report proposes a research and development program addressing highway bridge and tunnel security. In addition to securing the physical infrastructure, it is recognized that there is a need to protect the "info infrastructure" as increasing reliance is placed on information technology as a result of the

greater role being played by intelligent transportation systems. (53 pages)
Online: http://www.tfhrc.gov/structur/pubs/06072/

p-5 Covered Bride Manual (FHWA April 2005)
The manual focuses on the nuances of the engineering aspects of covered bridges, including some issues not addressed currently by national bridge specifications. The chapter on timber connections provides a comprehensive discussion of covered bridge joinery and represents an important contribution to covered bridge engineering. The manual is intended primarily for engineers and historic bridge preservations to provide technical and historical information on preservation of covered bridges. It may be of interest also to lay people, owners, and contractors involved with covered bridges. (327 pages)
Online: http://www.tfhrc.gov/structur/pubs/04098/

p-6 Timber Bridges: Design, Construction, Inspection, and Maintenance(Engineering Staff 1997)
This document provides engineers and educators with state-of -the –art information on timber bridges. In doing this it works towards the goals of 1) educating all engineers and educators of basic timber knowledge and 2) continued research toward new bridge technology and improvements for past designs. (18 Chapters)
Online: http://www.fpl.fs.fed.us/documnts/misc/em7700_8--entire-publication.pdf

p-7 Geosynthetic Reinforced Soil Integrated Bridge System Interim Implementation Guide (FHWA 2011)
This manual outlines the state-of-the-art and recommended practice for designing and constructing Geosynthetic Reinforced Soil (GRS) technology for the application of the Integrated Bridge System (IBS). The procedures presented in this manual are based on 40 years of State and Federal research focused on GRS technology as applied to abutments and walls. (169 pages) The second part of this series (p-8) is a synthesis report that covers the background of GRS-IBS and provides other supporting information to substantiate the design method. (169 pages)

p-8 Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report (FHWA 2011)
This report is the second in a two-part series to provide engineers with the necessary background knowledge of Geosynthetic Reinforced Soil (GRS) technology and its fundamental characteristics as an alternative to other construction methods. (64 pages)

p-9 Vermont/New Hampshire Timber Retaining Wall Initiative/Design Package(*USFS* 1996)
This packet overviews the timeber retaining wall. It discusses history and application of the binwall and the application and overview. Furthermore it offers plans o which intend to carry the user from the conceptual phase of deciding on a wall height to calculating timber and hardware sizes and quantities, and through the complete construction sequence of a wall. (7 pages)

p-10 Standard Plans for Southern Pine Bridges (USFS 1995)

This packet contains standardized designs and details for three timber bridge superstructure types, including stress laminated timber bridges, stress-laminated glued laminated sawn lumber bridges, and longitudinal sawn lumber timber bridges with transverse plank decks. Each set of plans encompasses numerous span length and width combinations, design loadings for AASHTO HA 20-44 and HS25-44 vehicles, and tow options for live-load defection criteria. (26 pages)

Online: http://www.fpl.fs.fed.us/documnts/misc/em7700_8--entire-publication.pdf

p-11 Plans for Crash-Tested Bridge Railings for Longitudinal Wood Decks(*USFS* 1995)

The project objective was to develop and crash test bridge railing and approach railing transitions for longitudinal wood bridge decks. The bridge railings were completed in accordance with AASHTO Performance Level 1, Performance Level 2, and NCHRP Report 350 Test Level 4. Approach railings were tested or adapted from previous testing in accordance with NCHRP Report 230. Full drawings sets are provided in customary U.S. and SI units of measure. The testing procedures, results, and drawings have been approved by the Federal Highway Administration Federal-Aid and Design Office for use on Federal-aid highway projects. (27 pages)

Online: http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr84.pdf

p-12 Plans for Crash-Tested Wood Bridge Railings for Concrete Decks (*USFS* 1998)

This publication documents several crashworthy wood bridge railings and approach railing transitions that have been adapted for use on concrete bridge decks. (17 pages)

Online: http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr108/fplgtr108.pdf

p-13 Magnetic-Based NDE of Pre-stressed and Post-Tensioned Concrete Members The MFL System (*FHWA* May 2000)

Describes all aspects of a study to develop a nondestructive evaluation (NDE) system based on the concept of magnetic flux leakage (MFL) to detect corrosion and fracture of prestressing steel in pre-tensioned and post-tensioned concrete bridge members.

Online: http://www.tfhrc.gov/structur/00-27.pdf

p-14 Enhanced Abutment Scour Studies for Compound Channels (*FHWA* August 2004)

This report describes a laboratory study of abutment scour for compound channels where the experiments simulated floodplains with defined channel and over bank flow areas at different elevations. This report will be of interest to bridge engineers and hydraulic engineers involved in bridge scour evaluations and to researchers involved in developing improved bridge scour evaluation procedures.

Online: http://www.fhwa.dot.gov/engineering/hydraulics/pubs/99156/99156.pdf

p-15 GRS Bridge and Abutments (*FHWA* 2001)

– This report describes three recent projects which evaluate the performance of Geosynthetic-Reinforced Soil for bridge support applications. The GRS abutments and piers were load tested and instrumented to evaluate performance. THE concept of pre-loading GRS is explained. The report also describes each of the products in detail, presents the results, and offers recommendations on the applications of GRS in bridge abutment and pier construction. The report will beneficial to researchers and practitioners in geo-technology, especially those interested in GRS applications. (135 pages)

p-16 Bridge Scour in Nonuniform Sediment Mixtures and in Cohesive Materials: Synthesis (*FHWA* January 2004)

This report is a summary of a six-volume series describing detailed laboratory experiments conducted at Colorado State University for the Federal Highway Administration as part of a study entitled "Effects of Sediment Gradation and Cohesion on Bridge Scour." This report will be of interest to hydraulic engineers and bridge engineers involved in bridge scour evaluations. It will be of special interest to other researchers conducting studies of the very complex problem of estimating scour in cohesive bed materials and to those involved in preparing guidelines for bridge scour evaluations.

Online:http://www.fhwa.dot.gov/engineering/hydraulics/library_arc.cfm?pub_number=143&id=69

p-16.10 Multiple Corrosion-Protection Systems for Reinforced Concrete Bridge Components (FHWA Nov 2011)

The results presented in this report represent the findings obtained during the first half of a 5-year study that includes longer-term ASTM G 109 and field tests. In the short-term tests used to date, the epoxy-coatings evaluated provide superior corrosion protection to the reinforcing steel. The results also indicate that the bars will continue to perform well in the longer term, although the tests do not evaluate the effects of long-term reductions in the bond between the epoxy and the reinforcing steel. (255 pages)

Online:http://www.fhwa.dot.gov/publications/research/infrastructure/bridge/07043/index.cfm

p-17 Standard Plans for Timber Bridge Superstructures (*USFS* 2001)

These standardized bridge plans are for superstructures consisting of treaded timber. Seven superstructure types are included: five longitudinal and two transverse deck systems. Both HS20 and HS25 loadings are included, along with L/360 and L/500 deflection criteria. (53 pages)

Online: http://www.treesearch.fs.fed.us/pubs/9710

p-18 Environmental Effects Associated With Wooden Bridges Preserved With Creosote, Pentachlorophenol, or Chromated Copper Arsenate (*USFS* 2000)

Timber bridges provide an economical alternative to concrete and steel structures. Wooden components of these bridges are treated with chromated copper arsenate type C, pentachlorophenol, or creosote to prolong the life of the structure. The preservative used to treat the wooden components in timer bridges is lost to the environment in small amounts over time. This report describes the concentration of wood preservatives lost to adjacent environments and the biological response to these preservatives as environmental contaminants. (100 pages)

Online: http://www.fpl.fs.fed.us/documnts/fplrp/fplrp587.pdf

p-19 Guide for Minimizing the Effect of Preservative-Treated Wood Sensitive Environments (*USFS* 2001)

Preservative-treated wood is commonly used of construction of highway bridges, foot bridges, wetland boardwalks, and other applications where the wood is placed in or over water. Many of these applications place the wood in pristine or sensitive ecosystems. Treated wood is used for these types of sensitive ecosystems. This wood is durable because the chemicals in the preservative are toxic to decay fungi and insects. However, these same chemicals that are beneficial in protecting the word are potentially toxic to aquatic organisms. This report describes the various types of pressure-treated wood; reviews recent research on environmental impacts of treated wood used in sensitive environments, and discusses methods of minimizing potential environmental impacts. (18 pages)

Online: http://www.treesearch.fs.fed.us/pubs/9685

p-20 Field Performance of Timber Bridges 18. Byron Stress-Laminated Truss Bridge (*USFS* 2000)

The Byron Bridge was constructed in the fall of 1993 in Byron, Maine. The bridge is a single-span, tow-lane, stress- laminated truss structure approximately 46 ft. long and 32 ft. wide. This report includes information on the design, construction, and field performance of the bridge. Field performance was monitored for approximately 5 years, beginning shortly after bridge construction. Performance monitory involved collecting and evaluating date relative to wood moisture connect, force level of stressing bars, behavior under static truck loading, and overall structural condition. (20 pages)

Online: http://www.fpl.fs.fed.us/documnts/fplrp/fplrp588.pdf

p-21 Field Observations and Evaluations of Streambed Scour at Bridges (*FHWA* May 2005)

This report describes the most comprehensive set of real-time field measurements of bridge scour ever assembled. It represents more than 6 years of dedicated effort by the US Geological Survey researchers to collect scour data during flood events wherever they occurred in the United States. The report will be of interest to bridge engineers and hydraulic engineers involved in bridge scour evaluations and to researchers involved in developing improved bridge scour evaluation procedures. (122 pages)

Online: http://www.fhwa.dot.gov/engineering/hydraulics/pubs/03052/

p-22 Steel Bridge Fabrication Technologies in Europe and Japan (*FHWA* 2001)

The purpose of the scanning tour was to conduct a broad overview of newly developed manufacturing techniques that are in use abroad for steel bridge fabrication are erection, as there is a need to further modernize structural steel fabrication facilities in the United States. The team's review concentrated on the following general topics: 1) Computer aided drawing and computer aided manufacturing 2) Automated recording of inspection, welding variables, and geometric measurements of quality control and virtual assembly. 3) High-performance steels and coatings. 4) Cutting and joining steel components, members, and structures 5) Certification and contracting of steel fabrication and erection. 6) Design innovation. (54 pages)

Online: http://international.fhwa.dot.gov/Pdfs/SteelBridge1.pdf

p-23 New Mexico Quality Deck Workshop (*FHW-New Mexico division* 2000)

The power point presentation from the New Mexico workshop reviews the following areas 1) cracking in concrete 2) specifications 3) standard drawings 4) design features-contract plans 5) real world experience 6) quality 7) Quality Bridge Workshop 8) hauling, placing and testing of bridge deck concrete 9) post placement inspection and preparation final finishing and curing 10) latex modified concrete 11) case studies 12) identification marks.

p-24 Innovative Technology for Accelerated Construction of Bridge and Embankment Foundations in Europe (*FHWA* Sept 2003)
A geotechnical engineering scan tour of Europe was organized in June 2002 to identify and evaluate innovative European technology for accelerated construction and rehabilitation of bridge and embankment foundations. The team identified 30 technologies and up to 15 processes that offer a potential for accelerating construction and rehabilitation of bridge and embankment foundations. The technologies that offer the greatest potential for success in terms of construction and expediency and ease of implementation are summarized in this report. (74 pages)
Online: http://international.fhwa.dot.gov/links/pub_details.cfm?id=496

p-25 Timber Bridges 2002 Award Winners (2002)
Brief 12-page report on the 15 winners the 2002 National Timber Bridge Competition for the United States

p-26 Design Example of Simple Span T-Beam Strengthening with Fiber-Reinforced Polymer Composites (FHWA Revised January 2011)
This design example is based on an established procedure followed by the author to achieve a strengthened structure through the use of fiber-reinforced polymer (FRP) composite wraps. (22 pages)

p-27 Cold Temperature Effects on Stress-Laminated Timber Bridges(*USFS* 2003)
This laboratory study is by James P. Wacker, General Engineer, Forest Products Laboratory, of Madison, Wisconsin. Stress-laminated bridges perform well if adequate bar force is maintained to provide the interlaminar friction and load transfer between adjacent deck laminations. This study was in response to concerns about the performance of stress-laminated bridges in extremely cold climates.
Online: http://www.woodcenter.org/docs/wacke96a.pdf

p-28 Structural Behavior of Ultra-High Performance Concrete Prestressed I-Girders (*FHWA* August 2006)
This report discusses a series of tests that were completed on prestressed concrete I-girders composed of ultra-high performance concrete (UHPC). Although not structurally optimized to take advantage of the high compressive strength of UHPC, these girders did make use of UHPC's significant tensile capacity through the elimination of all mild steel reinforcement. These results should aid bridge owners in their initial foray into the use of UHPC within the bridge inventory. (104 pages)
Online: http://www.tfhrc.gov/structur/pubs/06115/06115.pdf

p-29 Material Property Characterization of Ultra-High Performance Concrete (*FHWA* August 2006)
This report characterizes the material behaviors of one UHPC in terms of accepted concrete testing methodologies. This study focused on strength-based behaviors (e.g., compressive and tensile strength), long-term stability behaviors (3.g., creep and shrinkage), and durability behaviors (e.g., chloride ion penetrations and freeze-thaw). (186 pages)
Online: http://www.tfhrc.gov/structur/pubs/06103/06103.pdf

p-30 Optimized Sections for High-Strength Concrete Bridge Girders—Effect of Deck concrete Strength (*FHWA* October 2006)
This report contains an evaluation of the effect of high-performance concrete on the cost and structural performance of bridges constructed with high-performance concrete bridge decks and high-strength concrete girders. Bridge designers and owners are the main audience. (93 pages)
Online: http://www.tfhrc.gov/structur/pubs/05058/05058.pdf

p-31 Compilation and Evaluation of Results from High-Performance Concrete Bridge Projects, Volume I: Final Report (*FHWA* October 2006)
In 1993, FHWA initiated a national program to implement the use of high-performance concrete (HPC) in bridges. The program included the construction of demonstration bridges throughout the United States. In addition, other States have implemented the use of HPC in various bridge elements. The construction of these bridges has provided a large amount of data on the use of HPC. This report is divided into four parts. (178 pages)
Online: http://www.fhwa.dot.gov/bridge/pubs/05056/

p-32 Compilation and Evaluation of Results from High-Performance Concrete Bridge Projects, Volume II: Appendixes (*FHWA* October 2006)
This Appendixes is associated with the final report (p-31). This report should also assist designers and owners in recognizing that the use of high-performance concrete in bridges has advantages beyond those of improving durability. (303 pages)
Online: http://www.fhwa.dot.gov/bridge/pubs/05057/

p-33 Ultra-High Performance Concrete: A State-of-the-Art Report for the Bridge Community (FHWA June 2013)
http://www.fhwa.dot.gov/publications/research/infrastructure/structures/hpc/13060/13060.pdf
This report presents the state of the art in UHPC (Ultra-high performance concrete) with regard to uses in the highway transportation infrastructure. (171 pages)

p-34 Drilled Shaft Axial Capacities Effects Due to Anomalies (FHWA September 2008)
Drilled shafts are increasingly being used in supporting critical structures, mainly because of their high-load supporting capacities, relatively low construction noise, and technological advancement in detecting drilled shaft anomalies created during construction. The critical importance of drilled shafts as foundations makes it mandatory to detect the size and location of anomalies and assess their potential effect on drilled shaft capacity. (132 pages)

p-35 Evaluations and Findings for Dynamic Isolation Systems, Inc. Elastomeric Bearings (*HITEC* September 1998)
This report was done on the DIS isolator, a steel reinforced elastomeric bearing with a central lead core that is used to reduce earthquake forces on the structure by allowing the structure to translate through shear deformation of the rubber layers and by absorbing energy when the lead core yields. (42 pages)

p-36 Evaluations and Findings for FIP-Energy Absorption Systems, L.C.C. Slider Bearings (*HITEC* September 1998)
-This report is an evaluation of the FIP isolator that consists of three main elements: a pot bearing, a shock transmission, and one or two planes of elasto-plastic components to reduce the earthquake force on a structure by allowing it to translate and absorb energy as the shock transmission unit engages in a crescent moon to deform plastically. (42 pages)

p-37 Evaluations and Findings for R.J. Watson, Inc. Sliding Isolation Bearings (*HITEC* September 1998)
-This report evaluation is based on the EradiQuake System (EQS) isolator manufactured by R.J. Watson, Inc. The isolator consists of a disk bearing supporting a bearing block which houses polyurethane springs and a polyterafluoroethylene disk that slides on a stainless steel sole plate. The device is designed to reduce earthquake forces by allowing the structure to translate and by absorbing energy through friction. (38 pages)

p-38 Evaluations and Findings for Scougal Rubber Corporation High Damping Rubber Bearings (*HITEC* September 1998)
-This report evaluation is based on the Scougal isolator that is steel reinforced, high damping, and elastomeric bearing. This is designed to reduce earthquake forces and absorb energy by shear deformation of the rubber layers. (42 pages)

p-39 Evaluations and Findings for Skellerup Isolation Elastomeric Bearings (*HITEC* September 1998)
-This report evaluation is based on the Skellerup isolator device made of a steel reinforced elastomeric bearing with a central lead core. The Skellerup isolator device is designed to reduce earthquake forces on the structure by allowing the structure to translate through shear deformation of the rubber layers and by absorbing energy when the lead core yields. (38 pages)

p-40 Evaluations and Findings for Tekton Inc. Roller Bearings (*HITEC* September 1998)
-This report evaluation is based on the Ball-N-Cone (BNC) bearing manufactured by Tekton. This device is designed to reduce earthquake forces by allowing the structure to translate laterally. This device does not however provide damping. (38 pages)

p-41 Evaluations and Findings for Tekton Inc. Steel Rubber Bearings (HITEC September 1998)
-This report evaluation is based on the Tekton steel rubber bearing (SRB). The device is designed to reduce earthquake force on the structure by allowing the structure to translate laterally through shear deformation of the rubber layers and by absorbing energy when the steel pins deform plastically. (38 pages)

p-42 Evaluation Findings for Earthquake Protection Systems, Inc. Friction Pendulum Bearings (*HITEC* September 1998)
-This report evaluation is based on the Friction Pendulum isolator manufactured by EPS. The device is designed to reduce earthquake forces on the structure by allowing the structure to translate by pendulum motion and by absorbing energy through friction. (42 pages)

p-43 Laboratory Evaluation of Waterborne Coatings on Steel (*FHWA* April 2003)
This report presents findings from the results of a Federal Highway Administration in-house study investigating the performance of the current waterborne acrylic, epoxy, and polyurethane coatings on new steel surfaces. Both the cyclic laboratory tests and the outdoor marine exposure were used to evaluate the performance of different commercial waterborne products that were then compared with that of zinc-rich coatings. This report also presents the effect of chemical properties of primers on coating performance.
Online: http://www.tfhrc.gov/structur/pubs/03032/index.htm

p-44 Iowa Design Manual for Low Water Stream Crossings
Online: http://www.intrans.iastate.edu/reports/LWSC.pdf

p-45 Interim Report for Monitoring and Evaluation of Thin Bonded Overlays and Surface Laminates for Bridge Decks (MSU: Dept. of CE August 1997)
-This report is a part of a larger national effort to research thin bonded overlays for bridge decks, and investigated the relative performance and costs of various technologies used for thin overlays on concrete bridge desks. The portion of this program based in Montana used four different overlay treatments applied to a total of 13 bridges along Interstate 90 in southwestern Montana. The overlay technologies considered consisted of two Portland cement related products, an acrylic polymer modified, cement based topping, and silica fume concrete. (81pages)
Online: http://www.archive.org/details/588CE542-779F-4559-BF85-3E8714319A38

p-46 Performance of Weathering Steel in Highway Bridges: 3rd Phase Report (*American Iron and Steel Institute* 1995)
-In 1980 American Iron and Steel Institute initiated a long-term project to study the performance of weathering steel in different structures and environments. This 3rd phase report summarized their findings in 1993. (32 pages)
Online:http://www.steel.org/Content/ContentGroups/Construction2/Bridges/AISI_Construction_Pe15.htm

p-47 Design, Construction, & Quality Control Guideline for Stress Laminated Timber Bridge Decks (*FHWA* September 1993)
-This report presents background information on timber bridge materials and their quality control, a comprehensive step-by-step design procedure based on the 1991 AASHTO Guide Specification, and guidelines for construction, field monitoring, inspection, and maintenance procedures. (50 pages)

p-48 Velocity Variations in Cross-Hole Sonic Logging Surveys—Causes and Impacts in Drilled Shafts *(FHWA September 2008)*
This study evaluated the effectiveness of cross-hole sonic logging (CSL) for non-destructive evaluation of concrete drilled-shaft bridge foundations using numerical analysis. This project provides designers, inspectors, and contractors with a basis for understanding basic principles of the chemistry, physics, and mechanics involved in the process of drilled shaft construction, and for evaluating data presented by the CSL technique.(180 pages)
Online:http://www.cflhd.gov/techdevelopment/completed_projects/geotech/velocity/_documents/02_title_forward_TOC.pdf

p-49 Guide for In-Place Treatment of Wood in Historic Covered and Modern Bridges *(USFS March 2012)*
This guide describes procedures for selecting and applying chemical treatments to prevent or arrest bio-deterioration or fire to protect covered bridges or any timer structures. It is intended for use by inspectors, maintenance and preservation staff. (43 pages)
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr205.pdf

p-49.10 Guide for Materials Selection and Design for Metals Used in Contact with Copper-Treated Wood *(USFS 2013)*
This paper represents a compilation of research on the corrosion of metals in treated wood and is intended to explain why metals corrode in treated wood and give practical design recommendations. (11 pages)
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr227.pdf

p-49.20 Corrosion of Fasteners in Wood Treated with Newer Wood Preservatives *(USFS 2013)*
This document complies recent research findings related to corrosion of metals in preservative treated wood into a single report on corrosion of metals in wood. The document was created to serve as a desk reference for engineers to aid in materials selection when building with treated wood. (64 pages)
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr220.pdf

p-49.30 Educational Guide on the History of Covered Bridges in the United States *(USFS Oct 2011)*
This guide contains lesson plans for us by teachers of grade levels from kindergarten through high school senior on the history and preservation of covered bridges in the United States. Although the primary users will be history teachers, the topic of covered bridges has been covered broadly so that Mathematics, Science (Physics) and English teachers may find certain units useful in their classes. (127 pages plus interactive CD)
http://www.woodcenter.org/covered_bridges_education/educational-guide-on-the-history-of-covered-bridges-in-the-united-states.pdf

p-49.40 Use of Laser Scanning Technology to Obtain As-Built Records of Historic Covered Bridges *(USFS 2012)*
This study was conducted to examine the use of laser scanning technologies for providing as-built records for historic covered timber bridges. These newer technologies need to be explored so they can provide as-built records at a faster rate and with more accuracy. (18 pages)
http://www.fpl.fs.fed.us/documnts/fplrp/fpl_rp669.pdf

p-49.50 Covered Bridge Security Manual *(USFS 2013)*
This report is intended to assist covered bridge owners in selecting systems that will protect covered bridges with the option of adding active alerts to proper authorities for the purpose of heightening security. (34 pages)
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr223.pdf

p-49.60 Evaluating Naturally Durable Wood Species for Repair and Rehabilitation of Above-Ground Components of Covered Bridges *(USFS 2013)*
This report serves as a guide for the use of these naturally durable wood species for rehabilitation of above-ground components of covered bridges and incorporates the results of field and laboratory tests into the final recommendations. (40 pages)
http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr224.pdf

Maintenance

p-50 National Conference on Wood Transportation Structures (*USFS* 1996)
In October of 1996 the Federal Highway Administration the USDA Forest Service held a conference at which information on wood utilization in transportation applications was

presented. The conference included a plenary session, reviewing timber bridges throughout the world, followed by concurrent paper sessions on various topics. This report includes the papers presented at this conference.
Online: http://www.woodcenter.org/docs/fplgtr94.pdf

p-51 Bridge Inspector's Training Manual/90 (*FHWA* 1991)
This manual is intended for use by bridge inspectors. It provides information about the inspection and evaluation of a wide variety of bridge types. Specific details are provided concerning what to look for and where to look. While the examples used in this manual represent the most commonly encountered conditions, they should not be considered to be exhaustive. Additional information is available in the supplements to this manual, as well as the resources listed in the bibliography.

p-52 Extending the Life of a Bridge (*ASTM* August 1990)
This book is a collection of papers presented to show the importance of the correctly managing and caring for bridges currently in use, and the construction of new bridges to help achieve a longer lifespan. (132 pages)

p-54 Rural Roads and Bridges (*USDA* 1990)
This report acquaints policymakers, practitioners, and citizens with for aspects of rural road and bridge finance and administration. First, it reviews the condition of rural roads, based on information forma survey of highway officials. Second, it examines the status of local bridges use information form the National Bridge Inventory compiled by the Federal Highway Administration. Third, it analyzes costs to upgrade roads and bridges to acceptable standards for existing traffic. Fourth, it considers trends in financing methods with special emphasis on reliance on Federal and State revenues. The report then summarizes State and local options to improve maintenance of rural roads and bridges. (33 pages)

p-55 Improving Highway Safety at Bridges on Local Roads and Streets (*FHWA* 1998)
Bridge rail safety is critical. IT is often easier to evaluate how satisfactory an older bridge rail is by considering both is structural characteristic and its functional characteristics. . This publication explains how safe and effective bridge railings can be checked for and achieved. (35 pages)
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/98083/98083.pdf

p-60 NACE Bridge Maintenance on Local Roads (*NACE* 1995)

This training guide has been prepared for use by bridge maintenance foreman and crew to perform this important activity. This training guide has been prepared for use by bridge maintenance crews and other personnel responsible for inspection and maintaining bridges on county and local agency roads. This information should be useful during group meetings, informal discussion, and demonstration during bridge inspection and maintenance activities. (70 pages)

p-61 NACE Action Guide Volume III-3: Bridge Rehabilitation on Local Roads (*NACE* 1995)

The major objective of this action guide is to provide county personnel with an understanding of current techniques for rehabilitating and upgrading bridges with functional deficiencies and structural deterioration to adequately serve current and future traffic needs. Each chapter explains with great detail the steps of county bridge rehabilitation. These steps include: inspection, analysis, engineering, and consideration. (9 chapters)

p-64 Woods in Transportation Publication List (*USDA* 1999)

This is a guide to the publications available from the National Wood In Transportation Information Center (the Nation's Clearinghouse for information about Wood in Transportation Applications)

p-67 Inspection of Timber Bridges Using Stress Wave Timing Nondestructive Evaluation Tools (*USFS* 1999)

This guide was prepared to assist inspectors in the use of stress wave timing instruments and the various methods of locating and defining areas of decay in timber bride members. The first two sections provide (a) background information regarding conventional methods to locate and measure decay in timber bridges and (b) the principles of stress wave nondestructive testing and its measurement techniques. This guide includes all the information needed to begin to utilize and interpret results from stress wave timing nondestructive evaluation methods. (16 pages)

Online: http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr114.pdf

p-69 Job Site Evaluation of Corrosion-Resistant Alloys for Use as Reinforcement in Concrete(*FHWA* June 2006)

The use of corrosion-resistant materials in bridge construction has increased due to the requirement of the 75-100 year design life now implemented. This publication's goal was to evaluate and provide a historical record of approved State bridge construction projects that have used these materials. The study includes site visits, documentation of attributes and any problems associated with the various types of reinforcement types, acquisitions, and testing of samples. (86 pgs)

Online: http://www.tfhrc.gov/structur/pubs/06078/HRT-06-078_print.pdf

p-70 Highway Bridge Inspection: State-of-the-Practice Survey (*FHWA* 2001)
Visual Inspection is the primary tool used to perform mandated bridge inspections. This research study, performed by the FHWA Nondestructive Evaluation Validation Center, focused on evaluating current policies and practices that may affect the reliability of Visual Inspection. The first objective was to compile a state-of-the-practice report for bridge inspection, particularly as it pertains to Visual Inspection. The second objective was to gather information on bridge inspection management and assess how inspection management may influence the reliability of inspections. The final objective was to gather data about the current use of nondestructive evaluation technologies and to attempt to identify current and future research needs.
Online: http://www.tfhrc.gov/hnr20/nde/pdfs/01033.pdf

p-71 Guidelines for Ultrasonic Inspection of Hanger Pins (*FHWA* July 2004)
A failed hanger pin initiated the tragic collapse of one span of the Mianus River Bridge in Greenwich, CT on June 28, 1983, resulting in the deaths of three motorists. Following the collapse, there was an immediate increase of interest in the inspection and condition evaluation of bridge hanger pins. Ultrasonic inspection has become the primary method of performing detailed inspection of in-service hanger pins. This document describes the fundamentals of ultrasonic testing and general inspection requirements that can be used by State transportation agencies or by others performing ultrasonic hanger pin inspection. (99 pages)
Online: http://www.tfhrc.gov/infrastructure/nde/pubs/04042/04042.pdf

p-72 A Critical Literature Review of High-Performance Corrosion Reinforcements in Concrete Bridge Applications (*FHWA* July 2004)
This investigation was initiated to evaluate the corrosion resistance of various categories of high-performance reinforcement, including new products that are becoming available, in bridge structures that are exposed to chlorides. This interim report presents the results of a critical literature review of corrosion issues and behavior for high-performance reinforcements as applicable to bridges and a precursor to the experimental program. (48 pages)
Online: http://www.tfhrc.gov/structur/pubs/04093/04093.pdf

p-73 Long-Term Performance of Epoxy-Coated Reinforcing Steel in Heavy Salt-Contaminated Concrete (*FHWA* June 2004)
This report describes results obtained from a long-term natural weathering exposure testing of the remaining 31 post-Southern Exposure (SE) test slabs that contained epoxy-coated reinforcing bar (ECR), black bars, and stainless steel bars. This report will be of interest to materials and bridge engineers, reinforcing-concrete corrosion specialists, reinforcing bar manufactures, producers of organic coatings, and manufacturers of stainless steel.
Online: http://www.tfhrc.gov/structur/pubs/04090/04090.pdf

p-74 Integrity of Infrastructure Materials and Structures (FHWA October 2009)
This investigation was initiated for two purposes: (1) to evaluate stainless steel (SS) type 2304 (UNS S322304) as a corrosion-resistant reinforcement in concrete and (2) to develop sensor technology for characterizing corrosion rate on existing steel bridges in situ.
(85 pages)

p-75 Reliability of Visual Inspection for Highway Bridges (Vol. I &II) (*FHWA* 2001)

In 1998 and Industry Expert Panel consisting of experts proposed a work plan for bridge inspection. This plan and results are summarized in this report. The goal for this study is to examine the reliability of VI of highway bridges. The study focuses on the two most commonly completed inspections: Routine and IN-Depth Inspections. Results from performance trials are summarized and findings are given completing final conclusions offered in the last chapter. (485 pages)
Online: http://www.tfhrc.gov/hnr20/nde/01105.pdf

p-76 Performance of Concrete Segmental and Cable-Stayed Bridges in Europe (*FHWA* 2001)
The main objective of the scanning activity was to evaluate the European inventory of prestressed concrete segmental and cable-stayed bridges. In general, segmental and cable-stay technology and developments in Europe and the US are moving in parallel directions. Technical advances continue to be made with respect to corrosion, external and internal prestressing tendons, inspection methods, use of new composite materials, and construction techniques. (89 pages)
Online: http://international.fhwa.dot.gov/Pdfs/conc_seg_cabstay_euro.pdf

p-77 Assessing Stream Channel Stability at Bridges in Physiographic Regions. (*FHWA* July 2006)
This study expands and improves on a rapid channel assessment method previously developed to include additional factors. Another goal of this study was to tailor Thorne's reconnaissance method for bridge inspection and stability assessment needs. Site visits were conducted at 57 stream-bridge intersections and all the info collected was tabulated and rated. (157 pages)
Online:http://www.fhwa.dot.gov/engineering/hydraulics/pubs/05072/05072.pdf

p-78 A Laboratory and Field Study of Composite Piles for Bridge Structures. (*FHWA* March 2006)
This report presents the results of a lab and field study of composite piles for use as foundation elements for bridges. It covers Axial and lateral short-term displacement behavior and mechanical properties of two types of composite piles; a fiber-reinforced polymer(FRP) concrete-filled shell and a plastic pile reinforced with a welded steel cage. (384 pages)

p-79 LTBP Bridge Performance Primer (FHWA December 2013)
This report is intended to provide a comprehensive definition of bridge performance that will be the foundation for carefully designed research studies in the LTBP Program. The report describes the barriers and complications that hinder the understanding of bridge performance and identifies the measures by which bridge performance is currently defined. (67 pages)
http://www.fhwa.dot.gov/publications/research/infrastructure/structures/ltbp/13051/13051.pdf
Online: http://www.tfhrc.gov/structur/pubs/04043/index.htm#toc

p-80 LTAP Bridge Maintenance Training (*Texas LTAP/ Texas Engineering Extension Service* 11/ 2005)
This information is in the form of a reference manual and cd presentation. The manual covers a multitude of maintenance procedures and the presentation addresses the question of "why preventive maintenance". This is based on National Highway Institute course, "Bridge Maintenance Training." (75 page notebook w/cd's)

p-81 Characterization of Bridge Foundations Workshop Report (FHWA November 2013)

This report presents an overview and documents the results and conclusions of a workshop held in 2013 involving key staff from the FHWA hydraulics, geotechnical and structural disciplines brainstorming with stakeholders in separate breakout sessions. (66pages)
Online:https://www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13101/13101.pdf

p-82 Guidelines for Sampling, Assessing and Restoring Defective Grout in Prestressed Concrete Bridge Post-Tensioning Ducts (FHWA October 2013)
This study was performed to provide bridge owners with a practical protocol for inspecting, sampling, analyzing, evaluating, and responding to bridge grout concerns. (130 pages)
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13028/13028.pdf

p-83 An FHWA Special Study: Post-Tensioning Tendon Grout Chloride Thresholds (FHWA May 2014)
This report presents two chloride threshold values determined for the post-tensioned (PT) tendons that are fully encased in the commercially available grout. If PT tendons contain carbonated grout, segregated grout, duct cracks, grout voids filled with water with or without chloride ions, or free sulfate ions in contact with the strands, corrosion might start below the proposed threshold values. (196 pages)
http://www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/14039/14039.pdf

p-85 Bridge Management Experiences of California, Florida and South Dakota. (*FHWA*)
This publication describes how CA, FL and SD have used the Pontis Bridge Management System to shape their Asset Management Programs to be more efficient and cost effective. It discussed ways each state has integrated it into their existing programs such as Citrix MetaFrame Access Suite and the Project Level Analysis Tool. (28 pages)
Online: http://www.fhwa.dot.gov/infrastructure/asstmgmt/bmcs7.pdf

p-86 Bridge Evaluation: Quality Assurance in Europe (*FHWA* March 2008)
This report analyzes European agencies use of bridge inspection programs to insure highway user safety, meet durability, and serviceability expectations, and enhance capital investment decisions. From this report the U.S. can learn many recommendations in developing a rational basis for bridge inspection, frequency, guidelines for developing quality assurance/quality control procedures, illustrations, and reference photos for manuals, and integrated inspection repair approaches. (43 pages)
Online: http://international.fhwa.dot.gov/pubs/pl08016/pl08016.pdf

EQUIPMENT

Maintenance

p-103 How to Develop and Use Equipment Performance Specifications *(D)* (*TRB* 1991)

This article discuses the five easy steps to successful specification writing. (25 pages)

p-104 Perceptions of Highway Maintenance in Montana: The Results of a Telephone Survey (*MSU-Billings*, 1996)
Ratings were combined into a composite variable for each of the maintenance activities. The composite variable provides an indication of the level of attention and resources the

respondents believed each maintenance activity should receive from MDT.
Online: http://www.archive.org/details/B756D7CA-9A2C-4546-B988-D62574BA6658

Operation

p-150 Motograder Operator Training (*MDT* 1997)
-This manual is a training aid based on the Operator's Manual. It covers safety rules, equipment inspection, basic facts and terms, blade high-lifts, motograder principles to remember, grading techniques, grader attachment, operating techniques, inspection checklist, and operator training assessment. (38 pages)

p-151 Motor Grader Operators Handbook (*MT LTAP* 1995)
The purpose of this handbook is to assist beginning and experienced county operator in providing safe, long lasting roads. It is collection of the best information available on operating tips, roadway safety and roadway maintenance that every operator should know. (8 Chapters)

p-152 Total Station Training Manual *(D)* (*North Dakota DOT* 1993)
This manual was developed for the total station instrument and its use in highway survey. The total station instrument has revolutionized construction surveying techniques. This manual attempts to cover the bases of Nikon's "Top Gun" Total Station instrument and its applications in construction surveying. (50 pages)

p-155 Front-End Loader Operator Training (*MDT* 1997)
This manual is a training aid based on the Operator's Manual. It covers safety rules, equipment inspections, basic loader information, operating techniques, inspection checklist, and operator training assessment. (22 pages)

p-158 Bulldozer Operator Training (*MDT* 1997)
This manual is a training aid based on the Operator's Manual. It covers safety rules, equipment inspection, bulldozer controls, operating techniques, inspection checklist, and operator training assessment. (20 pages)

p-161 Backhoe Operator Training (*MDT* 1997)
This manual is a training aid based on the Operator's Manual. It covers safety rules, pre-start inspection, driving the machine, operating the backhoe loader, and includes a quiz and operator's assessment. (28 pages)

p-165 Field Data Collection Equipment Guide (*USFS* September 1999)
-This guide provides field personnel with basic information on the range of systems or components that are available in GIS data collection and mapping, where products can be purchased, and what they cost, facilitates advanced planning and procurement of systems, provides information on available state of the art technology and new products that well assist personnel in automating data collection tasks in the field, introduces GIS field data collection equipment evaluation, and provide resources for obtaining addition information on new products. (57 pages)

p-170 Maintenance Welding Techniques and Applications (*Cornell Local Roads Program* 1995)
This workbook is designed to give new and experienced welder's basic, practical methods and techniques for maintenance welding. Safety is presented several times in this workbook. The basic principles of torch use, arc welding, and metal identification are discussed. Later there are chapters about welding objects that are in hard-to-reach positions, cast iron repair, heat treatment, and soldering. The last few chapters introduce advanced techniques for more

experienced welders. (83 pages)
Online: http://www.clrp.cornell.edu/PDF/welding_manual_1995.pdf

ROADS

Construction

p-200 Standard Specs. for Construction of Roads and Bridges on Fed Highway Projects (*FHWA* 1996)
These Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects are issued primarily for constructing roads and bridges on Federal Highway Administration. These specifications are cited as "FP-96" indicating Standard Specifications issued in 1996. (813 pages)
Online: http://www.efl.fhwa.dot.gov/design/manual/Fp96.pdf

p-201 National Quality Improvement Task Force Report on Quality Assurance Procedures for Highway Construction (*FHWA* 1994)
This report is the result of a Task Force meeting held in Hot Springs, Arkansas in 1993. This Task Force Report has been written to develop a number of innovative approaches to Quality Control/Quality Assurance programs and to serve as a supplement for sampling and testing. The Task Force was comprised of 26 individuals representing private industry, State agencies, the FHWA, and consultants. (~50 pages)

p-202 Road Surface Analyzer *(D) US DOT*
This one page summary discusses the technology behind and the usefulness of the Road Surface Analyzer (ROSAN).

p-203 Simplified User's Guide to Time-Domain-Reflectometry Monitoring of Slope Stability (USFS Sept 2009)
This is a simplified guide for the implementation and use of a TDR cable system for monitoring the movement of known and potential landslides. Slope movement can be monitored by a number of methods and pieces of advanced equipment. However, using time domain Reflectometry (TDR) is one of the least expensive methods. (25 pages)

p-205 Highway Design Handbook, For Older Drivers and Pedestrians –Vol. I Guidelines/Recommendations – Vol. 2 (FHWA 2001)
This project update, revised, and expanded the scope of the Older Driver Highway Design Handbook published in 1998. The resulting document incorporates new research findings and technical developments; extensive feedback form State, county, and municipal engineers who reviewed and applied recommendations from the earlier version. All research products developed under this contract are designed to provide practical guidance to engineers to accommodate the needs and functional limitations of an aging population of road users. (362 pages)
Online: http://www.tfhrc.gov/humanfac/01103/coverfront.htm

p-206 Local Low Volume Roads and Streets (*FHWA* 1992)
- This reference provides local agencies with basic information concerning local low volume roads and streets. Although much of the information contained is applicable to all road and street activities, emphasis has been placed on LLVRAS. This reference is easy to use and specific topic may be quickly located. This reference will be particularly beneficial to individual with limited technical expertise and not formal training or experience.
Online: http://www.tfhrc.gov/humanfac/01105/cover.htm

p-207 A Policy on Geometric Design of Highways and Streets (*AASHTO* 1990)
The guidance provided by this text, is passed on established practice and is supplemented by recent research. This text is also intended to form a comprehensive reference manual for assistance in administrative, planning, and educational efforts pertaining to design formulation. The intent to this policy it so provide guidance to the designer by referencing a recommended range of values for critical dimensions. These guidelines are intended to provide operational efficiency, comfort, safety, and convenience for the motorist. (1044 pages)
Online:http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid

p-208 Assessing the Extent and Determinates of Induced Growth (MDT June 2013)
The objective of this research was to identify a Montana-specific, consistent, legally defensible, and efficient process for assessing the indirect land use and environmental effects of transportation projects for the Montana Department of Transportation (MDT). (173 pages)
From MDT: For librarians, the report has been cataloged, with OCLC # 852168240 for the electronic version and 852165576 for the print version. Only Electronically Available:
Online:
http://www.mdt.mt.gov/other/research/external/docs/research_proj/growth/final_report_jun13.pdf

p-209 The Basics of a Good Road (*CLRP* 1990)
This packet has several sections pertaining to road construction and maintenance. These sections are as follows: traffic, drainage, materials, paving, paving aggregate roads, and road geometry. (41 pages)

p-212.A Introduction to the Highway Safety Manual (*AASHTO* 2010)
This booklet provides an overview of the Highway Safety Manual: what it is, contents, integrating the HSM with the Project Development Process, data needs, example applications, getting started and resources. (13 pages)

p-212.1 Highway Safety Manual, 1st Edition, Volume 1 (*AASHTO* 2010)
The HSM is a resource that provides safety knowledge and tools in a useful form to facilitate improved decision making based on safety performance. The HSM assembles currently available information and methodologies on measuring, estimating and evaluating roadways in terms of crash frequency (number of crashes per year) and crash severity (level of injuries due to crashes). The HSM presents tools and methodologies for consideration of "safety" across the range of highway activities: planning, programming, project development, construction, operations, and maintenance. Volume 1 covers Introduction, human factors and fundamentals; and roadway safety management process.(190 pages)

p-212.2 Highway Safety Manual, 1st Edition, Volume 2 (*AASHTO* 2010)
Volume 2 covers predict method for rural two-lane, two-way roads; rural multilane highways, and urban and suburban arterials. (190 pages)

p-212.3 Highway Safety Manual, 1st Edition, Volume 3 (*AASHTO* 2010)
Volume 3 covers crash modification factors on roadway segments, intersections, interchanges, special facilities and geometric situations, and road networks. (190 pages)

p-212.4 Highway Safety Manual, Implementation Guide for Managers (*FHWA September 2011*)

This guide is intended for managers of departments of transportation (DOT) charged with leading and managing agency programs impacting the project development process and safety programs. This guide is based on lessons learned from early adopters of the Highway Safety Manual (HSM), many of whom are participating in the AASHTO's Lead State Initiative. It outlines what the HSM is (and is not), how it relates to other core technical documents and policies, and the potential benefits of its use. The guide is written in three sections – Introduction to the HSM, HSM Implementation Considerations, and HSM Implementation Opportunities in Program Development and Project Delivery. (34 pages)

Online: http://safety.fhwa.dot.gov/hsm/hsm_mgrsguide/hsm_mngrguide.pdf

p-213 Highway Engineering Handbook, Second Edition, McGraw-Hill, (2003)

p-214 A Policy on Geometric Design of Highways and Streets 2004 (*AASHTO* 2004)

This is the Fifth Edition of the "Green Book" from AASHTO. The guidance supplied by this text is based on established practices and is supplemented by recent research with regard to highway engineers striving to provide for the needs of highway users while maintaining the integrity of the environment. This text is also intended to form a comprehensive reference manual for assistance in administrative, planning, and education efforts pertaining to design formulation. (896 pages)

Online: http://www.ent.ohiou.edu/~trans/CE566/PDF%20Files%20for%20Web/Design%20Vehicles

p-215 Montana LTAP Inspector's Job Guide for Highway Maintenance Tables (*Montana LTAP* 2004)

These guidelines are intended to cover the very basic duties of inspection by reference to key activities. The guides must be supplemented by reference to contract documents, specifications, special provision, instructional manuals, and guidance by the project engineer. (22 pages)

p-216 Superior Materials, Advanced Test Methods, and Specifications in Europe (*FHWA* 2004)

FHWA and AASHTO this study, under the International Technology Scanning Program, visited four European nations and discussed their unique approaches to introducing, approving, and specifying processes for new materials and manufactured products employed in highway construction. The visits proved helpful in meeting the overall objectives of the scan, which will benefit the highway industry in the United States by identifying how processes for introducing new and innovative materials and products might be improved.

Online: http://isddc.dot.gov/OLPFiles/FHWA/011375.pdf

p-218 Field Guide for Unpaved Rural Roads (*Kansas LTAP* 2004)

The purpose of this updated guide is to provide assistance to local governments responsible for safety of unpaved rural roads. (Wyoming LTAP produced this guide in 1997.)

Online: http://www.t2.unh.edu/pubs/field_guide.pdf

p-219 Field Guide for Unpaved Rural Roads (*WY T2* 1997)

The purpose of this guide is to provide assistance to local governments responsible for safety of unpaved rural roads. A national focus group assisted in identifying key safety issues for unpaved rural roads. Those issues which ranked highest are included in this guide. This easy to use guide will provide a convenient reference to help answer questions in the field. (24 pages)

p-221 Use of Warranties on In-Service Performance for Roadway Construction Projects (*MSU* August 1998)

The objective of this project is to investigate the potential benefits of using in-service warranties on roadway construction projects in Montana. Contract awards should be based on securing the best technical quality for the lowest price. A maintenance bond should be required during the warranty periods.

Online: http://www.archive.org/details/F08FE6FC-21CC-4C90-9410-12A7B428FEF5

p-222 A Guide for Achieving Flexibility in Highway Design (*AASHTO* May 2004)

This Guide encourages highway designers to expand their consideration in applying the Green Book criteria. It shows that having a process that is open, includes good public involvement, and fosters creative thinking is an essential part of achieving good design. The term CSS, context-sensitive solutions, refers to an approach or process as much as it does to an actual design or solution.

p-223 Application of Geophysical Methods to Highway Related Problems (*FHWA* August 2004)

This publication provides highway engineers with a basic knowledge of geophysics and nondestructive test (NDT) methods for solving specific transportation related problems. Provides tools in the use of geophysical and NDT techniques to evaluate problems for design, planning, construction, or remediation techniques. (742 pages)

p-225 Guidelines for Geometric Design of Very Low-Volume Local Roads (*AASHTO* 2001)

The guidance supplied by this text addresses the unique needs of low-volume roads and the geometric designs appropriate to meet those needs.

p-226 Low-Volume Roads 2007, Volume 1, TRB No. 1989 (*TRB* 2007)

This is the ninth in a collection of peer-reviewed papers regarding low-volume road research. Every four years since 1975, this series of publications has collected the work of authors from six continents and more than 40 countries to share experiences and innovations. The two volumes of this Record contain a keynote paper and 80 technical papers of the highest quality that are pertinent to low-volume road systems. Viewed also at www.trb.org. (359 pages)

p-227 Deep Patch Road Embankment Repair Application Guide (*USDA* October 2005)

- Provides an application guide that describes the background, performance, design, and construction details of the deep patch road embankment repair technique. Also details a method for designing deep patches. (21 pages) Also found at
Online: http://www.fs.fed.us/eng/pubs/pdf/05771204.pdf

p-228.1 Low Volume Roads 2011, Volume 1, TRB No. 2203 (TRB 2011)
The three volumes of this series present a keynote paper and 90 technical papers pertinent to low-volume roads, 44 by authors from the United States and 46 by authors from 18 other countries. Volume 1 contains topics on Environment; Safety; Economics, Finance, and Planning; Design(225 Pages) *For full color versions go to www.TRB.org/TRROnline*

p-228.2 Low Volume Roads 2011, Volume 2, TRB No. 2204 (TRB 2011)
The three volumes of this series present a keynote paper and 90 technical papers pertinent to low-volume roads, 44 by authors from the United States and 46 by authors from 18 other countries. Volume 2 contains topics on Maintenance; Stabilization; and Geotechnical Engineering. (266 Pages) *For full color versions go to www.TRB.org/TRROnline*

p-228.3 Low Volume Roads 2011, Volume 3, TRB No. 2205 (TRB 2011)
The three volumes of this series present a keynote paper and 90 technical papers pertinent to low-volume roads, 44 by authors from the United States and 46 by authors from 18 other countries. Volume 3 contains topics on Materials and Pavement Management.(253 Pages) *For full color versions go to www.TRB.org/TRROnline*

p-230 Low-Cost Treatments for Horizontal Curve Safety (*FHWA* December 2006)
This Guide identified 20 strategies as alternative countermeasures—or treatments—to address the specific safety problem at horizontal curves. (Lists cost and examples.) These strategies share one of two objectives: 1. Reduce the likelihood of a vehicle leaving its lane and either crossing the roadway centerline or leaving the roadway at a horizontal curve. 2. Minimize the damaging consequences of a vehicle leaving the roadway at a horizontal curve.
Online:
http://safety.fhwa.dot.gov/roadway_dept/horicurves/fhwasa07002/fhwasa07002

p-231 The Federal Highway Administration Highway Cost Allocation Workshop (*FHWA* June 1995)
This report summarizes results and recommendations of the Highway Cost Allocation Workshop sponsored by the FHWA in cooperation with AASHTO. Presentation during the plenary sessions covered the following topics: 1)Federal studies and research since 1982 related to highway cost , 2)State perspectives on highway cost allocation, 3)Review of recent State highway cost allocation studies, 4)Highway cost allocation implication of the Intermodal Surface Transportation Act, 5)Evolution of 1982 Federal highway cost allocation methods 6)Other approaches to highway cost allocation, 7)Other approaches to highway cost allocation, 8)Cost allocation implication of changes in Federal and State highway finance since 1982 and the outlook for the future, 9)How environmental and other externalities should be treated in Federal highway cost allocation and 10)Technical issues in highway cost allocation. (46 pages)
Online:
http://www.cflhd.gov/techDevelopment/completed_projects/survey/_documents/02_Title_Forward_TOC.pdf

p-232 Advanced Surveying and Mapping Technologies: Systems Overview & Applications (FHWA 5/2008)
This report presents a study, with resulting conclusions, to investigate emerging surveying and mapping technologies, and their applicability to typical assignments of the Office of Federal lands Highway (FLH) of the FHWA. (42 pages)

p-233 Assessment of Computer-Assisted Interactive Applications (*FHWA* December 1993)

This report presents the results of a comprehensive study of eight computer assisted interactive applications located within the Federal Highway Administration (FHWA), Local Technical Assistance Program (LTAP), and the Federal Lands Highway Program (FLHP). A detailed discussion of the advantages and disadvantages of the applications is presented as well as recommendation concerning future applications within the FHWA's technology transfer programs. (45 pages)

p-234 Surveying Methods for Local Highway Departments *(D) (Cornell Local Roads Program* 1994)

We prepared this workbook for a training course on basic surveying methods for local highway departments to provide highway officials with some basic concepts about surveying. The course and this reference book are intended for town, village, county, and city highway officials, street foreman, construction supervisors, and others who want to learn about basic surveying methods, and whose knowledge and experiences with surveying techniques is limited. Topics include how to back an curve, crown a road, check a grade, take elevations on each end of a culvert, and how to determine pipe length. (60 pages)

p-235 NCHRP Report 440: Accident Mitigation Guide for Congested Rural Two-Lane Highways (*TRB* 2000)

This guide will assist planners, designers, and traffic engineers in identifying and designing projects to improve safety on congested rural two-lane highways. The guide assumes that widening the road to four lanes is not a practical solution because of financial, environmental, or societal constraints. Geometric, traffic control, and other types of countermeasures are discussed. (164 pages)

p-236 Ground-Based LIDAR Rock Slope Mapping and Assessment (*FHWA* September 2008)

LiDAR (Light Detection and Ranging), also referred to as 3D laser Scanning, is an emerging three-dimensional mapping technology that employs a laser and a rotating mirror or housing to rapidly scan and image volumes and surficial areas such as rock slopes and outcrops, buildings, bridges, and other natural or man-made objects. This report was to determine whether the new technology of LiDAR could assiste FHWA with highway rock slope stability. (114 Pages)

Online:

http://www.cflhd.gov/techDevelopment/completed_projects/geotech/LiDAR/_documents/02_title_forward_toc.pdf

p-237 Safety Evaluation of Lane and Shoulder Width Combinations on Rural, Two Lane, Undivided Roads (*FHWA* 2009)

The FHWA organized a pooled fund to study 26 states to evaluate low-cost safety strategies as part of its strategic highway safety effort. The purpose was to evaluate the safety effectiveness of several low-cost safety strategies.(8 pages)

Online: http://www.tfhrc.gov/safety/pubs/09031/09031.pdf

p-252 Transportation Research Board of the National Academies: Eighth International Conference on Low-Volume Roads 2003 (No. 1819, Volume 1 and Volume 2) (*TRB* 2003)

Nearly 70% of the road miles in the US, and nearly 90% of road miles in the world, are low-volume roads. Financial limitations force road administrators to seek low-cost and innovative solutions to keep their low-volume roads in the best condition possible. This is not an easy task. In recognition of this reality, a series of conference on low-volume roads was begun in 1975 by what is now known as the Committee on Low-Volume Roads in the Transportation Research Board. The goals of this Eighth Conference are consistent with those of past meetings: to identify and share practical solutions for administration, planning, design, construction, environmental management, and maintenance of low-volume roads. This two-volume proceeding contains 96 papers.

p-255 The Status Applicability of Intelligent Transportation Systems in Montana (*WTI* 1996)

p-257 Technology in Rural Transportation "Simple Solutions" (*FHWA* 1997)
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/its/ruralitsandrd/simsolutions.pdf

p-260 Long-Term Durability of Geosynthesis Based on Exhumed Samples From Construction Projects

p-264 Montana Statewide ITS Strategic Plan-June (*WTI* 1999)

The Montana ITS Strategic Plan provides the framework for the development of an ITS Program in the State of Montana. The Montana ITS Strategic Plan planning process established the basis for an ITS Program that will provide continued multi-division and multi-agency coordination, systems integration; multi jurisdictional partnerships; leveraging of diverse funding sources; and facilitating innovation in the statewide Montana transportation system. The possibilities of ITS in Montana are considerable, with significant benefits to the traveling public.

p-265 Falling Weight Deflectometer Calibration Center and Operational Improvements: Redevelopment of the Calibration Protocol and Equipment (FHWA Oct 2011)

This report details the critical updates to the Strategic Highway Research Program falling weight deflectometer (FWD) calibration procedure. This has led to the revision of the American Association of State Highway and Transportation Officials R32-09 calibration procedure. (268 pages)

Online:
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/07040/index.cfm

p-266 Performance Test for Geosynthetic-Reinforced Soil Including Effects of Preloading (*FHWA* January 2001)

A study was undertaken to investigate the behavior of Geosynthetic Reinforced Soil masses under various loading conditions and to develop a simplified analytical model for predicting deformation characteristic of a generic GRS mass. To conduct the study, a revised laboratory test, known as the Soil-Geosynthitic Performance test, was first developed. Finite analysis were performed to examine the tress distribution in the SGP test. The importance of using small reinforcement spacing was evidenced by the stress distribution. A Simplified Preloading-Reloading (SPR) analytical model was developed to predict the deformation characteristics of a GRS mass subject to monotonic loading and preloading/reloading. The SPR model was shown to be able to accurately predict the results obtained from the SPG tests and numerical analysis of automated plane strain reinforcement tests. (270 pages)

Online: http://www.tfhrc.gov/structur/gtr/01-018.pdf

p-267 Intelligent Transportation System Benefits: 2001 Update (*FHWA* 2001)

The purpose of this report is to provide a summary of data available in the ITS Benefits Database. It is a compendium of reported impacts of ITS that have been collected from a number of sources, and builds upon a history of similar summary reports that have been authored over the last six years. The report highlights benefits identified by other authors. It demonstrates that in general all ITS services have shown some positive benefit and that negative impacts are usually outweighed by other positive results. (75 pages)

Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13463.pdf

p-268 What Have We Learned About Intelligent Transportation Systems? (*FHWA* 2000)

In sort, this study is concerned with what we have learned about ITS. The study examines which ITS technologies and applications have been successful, which have not, and for which more information is needed to make a judgment. (188 pages)

Online: http://ttap.colostate.edu/Library/FHWA/FHWA-OP-00-what.pdf

p-269 Guide to Risk Assessment and Allocation for Highway Construction Management (*FHWA* October 2006)

The purpose of this International Technology Scanning Program study was t identify practices that might be evaluated and applied in the United States to improve construction management. (72 pages)

Online: http://international.fhwa.dot.gov/riskassess/pl06032.pdf

p-270 Guide to Earthwork Construction (*TRB* 1990)

Online: http://onlinepubs.trb.org/onlinepubs/sar/sar_8.pdf

p-271 Intro to Deep Mixing Methods as Used in Geotechnical Applications (*FHWA* October 2001)

This reports focuses closely on the properties of soils created by DMM and aspects of quality control, quality assurance and verification.

Online: http://isddc.dot.gov/OLPFiles/FHWA/009360.pdf

p-275 Performance-Based Contractor Prequalification as an Alternative to Performance Bonds (FHWA August 2014)

FHWA is interested in ensuring that State transportation departments select contractors that can complete projects cost-effectively. One potential method to help select qualified contractors is to use a performance-based contractor prequalification process. FHWA commissioned this study to evaluate the wisdom of expanding the use of this process. This report presents the results of this study, which examined relevant literature, evaluated the benefits and costs of performance bonds and performance-based contractor prequalification, and recommended a model performance-based prequalification approach. (178 pages) *(Online document not available as of 11/14/2014)*

http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/14035/index.cfm

p-279 Montana Public Works Standard Specifications – Fourth Ed. (*Montana Contractors Association Inc.* 1996)

The 1996 edition of the Montana Public Works Standard Specifications represents the Fourth Edition of this document. The CSI format uses an outline style to describe scope of work, materials, execution of work, method of measurement and basis of payment. The outline should be flexible enough to include or exclude sections of the documents when such change may become necessary.

Online: http://www.archive.org/details/montanapublicwor00mont

p-280 Montana Public Works Standard Specifications – Fifth Edition (*Montana Contractors Association Inc.* 2003)

The Fifth Edition of the MONTANA PUBLIC WORKS STANDARD SPECIFICTAIONS is the updated edition. Multiple revisions have been made to update this book.

Online: http://www.bozeman.net/bozeman/water-sewer/pdfs/COB_Modifications_to_MPWSS_Version_5.pdf

p-280.01 Montana Public Works Standard Specifications – Sixth Edition (*Montana Contractors Association Inc.* 2010)

The Sixth Edition of the MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS is the updated edition. (DVD in back of book) To order: www.mtagc.org

p-281 Addendum Number #2 to the Montana Public Works Standard Specifications (*Montana Contractors Association* 2000)

The following corrections, clarifications, and /or alterations to the Forth Edition of the Montana Public Works Standard Specification are a part and parcel of said specifications as if included therein. This Addendum supersedes and replaces select section of the bound specifications and all of Addendum Number 1 dated June 1, 1998. All documents and changes included in Addendum Number 1 are reissued and included in this Addendum. (~150 pages)

p-284 Clay Seam Mapping With Electromagnetic Induction (*FHWA* November 2005)

This report summarizes multi-phase geophysical demonstrations using various electromagnetic induction (EMI) methods on SR537 near Dulce, New Mexico. The road has had extensive surface rehabilitation due to the presence of swelling clay-rich zones in the road base. Using electromagnetic geophysical methods with rapid acquisition procedures provided a means of detecting the location of potential swelling clay-rich zones. This information was used to guide the soil boring program, thus greatly reducing the risk of missing a clay-rich zone during the site characterization planning stage and thus preventing or minimizing cost-overruns during the reconstruction phase. (94 pages)

Online: http://www.efl.fhwa.dot.gov/files/technology/NATR-Clay-Seam

p-285 Infrastructure Research and Technology Stakeholder Workshop Summary Report (*FHWA* 2003)
This report documents the Stakeholder Workshop discussions and recommendations. FHWA will use the workshop discussions and recommendations to revise and sharpen the Infrastructure R&T vision and help to define stakeholder involvement. FHWA (2003)
Online: http://www.fhwa.dot.gov/infrastructure/irtfinalsep03.pdf

p-286 Context Sensitive Roadway Surfacing Selection Guide (*FHWA* August 2005)
This Guide documents the available options for roadway surfacing, and provides a decision-making process to allow consideration of all conventional engineering design factors, such as, structural capacity, performance, durability, safety, life-cycle costs, but will also allow consideration of aesthetics, context compatibility, and environmental impacts. (A CD-ROM titled Roadway Surfacing Option Photo Album accompanies this Guide.) (346 pages)
Online: http://www.cflhd.gov/techDevelopment/completed_projects/pavement/context-roadway-surfacing/_documents/context0-toc.pdf

p-287 Subsurface Imaging of Lava Tubes, Roadway Applications (*FHWA* September 2005)
This report contains the details of geophysical surveys performed at the Lava Beds National Monument in northern California. The geophysical surveys were preformed over several areas with known lava tubes. This report provides the geological site conditions, overviews of the geophysical methods, summary of the results, and overall recommendations that should be considered for future void detection. (137 pages)
Online: http://www.cflhd.gov/techDevelopment/completed_projects/geotech/lava-tubes/_documents/lava00-toc.pdf

p-288 INSAR Applications for Highway Transportation Projects (*FHWA* April 2006)
Satellite Synthetic aperture radar (SAR) technology, in combination with interferometry (InSAR), has the ability to measure topography or ground movement to sub-centimeter accuracy. This project's objective was to establish and demonstrate reliable, cost effective procedure to measure ground movement using InSAR in support of federal highways projects. Three sites were studied in Washington and Colorado. (100 pages)
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-TD-06-002.pdf

p-289 InSAR Deformation Monitoring: General's Highway, Sequoia Nat'l Park (FHWA July 2009)
Ground movement was monitored using Interferometric Synthetic Aperture Radar (InSAR) coupled with on-site corner reflector technology for an area where the General's Highway in the Sequoia National park, California crossed over an unstable slope. (36 pages)

p-290 A AASHTO Provisional Standards 2006 (*AASHTO* 2006)
This publication includes a complete set of current protocols containing a total of 41 provisional standards. A chronology of year-to-year status of the Provisional Standards is included immediately following the table of contents. This is the tenth addition of the AASHTO Provisional Standards.

p-290 B AASHTO Provisional Standards – Standard Specifications for Transportation Materials and Methods of Sampling and Testing Part 1A – Specifications
The 26 annual AASHTO Transportation materials and methods of sampling and testing standard specifications. This report contains 165 materials specifications and 36 recommended

practices, which both contain English and Metric units of measure.

p-290 C AASHTO Provisional Standards – Standard Specifications for Transportation Materials and Methods of Sampling and Testing Part 2 A- Tests

The 26th annual AASHTO Transportation materials and methods of sampling and testing. Contains 214 test methods and equipment standards of which both contain English and Metric units of measure.

p-290 D AASHTO Provisional Standards – Standard Specifications for Transportation Materials and Methods of Sampling and Testing Part 2B – Specifications

The 26 annual AASHTO Transportation materials and methods of sampling and testing standard specifications. This report contains 165 materials specifications and 36 recommended practices, which both contain English and Metric units of measure.

p-290 E AASHTO Provisional Standards – Standard Specifications for Transportation Materials and Methods of Sampling and Testing Part 2B – Tests
The 26th annual AASHTO Transportation materials and methods of sampling and testing. Contains 214 test methods and equipment standards of which both contain English and Metric units of measure.

p-294 Road Safety Assessment: Amsterdam Road/I-90 EB On-ramp (MDT October 2010)
The overall purpose of this RSA was to determine if an additional on-ramp to the Interstate would potentially degrade safety with the two existing on-ramps. Additionally, the RSA explored several potential design options and their respective safety and operational impacts. (48 pages)

p-295 Road Safety Audits: Case Studies (*FHWA* March 2007)
Road Safety Audits are an effective tool for proactively improving the future safety performance of a road project during the planning and design stages, and for identifying safety issues in existing transportation facilities. This is a series of 10 Road Safety Audit case studies to demonstrate their usefulness. (64 pages)

Asphalt and Pavement

p-302 Pavement Notebook for FHWA Engineers (*FHWA* 1996)
This notebook is intended to be a working tool that provides a readily available completion of current FHWA policy and guidance on pavement. It is composed of: 1) reference to appropriate Federal-aid Highway Program Manual directives 2) other issuances 3) FHWA memorandums clarifying policy 4) discussions reflecting current state-of-the-art or philosophy 5) material on developmental and research areas related to pavements.
Online: http://isddc.dot.gov/OLPFiles/FHWA/009630.pdf

p-303 Distress Identification Guide From the Long-Term Pavement Performance Program (LTAP Clearinghouse 8/2005)
Derived from Long Term Pavement Performance (LTPP) program's Distress Identification Manual, 4th Revised Edition, published in June 2003. Covers cracking, patching and potholes, surface deformation, surface defects, misc. distresses. (Extra copies available from LTAP Clearing house; PDF files for printing are also available for printing) (LTAP Clearinghouse 8/2005) 7"x4" guide, 46 pages

p-304 Asphalt PASER Manual (Wisconsin Transportation Information Center 1987, 1989 ed.)
The key to using the PASER program is in assessing the condition of each road section consistently and at regular intervals. Once you have some relative measure for the overall condition of each local road section, this manual can help you: 1) select appropriate treatments 2) evaluate road sections competing for immediate attention 3) anticipate future deterioration and apply feasibly inexpensive maintenance 4) justify budgets for roadway improvements that are adequate to keep roads in good condition. (39 pages)

p-305 Long-Term Pavement Performance Program – Falling Weight Deflectometer Maintenance Manual (*FHWA* December 2006)
This document provides FWD owners, operators, and technicians information as a supplement to the Dynatest 8000 owner's manual. Maintenance guidelines are based on continuous operation of FWDs. (88 pages)

p-306 Long-Term Pavement Performance Program – Falling Weight Deflectometer Measurements, Version 4.1 (*FHWA* December 2006)

This document provides background information and field operations guidelines for the collection of Falling Weight Deflectometer (FWD) data on Long Term Pavement Performance (LTPP) test sections. It includes equipment setup, equipment calibration, test locations, and test procedures. (79 pages)

Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/06132/06132.pdf

p-307 Long Term Pavement Performance Computed Parameter: Moisture Content (*FHWA* March 2008)

This report contains information using time domain reflectometry (TDR) data collected as part of a Long Term Pavement Performance seasonal monitoring program that can be used to estimate moisture content, conductivity, reflectivity, and density. These results were compared to previous methods taken as well as ground truth data. This information is useful not only through in-service pavement, but also provides a method that can be utilized by highway agencies interested in monitoring subsurface conditions and analyzing their effect on pavement response.(95 pages)

Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/08035/08035.pdf

p-308 Long-Term Pavement Performance Computed Parameter: Frost Penetration (FHWA November 20098)

Frost penetration information is necessary for determining the effect of freeze and thaw on pavement structural responses. This report describes a methodology for determining frost penetration in unbound pavement layers and subgrade soil using electrical resistivity, moisture, and temperature data collected for instrumented LTPP Seasonal Monitoring Program sites. (92 pages)

Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/08057/08057.pdf

p-309 Environmental Considerations in the Use of Salvaged Asphalt Pavement (*MT DOT* July 1994)

The purpose of this sub-study was to investigate the potential for soil and groundwater and surface water contamination arising from the stockpiling, use, or disposal or salvaged asphalt pavement in Montana. The investigation was keyed to the four asphalt sources generally used in Montana highway pavements, those sources being the four Montana oil refineries. Test results are included. (20 pages)

Online:
http://www.mdt.mt.gov/research/docs/research_proj/recycled_asph/salvaged_asphalt.pdf

p-310 Long-Term Pavement Performance Program Manual for Profile Measurements and Processing (FHWA November 2008)

This manual describes operational procedures to be followed when measuring longitudinal pavement profiles for the LTPP program using the International cybernetics Corporation (ICC) road profiler, Face Company Dipstick, and the rod and level. (241 pages)

Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/08056/08056.pdf

p-310.10 Field Simplified Techniques for Evaluation and Interpretation of Pavement Deflections for Network-Level Analysis: Guide for Assessment of Pavement Structure Performance for PMS Applications (FHWA June 2012)
The objective of this study was to develop an approach for incorporating techniques used to interpret and evaluate deflection data for network-level pavement management system (PMS) applications. The first part of this research focused on identifying and evaluating existing techniques, seeking out those that were simple, reliable, and easy to incorporate into current PMS practices, as well as those that produced consistent results. The second part of the research detailed the development of guidelines for the application of recommended techniques and procedures for determining optimum falling weight deflectometer (FWD) test spacing and data collection frequency. This guide contains step-by-step instructions for applying appropriate evaluation techniques for network-level (not project-level) measurements and analyses. (33 pages)
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12025/index.cfm

p-310.11 Estimation of Key PCC, Base, Subbase, and Pavement Engineering Properties From Routine Tests and Physical Characteristics (FHWA August 2012)
This study initially verified the adequacy of the Long-Term Pavement Performance (LTPP) data and also made a preliminary assessment of the feasibility of developing the correlation models. In the next phase of the study, prediction models were developed to help practicing engineers estimate proper MEPDG inputs. This report describes the basis for selecting material parameters that need predictive models, provides a review of current LTPP program data, and proposes several statistically derived models to predict material properties.(214 pages)
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12030/index.cfm

p-310.12 User's Guide: Estimation of Key PCC, Base, Subbase, and Pavement Engineering Properties From Routine Tests and Physical Characteristics (FHWA August 2012)
This user's guide provides a summary of the models developed, describes their applications for specific project conditions, and lists their limitations. The following models are included:
• PCC materials: Compressive strength, flexural strength, elastic modulus, tensile strength, and coefficient of thermal expansion.
• Stabilized materials: Elastic modulus of lean concrete base.
• Unbound materials: Resilient modulus of fine-grained and coarse-grained materials.
• Rigid pavement design features: Pavement curl/wrap effective temperature difference for jointed plain concrete pavement and continuously reinforced concrete pavement designs. (86 pages)
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12031/12031.pdf

p-311 Utility Cuts in Paved Roads: Field Guide (*FHWA* September 1996)
This pocket guide focuses on making and restoring utility cuts in a timely and safe manner, with as little disruption of traffic and commerce as possible, and without leaving behind a defective pavement.
Online: http://www.dot.state.il.us/blr/l014.pdf

p-312 A Quick Check of Your Highway Network Health (*FHWA* 2006)
Historically, many highway agency managers and administrators have tended to view their highway systems as simply a collection of projects. By viewing the network in this manner, there is a certain comfort derived from the ability to match pavement actions with their physical/functional needs. (8 pages)
Online: http://www.pavementpreservation.org/toolbox/links/QuickCheck2.pdf

p-313 Pavement Management at the Local Government Level *(D)* (*FHWA* July 1990)
The report for this project describes a survey and evaluation of the experiences of thirteen agencies which have initiated such activities. The results of the study have suggested to the investigators that the development of a "generic" pavement management system would be extremely desirable undertaking. Included in the report is a brief discussion of the form that such a system might take and the stages of development. (43 pages)

p-314 Full Depth Recycling Workshop (July 2004)
This file contains the handouts from the one-day workshop on full depth recycling pavement with concrete held in Missoula, MT: booklet on Soil-Cement Inspector's Manual; leaflets on Construction, Soil-Cement Recycling, and Soil-Cement Information; booklet on Building Better Outcomes With Concrete; Soil-Cement Construction Handbook; CD – The Right Choice for Rebuilding Roads. (Portland Cement Associates)

p-316 Asphalt Pavement: Warranties, Technology, and Practice in Europe (*FHWA* November 2003)
A diverse team of experts was assembled to research, document, and promote best practices in Europe relating to short-and long-term warranty contracting for asphalt paving projects. Specifically, the team studied methodologies to determine risk assessment for agencies and contactors; administration of warranty contracts; criteria to account for traditional performance indicators; and practices to maintain smoothness and skid resistance. The report covers key findings and recommendations relating to material and workmanship warranties, performance warranties, best-value procurement, and alternative contracting. (64 pages)
Online: http://international.fhwa.dot.gov/apw/apwscan.pdf

p-319 Recommended Performance Guidelines – (*AEMA* 1991)
AEMA Guides reference documents from ASTM, ARRA, and ISSA. Each of these associations updates their own publications on a regular basis. Some of these documents are included in this volume, and were current at the time of publications. (123 pages)

p-321 Improving pavements With Long-Term pavement Performance: Products for Today and Tomorrow (*FHWA* September 2006)
In 1998, the FHWA Long-Term Pavement Performance Program and the Highway Division Pavements committee of the American Society of Civil Engineers initiated a program to organize an international contest on the use of LTPP data. The competition was designed to promote the use of LTPP data and involve the future pavement engineers in university in the analysis of data from the LTPP data base. The program has been in operation for 5 years with four contests completed. The papers contained in this document are the result of the 2003-2004 contest. (160 pages)

Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/06109/06109.pdf

p-322 Design of Hot Mix Asphalt Pavements (*NAPA* 1991)
This publication presents a method of for designing Hot Mix Asphalt pavements for parking lots, storage yards, low-volume roads, and other areas which are not subject to abnormally large of frequent overloads and for which traffic counts are often estimated. Fundamentals of specifying asphalt mixtures are also explained, and recommended tolerances and construction guidelines are provided as an aid to the specifier. (61 pages)

p-325 'Glasphalt' Utilization Dependent on Availability *(D)* (*Roads & Bridges* 1993)
When used in roadway surface course, "glasphalt"—produced when waste glass is used as a substitute for a portion of aggregate or sand in hot-mix asphalt concrete (HMA)-sparkles at night in the glow of headlights. Some of the most important glasphalt issues to be addressed in this article include cost effectiveness, performance, availability, effective mix design, recyclability, and heath precautions. (3 pages)

p-326 Recycling: Will Roads Become 'Linear Landfills'? *(D)* (*Roads & Bridges* 1992)
This article is the beginning of a series of articles on the use of recycled waster material in highways and roads in the U.S. The recycling of waste material in pavements by most accounts is here to stay. This article focuses on the environmental factors and the growing waste. (5 pages)

p-327 Glass Roads Cut Costs *(D)* (*Better Roads* 1993)
This article discusses the economic benefits of glass asphalt. (1 page)

p-328 User Guidelines for Waste and By-Product Materials in Pavement Construction (*FHWA* April 1998)
This manual covers nineteen waste and by-product materials from the domestic, industrial, and mining sectors and six high-volume pavement construction applications. For each material, information on material origin, sources, and properties is provided. In addition, application-specific information is provided, including past performance, engineering properties, processing requirements, design and construction, and unresolved issues. (683 page)

p-329 Polymerized Crumb Rubber Modified Mixtures in Minnesota (*Minn DOT* January 1994)
The University of Minnesota conducted an evaluation of both asphalt-rubber interactions and asphalt-rubber mixtures using the dry process. Experimentation with pre-treating the rubber in order to reduce its demand for key asphalt components was also investigated. (127+ pages)

p-331 Rural Road Condition Survey Guide (Parts I-III) (*ERES Consultants Inc.* 1995)
This Guide contains information about the management of paved and gravel roads. The approaches to managing paved versus gravel roads differ in some respects. Both include an inventory of the physical characteristics of the road network and an assessment of the road condition; however, the analysis of the collected information is different for the two road types. Because of these differences in management approach, the final section in the Guide is dedicated solely to the management of gravel roads. (61 pages)

p-332 Pavement Condition Survey Guide for City Streets (Parts I-III) (*ERES Consultants Inc.* 1994)
This Guide has been developed to introduce the cities of South Dakota to the concept of pavement management. The guide includes background information on pavement

management systems, as well as detailed information about a simple and easy-to-use system. Cities that implement the contents of this Guide will be able to start performing pavement management activities. (50 pages)

p-333 A Study of Recycling Feasibility (*MDT* 1996)
This report describes a feasibility of recycling asphalt pavements using tow major analytical techniques: High Performance Gel Chromatography and Dynamic Mechanical Analysis. HP-GPC probes the chemistry of the asphalt cement. DMA measures certain physical characteristics of the asphalt cement and of the mix. Four projects that had been recycled, three by hot methods, the other by a cold, in-place process, were studied. The report details the study procedures and discusses the data and their interpretations. (74 pages)

Online:
http://www.mdt.mt.gov/research/docs/research_proj/recycled_asph/recycle_feasibility.pdf

p-334 Montana Department of Transportation Maintenance Chip Seal Manual (*MDT* 1996)
Several types of treatments can be used for preventive maintenance. However, regardless s of the type of treatment, proper treatment, timing, materials, construction procedures and quality control will determine if the treatment is successful. The objective of this handbook is to provide MDT Maintenance with the necessary tools to be successful in implementing treatments. (86 pages)

p-335 Asphalt Roadway Rehabilitation Alternatives-Instructor's Manual (*FHWA)*
This is a compiled power point focusing on asphalt roadway rehabilitation alternatives the modules are divided into the following subtopics: evaluation of existing asphalt roadways, full depth asphalt roadways, thick-lift asphalt roadways, thin-lift hot mix asphalt roadways, think-lift cold mix asphalt roadways, and surface treated roadways. (~1000 pages)

p-335a Asphalt Roadway Rehabilitation Alternatives -Slides to accompany training course (*FHWA)*

p-336 Asphalt Roadway Rehabilitation Alternatives-Participant's Manual (*FHWA* 1997*)*
The information presented here is designed to provide information about asphalt pavement repair. Only asphalt roads, that is roads made with asphaltic materials such as hot-mix asphalt concrete, cutback asphalts, or emulsified asphalts, are considered in this course. Moreover, this course is intended to assist agencies with cost-effective maintenance of asphalt roads.
Online: http://isddc.dot.gov/OLPFiles/FHWA/013560.pdf

p-337 Asphalt Paving Inspection and Chip Seal Application Checklists (*FHWA)*
This pocket size notebook review asphalt paving inspections covering the following areas: 1) preliminary responsibilities 2) milling 3) equipment inspections 4) traffic control 5) weather requirements 6) tack coat 7) paving operation 8) compaction 9) constructing transverse joints. The notebook is closed with a chip seal application checklist for your final preparations. (12 pages)
Online: http://www.fhwa.dot.gov/Pavement/preservation/ppcl02.pdf

p-339 Coordinated Freeway and Arterial Operations Handbook (*FHWA* May 2006)
The focus of this guide is on operating freeways and adjacent arterials together in a coordinated manner that treats these roadways not as separate entities, but as an interconnected traffic operations corridor. The purpose of this document is to provide direction, guidance and recommendations for transportation management engineers, and planners on how to proactively and comprehensively coordinate freeway and arterial street operations. (152

pages.)
Online: http://www.tfhrc.gov/its/pubs/06095/06095.pdf

p-340 Freeway Management Handbook (*FHWA* August1997)
This handbook is intended to be a "How To" manual for planning, designing, operating, and maintaining a freeway management system. For many of the elements and functions, there are excellent reference materials that provide detailed information about the technologies and techniques. This manual also provides references to materials which provide technical details.
Online: http://www.library.unt.edu/gpo/OTA/pubs/fmh/mastoccd.pdf

p-340.10 FHWA Freight and Land Use Handbook (*FHWA* April 2012)
The goal of this Freight and Land Use handbook is to provide transportation and land use planning practitioners in the public and private sectors with the tools and resources to properly assess the impacts of land use decisions on freight movements, as well as the impacts of freight development and growth on land use planning goals. The handbook identifies freight-related land use issues, key considerations, and available resources. Throughout the handbook, examples and case studies from a range of urban and rural areas across the country are used to demonstrate the effectiveness of these techniques.
Online: http://www.ops.fhwa.dot.gov/publications/fhwahop12006/index.htm

p-341 Advanced Quality systems: Guidelines for Establishing and Maintaining Construction Quality Databases (*FHWA* November 2006)
The main objective of this study was to develop and present guidelines for State highway agencies (SHAs) in establishing and maintaining data base systems geared towards construction quality issues for asphalt and concrete paving projects. (106 pages)
Online: http://www.fhwa.dot.gov/pavement/concrete/pubs/07019/07019.pdf

P-343 Portable Seismic Property Analyzer: Identification of Asphalt Pavement Layers (FHWA July 2009)
This study was to evaluate the effectiveness of the Portable Seismic Property Analyzer (PSPA) to rapidly and nondestructively measure thickness and in situ moduli of asphalt pavement layers. Based on the results, the PSPA is proposed as a viable tool for immediate implementation by the Federal Highway Administration, Federal Lands Highway. (96 pages)

p 344 Superpave Construction Guidelines (*FHWA* October 1994)
The purpose of this document is to provide guidance for good construction practices for Superpave designed mixtures. Recommended construction practices for Superpave design mixtures are covered, however, the report focuses on the problems that have been encountered with construction of course-graded Superpave designed mixtures and issues that may be different from conventional mixtures. Construction practices were discussed for material types including aggregate, asphalt, and modifiers; plant production; trucking; placement and compaction; and QC/QA. This document was developed to provide information to the contractor to help with process control. (15 pages)

p-345 Longitudinal Joints: Problems and Solutions

p-348 Current Application and Successful Implementation of Local Agency Pavement Management in the US (*FHWA* 1997)
The report highlights the important activities that local agencies, Technology Transfer Centers (T^2 Centers), and Metropolitan Planning Organizations (MPOs) are engaged in to implement pavement-management systems at the local agency level, and the issues that arise from implementing such systems around the United States. This report documents how communities are benefiting from theses local management programs, and provides recommendations for the

FHWA in advancing these programs at the local level. (55 pages)

p-349 Segregation Causes and Cures for Hot Mix (*AASHTO* 1997)
This document explores the world of Hot Mix Asphalt and segregation. It takes one step by step through the process of paving with hot mix asphalt, discussing each possible cause of segregation. The report explains how this segregation can be avoided by taking the necessary actions. (23 pages)

p-351 Life-Cycle Cost Analysis in Pavement Design (*FHWA* September1998)
Provided here is technical guidance and recommendations on good practice in conducting Life-Cycle Cost Analysis in pavement design. It also introduces, Risk Analysis, a probabilistic approach to describe and account for the uncertainty inherent in the process. It deals specifically with the technical aspects of the long-term economic efficiency implications of alternative pavement designs. The Bulletin is directed at State highway agency personnel with responsibility for condition or reviewed pavement design LCCAs. (017 pages)
Online: http://isddc.dot.gov/OLPFiles/FHWA/013017.pdf

p-351.10 Reformulated Pavement Remaining Service Life Framework (FHWA November 2013)
This report presents the framework for replacing the current RSL terminology with one based on more exact construction event terms. It explores many issues that exist with the current RSL terminology that complicate proper interpretation, interagency data exchange, and use. (80 pages)
Online:https://www.fhwa.dot.gov/publications/research/infrastructure/pavements/13038/13038.pdf

p-351.11 Pavement Remaining Service Interval Implementation Guidelines (FHWA November 2013)
This report provides guidelines for implementing the RSI concept as a replacement to the current remaining life terminology for pavements. See companion report P-351.10.
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/13050/13050.pdf

p-352 Pavement Preservation: A Road Map for the Future (*FHWA* October 1998)
Presents ideas, strategies and techniques for pavement preservation from a forum held in October, 1998.
Online: http://isddc.dot.gov/OLPFiles/FHWA/014729.pdf

p-353 LTPP Pavement Maintenance Materials: SPS-4 Supplemental Joint Seal Experiment, Final Report (*FHWA* October 1999)
Documents the entire SPS-4 supplemental joint seal study, including the installation of 29 unique joint seal treatments, the laboratory testing of experimental sealant materials, and the multi-year performance monitoring of the various joint seal treatments. It also discusses the results of comprehensive statistical analyses conducted on sealant material performance.
Online: http://isddc.dot.gov/OLPFiles/FHWA/013742.pdf

p-354 LTPP Pavement Maintenance Materials: PCC Partial-Depth Spall Repair Experiment, Final Report (*ERES Consultants Inc.* October 1999)
Documents the entire portland cement concrete (PCC) partial-depth spall repair study, including the installation of 30 unique repair types (i.e., combinations of patching material and patching method) at 4 different test sites, the laboratory testing of experimental repair materials, and the 7-year performance monitoring of the various partial-depth repairs. IT also discusses the results of comprehensive statistical analyses conducted on material performance

and laboratory testing data. The results of a detailed cost-effectiveness analysis are also presented.
Online: http://isddc.dot.gov/OLPFiles/FHWA/013717.pdf

p-355 Evaluation Findings of the MX 30 Pavement Marking Retroreflectometer (*HITEC* 2000)
Presents the results of a detailed evaluation for the MX 30 pavement marking retroreflectometer.

p-356 Evaluation Findings of the Mirolux Plus Pavement Marking Retroreflectometer (*HITEC* 2000)
Presents the results of a detailed evaluation for the Mirolux Plus 30 (MP-30) hand held pavement marking 30-meter retroreflectometer manufactured by Mirolux Products, Inc.

p-357 Evaluation Findings of the Laserlux Mobile Pavement Marking Retroreflectometer (*HITEC* 2000)
Presents the results of a detailed evaluation for the Laserlux mobile marking retroreflectometer.

p-358 Evaluation Findings of the LTL 2000 Pavement Marking Retroreflectometer (*HITEC* 2000)
Presents the results of a detailed evaluation for the LTL 2000 hand held pavement marking retroreflectometer manufactured by Delta Light & Optics and distributed by Flint Trading.

p-359 Evaluation Findings of the Ecodyn Mobile Pavement Marking Retroreflectometer (*HITEC* 2000)
Presents the results of a detailed evaluation, one of six pavement marking 30-meter retroreflectometers that were evaluated.

p-360 Evaluation Findings of the FRT01 Pavement Marking Retroreflectometer (*HITEC* 2000)
Describes the evaluation of the FRT01 handheld pavement marking retroreflectometer manufactured by Mechatronic.

p-361 Insights into Pavement Preservation (*FHWA* 2000)
Aims to make clear what pavement preservation is- and what it is not.
Online: http://isddc.dot.gov/OLPFiles/FHWA/013687.pdf

p-362 Temperature Predictions and Adjustment Factors for Asphalt Pavement (*FHWA* June 2000)
Presents the results of an analysis of the response that deflections and back calculated asphalt moduli have to the pavement temperature.
Online: http://www.tfhrc.gov/pavement/ltpp/pdf/98085a.pdf

p-363 Flexibility in Highway Design (*FHWA* 1997)
– This Guide is about designing highways that incorporate community values and are safe efficient, effective mechanisms for the movement of people and goods. It is written for highway engineers and project managers who want to learn more about the flexibility available to them when designing roads and illustrates successful approaches used in other highway projects. It can also be used by citizens who want to gain a better understanding of the highway design process.
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-PD-97-062.pdf

p-364 Recycled Materials in European Highway Environments (*FHWA* October 2000)

A U.S. delegation met with more that 100 representatives from transportation and environmental ministries, research organization, and industries in Sweden, Denmark, Germany, the Netherlands, and France. The purpose was to review and document policies, programs and techniques that promote the use of recycled materials in the highway environment

Online: http://international.fhwa.dot.gov/pdfs/recycolor.pdf

p-365 Pavement Management (*Delaware DOT* October 2000)

This manual will help you learn more about DelDOT's Pavement Management System, which is a process to cost-effectively manage the State's roadway system. PMS utilizes computer software for storing and analyzing data, and then provides you with information and recommendations to assist you in road-related decision-making.

p-366 Pavement Management Catalog for Software and Data Collection Equipment (*FHWA* 2002)

This catalog is intended as a sourcebook of information regarding pavement management software and data collection equipment to assist officials in selecting systems to meet the needs of their communities.

Online:

http://knowledge.fhwa.dot.gov/tam/aashto.nsf/All+Documents/9C49D4630693632085256CCC00485AE2/$FILE/PMScatalog.pdf

p-367 Asphalt Seal Coat Treatments (*USFS* April 1999)
This publication identifies and discusses applications of the various asphalt seal coat treatments that are available.
Online: http://www.fs.fed.us/eng/pubs/html/99771201/99771201.htm

p-368 Crack Seal Application (*FHWA* November 2001)
This checklist is one of a series created to guide State and local highway maintenance and inspection staff in the use of innovative pavement preventive maintenance process.
Online: http://www.fhwa.dot.gov/Pavement/preservation/ppcl01.pdf

p-369 Pavement Preservation Checklists Series: (*FHWA* 2002)
1) Crack Seal 2) Chip Seal Application 3) Thin Hot-Mix Asphalt Overlay 4) Fog Seal Application 5) Microsurfacing Application 6) Joint Sealing Portland Cement Concrete Pavements 7) Diamond Grinding of Portland Cement Concrete Pavements 8) Dowel-Bar Retrofit for Portland Cement Concrete Pavements Checklist 9) Partial-Depth Repair of Portland Cement Concrete Pavements 10) Full-Depth of Portland Cement Concrete Pavements 11) Hot In-Place Asphalt Recycling Application Checklist 12) Cold In-Place Asphalt Recycling Application Checklist 13) Slurry Seal Application Checklist
These 13 12-15 page notebooks checklists guide state and local highway maintenance and staff in the use of innovative pavement preventive maintenance processes. The checklists take users through such steps as project review, material checks, surface preparation, equipment inspections, weather requirements, and common problems and solutions.
Online: http://www.fhwa.dot.gov/pavement/preservation/ppcl00.cfm

p-370 Superpave Mixture Design Guide (*FHWA* February 2001)
This document, intended as a companion to the National Asphalt Pavement Association's *Superpave Construction Guidelines*, is a guide for the HMA designer to maximize the benefits of Superpave while avoiding potential problems. This guide discusses several issues that should be considered during the mixture design process to maximize benefits of this method. (18 pages)
Online: http://www.tfhrc.gov/pavement/1052.pdf

p-371 Hot-Mix Asphalt Paving Handbook 2000 (*US Army Corps of Engineers* 2000)
The purpose of the Hot-Mix Asphalt Paving Handbook is to describe the production and placement of asphalt mixtures from a practical point of view. The book is divided into three parts. The first begins by providing a brief review of project organization. Part II is organized roughly in the order of HMA plant operations. And Part III reviews the various operations involved in placing the HMA at the laydown site. (219 pages)
Online: http://www.faa.gov/documentLibrary/media/advisory_circular/150-5370-14A/150_5370_14a_app1_Introduction.pdf

p- 372 Evaluations and Findings of Bondage CU-31 Bonding Solution (*HITEC* September 1998)
-An evaluation was done to test the effectiveness of Bondade CU-31 liquid bonding compound as an innovative asphalt tacking material in extending the life of pothole repairs and to promote its use within the highway community. (47 pages)

p-373 Chip Seals (*TEEX* February 2007)
This reference manual contains information from Module 2-4, Chips Seals, NHI. It describes recommended design steps and construction procedures associated with constructing good quality chip seal treatments on existing hot-mix asphalt (HMA) pavements. (44 pages)

p-374 Guidelines for Using Prime and Tack Coats (*FHWA* July 2005)
The objective of this study was to produce a prime and tack coat guide publication developed for project development and field personnel to provide decision –making guidance on how to use, when to keep, and when to eliminate prime and tack coats. (110 pages)
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-TD-05-002.pdf

p-375 Performance Analysis of an Experimental Field Project Utilizing Asphalt Modifiers: Final Report (*MSU: Dept. of CE* March 1997)
This report focuses on the results of a five year monitoring of the polymer modified test sections. These polymer modified test sections were used in an effort to combat rutting and cracking to help the life expectancy of pavement. (194 pages)
Online: http://www.archive.org/details/AF7F3385-B0BF-4A62-A9FF-04AD5B2BBF94

p-376 Selecting a Preventive Maintenance Treatment for Flexible Pavements (*FHWA* August 2000)
This report is a continuation of research and efforts to promote the principals of pavement preservation by the Foundation for Pavement Preservation. The Objectives of this study are to: 1) Review existing practices related to selecting appropriate preventive maintenance strategies. 2) Develop a framework for the selection of the most appropriate preventive maintenance treatments. 3) Prepare a summary report which documents the findings. (43 pages)
Online: http://isddc.dot.gov/OLPFiles/FHWA/013551.pdf

p-379 Modeling of Hot-Mix Asphalt Compaction: A Thermodynamics-Based Compressible Viscoelastic Model (FHWA 2010)
This study was conducted to develop a model within the context of a thermomechanical framework for the compaction of asphalt mixtures. The developed model is a useful tool for simulating the compaction of asphalt mixtures under laboratory and field conditions. (110 pages)

p-380 A Predictive Approach for Long-Term Performance of Recycled Materials Using Accelerated Aging, Volume I & Volume II. (*FHWA* June 2001)
Coal fly ash use in Portland cement concrete was selected as a model system to develop an accelerated ageing approach. This approach, incorporate din an experimental design, allowed a systematic exploration of the separate effects and combined interactions of both developmental and derogative accelerated again variables. The again protocol impacted both physical and chemical properties of the prism monoliths. Covered are the impacts on the chemical properties as well as other findings. (199 pages)

p-381 Fundamental Properties of Asphalts/Modified Asphalts –Vol. I & Vol. 2 (*FHWA* 1999)

The mission of this project was to improve the 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 again, and propensity of asphalt films to reconsolidate after micro cracking. The results of said exposures are included in this document and have been used to produce a comprehensive chemical model of petroleum asphalt. Final, the results have been used to develop new analytical methods that improve the capability to predict performance of asphalt in roadway service. (459 pages)

p-382 LTPP Computed Parameter: Dynamic Modulus (FHWA September 2011)

The dynamic modulus, |*E**|, is a fundamental property that defines the strain response characteristics of asphalt concrete mixtures as a function of loading rate and temperature. The dynamic modulus, |*E**|, is a fundamental property that defines the strain response characteristics of asphalt concrete mixtures as a function of loading rate and temperature. Given the significance of |*E**|, this study evaluated existing prediction models, developed new models, and populated the Long-Term Pavement Performance database to provide a valuable data source for the pavement community. Supplementing the full suite of material properties, performance history, traffic, and climate with |*E**| estimates will be advantageous in conducting MEPDG calibration, validation, and implementation. (263 pages)

Online:
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/10035/index.cfm

p-383 Impact of Design Features on Pavement Response and Performance in Rehabilitated Flexible and Rigid Pavements (FHWA Oct 2011)

The primary focus of this research was to determine the effects of design and construction features, such as overlay thickness and mix type, presence of milling, and type of restoration, on pavement response and performance and to establish their importance in the prediction of future performance of rehabilitated pavements. (261 pages)

Online:
http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/10066/index.cfm

p-384 Improving pavements With Long-Term Pavement Performance: Products for Today and Tomorrow (*FHWA* November 2005)

This report is a compilation of award-winning technical papers from the Third Annual International contest on LTPP Data Analysis 2001-2202, various authors. (FHWA 11/2005) 137 pages

p-385 Guidelines on the Use of Thermistor and Time Domain Reflectometry Instrumentation for Spring Thaw Road Management on Low Volume Asphalt Roads (*USFS* December 2001)

These guidelines are a follow up to the parent time domain reflectometry (TDR) project report (Hanek, Truebe, and Kestler 2001) and provide recommendations on installing and using thermistor and TDR technology for spring-thaw road management.

p-386 Asphalt Pavement Maintenance-Field Guide (*Minn DOT* June 2002)

This field guide provides guidelines for preventive asphalt pavement maintenance techniques for a variety of distresses and conditions.

Online: http://www.dot.state.ak.us/stwddes/research/assets/pdf/apmfg.pdf

p-387 Design, Construction, and Maintenance of Open-Graded Asphalt Friction Courses (*NAPA* 2002)
From National Asphalt Pavement Association . This report is on OGFC, a Hot Mix Asphalt mixture with interconnecting voids that provides improved surface drainage during rainfall.

p-388 Quantification of Smoothness Index Differences Related to Long-Term Pavement performance Equipment Type (*FHWA* September 2005)
The main objective of this project is to quantify and resolve the differences in the longitudinal profile and roughness indices that are attributable to the different profiling equipment that have been used in the LTPP program. 144 pages
Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/05054/05054.pdf

p-389 Pavement Smoothness Index Relationships: Final Report (*FHWA* October 2002)
This October 2002 research effort reports on developing a series of relationships between IRI and PI that can assist States in transitioning to in IRI or PI0.0 smoothness specification for HMA and PCC pavements.
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-RD-02-057.pdf

p-390 Study of LTPP Laboratory Resilient Modulus Test Data and Response Characteristics: Final Report (*FHWA* October 2002)
This report documents the first comprehensive review and evaluation of the resilient modulus test data measured on pavement materials and soils recovered from the LTPP test sections.
Online: http://www.tfhrc.gov/pavement/ltpp/reports/02051/02051.htm#F56

p-391 Back-Calculation of Layer Parameters for LTPP Test Sections, Volume II: Layered Elastic Analysis for Flexible and Rigid Pavements (*FHWA* October 2002)
The report summarizes the reasons why MODCOMP4 was selected for the computations and analyses of the deflection data, provides a summary of the results, and identifies those factors that can have a significant effect on the results.
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-RD-01-113.pdf

p-392 Validation of the Superpave Asphalt Binder Fatigue Cracking Parameter Using an Accelerated Loading Facility (*FHWA* October 2002)
This study used an Accelerated Loading Facility (ALF) to validate the Superpave asphalt binder parameter for fatigue cracking, G*sin(delta).

p-393 Optimization of Traffic Data Collection for Specific Pavement Design Applications (*FHWA* May 2006)
The purpose of this study is to establish the minimum traffic data collection effort required for pavement design applications satisfying a maximum acceptable error under a prescribed confidence level. A three-dimensional plot was produced that can be used to establish the minimum required traffic data collection effort, given the acceptable error and the desired confidence level. (126 pages)
Online: http://www.fhwa.dot.gov/pavement/ltpp/pubs/05079/05079.pdf

p-394 Long-Term Pavement Performance (LTPP) Data Analysis Support: National Pooled fund Study TPF-5(013) (*FHWA* November 2006)
This report documents a study conducted to evaluate pavement adaptations currently in use to mitigate frost-related damage along with the cost differences associated with constructing and maintaining pavements in the various climates. (262 pages)
http://www.fhwa.dot.gov/pavement/ltpp/pubs/06121/06121.pdf

p-395.10 Relating Ride Quality and Structural Adequacy for Pavement Rehabilitation/Design Decisions (LTPP November 2012)
This project was intended to develop and document a mechanism to include both ride quality and structural adequacy values within the context of current network-level pavement management system practices for highway agency implementation to ensure smooth pavements that are also structurally adequate. (179 pages)
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12035/12035.pdf

p-395.20 Performance Testing for Superpave and Structural Validation (FHWA November 2012)
The primary objective of this full-scale accelerated pavement testing was to evaluate the performance of unmodified and polymer modified asphalt binders and to recommend improved specification tests over existing Superior PERforming Asphalt PAVEment (Superpave) binder performance grading methodologies.
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/11045/11045.pdf

p-395.30 Curl and Warp Analysis of the LTPP SPS-2 Site in Arizona (LTPP Dec 2012)
This study examined the roughness and roughness progression of 21 test sections on the LTPP SPS-2 site in Arizona over the first 16 years of the experiment. This study applied objective profile analyses to quantify the level of curl and warp on each section (110 Pages)
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12068/12068.pdf

p-395.40 Simplified Techniques for Evaluation and Interpretation of Pavement Deflections for Network-Level Analysis (LTPP Dec 2012)
The objective of this study was to develop an approach for incorporating techniques used in interpret and evaluate deflection data for network-level pavement management system (PMS) applications (198 Pages)
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/12025/12025.pdf

p-395.41 Long-Term Pavement Performance Pavement Loading User Guide (LTPP PLUG) (FHWA October 2013)
This guide addresses the selection and use of axle loading defaults for Mechanistic-Empirical Pavement Design Guide (MEPDG) applications. (98 pages)

Online:http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/ltpp/13089/13089.pdf

p-396 Exposure of Paving Workers to Asphalt Emissions When using Asphalt Rubber Mixers (*Asphalt Rubber Producers Group, Grace Rinck, & Dan Napier*, 1991)
This study evaluates the exposure of paving crew and blender crew workers to volatile organics, benzene soluble organic, coal tar pitch, volatiles, and specific polynuclear aromatic hydrocarbons. The monitoring of this study was conducted over a 2 ½ year period in Southern California. (25 pages)

p-397 Manual for Emulsion-Based Chip Seals for Pavement Preservation (NCHRP Report 680, April 2011) [On-line ONLY]
This manual provides new guidance for designing and constructing chip seals over hot mix asphalt pavements, together with test methods for evaluating some aspects of chip seal construction. (111 pages)
Online: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_680.pdf

Concrete

p-400 Users Manual for LS-DYNA Concrete Material Model 159 (*FHWA* May 2007)
This manual documents the theory of the concrete material model, describes the required input format, and includes example problems for use as a learning tool. (89 pages)
Online: http://www.tfhrc.gov/safety/pubs/05062/05062.pdf

p-401 Evaluation of LS-DYNA Concrete Material Model 159 (*FHWA* May 2007)
This manual documents the evaluation of the concrete material model, including the selection of the concrete model input parameters. (206 pages)
Online: http://www.tfhrc.gov/safety/pubs/05063/05063.pdf

p-402 Freeze-Thaw Resistance of Concrete with Marginal Air Content (*FHWA* December 2006)
This study evaluated the freeze-thaw resistance of several "marginal" air void mixes, with two different types of air-entraining admixtures (AEA)—a Vinsol resin and a synthetic admixture. This study used rapid cycles of freezing and thawing in plain water, in the absence of deicing salts. (93 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/06117/06117.pdf

p-403 Concrete PASER Manual (Transportation Information Center-University of Wisconsin February 1992)
This manual is designed to provide background information on concrete road conditions and causes of distress as well as a simple procedure to rate road conditions. The rating procedure (PASER) can be used alone or as part of a pavement management system. (48 pages)
Online: http://epdfiles.engr.wisc.edu/pdf_web_files/tic/manuals/Concrete-PASER_02.pdf

p-404 Report on the 1992 U.S. Tour of European Concrete Highways (*AASHTO* 1992)
The US TECH Study Tour traveled throughout Europe attending presentations, examining pavement and construction sites, and reading literature and technical reports. The most important findings of this trip as determined by the 21 person team are summarized in this report. (124 pages)

p-405 The Use of Lithium to Prevent or Mitigate Alkali-Silica Reaction in a Concrete Pavements and Structures (*FHWA* March 2007)
This document is intended to provide practitioners with the necessary information and guidance to test, specify, and use lithium compounds in new concrete construction, as well as

p-407 High Performance Concrete Tool Kit (*FHWA* May 1997)
FHWA's primary purpose in offering the HPC Showcase and preparing the HPC definition is to stimulate the use of higher quality concrete in highway structures. The paper presents the performance definition using three tables: Table 1 gives the parameters and performance criteria, Table 2 identifies standard tests to evaluate performance, and Table 3 relates recommended performance to exposure conditions. (150 pages)

p-410 Development of a Multiaxial Viscoelastoplastic Continuum Damage Model for Asphalt Mixtures (FHWA Sept 2009)
This report highlights findings from the FHWA DTFH61-05-H00019 project, which focused on the development of the multiaxial viscoelastoplastic continuum damage model for asphalt concrete in both compression and tension. The performance of this structure is closely related to the performance of asphalt concrete. (264 pages)

p-411 Accelerated Aging of Concrete: A Literature Review (*FHWA* February 2002)
This literature review describes the general concept of aging of materials and defines accelerated aging. It describes accelerated aging procedures and applications of accelerated aging, and discusses thermal aging, the most common accelerated aging technique.

p-412 Computer-Based Guidelines for Concrete Pavements, Volume 1: Project Summary (*FHWA* February 2005)
This report documents the investigation, modeling and validation of the enhanced High PERformance PAVing (HIPEPAV®) II, a comprehensive, yet user-friendly software package. HIPERPAVE II primarily incorporates a set of guidelines for the proper selection of design and construction variables to minimize early-age damage to Jointed Plain Concrete Pavement (JPCP) and Continuously Reinforced Concrete Pavement (CRCP). This is a three-volume set. Volume II is the User's Manual and Volume III is the Technical Appendixes (III will be available on-line: http://www.tfhrc.gov/pavement/pccp/hipemain.htm).
This report will be of interest to those involved in concrete pavement mix design, as well as the design and construction of concrete pavements. (FHWA Feb 2005) (96pages)
Online: http://www.tfhrc.gov/pavement/pubs/04121/04121.pdf

p-413 Computer-Based Guidelines for Concrete Pavements Volume II: Design and Construction Guidelines and HIPERPAV® II User's Manual (*FHWA* February 2005)
This report provides general instructions on the use and application of the HIPERPAV II. (See p-412). (II will be available on-line: http://www.tfhrc.gov/pavement/pccp/hipemain.htm or on CD).
This report will be of interest to those involved in concrete pavement mix design, as well as the design and construction of concrete pavements. (FHWA Feb 2005) (160 pages)
Online: http://www.hiperpav.com/downloads/FHWA-HRT-04-122.pdf

p-414 Computer-Based Guidelines for Concrete Pavements, Volume III: Technical Appendices (*FHWA* January 2006)
This Volume III documents the investigation, modeling, and validation of the enhanced High PERformance PAVing (HIPEPAV) II software program. It is the Technical Appendices, which documents work carried out during the study. (Volume I: p-412, Volume II: p-413) (345 pages)

Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/04127/04127.pdf

p-415 Portland-Cement Concrete Rheology and Workability: Final Report (*FHWA* April 2001)
Methods for determining the workability of freshly mixed Portland-cement concrete with slums lass than 2 in were investigated. Four potential methods to determine the workability of concrete were proposed for evaluation and development. The methods included two moving-object methods, one free-orifice method, and a vibrating slope method. The report outlines modifications to thee existing techniques and equipment to permit the measurement of rheological properties at tow or more shear rates. (109 pages)
Online: http://www.tfhrc.gov/pavement/pccp/pdfs/00025.pdf

p-416 Concrete Mixture Optimization Using Statistical Methods: Final Report (*FHWA* September 2003)
This report presents the results of a research project whose goals were to investigate the feasibility of using statistical experiment design and analysis methods to optimize concrete mixture proportions and to develop an Internet-based software program to optimize concrete mixtures using these methods.
Online: http://www.tfhrc.gov/pavement/pubs/03060/03060.pdf

p-417 Guidelines for the Use of Lithium to Mitigate or Prevent Alkali-Silica Reaction (ASR) (*FHWA* July 2003)
This report is intended to provide practitioners with the necessary information and guidance to test, specify, and use lithium compounds in new concrete construction as well as repair and extend the service life of existing concrete structures. This report will be of interest to engineers, contractors and others involved in designing and specifying new concrete, as well as those involved in mitigating the damaging effects of alkali-silica reaction in existing concrete structures.
Online: http://www.tfhrc.gov/pavement/pccp/pubs/03047/

p-418 Estimating Cumulative Traffic Loads, Volume II (*FHWA* March 2005)
In 1998, FHWA sponsored a two-phase study to develop traffic load estimates for Long-term Pavement Performance (LTPP) sites. This report describes the results of the Phase 2 study. The Phase 1 study resulted in the development of methodology for estimating axle load spectra for all years the LTPP sites were in service. Phase 2 used this methodology to estimate axle loads for all LYPP sites that had acceptable site-specific axle weight data. In total traffic load estimates were made for 558 LTPP traffic sites. This report will be of interest to engineers involved in pavement management, design, maintenance, and rehabilitation and in traffic data collection and analysis. (FHWA 2005) (152 pages)
Online: http://www.fhwa.dot.gov/pavement/ltpp/03094/03094.pdf

p-419 Assessment of Selected LTPP Material: Data Tables and Development of Representative Test Tables (*FHWA* March 2003)
March 2003, this report documents an evaluation of selected LTPP (Long-term Pavement Performance) material data tables as of January 2000. Issues addressed include the availability, characteristics and quality of the data in the selected tables. Anomalies in the data were identified and corrected where possible, and the “cleaned-out” data were used in developing representative data tables. Recommendations for adjustments in the current data collection process are also presented.
Online: http://www.tfhrc.gov/pavement/ltpp/reports/02001/02001.htm

p-420 Backcalculation of Layer Parameters for LTPP Test Sections, Vol.I (*FHWA* January 2001)

This report documents the results of backcalculation of layer material properties for rigid pavements include in the Long Term Pavement Performance program in the United States using deflection testing data. This study backcalculated the layer material properties for rigid pavements using the slab on elastic sold foundation and the slab on dense-liquid foundation procedures. The "best fit" algorithm was used after consideration of alternative methods of backcalculation. Pre-processing and post-processing utility software were developed to facilitate data handling. That date is included along with key findings. (115 pages)

Online: http://www.tfhrc.gov/pavement/ltpp/pdf/00086.pdf

p-421 Rural Roadway Information & Management System for Windows (*The North Dakota State University Technology Transfer Center* April 1998)

There has been a Roadway Inventory and Management Program designed for several years. Now we have developed the program for windows application. This manual helps one work within that program. (66 pages)

p-422 The ND Technology transfer Center's Roadway Sign Inventory & Management System for County Road or City Street Dept.-Operations Manual (Version6.0 for Windows) (*The North Dakota State University Technology Transfer Center* March 1998)

Now we have developed the program as a windows application. It was designed using the VISUAL Dbase for Windows Relational Database package. Although users must have a modern day computer with either Windows 3.1 or Windows 95 installed, they do not need the VISUAL Dbase program. This manual walks the user through the program. (49 pages)

p-423 Interim Recommendations for the Use of Lithium to Mitigate or Prevent Alkali-Silica Reaction (ASR) (*FHWA* July 2006)

This report provides practitioners with the necessary information and guidance to test, specify and use lithium compounds to combat Alkali-Silica reactions (ASR) in new concrete construction, repair and service. (94 pages)

Online: http://www.fhwa.dot.gov/Pavement/pub_details.cfm?id=437

p-424 Guide for Curing Portland Cement Concrete Pavements, Volume II (*FHWA* August 2006)

This report contains information on the current state of knowledge of curing hydraulic-cement concrete and on concrete curing practice. (170 pages)

Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/05038/05038.pdf

p-425 Microdamage Healing in Asphalt and Asphalt Concrete; Volume I, Volume II, Volume III, Volume IV. (*FHWA* June 2001)

This summary report chronicles the research highlights of the entire study of microdamage healing in asphalt concrete. The primary objectives of the study were to: 1) Demonstrate that microdamage healing occurs, 2) Confirm that the same fracture properties that control propagation of visible cracks control the propagation of microcracks, 3) Identify the asphalt constituents which influence microdamage and microdamage healing, 4) establish appropriate correlations between microdamage and microdamage healing in the laboratory and in the field and 5) Predict the effect of microdamage healing on pavement performance and develop the appropriate constitutive damage models that account for the effects of microdamage healing. (76 pages)

Online: http://isddc.dot.gov/OLPFiles/FHWA/012849.pdf

Online: http://isddc.dot.gov/OLPFiles/FHWA/012723.pdf

Online: http://isddc.dot.gov/OLPFiles/FHWA/012857.pdf

Online: http://isddc.dot.gov/OLPFiles/FHWA/012966.pdf

p-426 Incremental Costs and Performance Benefits of Various Features (*FHWA* April 2004)
This report presents a methodology for quickly assessing the relative costs and benefits of incorporating various design features in PCC pavements. That methodology has been incorporated into an analytical software tool that can be used by pavement deign engineers who are interested in investigating the cost versus performance trade-offs associated with the selection of different features during the PCC pavement process. (203 pages)
Online: http://www.tfhrc.gov/pavement/pubs/04044/04044.pdf

p-427 The Effects of Higher Strength and Associated Concrete Properties on Pavement Performance. (*FHWA* June 2001)
The major goal of this project was to develop recommendations for PCC properties and materials characteristics found n higher strength JPCP's with improved long-term performance as determined by join spalling and faulting, and transverse slab cracking. Primary project variables were pavement age, climate, traffic, distress levels and types, joint spacing, and compressive strength. (237 pages)
Online: http://www.tfhrc.gov/pavement/pubs/00161a.pdf

p-428 Long-Life Concrete Pavements in Europe and Canada (*FHWA & AASHTO* August 2007) http://international.fhwa.dot.gov/pubs/pl07027/pl07027.pdf
This scanning study identified design philosophies, materials requirements, construction procedures, and maintenance strategies used in Europe and Canada to build long-life concrete pavements.(Checked out and never returned 1-16-09. Above pdf can be viewed on web)
Online: http://international.fhwa.dot.gov/pubs/pl07027/pl07027.pdf

p-429 Design of Continuously Reinforced Concrete Pavements Using Glass Fiber Reinforced Polymer Rebars (*FHWA* October 2005)
This report investigates the effects on stress development in pavement and on critical design factors from substituting glass fiber reinforced polymer (GFRP) reinforcement for conventional steel reinforcement in continuously reinforced concrete pavements (CRCPs) in order to determine the performance characteristics of the GFRP-reinforced concrete pavements. (FHWA 10/2005) 70 pages
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-HRT-05-081.pdf

p-430 Prediction of Chloride Penetration in Concrete (*FHWA* October 2001)
The objective of this study was to identify or develop a test for predicting chloride penetration in concrete, to be used for evaluating new mixes, for accepting or rejecting new concrete according to specifications, and for evaluating in –place concrete. In this, study different test procedures were evaluated for use in predicting the chloride penetration resistance of concrete in a short time frame. The test results were correlated to those of long-term slat pondering and diffusion tests. (419 pages)
Online: http://www.fhwa.dot.gov/Pavement/pub_details.cfm?id=71

p-431 Electrochemical Chloride Extraction: Influence of Concrete Surface on Treatment (*FHWA* October 2002)
This interim report describes the progress made in ascertaining the cause of the abrupt drop in the amount of current that can pass through salt-contaminated concrete.
Online: http://www.tfhrc.gov/structur/pubs/02107/02107.pdf

p-432 Service Life Prediction Based on Sorptivity for Highway Concrete Exposed to Sulfate Attack and Freeze-Thaw Conditions (*FHWA* March 2002)
This report documents a study that investigated permeability as an indicator of the general durability of hydraulic cement concrete.

p-433 Design and Evaluation of Jointed Plain Concrete Pavement with Fiber Reinforced Polymer Dowels (FHWA Sept 2009)
This study evaluates fiber reinforced polymer (FRP dowel bars as load transferring devices in jointed plain concrete pavement under HS25 static and fatigue loads and compares their response with JPCP consisting of steel dowels. (160 pages)

p-434 Guidelines for Detection, Analysis, and Treatment of Materials-Related Distress in Concrete Pavements, Volumes 1, 2, & 3 (*FHWA* August 2002)
Volume 1, 2, 3-This report documents the investigation of MRD in concrete pavements and the development of a set of systematic guidelines for the evaluation of MRD.
Online: http://isddc.dot.gov/OLPFiles/FHWA/013378.pdf
Online: http://isddc.dot.gov/OLPFiles/FHWA/013376.pdf
Online: http://isddc.dot.gov/OLPFiles/FHWA/013357.pdf

p-435 Transport Properties and Durability of Concrete: Literature Review and Research Plan (*FHWA* August 2002)
This report reviews the state of the art for measurement of transport properties in the laboratory and field and discusses the linkages between transport properties and models for various deterioration processes of relevance to highway concretes
Online: http://fire.nist.gov/bfrlpubs/build99/PDF/b99038.pdf

p-436 Corrosion Inhibitors in Concrete (*FHWA* March 2002)
The overall objective of this work in progress is to assess the effectiveness of corrosion inhibitors for steel in concrete.

p-437 Long-Term Effectiveness of Cathodic Protection Systems on Highway Structures (*FHWA* July 2003)
The primary objective of this 5-year study was to determine the effectiveness of various materials and configurations when used as auxiliary anodes on highway structures during a long-term evaluation. The findings of the study summarize the protection provided by the systems evaluated and estimate the expected service life for the anode materials in similar environments.
Online: http://www.tfhrc.gov/pavement/ltpp/pdf/01096.pdf

p-438 Long-Term Performance of Corrosion Inhibitors Used in the Repair of Reinforced Concrete Bridge Components (*FHWA* July 2003)
This follow-on study of the SHRP effort was initiated by the FHWA in August 1994 and ended in July 1999. The primary goal of this study was to monitor the SHRP field sites for 5 years to determine the long-term effectiveness of corrosion inhibitors. An analysis of the results concluded that neither of the corrosion inhibitors evaluated in this study, using the specified repairs and exposed to the specific environments, provided any corrosion-inhibiting benefit.
Online: http://www.tfhrc.gov/pavement/ltpp/reports/01097/pdf/01097.pdf

p-439 Achieving a High Level of Smoothness in Concrete Pavements Without Sacrificing Long-Term Performance (*FHWA* October 2005)

This report contains guidance on how highway agencies and contractors can achieve smooth, long-lasting Portland cement concrete (PCC) pavements. This report should be of interest to those involved in the design and construction of concrete pavements. (99 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/05068/05068.pdf

p-440 Long-Term Plan for Concrete Pavement Research and Technology—The Concrete Pavement Road Map: Volume I, Background and Summary (*FHWA* September 2005)
This volume, one of two volumes, provides the background and summary information on the effort that led to the CP (Concrete Pavement) Road Map. (111 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/05052/05052.pdf

p-441 Long-Term Plan for Concrete Pavement Research and technology—The Concrete Pavement Road Map: Volume II, Tracks (*FHWA* September 2005)
This is volume two of two volumes that contains the research statements to be addressed under the CP (Concrete Pavement) Road Map. (417 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/05053/05053.pdf

p-442 Pavement Preservation Checklists; #7 – 13 (*National Center for Pavement Preservation, Rec'd* January 2005)
Seven small flip booklets regarding pavement preservation: #7 Diamond Grinding of Portland Concrete Pavements; #8 Dowel Bar Retrofit for Portland Cement Concrete Pavements Checklist; #9 Partial Depth Repair of Portland Cement Concrete Pavements Checklist; #10 Full Depth Repair for Portland Cement Concrete Pavements Checklist; #11 Hot In-Place Asphalt Recycling Application Checklist; #12 Cold In-Place Asphalt Recycling Application checklist; #13 Slurry Seal Application checklist (Page length ranges from 9 to 17).

p-443 A Highway Concrete Pavement Technology Development and Testing: Volume I – Field Evaluation of Strategic Highway Research Program (SHRP_ C-202 Test Sites (Alkali-Silica Reaction (ASR) (*FHWA* August 2006)
This report describes and quantifies the differences between test sections and the results of the various treatments used to combat ASR. The 4 test sections in CA, NV, NM, and SD were monitored for 5 years. Visual surveys, faulting measurements, relative humidity, petrographic examination and compressive strength and elastic modulus were tested. (185 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/02082/02082.pdf

p-443 B Highway Concrete Pavement Technology Development and Testing: Volume II – Field Evaluation of Strategic Highway Research Program (SHRP) C-203 Test Sites (Freeze-Thaw Resistance)(*FHWA* August 2006)
This report documents the results from 2 field sites used to research the resistance of concrete to freezing and thawing. The sites were monitored for long-term performance to verify the effectiveness of freeze-thaw resistance technology. The monitoring included annual distress surveys, and physical testing of cores taken from the concrete slabs at both sides. In addition one site was evaluated for D-cracking. The results show very little visual distress or physical distress. Results and conclusions are provided. (47 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/02083/02083.pdf

p-443 C Highway Concrete Pavement Technology Development and Testing: Volume II – Field Evaluation of Strategic Highway Research (SHRP) C-205 Test Sites (High-Performance Concrete) (*FHWA* August 2006)
The report discusses in detail the effects of climate and material properties on the HES concrete durability. 8 High-Early-Strength (HES) concrete patches were constructed and

examined over 7 years for durability. The report also presents comparisons of the rapid chloride permeability and AC impedance test results and the rate of strength gain for the mixes evaluated. (69 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/02084/02084.pdf

p-443 D Highway Concrete Pavement Technology Development and Testing: Volume IV – Field Evaluation of Strategic Highway Research Program (SHRP) C-206 Test Sites (Early Opening of Full-Depth Pavement Repairs) (*FHWA* August 2006)
The objective of this study was to monitor and evaluate the performance of experimental full-depth repairs made with high-early-strength(HES) materials. The goal was to establish guidelines for the minimum strength required at opening time to ensure adequate performance of full-depth PCC pavement repairs. This report presents the results of annual surveys and analysis of the collected data. (51 pages)
Online: http://www.fhwa.dot.gov/Pavement/pccp/pubs/02085/02085.pdf

p-443 E Highway Concrete Pavement Technology Development and Testing: Volume V – Field Evaluation of Strategic Highway Research Program (SHRP) C-206 Test Sites (Bridge Deck Overlays) (*FHWA* August 2006)
The objective of this study was to monitor and evaluate the performance of two concrete overlays; silica fume concrete (SFC) and latex-modified Type III PCC (LMC-III). One is a long-term low permeability overlay and the other is a high early strength overlay. The overlays were studied for 6 years and the results and conclusions are summarized in this report. (80 pages)
Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/02086/02086.pdf

p-444 A Identifying Incompatible Combinations of Concrete Materials. Volume I – Final Report (*FHWA* August 2006)
This study reports on unexpected interactions in Portland cement concrete such as stiffening or excessive retardation, potential for uncontrolled early-age cracking, and unstable or unacceptable air void systems. It develops a protocol to allow users to monitor their materials and concrete systems. It has determined simple field tests to provide early warning signs of potential problems. (159 pages)
Online: http://www.fhwa.dot.gov/pavement/concrete/pubs/06079/06079.pdf

p-444 B Identifying Incompatible Combinations of Concrete Materials. Volume II – Test Protocol (*FHWA* August 2006)
This study reports on unexpected interactions in Portland cement concrete such as stiffening or excessive retardation, potential for uncontrolled early-age cracking, and unstable or unacceptable air void systems. It develops a protocol to allow users to monitor their materials and concrete systems. It has determined simple field tests to provide early warning signs of potential problems. (83 pages)
Online: http://www.fhwa.dot.gov/pavement/concrete/pubs/06080/06080.pdf

p-445 Corrosion Resistant Alloys for Reinforced Concrete (*FHWA* July 2007)
This investigation was initiated to evaluate the corrosion resistance of various types of corrosion resistant reinforcement, including new products that are becoming available, in bridge structures that are exposed to chlorides. This interim report presents results from the initial 3 years of an overall 5-year program. (132 pages)
Online: http://www.fhwa.dot.gov/bridge/pubs/07039/07039.pdf

p-446 Multiple Corrosion Protection Systems for Reinforced Concrete Bridge Components (*FHWA* July 2007)

Eleven systems combining epoxy-coated reinforcement with another corrosion protection system are evaluated using the rapid macrocell, Southern Exposure, cracked beam, and linear polarization resistance tests. The results presented in this report represent the findings obtained during the first half of a 5-year study that includes longer-term ASTM G 109 and field tests. (92 pages)

Online: http://www.fhwa.dot.gov/bridge/pubs/07043/07043.pdf

p-447 Drilled Shaft Foundation Defects: Identification, Imaging, and Characterization *(FHWA October 2005)*

This report addresses concrete structures that contain access tubes, specifically what constitutes a defect in a drilled shaft and how to relate to observed defect in velocity tomogram to engineering strength information. This study was conducted through the development of a three-step approach: 1) Anomaly Identification and Independent Verification, 2) Defect Definition, and 3) Defect Characterization. (124 pages)

Online: http://www.fhwa.dot.gov/bridge/pubs/07043/07043.pdf

p-448 Minimizing Cracking in Cement-Treated Materials for Improved Performance *(KP George, Hitek Engineering Consultants, Inc. 2002)*

This report describes the findings and results of research conducted to determine, 1)the causes of pavement cracking, 2) how shrinkage cracking can be mitigated, and 3)mix design criteria that would minimize cracking and improve performance. (35 pages)

p-450 Evaluation of the Troxler Model 4430 Water Cement Gauge (*HITEC* August 1996)
This report looks at the importance of measuring the water to cement ratio needed for the concrete mix and the Troxler Model 4430 Gauge that was created to ensure the right mixture. (41 pages)

p-451 Evaluating the Performance of Soil-Cement and Cement-Modified Soil for Pavements: A Laboratory Investigation *(Tom Scullion, Stephen Sebesta, John P. Harris, and Imran Syed 2005)*
This report present the finding on an extensive laboratory testing study to identify new approaches to improving the performance of soil-cement bases and cement-modified soils in pavements.(130 pages)

p-452 Soil-Cement Construction Handbook: Engineering Bulletin (*Portland Cement Association* 1995)
The procedure given here for building soil-cement base courses represent over 50 years of field experience. It is the intent of this publication to show how high-quality soil-cement can be built rapidly and easily under a wide variety of conditions by fulfilling these requirements.

p-453.10 Accelerated Determination of ASR Susceptibility During Concrete Prism Testing Through Nonlinear Impact Resonance Ultrasonic Spectroscopy (FHWA October 2013)
This study evaluates 10 concrete mix designs with varying ASR (alkali-silica reaction) reactivity. This report presents the results of those tests to illustrate the utility of this new method as a complementary technique for damage assessment of laboratory concrete prisms specimens. (76 pages)
Online:http://www.fhwa.dot.gov/publications/research/infrastructure/structures/bridge/13085/13085.pdf

p-453.11 Selecting Measures to Prevent Deleterious Alkali-Silica Reaction in Concrete: Rationale for the AASTO PP65 Prescriptive Approach (FHWA October 2012)
This document is intended to provide the background information that was used in the development of the prescriptive approach (PP65-11).
Online:https://www.fhwa.dot.gov/pavement/concrete/asr/hif13002/hif13002.pdf

Gravel

p-462 Bioremediation in the Highway Environment: Three Case Studies

p-463 Off-Hwy. Vehicle-Final Environmental Impact Statement and Proposed Plan Amendment for MTR, ND, and Portions of SD (*USFS* January 2001)
This is a summary of the final environmental impact statement and proposed plan amendment, which discloses the potential environmental consequences of managing motorized wheeled cross-country travel on lands administered by BLM and the FS. (251 pages)

p-464 NACE Blading Aggregate Surfaces (*NACE* 1997)
This guide provides tips for grader operations on blading aggregate surfaced roads and can be especially helpful for training on the grader at the job site.

p-465 Problems Associated With Gravel Roads (*FHWA* May 1998)
This handbook looks at the overall environment of gravel roads; the material used to surface them; the common surface defects—their causes, prevention, and correction; and the equipment and techniques used to repair and maintain gravel roads.

p-466 Gravel PASER Manual (Transportation Information Center-University of Wisconsin May 1989)
This manual is designed to provide background information on gravel road conditions and causes of distress as well as a simple procedure to rate road conditions. (32 pages)
Online: http://www.t2.unh.edu/nltapa/Pubs/Asphalt_raods_Paser_Manual.pdf

p-467 Earth and Aggregate Surfacing Design Guide for Low Volume Roads (*USFS* September 1996)
This guide redefines the surfacing design process and performance criteria. And, for the first time, recognition is given to the importance of road maintenance in long-term road performance and that road surface design and management play a major role in erosion and sediment control. (301 pages)

p-468 Economics of Upgrading an Aggregate Road (*Minn DOT & LRRB* January 2005)
This report describes a research project that provides Minnesota counties, and townships with information and procedures to make informed decisions on when it may be advantageous to upgrade and pave gravel roads. It also provides resources to assist county and township governments in explaining to the public why certain maintenance or construction techniques and policy decisions are made. (72 pages)
Online: http://www.mrr.dot.state.mn.us/research/pdf/200509.pdf

p-469 Soil and Water Road-Condition Index – Field Guide (USFS December 2008)
The soil and water road-condition index (SWRCI) was developed to provide a road-condition assessment tool for watershed- and project-scale analysis. SWRCI is intended to be a rapid-assessment toll for soil scientists and hydrologists to identify effects of roads on soil quality and function, as well as impacts to water quality and downstream values. (93 pages)

p-469A Soil and Water Road-Condition Index – Desk Reference (USFS Dec 2008)
The SWRCI desk reference is a companion document to the SWRCI field guide and rating form. The desk reference – provides a description of each road attribute; identifies the questions the attribute addresses for a project- or watershed-scale road analysis; and identifies related indicators and the usefulness of the attribute in identifying road impacts to soil and water resources with referenced research findings. (25 pages)

p-470 Forest Service Roadless Area Conservation Final Environmental Impact Statement-Vol.I (*USFS* November 2000)
This final environmental impact statement responds to strong public sentiment for protecting roadless areas and the clean water, biological diversity, dispersed recreation opportunities, wildlife habitat, forest health, and other pubic benefits provided by these areas. This action also responds to budgetary concerns and the need to balance management objectives with funding priorities. (~1000 pages)

p-471 Forest Service Roadless Area Conservation Final Environmental Impact Statement-Vol.II (*USFS* November 2000)

p-472 Forest Service Roadless Area Conservation Final Environmental Impact Statement-Vol.III (*USFS* November 2000)
The Forest Service has documented, analyzed, and responded to the public comments received on the Draft Environmental Impact Statement. This publication describes the substantive comments received on the DEIS and provides the agency's response to those comments. (215 pages)

p-473 Forest Service – Considerations in Lowering Maintenance Standards of National Forest System Roads to Maintenance Level 2 (USFS August 2013)
The focus of this guide is on the safety aspects and considerations of lowering maintenance level (ML) 3, 4 or 5 National Forest System roads (NFS) to ML2. (62 pages)
Online: http://permanent.access.gpo.gov/gpo40828/pdf13771803Pdpi300.pdf

p-475 Environmentally Sensitive Maintenance for Dirt and Gravel Roads (Penn State October 2007)
The manual will provide insight into using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads. The manual will address the environment of forests, mountainous terrain, and rolling hills. (334 pages)
Online:
http://www.epa.gov/owow/nps/sensitive/EnvironmentallySensitiveMaintenance_DirtGravelRoads.pdf

p-476 Environmentally Sensitive Road Maintenance Practices for Dirt and Gravel Roads (USFS 2012)
This field guide (based on the 2007 manual, p-475) provides examples of environmentally sensitive maintenance practices to reduce erosion and sediment, maintain subsurface hydrologic connectivity, restore drainage density to more natural conditions, and eliminate diversion potential. (126 pages)
Online: http://www.fs.fed.us/eng/pubs/pdf/11771802.pdf

p-477 Guidelines for Road Maintenance Levels (USFS 2012)
This guide defines, summarizes, and illustrates the five road maintenance levels to help Forest Service line officers, road managers, transportation engineers, equipment operators, field personnel, partners, and cooperators understand and achieve consistent application of road management and maintenance standards. (47 pages)
Online: http://www.fs.fed.us/t-d/pubs/pdf/hi_res/11771811hi.pdf

p-480 Gravel Roads, Maintenance and Design Manual (FHWA/South Dakota LTAP April 2005)
This manual contains guidelines to help answer questions about the maintenance of gravel roads.

Weed Control

p-503 Cast Iron Tree Grates *(D)* (*NEENAH Foundry Company* 1989)
This informational packet includes information iron cast iron tree grates, their expandability, functionality, illumination, and installation. (9 pages)
Online: http://www.aecinfo.com/1/resourcefile/00/29/76/default2976_1.html

p-505 The Nature of Roadsides and the Tools to Work With It (*FHWA* 2003)
This 32-page guide covers our responsibilities to manage roadside vegetation; using native

plants, ten best management practices that work; ten research reviews you can apply, and other useful information.
Online: http://www.invasivespeciesinfo.gov/docs/plants/roadsides/index.htm

p-515 Vehicle Cleaning Technology for the Controlling of Noxious Weeds and Invasive Species (*USDA* October 2005)
Summarizes the concepts for removing seeds from vehicles and equipment to control the spread of noxious weeds, invasive species, and disease. Many silvicultural and land management activities on national forest land involve moving vehicles and equipment at off-road locations. As a result, seeds and spores can be picked up, transported, and transplanted over great distances. Also found at http://www.fs.fed.us/eng/pubs/pdf/0551203.pdf (27 pages)
Online: http://gacc.nifc.gov/rmcc/administrative/docs/weed_wash_unit.pdf

p-520 Roadside Weed Management (*FHWA* 2007)
This publication contains information on each State's weed law, and weed resources, policy, and more. (369 pages)

p-521 Vegetation Control for Safety (FHWA August 2008)
This guide is to help local road agency maintenance workers identify locations where vegetation control is needed to improve traffic and pedestrian safety, to provide guidance for maintenance crews, and to make them aware of safe ways to mow, cut brush and otherwise control roadside vegetation..(50 pages)
Online:
http://safety.fhwa.dot.gov/local_rural/training/fhwasa07018/fhwasa07018.pdf

p-522 Roadside Revegetation: An Integrated Approach to Establishing Native Plants *(FHWA November 2007)*
This report offers an integrated approach to facilitate the successful establishment of native plants along roadsides and other areas of disturbance associated with road modifications. It guides readers through a comprehensive process of: 1. Initiating, 2. Planning, 3. Implementing, and 4. Monitoring a roadside revegetation project with native plants. (424 pages)

p-523 Current and Innovative Solutions to Roadside Revegetation Using Native Plants – A Domestic Scan Report *(FHWA January 2011)*
The use of native plants in roadside revegetation has evolved as more and more resource management agencies prescribe the practice as a much better approach for ecosystem. A domestic scan was initiated by the Federal Highway Administration to facilitate understanding about the processes and techniques used in successful and innovative projects that used native plants for roadside revegetation. (72 pages)

Fabrics and Geotextiles

p-550 Geotechnical Fabrics Report 1997 Specifier's Guide (*TC Mirafi* 1997)
Online:
http://images.library.wisc.edu/EcoNatRes/EFacs/CrandonMineRep/TailAd97n3/reference/econatres.tailad97n3.i0029.pdf

p-551 Geotextile Selection and Installation Manual for Rural Unpaved Roads

(*FHWA* April 1989)

p-552 Geotextile Design & Construction Guidelines Part I and II (*FHWA* October 1998)
These guidelines have been condensed form the FHWA Geotextile Engineering Manual for use as an implementation document for project managers and highway designers. IT will also be useful as a design reference guide for pavement and geotechnical specialists. The guidelines when used in conjunction with the FHWA Geotextile Engineering Manual will enable the highway engineer to properly design, select, test, specify, and construct with geotextiles and related products such as geogrids and geocomposite drainage materials.

p-553 Evaluation of the Tensar Ares Retaining Wall (*HITEC* November 1997)
The report describes a HITEC evaluation designed to determine the basic capabilities and limitations of the ARES System for use as a technically viable precast MSE retaining wall system. The evaluation was conducted based on design, construction, performance, and quality assurance information outlined in the HITEC Protocol. (131 pages)

p-554 Fabric for Reinforcement and Separation in Unpaved Roads *(Minn DOT* December 1998)
Describes research on soil-fabric-aggregate systems to evaluate the effect a geotextile has on the performance of an unpaved road.
Online: http://www.lrrb.org/pdf/199904.pdf

p-555 Evaluation of the SSL MSE PLUS Retaining Wall System (*HITEC* August 1999)
Describes evaluation of the SSL MSE Plus retaining wall system, a mechanically stabilized earth (MSE) structure, based on data submitted by the developers, designer and supplier.

p-556 An Introduction to the Deep Soil Mixing Methods as Used in Geotechnical Applications (*FHWA* March 2000)
This report traces the historical development of the various propriety Deep Mixing Methods(DMM) and provides a structured summary of application. It also compares the applicability of DMM with other competitive forms of ground treatment and improvement. The report focuses on methods, equipment, procedures and properties of the treated soil. It also describes the natures of the market in North America, Japan and Scandinavia.
Online: http://isddc.dot.gov/OLPFiles/FHWA/009360.pdf

p-560 Shored Mechanically Stabilized Earth (SMSE) Wall Systems Design Guidelines (FHWA February 2006)
The purpose of this design guideline is to serve as the FLH standard reference for roadway projects using shored MSE walls. (230 pages)
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-TD-06-001.pdf

p-561 Durability of Segmental Retaining Wall Blocks: Final Report (*FHWA* April 2007)
This report summarizes the key findings of this project and provides guidance on producing durable SRW (segmental retaining wall) blocks to ensure long-term performance of SRW systems in highway applications. (271 pages)
Online: http://www.tfhrc.gov/structur/pubs/07021/07021.pdf

p-565 Promoting Geosynthetics Use on Federal Lands Highway Projects (*FHWA* December 2006)
This study aims to develop recommendations to identify, promote, and advance the use of geosynthetic materials across the FLH in the Roadway, Bridge/Structures, and Geotechnical areas. (103 pages)
Online:
http://www.cflhd.gov/programs/techDevelopment/geotech/promogeoflhp/documents/02_title_forward_toc.pdf

p-569 Polyurethane Resin (PUR) Injection for Rock Mass Stabilization *(FHWA September 2008)*
The primary objective of this study is to provide specific guidance on the appropriate application and use of polyurethane resin (PUR) injection for stabilizing jointed and fractured rock masses and constructed rock structures. It is envisioned that this technology will provide both primary and supplemental rock mass stabilization and structure preservation options for a broad range of applications, encompassing geotechnical, historic and archeological structures. (76 pages)

Online:
http://www.cflhd.gov/programs/techDevelopment/geotech/PUR/documents/02_title_forward_TOC.pdf

p-570 SNAP (Soil Nail Analysis Program) User's Manual (FHWA Sept 2010)
Soil nail walls are internally stabilized earth-retaining structures. This user's manual discusses the theoretical basis for the computer program, gives a comparison of available soil nail wall design guidelines, discusses program execution including inputs and outputs, and includes two worked examples to demonstrate use of the program. (118 pages)

p-571 Hollow Bar Soil Nails, Pullout Test Program (FHWA May 2010)
This report reviewed the current practice of design of grout-to-ground bond strength and testing protocol for the hollow bar soil nail (HBSN) installations. The study evaluates if there is a correlation between a conventional solid bar soil nail (SBSN) and the installed HBSNs. (60 printed pages; 367 on CD ROM included)

p-572 Hollow Bar Soil Nails, Review of Corrosion Factors and Mitigation Practice (FHWA August 2010)
The scope of this report is limited to the preparation and distribution of a survey questionnaire, evaluation of various parameters for HBSNs as they relate to corrosion, preparation of a summary of the responses to the questionnaire, and a review of existing corrosion guidance. (82 pages)

Drainage, Culverts, Erosion, Watersheds

p-600 Evaluation and Management of Highway Runoff Water Quality (*FHWA* June 1996)
The objective of this manual is to gather and synthesize the results of past documentation and research on highway storm water runoff into a dingle-volume user's manual on water quality

impact assessment and mitigation. The manual will be useful to highway designers and environmental professional by presenting the available and appropriate impact prediction and mitigation tools for use during highway project planning and development activities. (455 pages)

p-601 County Storm Drainage Manual (Purdue University-Experiment Station and the County Commissioners of Indiana May 1981)
Engineers, surveyors or others involved with storm drainage design are faced with the task of designing drainage systems that are economical and at the same time provide adequate protection to minimize the loss of property or life. This manual has been complied to provide the designer with resource material which will help in meeting this challenge.

p-602 Roadway and Roadside Drainage (Orr, New York LTAP Center, Feb 2003 Revised)
This workbook, used in conjunction with training sessions is intended to provide basic drainage information to people who fix roads in New York State. It includes basic information to help people who build and maintain drainage systems. *Note: This workbook is cited in Gravel Roads: Maintenance and Design: p-480.* (89 pages)

p-603 Front Runner, An Evaluation of a Front-Mounted Rock Rate (*USFS* June 1998)
Four Front Runner front-mounted rock rakes for evaluation under actual working condition National Forest roads to see if the rake could be used for some road maintenance takes previously done by a motor grader. The purpose of this report is to summarize the results of the evaluation and does not compare the rake to other road maintenance equipment previously tested. (10 pages)
Online: http://www.fs.fed.us/t-d/pubs/html/98771202/98771202.html

p-605 Spill Compliance Manual (*J.J. Keller & Associates, Inc*. 2004)

p-606 Environmental Compliance Manual (*J.J. Keller & Associates, Inc*. 2004)

p-607 Erosion Control Treatment Selection Guide (*USFS* December 2006)
This guide presents a strategy and information to assist professional judgment in developing cost-effective erosion control treatments for conditions commonly encountered on USDA Forest Service lands. This guide focuses on erosion control treatment and does not specifically address sediment control. (53 pages)
Online: http://www.fs.fed.us/eng/pubs/pdf/hi_res/06771203hi.pdf

p-608 Environmental and Dust Control Workshop (*Nevada Technology Transportation* Aug 1996)
This work shall consist of preparing slopes, placing and compacting topsoil, seeding, fertilizing, mulching, and placing erosion control fabric on all graded and disturbed areas in accordance with these specifications and the details shown in the contract documents. (150 pages)

p-609 Environmentally Sensitive Maintenance for Dirt and Gravel Roads (*Gesford and Anderson* March 2006)
The manual will provide insight into using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads. The manual will address the environment of forests, mountainous terrain, and rolling hills. (310 pages)
Online:

http://ntl.bts.gov/lib/26000/26800/26882/EnvironmentallySensitiveMaintenance_DirtGravelRoads.pdf

p-610 Erosion Control Handbook (*Minnesota/FHWA* 2003)
-This manual will assist counties, townships and local units of government by providing guidelines and methods for effective erosion control practices on low volume roads. (118 pages)
Online: http://www.mnltap.umn.edu/pdf/erosioncontrolhandbook.pdf

p-611 Montana Association of County Road Supervisors - Culvert Notes

p-612 Erosion, Sediment, and Runoff Control for Roads and Highways *(D)* (*US EPA* 1995)
This article discusses the harm caused by runoff and why it must be controlled. The article specifically discusses principals for runoff control, best management practices, and operation and maintenance. (7 pages)
Online: http://water.epa.gov/polwaste/nps/road_runoff.cfm

p-613 Water/Road Interaction Guide (*FHWA* September 2003)

p-614 Best Management Practices for Erosion and Sediment Control (*FHWA* 1995)
The purpose of this manual is to provide guidance erosion and controlling sediment on highway construction projects. It addresses the selection of erosion and sediment control measures and the developments of erosion control plans. Construction and inspection of the measures are presented for each practice. (187 pages)
Online: http://isddc.dot.gov/OLPFiles/FHWA/009340.pdf

p-615 Fish Passage Through Culverts in Montana: A Preliminary Investigation (February 1996)

p-616 Current and Innovative Solutions to Roadside Revegetation using Native Plants (FHWA January 2011)
This report summarizes the observations, discussions and broad conclusions of nationally-recognized revegetation specialists during the 2009 scan tour.
http://www.wfl.fhwa.dot.gov/programs/td/publications/documents/reveg-solutions.pdf
Online:
http://www.mdt.mt.gov/research/docs/research_proj/final_report_fishculverts.pdf

p-617 Roadside Use of Native Plants (*FHWA* August 2000)
This book opens with short essays on principles of ecological restoration and management . It is followed with a state by state listing of native plants, scientific and common names, a color map and resources to find more information on noxious species as well as local experts.
Online: http://www.fhwa.dot.gov/environment/rdsduse/

p-618 Montana Sediment and Erosion Control Manual (May 1993)
This manual is designed to assist contractors, engineers and consultants with designing and implementing an erosion control plan as required by a MPDES general permit for storm water

discharges associated with construction activity. Many practices may be used in mining sites, logging activities, agriculture and small development or homeowner projects.

p-619 Soil Erosion and Water Pollution Prevention : NACE Action Guide Volume III-8 (*NACE* 1992)
This publication covers the problem of soil erosion. Topics include water erosion, prevention, control during construction, permanent stabilization, maintenance and repair and winter salting.

p-620 Pollution Control Programs for Roads, Highways and Bridges *(D) (US EPA, US DOT, and FHWA* 1995)
A number of federal regulations and programs address runoff pollution during the construction, operation, and maintenance of roads, highways, and bridges. This pamphlet discusses some of these programs. (3 pages)
Online: http://www.epa.gov/owow/nps/education/control.html

p-621 Riparian Buffer Strategies for Urban Watersheds (*MSU Department of Environmental Programs* December 1995)
This report provides guidance on riparian buffer programs used to mitigate the impact of urban areas on nearby streams. It utilizes the results of a national survey of riparian buffer programs, as well as, a comprehensive review of riparian buffer literature to make recommendations on buffer design. Also analyzing buffer pollutant removal potential and pollution prevention techniques, via chemical, biological and physical processes.

p-622 Clearing and Grading Strategies for Urban Watersheds (*MSU Department of Environmental Programs* December 1995)
This guidance report discusses the problems with clearing and grading activities that precede land development. Those outline here in particular are that of excessive sediment loads, and recommendations for their minimization.

p-623 More than Asphalt, Concrete, and Steel (*US DOT & FHWA* 1997)
This publication covers different areas of asphalt, concrete, and steel. Specifically: bicycle lanes, paths, and racks, congestion reduction, greener roadsides, historic pedestrian areas.

p-624 Operation, Maintenance and Management of Stormwater Management (*Watershed Management Institute* August 1997)
In this publication stormwater systems operation maintenance and management are covered. Topics include stormwater management practices, Planning and design considerations, programmatic and regulatory aspects, maintenance considerations for facility owners, construction inspection, inspection and maintenance after construction, costs and financing of stormwater facility operation and maintenance, disposal of stormwater sediments and finally information sources.
Online: http://stormwaterfinance.urbancenter.iupui.edu/PDFs/OMMSWM.pdf

p-624-B A Guide to Wetland Functional Design (*FHWA* 1990)
This guidebook was developed as a conceptual guide to replacing wetland function identified used the Wetland Evaluation Technique. The Functions modified slightly from those in WET, include Nutrient Removal/Transformation, Sediment/Toxicant Retention, Sediment Stabilization, Floodflow Alteration, Groundwater Recharge, Production Export, Aquatic Diversity, and Wetland Dependant Bird Habitat Diversity. The guidebook offers guidelines for developing both site selection and site design features, and includes a discussion of designing for multiple functions. (230 pages)

p-625 Wetlands Education Materials for Montana (*Montana Watercourse* March 1998)
This is a second edition catalog of wetlands education materials available to Montana's teachers, students, educators and interested citizens. It contains region specific sources of information on wetlands.
Online: http://www.archive.org/details/catalogofwetland00waterich

p-626 Who Does What With Montana's Wetlands (*Montana Watercourse* July 1998)
This directory provides useful information for landowners, public employees, and natural resource managers to help them navigate the diverse terrain of wetlands resources, agencies and information materials. This directory includes financial and technical information for federal and state, general information for federal and state, and regulatory information for federal and state.

p-627 A Landowners' Guide to Montana Wetlands (*Montana Watercourse* July 1998)
The purpose of this guide is to provide information for Montana landowner' informed use and management of their wetlands, bringing to life options for wetland protection, enhancement, and restoration. Simplified charts are provided to help private landowners pursue the options for themselves, by identifying and accessing the wealth of technical and financial assistance available for wetlands. And also a guide to wetland laws and regulations.
Online: http://www.archive.org/details/1574D595-1A80-4232-BC15-5A7B5BFB590C

p-628 Scenic Byways, A Design Guide for Roadside Improvements (*USFS* 2003)
The purpose of this design guide is to assist the planners, designers, and managers of scenic byways. It shows examples of improvements, outlines the planning process, and describes design principles. This book is focused on scenic byways that cross Federal lands, these principles may be applied to all byways within America. (106 pages)
Online:
http://www.contextsensitivesolutions.org/content/reading/byways_design/resources/byways_design/

p-629 Community-Based Watershed Management: Lessons from the National Estuary Program (*US EPA* February 2005)
This handbook describes the highly successful approaches to watershed management implemented by 28 National Estuary Programs (NEPs). The principles and lessons learned contained in this document are relevant not only to NEPs, but to other watershed organizations who are working to implement watershed protection and restoration efforts. (98 pages)
Online: http://www.epa.gov/neplessons/documents/srNEPPrimer.pdf

p-630 Drainage: NACE Action Guide Volume III-5 (*NACE* 2000)
This guide has been developed to assist local officials in their efforts to develop rational plans for roadway drainage. IT should help create a practical, uniform, and systematic approach to the problem. Specifically, this guide is designed to provide the county engineer with a format for the investigation of existing drainage patterns, analysis of rainfall frequencies and intensities, determination of probable flow requirements, hydraulic design of the necessary channels, and implications of artificial drainage systems. A chapter on storm water management facilities is also included. (150 pages)

p-631 Low-Volume Roads Engineering – BMP Field Guide by Gordon Keller &

James Sherar (*USFS* July 2003)
This guide is intended to provide an overview of the key planning, location, design, construction, and maintenance aspects of roads that can cause adverse environmental impacts and to list key ways to prevent those impacts. Best Management Practices are general techniques or design practices that, when applied and adapted to fit site specific conditions, will prevent or reduce pollution and maintain water quality. (156 pages) (In CD – SW0631 MT LTAP library)
Online:
http://ntl.bts.gov/lib/24000/24600/24650/Index_BMP_Field_Guide.htm

p-632 Effects of Geosynthetic Reinforcement Spacing on the Performance of Mechanically Stabilize Earth Walls (*FHWA* September 2003)
This report is part of an effort to refine the design of Mechanically Stabilized Earth (MSE) walls with modular block facing. The study simulated the construction of a reinforced soil wall up to failure with two-dimensional finite difference computer program. Results of the study indicate that reinforcement spacing controls the failure mechanism and affects considerably the performance and internal stability of MSE walls. The results of the study infer that the beneficial effects of reinforcement of reinforcement spacing in MSE systems should be considered as a component of sound design.
Online: http://www.fhwa.dot.gov/engineering/geotech/pubs/03048/toc.cfm

p-633 A Soil Bioengineering Guide for Stream bank and Lakeshore Stabilization (*USFS* October 2003)
This guide illustrates the many soil bioengineering techniques being used by various agencies and private industry to stabilize stream banks. It is essential that one have a firm grasp of the functions of the watershed and its riparian ecosystem before executing any of the soil bioengineering techniques presented in this guide. Look at the big picture and find the cause. Treat the cause; not the symptom.
Online: http://www.fs.fed.us/publications/soil-bio-guide/guide/cover-front-matter.pdf

p-634 Maintenance of Drainage Features for Safety, A Guide for Local Street and Highway Maintenance Personnel (FHWA July 2009)
This guide identifies typical drainage problems and suggest corrective measures to improve safety. (38 pages)

p-635 Soil & Base Stabilization and Associated Drainage Considerations Vol I& II (*FHWA* July 1992)
This two-volume user's manual provides guidance to pavement design, construction, and materials engineers responsible for soil stabilization operations related to the transportation field. Volume I relates primarily to the design and construction of stabilized pavements. It serves as a guide for selecting an appropriate stabilizer on appropriate stabilizer on a project and provides important information with regard to drainage, construction procedures, and thickness design. Volume two contains information necessary in determining the type and amount of chemical stabilizer to be used on a project. (183 pages).
Online: http://isddc.dot.gov/OLPFiles/FHWA/014732.pdf

p-636 Riparian Protection and Restoration: Road Design Techniques (*USFS* August 2002)
The descriptions of riparian restoration projects discussed illustrate how road projects can help protect, restore, and keep riparian areas intact. Road riparian management that incorporates interdisciplinary planning, design, implementation, and monitoring has proven to be highly

successful. It also benefits both the resource and those who use the land for product extraction, recreation, and other sociological pursuits. (13 pages)
Online: http://www.fs.fed.us/eng/pubs/html/02251202/02251202.htm

p-637 Stabilization and Rehabilitation Measures for Low-Volume Forest Roads (*USFS December 2011*)
This document will assist the Forest Service and other Federal, State, and local land management agencies road managers, transportation engineers, equipment operators, resource specialists, field personnel, and others who are involved in rehabilitation and stabilization of low-volume roads. This guide was developed by obtaining information that contains methodologies and project-specific data from national forests throughout the country. (333 pages)
Online: http://www.fs.fed.us/t-d/php/library_card.php?p_num=1177%201801P

p-638 Evaluation of the Tricon™ Retained Soil Wall System (*CERF* May 2002)
This report describes a HITEC evaluation designed to determine the basic capabilities and limitations of the Tricon System for use as a technically viable precast MSE retaining wall system.

p-639 Evaluation of the Geo-Con Vert Wall System (*CERF* April 2002)
This report describes a HITEC evaluation designed to determine the basic capabilities and limitations of the Geo-Con Vert Wall for use as a technically viable permanent excavation support retaining wall system.

p-640 Evaluation of the Inter-Lok™ Retaining Wall System (*CERF* May 2002)
This report describes a HITEC evaluation designed to determine the basic capabilities and limitations of the INTER-LOK System for use as a technically viable precast MSE retaining wall system.

p-645 Effects of Water Flow Rate and Temperature on Leaching From Creosote-Treated Wood (*USFS* 2002)
There is relatively little data on the rates of creosote loss in many exposures, including aquatic applications. To address this concern, the Federal Highway Administration has funded a series of studies to evaluate the environmental impact of creosote-treated wood used in timber bridges.(From the Department of Forest Products, Oregon State University, and Corvallis, Oregon)
Online: http://www.fpl.fs.fed.us/documnts/fplrn/fplrn286.pdf

p-650 Summary of Trenchless Technology for Use with USDA Forest Service Culverts (*USFS* September 2005)
This report, which summarizes the trenchless technologies most appropriate for USDA Forest Service roadway culvert applications, can help USDA Forest Service engineers best determine where and when to use this rapidly evolving technology. Techniques for replacing or rehabilitating corrugated metal pipe (CMP culverts, 18 inches or greater in diameter, are emphasized because they are commonly use for USDA Forest Service culverts. (USFS 9/2005) 17 pages
Online: http://www.fs.fed.us/eng/pubs/pdf/05771201.pdf

p-651 Culvert Scour Assessment (*USFS* October 2009)
The purpose of this study is to quantitatively analyze (1) the geomorphic and structure controls on channel-bed and footing scour at road-stream crossings, and (2) the effectiveness of aquatic organism passage (AOP) at these crossing by comparing channel characteristics within the

crossing structure to reference channel conditions not influenced by the structure. (17 pages and CD with Appendixes)
Online:
http://www.fs.fed.us/eng/pubs/pdf/CulvertScour/CulvertScourHi/%20Culvert_ScourHi.pdf

p-652 Decision Analysis guide for Corrugated Metal Culvert Rehabilitation and Replacement Using Trenchless Technology (USFS December 2012)
This publication will provide guidance in selecting which trenchless technologies may be advantageous for rehabilitating or replacing aging corrugated metal pipes based upon various observed conditions. 93 pages)
Online: http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf11771810/pdf11771810Pdpi72.pdf

p-655 Impact of Alternative Storm Water Management Approaches on Highway Infrastructure: Guide for Selection of Best Management Practices – Volume 1 (*Minn DOT & LRRB* 2005)
The study presented in this report had a goal of evaluating storm water BMPs that are located adjacent to roadway infrastructures. The primary objective was to assess the potential adverse impact of storm water BMPs on the function and long-term operational cost of roadways. (60 pages – report format)

p-656 BPM for Chemical Treatment Systems for Construction Stormwater & Dewatering *(FHWA OCT 2008)*
The two objectives of this book are: 1. To provide a technically credible basis for best management practices for the use of CTS for turbidity reduction on road construction projects; and 2. To identify the most important variables to address when selecting chemical treatment BPM for a particular site. (23 pages)

p-660 Video Inspection of Highway Edgedrain Systems (*FHWA* April 1998)
This report documents the results of 287 video inspections of highway edgedrain systems in 19 states. These inspections were conducted to both demonstrate the capabilities of the technology as well as demonstrating some of the common problems associated with the performance of edgedrain systems. (43 pages)
Online: http://isddc.dot.gov/OLPFiles/FHWA/013570.pdf

p-661 Maintenance of Drainage Features for Safety – A Guide for Local Street and Highway Maintenance Personnel (FHWA July 2009)
This guide, which is an update to the same titled guide published in 1990, is intended to help local agency maintenance workers ensure their agency's signs are maintained to meet the needs of the road user. The guide succinctly covers the following topics: a description of sign types, sign materials and sign supports; sign installation and the elements of a sign management system including inventory, inspection, preventive maintenance, repair and replacement, and recordkeeping. This guide identifies typical drainage problems and suggests corrective measures to improve safety. (38 pages)
Online: http://safety.fhwa.dot.gov/local_rural/training/fhwasa09024/

p-662 Simplified User's Guide to Time-Domain-Reflectometry Monitoring of Slope Stability (*USFS September 2009*)
This is a simplified guide for the implementation and use of aTDR (time domain reflectometry) cable system for monitoring the movement of known and potential landslides. The purpose of this guide is to summarize basic information to assist field personnel in assembling and installing a TDR measurement system, as well as processing the TDR data. (25 pages)

Online: http://www.fs.fed.us/eng/pubs/pdf/08771804.pdf

Dust Control

p-705 Road Stabilizer Product performance: Buenos Aires National Wildlife Refuge (FHWA 10/2005)
The primary objective of this project was to evaluate a number of road stabilizer products for potential use on FLH projects for dust control and surface stabilization. The performance of six different products was documented at the Buenos Aires National Wildlife Refuge in Arizona. Each section was evaluated for the products' application ease performance over a 2-year period, and cost effectiveness. (78 pages)

p-706 Road Stabilizer Product Performance—Seedskadee National Wildlife Refuge *(FHWA 2008)*
The primary objective of this project, like its predecessor project at Buenos Aires National Wildlife Refuge in Arizona, was to evaluate six different road stabilizer products for potential use on FLH projects for dust control and surface stabilization. (106 pages)

p-710 Dust Palliative Selection and Application Guide (*USFS* November 1999)
Online: http://www.airquality.nrcs.usda.gov/Documents/USFS_DustGuide.pdf

p-712 Effectiveness and Environmental Impact of Road Dust Suppressants (*Mountain-Plains Consortium* March 1995)
Although dust control has been practiced for decades, quantitative studies on the effectiveness, of the various dust suppressing methods and their environmental impact have been virtually nonexistent. The purpose of this research project, therefore, is to evaluate, under field conditions, the effectiveness of some of the commonly used road dust suppressants, and to investigate water quality effects resulting from their use. (110+ pages)
Online: http://www.mountain-plains.org/pubs/pdf/MPC94-28.pdf

p-715 Dust Control on Low Volume Roads – A Review of Techniques and Chemicals Used (*FHWA* May 2001)
This report is intended to serve as a practical dust control guide for low volume roads.

p-720 Surface-Aggregate Stabilization with Chloride Materials (*USFS* December 2006)
This publication provides Federal, State, county, and local road managers information on the performance and cost effectiveness of road-mixing high applications of calcium and magnesium chloride that are applied in a one-time construction process. The purpose of this project was to develop guidelines for chloride-stabilization and aggregate-surfacing materials in various environments. (23 pages plus CD)
Online: http://www.fs.fed.us/t-d/pubs/pdf/06771805.pdf

p-721 Best Practices for Dust Control on Aggregate Roads (LRRB Jan 2009)
This study evaluated the performance and cost of commonly used dust palliatives using a mobile air sampling technique. Treatments of calcium chloride, magnesium chloride, and organic polymer-plus-binder were evaluated at standard applications rates during the first year and at variable rates during the second year. The treatments were applied to a variety of subject roads that were located throughout Minnesota. Average daily traffic levels varied from 25 to 700 vehicles per day. (30 pages)

p-722 Stabilization Selection Guide for Aggregate-and Native-Surfaced Low Volume Roads (USFS March 2009)

The purpose of this guide is to facilitate the selection of modification/stabilization agents and techniques for aggregate-surfaced and native/unsurfaced LVRs. The objective is to provide low-cost alternatives that reduce aggregate wear and loss, reduce the time period between major rehabilitation (i.e., between adding new aggregate or the total reconditioning of the road pavement). Also included is information on available stabilizing agents, appropriate conditions for use, selection procedures, quantity determination, and contact information for manufacturers/suppliers. (40 pages)

p-723 Unpaved Road Chemical Treatments, State of the Practice Survey (FHWA January 2013)
This report documents survey results regarding the state of the practice of using chemical treatments on unpaved roads. It provides insights into road manager choices and challenges and is useful supplementary reading to the "Unpaved Road Dust Management, A Successful Practitioner's Handbook" by Jones et al. (p-724) Available electronically only:
http://www.cflhd.gov/programs/techDevelopment/materials/DustSurvey/documents/UnpavedRoadChemicalTreatmentsStateOfThePracticeSurvey.pdf

p-724 Unpaved Road Dust Management, A Successful Practitioner's Handbook (FHWA January 2013)
This handbook provides broad programmatic aspects of unpaved road management. It is based on observations made during a national scan tour and provides useful and insightful excerpts of real-world examples and includes practical how-to instructions for determining what type of treatment may be needed for different situations.
Available electronically only:
http://www.cflhd.gov/programs/techDevelopment/materials/Handbook/documents/UnpavedRoadDustManagementASuccessfulPractitionersHandbook.pdf

Snow and Ice Removal

p-750 Local Government Snowplow Salt and Sander Controller Calibration Guide (*MN LRRB 2009 RICO8)*
The purpose of this guide book is to provide easy-to-use steps for calibrating snowplow sander controllers. It is an experience-based guide that captures tips and techniques learned by experienced calibrators. It covers both automatic and manual controllers. It suggests approaches for both open-loop and closed-loop automatic controllers. The guide covers both calibration and verification. It also suggests "when to calibrate." (73 pages)

p-752 Deicing Salt and Our Environment (*The SALT Institute)*
The fastest, cheapest and most effective method of coping with winter's ice and snow is deicing salt. This notebook covers the following issues and their relation to deicing salt: 1)Deicing Salt and our Environment 2) Road, Bridge and Vehicle Corrosion 3)Roadside Vegetation 4) Human Health 5) Wildlife and Fish 6) Sensible Salting 7) Figures and tables. (25 pages)

p-753 Safety Restoration During Snow Removal Guidelines (*FHWA* Feb 1991)
This report addresses findings from a study on the safety aspects for nonfunctioning highway safety features which can occur with maintenance snow removal activities during emergency and past-snowstorm cleanup operations. Remedies to the resulting hazards are also identified.

(95 pages)

p-754 Ice Detection and Highway Weather Information Systems Summary Report (*Technology Applications* 1993)
During the last 20 years, a number of State Highway agencies have installed ice detection and highway weather information systems. Their evaluations have addressed the performance of the system equipment and not its usefulness, effects on highway safety, and cost-saving aspects. Participants' experiences during this evaluation showed that PROACTIVE use of ice detection and highway information systems to aid in planning winter maintenance operations can reduce personnel, material, and equipment needs; reduce the potential for accidents for to icing conditions; and reduce the amount of corrosive or environmentally harmful chemical used for snow/ice control. (~25 pages)

p-755 The Snowfighter's Handbook (*Salt Institute* 1991)
The purpose of this manual is to provide the snow fighters with information, including the latest procedures and techniques, for combating winter storms. It will help snow fighters give the public the most effective snow and ice control program possible and, therefore, safe winder roads at least overall cost. The salting methods contained in this manual are the cornerstone of an effective winter maintenance program. (20 pages)

p-756 Salt Storage (*Salt Institute* 1997)
This manual was designed to help one manage their deicing salt. It will help in planning or improving salt storage facilities and provided guidance for good storage and handling procedures. (18 pages)
Online: http://www.t2.unh.edu/pubs/Salt_Storage_Handbook.pdf

p-758 Snow Fences Information Binder

Article 1: Benefits and Costs of Snow Fences on Wyoming Interstate 80 (*Ronald D. Tabler, Richard P. Furnish and USFS*) (8 pages)
Article 2: Estimating the Transport and Evaporation of Blowing Snow (*Ronald D. Tabler and USFS* 1975) (20 pages)
Article 3: Geometry and Density of Drifts Formed by Snow Fences (*Ronald D. Tabler and USFS* 1980) (15 pages)
Article 4: Predicting Profiles Of Snowdrifts in Topographic Catchments (*Ronald D. Tabler and USFS* 1975) (11 pages)
Article 5: Slide Rule for Snow Fence Design (*Ronald D. Tabler and USFS* 1987) (4 pages)
Article 6: Snow Control Course Notes (Ronald D. Tabler and USFS) (4 pages)
Article 7: Studying Snowdrifting Problems with Small-Scale Models Outdoors *(Ronald D. Tabler, Robert L. Jairell, and USFS* 1980) (13 pages)
Article 8: Using Visual Range Data for Highway Operations in Blowing Snow (*Ronald D. Tabler and USFS* 1984) (7 pages)

p-759 Snow and Ice Control, A Best Practices Review (*State of Minn. Office of Legislative Auditor* May 1995)

This report has four chapters. Chapter 1 provides background information about the kinds of snow and ice control practices in the state, who is responsible for winder road maintenance, and how it is financed. Chapter 2 presents 12 actions for effective snow and ice control. It also lists some o f the practices local governments currently use that illustrate the value of these 12 actions. Chapter 3 details examples of effective practices in use around Minnesota and describes how they might be duplicated by other local governments. Chapter 4 discusses trends, observations, and conclusions about snow and ice control resulting from our review. (148 pages)
Online: http://www.auditor.leg.state.mn.us/ped/pedrep/9506-all.pdf

p-760 Survey of: Alternative Road Deicers (*FHWA* February 1992)

It is the goal of this study to identify and investigate alternative deicing compounds in terms of general operational characteristics and potential environmental impacts. The three objectives of this study are: 1) To identify all compounds that have been considered for use as a roadway deicer. These alternative deicing compounds may potentially be used in snow and ice control operations on highways; 2) To evaluate the performance, operational criteria, roadway impacts, and cost related issues associated with the identified alternative deicers; and 3) To review potential adverse environmental effects associated with use of each alternative deicer. (200 pages)

p-761 Manual of Practice for an Effective Anti-icing Program (*FHWA* June 1996)

This manual provides information for successful implementation of an effective highway anti-icing program. It is written to guide the maintenance manager in developing a systematic and efficient practice for maintaining roads in the best conditions possible during winder storm. It describes the significant factors that should be understood and must be addressed in an anti-icing program, with the recognition that the development of the program must be based on the specific needs to the site for region within its reach. The manual includes recommendation for anti-icing practices and guidance for conducting anti-icing operations during specific precipitation and weather events. (63 pages)
Online: http://www.fhwa.dot.gov/reports/mopeap/mop0296a.htm

p-762 Low Cost Winter Maintenance (1995) *Swedish Experiences*
The general aim of road maintenance and operation in Sweden has been formulated as follows: "Both individuals and industry throughout the country are to be offered satisfactory road transport standards at the lowest possible socio-economic costs." Sweden meets these standards, by having one of the highest positions of traffic safety globally. This publication discusses their methods of road maintenance. (15 pages)

p-763 Relation Between Winter Road Maintenance and Road Safety

p-765 Evaluation of An Ice Ban®Product as a Prewetting Agent for Snow Removal and Ice Control Operations (*Virginia Transportation Research Council January 2000) (VTRC 00-R12)*
The researchers concluded that the cost and operational problems associated with using Ice Ban M50 as a prewetting agent exceeded those associated with using $MgCl_2$ as a prewetting agent. Experimentation should proceed cautiously until additional research addresses concerns with product stability, mold, and other probable environmental issues.
Online: http://www.virginiadot.org/vtrc/main/online_reports/pdf/00-r12%20.pdf

p-766 Snow Removal and Ice Control Technology, TRB Conference Proceedings
This publication contains selected papers presented at the Fourth International symposium in Reno, Nevada sponsored by TRB, NDOT, AASHTO, World Road Association-PIARC, and FHWA. The conference was held on August 1-16, 1996.

p-767 Minnesota Snow and Ice Control: Field Snow place Operations (*Minn LTAP* 2005)
Online: http://www.mnltap.umn.edu/pdf/snowicecontrolhandbook.pdf

p-772 Snow-Removal Attachments for Motor Graders for Local Agency Personnel Subtask B- Video Development Report (*Wilber Smith Association* September 1995)
This report provides information on the first five parts of subtask B for the task and project. The report provides a brief outline of the videotape script and state-of-the-practices presented in the videotape. The report also provides shot information, sample graphics, information on the music to be used and the proposed narrator's resume. (20 pages)

p-775 Collaborative Research on Road Weather Observations and Predictions by Universities, State Departments of Transportation, and National Weather Service Forecast Offices (*FHWA* October 2004)
This report documents the results of five research projects to improve the sensing, prediction and use of weather-related road conditions in road maintenance and operations. The primary purpose for these projects was to evaluate the use of weather observations and modeling systems to improve highway safety and to support effective decisions made by the various jurisdictions that manage the highway system.
Online: http://www.tfhrc.gov/its/pubs/04109/04109.pdf

p-776 Identifying and Assessing Key Weather-Related Parameters and Their Impacts on Traffic Operations Using Simulation (*FHWA* September 2004)
The objectives of this report are to identify how adverse weather affects traffic operations, to assess the sensitivity of weather-related traffic parameters in a microscopic traffic simulation package (CORSIM), and to develop guidelines for using the CORSIM simulation model to account for the effects of adverse weather.
Online: http://www.tfhrc.gov/its/pubs/04131/04131.pdf

Roundabouts

p-780 Roundabouts: An Informational Guide
This publication contains information for both public and private organizations regarding introductory material through design detail as well as applications of roundabout intersections. Topics include definition, what distinguishes roundabouts, public acceptance and legal issues, identifying sites, estimating capacity and delays, design principles, illumination and landscaping.
Online: http://www.tfhrc.gov/safety/00-067.pdf

p-781 Roundabouts: A Safer Choice (FHWA 2008- Brochure)
An educational resource on roundabout circular intersections.
Online:
http://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa08006/longdesc.cfm

p-782 Mini-Roundabouts (FHWA 2010)
This technical summary focuses on single-lane mini-roundabouts that explore the unique characteristics of mini-roundabouts while reinforcing the need to apply the principles-based approach common to all roundabout design. It provides readers with an overview of key considerations for planning, analysis, and design of mini-roundabouts. (14 pages)

p-783 An Evaluation of Signing for Three-Lane Roundabouts (FHWA March 2010)
This technical summary study's objectives were to identify signing and marking strategies that result in higher levels of comprehension and compliance in lane selection on the approach to roundabouts and to examine the effects of these strategies on lane use after an approach lane has been selected. (12 pages)

p-784 Access Management in the Vicinity of Intersections (FHWA Feb 2010)
This Technical Summary is an overview for roadway professionals by providing safety considerations involving access management, referring to the design, implementation and management of entry and exit points between roadways and adjacent properties. (15 pages)
Electronically available at: http://safety.fhwa.dot.gov/intersection

p-785 Roundabouts – Technical Summary (FHWA Feb 2010)
This Technical Summary is an overview of key considerations for planning, analysis, and design of single-lane and multilane roundabouts. (26 Pages)
Electronically available at: http://safety.fhwa.dot.gov/intersection

p-786 Intersection Safety – Issue Briefs – 16 (FHWA Nov 2009)
These 16 four-page briefs covering intersection safety issues are provided for all roadway planners, including the general public to promote intersection safety issues. (64 pages)
Additional electronic information at: safety.fhwa.dot.gov

p-787 Temporary Traffic Control for Building and Maintaining Single and Multi-Lane Roundabouts (ATSSA January 2013)
The traffic control guidelines outlined in this document can be used during various maintenance and construction activities such as pavement repair, striping, signing, delineation, landscaping, and intersection repair as well as during the construction of new roundabouts. (36 pages)
Online: https://s3.amazonaws.com/media.atssa.com/rsti/Roundabouts.pdf

Speed Bumps

p-789 Even a Lowly Hump takes Good Engineering *(D)Engineering Times: Frederike Velazquez*
This article discusses the controversy around speed humps and their standards. (1 page)

p-790 Guidelines for the Design and Application of Speed Humps (*ITE Traffic Engineering* 1997)
This Recommended Practice provides guidelines for the design and application of speed humps, a geometric design technique to control vehicular traffic speeds along a roadway. Speed humps consist of raised pavement construct or placed in ,on, and across or partly across a roadway. FOR the purposes of this document, speed humps are dined as a roadway geometric design feature whose primary purpose is to reduce the speed of vehicles traveling along that roadway. There might be certain secondary purposes to speed hump installations, such as traffic diversion, but that is not their primary intended purpose. (39 pages)

p-790A Guidelines for the Design and Application of Speed Humps – Paper *(D) (International Public Works Congress and Exposition 1992)*
This paper summarizes recommended guidelines for the design and application of speed humps, a proposed Recommended Practice of the Institute of Transportation Engineers. The proposed Recommended Practice considers speed humps a roadway geometric design feature intended to physically reduce vehicle speeds. (10 pages)

p-794 Crash Impact of Smooth Lane Narrowing with Rumble Strips at Two-Lane Rural Stop-Controlled Intersections (FHWA June 2010)
As a low-cost remedy to address crashes at unsignalized intersections on two-lane rural roads, the Federal Highway Administration developed and evaluated a treatment to reduce approach speeds by narrowing lanes using rumble strips in the median and on the right-lane edge. Results showed a 32 percent reduction in total crashes and a 34 percent reduction in fatal/injury crashes (in eight experimental sites between 2007 and 2008).(8 pages)

p-795 Center Rumble Strips–Insurance Institute for Highway Safety–9 Page Report *(D)* (*Insurance Institute for Highway Safety* 2004
Opposing –direction crashes account for about 20 percent of all fatal crashes on rural tow-lane roads and result in about 4,500 fatalities annually. The present study evaluated a potential engineering countermeasure for such crashed—installation of rumble strips along the centerlines of undivided rural tow-lane roads to warn/alert distracted, fatigued, or speeding motorists whose vehicles are about to cross the centerlines and encroach into opposing traffic lanes. Data were analyzed for approximately 210 miles of treated roads in seven states before and after installation of centerline rumble strips. An empirical Bayes before-after procedure was employed to properly account for regression to the man while normalizing for differences in traffic volume and other factors between the before and after periods. The findings of the study are also fleshed out in detail. (9 pages)

p-796 Safety Evaluation of the Safety Edge Treatment (FHWA April 2011)
This report examines the safety effects, costs, and benefits of this low-cost treatment for two-lane and multilane rural highways. The safety evaluation found that the safety edge treatment appears to have a small positive crash reduction effect. (95 pages)
Online: http://www.fhwa.dot.gov/publications/research/safety/11024/

p-796A Safety Evaluation of the Safety Edge Treatment – Summary Report (FHWA April 2011)
Benefit-cost analysis based on the estimated 5.7 percent crash reduction effectiveness of the safety edge treatment found that this treatment is so inexpensive that it is highly cost-effective for application in a broad range of conditions on two-lane highways. (8 pages)
Online: http://www.fhwa.dot.gov/publications/research/safety/hsis/11025/

SAFETY

General

p-803 Commercial Vehicle Preventable Accident Manual & Work Sheet Supplement (*Triodyne Inc.*1997)
This manual was originally published in effort to reduce the number of vehicle accidents on the nation's highways. The focus of the manual is on improved safety management, preventive maintenance, and defensive driving. The work sheets are intended to be used for training drivers, maintenance personnel, and safety managers to increase their understanding of potential accident situations and accident prevention methods. (30 pages)

p-804 An Examination of Fault, Unsafe Driving Acts, an Total Harm in Car-Truck (*FHWA 2004)*
Collisions, HSIS This 8-page summary report aims to improve knowledge about the high-risk behaviors of truck and passenger vehicle (car) drivers. The Federal Motor Carrier Safety Administration has set a goal to reduce truck-involved fatal crashes by 41 percent by 2008. Meeting this goal will require improving truck safety and enhancing truck and car drivers' behavior and performance. (FHWA 2003)

p-805 Job Site Training for Your Employees *(D)*(*Cornell Local Roads Program* 1994)
We prepared this workbook for our training course on safety issues for local highway departments. The course is intended for highway superintendents, commissioner of public works, highway managers and supervisors, safety officers, and others who are in charge of training highway employees about safety in the workplace. (57 pages)

p-806 Results from a Safety Survey: Workforce Development for Transportation Professionals (*FHWA* 2002)
Goals of the survey were to assess what topics the transportation safety community would like to have and to evaluate how they would like to access the training courses.

p-807 A Review of Pedestrian Safety Research in the United States and Abroad (*FHWA* January 2004)
This document summarizes research on pedestrian safety in the United States with a focus on crash characteristics and the safety effects of various roadway features and traffic-control devices; it also considers pedestrian educational and enforcement programs. The results of this research will be useful to transportation researchers, engineers, planners, and safety professionals involved in improving pedestrian safety and mobility.
Online:
http://www.t2.unh.edu/nltapa/Pubs/review_ped_safety_us_and_abroad.pdf

p-808 Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes (*FHWA* September 2007)
This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to pedestrian crashes (4 pages)
Online:
http://www.ite.org/safety/issuebriefs/Intersection%20Issue%20Brief.pdf

p-809 Implementing the High Risk Rural Roads Program (FHWA March 2010)
This report documents common challenges, noteworthy practices and lessons learned experienced through the implementation of the High Risk Rural Roads Program. States can use these documented practices to launch their HRRRPs, identify next steps for a program already moving forward, or implement noteworthy practices to improve an established program. (52 pages) *see also sw809*

p-810 The Professional Driver's Preventable Accident Manual (T*riodyne Inc.* 1994)
This manual discusses countermeasures which may be used to reduce the incident of preventable Commercial Motor Vehicle accidents. It presents guides and tips to help drivers and safety supervisors formulate strategies which are reflective of the particular needs an circumstances of their company and will lead to improved driving safety. (60 pages)

p-811 A Evaluation of Safety, Design and Operation of Shared-User Paths – Final Report and Calculator; A User's Guide (*FHWA* July 2006)
This report developed a Level of Service (LOS) estimation method for shared-user-paths. The research included the development of the theory of traffic flow on a path, an extensive effort to collect data on path operations, and a survey through which path users expressed their degree of satisfaction with the paths shown in a series of videos. (161 Pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/04100/04100.pdf

p-811 B Shared-Use Path Level of Service Calculator; A User's Guide (*FHWA* July 2006)
The User's Guide provides step by step instructions on how to use the Level of Service (LOS) procedure and spreadsheet calculation tool for Shared-Use-Paths. (67 Pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/pedbike/05138/05138.pdf

p-812 Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations (*FHWA* August 2005) ***Electronic ONLY***
http://www.fhwa.dot.gov/publications/research/safety/04100/04100.pdf
Five-year study regarding pedestrian crashes at 1,000 marked crosswalks and 1,000 matched unmarked comparison sites. Results revealed that on two-lane roads, the presence of a marked crosswalk alone at an uncontrolled location was associated with no difference in pedestrian crash rate, compared to an unmarked crosswalk. Raised medians provided significantly lower pedestrian crash rates on multilane roads, compared to roads with no raised median. Older pedestrians had crash rates that were high relative to their crossing exposure. (112 pages)

p-813 Synthesis of Safety Research Pedestrians (*FHWA* August 1991)
The purpose of this report is to provide an overview of some of the research studies on pedestrian safety. This includes details of pedestrian's accident characteristics, measure of pedestrians' exposure and hazard, and more than a dozen specific roadway improvements and their effects on pedestrian safety. Pedestrian educational considerations are also briefly discussed. (101 pages)

p-814 Effects on Safety of Pavement - Truck Tire Interaction (*FHWA* January1992)
This report presents the findings of a research study to evaluate the frictional performance of truck and bus tires and its implication on highway safety, and to evaluate the effects of suspension characteristics on the braking and cornering performance of trucks. A new truck tire tester was built for the tires testing task, which enabled the measurement of the forces involved in braking and cornering under various speed, vertical load, and slip angle conditions of different pavement surfaces. Six types of radial and bias-ply tires were tested. A computer simulation study was conducted in the second task to investigate the effects of suspension type, tire type, roadway alignment, pavement roughness and surface wetness. (125 pages)

p-815 Access Management Manual (*TRB* April 2003)
The purpose of this manual is to compile the best of this information, along with the insights of a diverse group of practitioners, into one source that summarized the state of the art on access management. It is intended to assist state transportation agencies, local governments, metropolitan planning organizations, and their consultants in program developers, and other interested parties with a comprehensive reference tool on this subject. (371 pages)

p-816 Safety Effectiveness of Highway Design Features (Vol. I-VI) (*FHWA* November1992)
This series provides designers and traffic engineers with useful information on the relationship between accidents and highway geometrics.
Volume I - Access Control
Volume II - Alignment
Volume III - Cross Sections
Volume IV - Interchanges
Volume V - Intersections
Volume VI - Pedestrians and Bicyclists

p-817 AVOID Getting Plowed on Montana's Highways *(D) (MT DOT)*
This pamphlet discusses what you can and should do in an emergency situation and how avoid an emergency situation in winter conditions. (4 pages)

p-818 A Clear Roadside Policy for Above-Ground Utilities (D) (University of Alabama- Civil Engineering Department Professor Turner1993)
This essay reports the grim statistics which underscore the need for improvements in roadside safety. The essay continues discussing the following subtopics: the clear roadside, AASHTO Roadside Design, Implementing the Clear Roadside, and Roadside Safety Treatments. (12 pages)

p-820 Manual and Specifications on School Crossing Zones Supplement to Part VII of Manual on Uniform Traffic Devices (*Utah DOT* 1992)
This manual is intended to supplement the general guidelines contained in the MUTCD to standardize, as much as possible, applications of traffic control devices and crossing guards at school areas on all public highways in the State of Utah. (20 pages)

p-821 Guide to Safety Features for Local Roads and Streets (*FHWA* October 1992)
The specific purpose of this Guide is to provide local transportation agency personnel with important information related to highway safety features intended for use on roads and streets in rural and small urban areas. The intended uses and function of each of several safety features are discussed. Examples of both good and bad practices are given.

p-822 Traffic Safety Digest (National Highway Traffic and Safety Administration Winter 1996)
This is composition of individual state's 3D Month Program. Topics which are covered are: alcohol and other drugs, emergency medical services, motorcycle safety, occupant protection, and police traffic services. Each page lists the states individual problem, goals, strategies, and results. (~300 pages)

p-823 Administrator's Highway Safety Program of Excellence, Award-Winning Projects (July 1995)

p-826 NIOSH Pocket Guide to Chemical Hazards (*CDC* 2004)

p-827 Workshop on Road & Street Safety Management *($7 each)* (*LTAP MSU* 1995)
This workshop deals with the design, construction operations and maintenance practices that will lead to increased safety on roadway systems. The specific objective is to provide local transportation agency personnel with important information related to highway safety features intended for use on roads and streets in rural and small urban areas. The intended uses and functions for each of several safety features are discuses and examples of both good and poor practices are presented. (182 pages)

p-828 Summary of Experiences Related to Demonstration Project 86-Relieving Traffic Congestion through Incident Management *(D)* (*US DOT and Washington State Transportation Center* 1997)
This report describes experiences related to the presentation of FHWA's incident management workshop, "Relieving Traffic Congestion Through Incident Management". The information in this report will form the basis for creating the NHI incident management course. More information on "how" to improve or perform incident management needs to be incorporated into incident management training. Recommendations for future training efforts are included. (25 pages)

p-829 Hazardous Materials Incident Prevention Manual (*Triodyne Inc.*1996)
This manual presents countermeasures which may be used to reduce the number of Hazardous Materials Incidents. It include guides and tips to help Hazmat employees and safety managers formulate strategies appropriate to their company circumstance which will lead to improved hazardous materials safely. (53 pages)

p-830 Study of Accidents at Signalized Intersections- Phase I, Final Report (*MSU-Department of Civil Engineering* February 1997)
The objective of this study is to examine historical statistical and hard copy accident data at signalized intersection from across Montana to establish magnitude and rates, patterns and trends, and casual effects susceptible to correction. The following variables were evaluated: type of accident, severity, alcohol involvement, roadway surface condition, age of drivers, and contributing factors. Accident rates were calculated along the State Primary Routes in Montana to establish variables of influence and significant casual patterns. The findings are included.
Online: http://ntl.bts.gov/lib/20000/20200/20259/PB98119209.pdf

p-831 Safety Effectiveness of Intersection left- and Right-Turn Lanes (*TECHBRIEF* 2001)
This TechBrief outlines a new report regarding intersection safety effectiveness.
Online: http://www.tfhrc.gov/safety/pubs/02089/02089techbrief.pdf

p-832 IHSDM Intersection Diagnostic Review Model Knowledge Base Report (*FHWA* October 2002)
This report documents the results of the study, "Development of an Expert System for the Interactive Highway Safety Design Model (IHSDM)."
Online: http://www.tfhrc.gov/safety/ihsdm/pubs/02045/#toc

p-833 A Review of the Signalized Intersections: Informational Guide (*FHWA* April 2004)
The information contained in this guide is based on the latest research available. The guide's information and tools will help practitioners make insightful intersection assessments and understand the tradeoffs of potential improvement measures. Additional resources and references are highlighted for those who wish to learn more about a particular subject. (9 pages) (20+ extra copies to give away – in drawer)
Online:
http://www.fhwa.dot.gov/publications/research/safety/04092/index.cfm

p-834 Signalized Intersections: Informational Guide (*FHWA* 2004)
This guide provides a single, comprehensive document with methods for evaluating the safety and operations of signalized intersections and tools to remedy deficiencies. The treatments in this guide range from low-cost measures such as improvements to signal timing and signage, to high-cost measures such as intersection reconstruction or grade separation. Although the guide focuses primarily on high-volume signalized intersections, many treatments are applicable for lower volume intersections as well. (369 pages)

p-835 NACE Action Guide Vol.III-4 Roadway Safety (*NACE* 2000)
This guide has been prepared to assist county agencies—specially, road superintendents, engineers, an assistant engineer-with highway responsibilities. It is intended to help identify various road hazards that may be present and to help develop safety improvements. It includes suggestions on ways to evaluate the seriousness of hazards and to develop priority lists for addressing those hazards. Standards of construction are indicated, and some comments are made on financing.

p-836 Regional Traffic Incident Management Programs (*ITS* May 2001)
The objective of this implementation guide is to provide a robust framework for agencies to use to organize and conduct current and future incident management efforts, and to evolve these efforts into formal long-term sustained programs. Such a framework will help programs to grow in a structured manner, thus fostering sustainability and enhancing program performance and efficiency.

p-837 Validation of Accident Models for Intersections (*FHWA* July 2005)
This report describes the results of validation and calibration of motor vehicle crash models for rural intersections. Both the validation and recalibration activities were conducted in pursuit of one overriding research objective, which was to make marginal improvements to an existing set of statistical models for predicting crashes at two-and four-lane intersections, with the primary intent to be used in IHSDM (Interactive Highway Safety Design Model). (297 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/03037/03037.pdf

p-838 Informational Report on Lighting Design for Midblock Crosswalks (*FHWA* April 2008)
This report includes information on lighting parameters and design criteria that should be considered when installing fixed roadway lighting for midblock crosswalks. The research included provides information on lighting that will enhance the ability of drivers to detect those pedestrians. (21 pages)
Online: http://www.tfhrc.gov/safety/pubs/08053/08053.pdf

p-839 Ready for the Road by Joe Kolman (Jan/Feb 2008) *Montana Magazine*
This article interviews Director Steve Jenkins, Montana LTAP, with regards to being prepared when driving the roads of Montana, be it winter or summer. (Pages 64-68)

p-840 Roadway Safety Guide
Online: http://www.roadwaysafety.org/wp-content/uploads/guide3.pdf

p-841 NCHRP (Nat'l Cooperative Highway Research Program) Synthesis 321 (*TRB* 2003)
The goal of this synthesis is to assist local agencies in implementing safety improvements by providing a practical and easy to use summary of safety tools. There are many safety tools that are adaptable for local agencies. This documentation provides an overview of safety tools ranging from rigorous analysis to applying partner concepts. (168 pages)
Online: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_321.pdf

p-842 Roadside Design Guide 2002 (*AASHTO* 2002)
To be consistent with AASHTO's *A Policy on Geometric Design of Highways and Streets*, design speed has been selected as the basic speed parameter to be used in this guide. While it is a readily accepted fact that safety can best be served by keeping motorists on the road, the focus of this guide is on safety treatments that minimize the likelihood of serious injuries when a driver does run off the road. Note that this is a guide, not a standard nor is it a design policy. It is intended for use as a resource document from which individual highway agencies can develop standards and policies. (With CD's)

p-843 Roadside Design Guide 2011 (AASHTO 4th Edition 2011)
The purpose of this guide is to present the concepts of roadside safety to the designer in such a way that the most practical, appropriate, and cost-effective roadside design can be accomplished for each project.(165 pages)

p-844 Developing Safety Plans: A Manual for Local Rural Road Owners (FHWA March 2012)

p-845 Road Transport and Intermodal Research Safety Strategies for Rural Roads (*OECD* 1999)
Each year, more than 75000 people are killed on rural roads in OECD Member Counties. Because OECD countries have experienced a reduction the total number of car crash fatalities, it is clear that motorway and urban road safety improvements have been more successful than those on rural roads. Thus an expert group was composed to write a report. The report shows that as much as 80% of all accidents on rural roads fall into three categories. It is therefore recommended that every OECD Member country should develop a rural road safety improvement strategy. The strategy is outlined throughout this publication. (140 pages)

p-846 Bureau of Transportation Statistics Pocket Guide to Transportation (*US DOT and Bureau of Transportation Statistics* January 2003)
This pocket guide provides statistics regarding: transportation system extents and use, transportation safety, transportation security, mobility, transportation and the economy, and transportation and the environment. (46 pages)
Online:
http://www.bts.gov/publications/pocket_guide_to_transportation/2003/pdf/entire.pdf

p-847 Safety Engineering 2nd Edition (*American Society of Safety Engineers* 1994)
One area in which awareness is still a major problem is in engineering education. Rarely does an engineering student get a good preparation for the safety considerations that will be expected of him or her. Engineers are expected to recognize potential hazards in products and systems they design, and to eliminate or reduce those hazards in products and systems they design, and to eliminate or reduce those hazards in products and systems they design and to eliminate or reduce those hazards as soon as possible. This publication covers the following subjects: attitudes and standards, the human element, the workplace environment, equipment design, and applications. (435 pages)

p-848 Fatal and Injury Accident Rates on Public Roads in the United States (FHWA October 1992)
This report represents data which can be used in evaluation of the highway safety performance of the States. The data were submitted by the States through the Highway Performance Monitoring system operated by the Federal Highway Administration.
(95 pages)

p-849 Underground Transportation Systems in Europe: Safety, Operations, and Emergency Response (*FHWA* June 2006)
The objectives of the 11-member scan team were to learn what is being done internationally for underground transportation systems in the areas of safety, operations, and emergency response. This report lists nine initiatives and practices that relate to human factors, planning, design, and incident and asset management. The scan team developed a detailed implementation plan covering these nine areas. (48 pages)
Online: http://international.fhwa.dot.gov/uts/uts.pdf

p-850 Traffic Incident Management Handbook (*FHWA* November 2000)
This handbook provides detail on important elements of successful incident management programs, as well as field operations. It includes new and advanced incident management topics. The focus is on the safety benefits achievable through effective incident management, as experiences by crash victims, the motoring public, and response agency field.
Online:
http://www.iacptechnology.org/IncidentManagement/TrafficIncidentMgmtHandbook.pdf

p-853 Traffic Monitoring: A Guidebook (FHWA July 2010)
This guidebook does not attempt to cover every aspect and detail of traffic monitoring. Instead, this document provides a starting point that leads the user to the locations of relevant and more detailed information to assist in the establishment of a successful traffic monitoring program. (39 pages)
Online: http://www.fhwa.dot.gov/ohim/tmguide/

p-854 Traffic Monitoring in Recreational Areas (FHWA August 2010)
Traffic monitoring in recreational areas is often challenged by distinct traffic and roadway characteristics and the multitude of agencies responsible for the management of Federal lands and/or the collection of supporting traffic data. In an effort to improve/lend consistency to traffic monitoring in recreational areas, the Coordinated Technology Implementation Program tasked the Office of Federal Lands Highway-FHWA with conducting an assessment of the nationwide practices for recreation traffic data collection. Key findings from these activities (review of pertinent literature, targeted survey, workshop) are briefly described. (37 pages)
Online: http://tti.tamu.edu/documents/FHWA-WFL-TD-10-003.pdf

p-856 European Road Lighting Technologies (*International Technology Exchange Program* Sept 2001)
In April 2000 a scan team visited Finland, Switzerland, France, Belgium, and the Netherlands. Based on its observations, the panel developed specific recommendations for the U.S. lighting community in such areas as visibility design technique; dynamic road lighting; pavement reflection factors; master lighting plane; lighting techniques for roundabouts. Crosswalks, and pedestrian areas; energy-absorbing poles; signal and equipment quality level and maintenance. (65 pages)
Online: http://international.fhwa.dot.gov/pdfs/euroroadlighting.pdf

p-857 European Right-of-Way and Utilities Best Practices (*FHWA* August 2002)
This report describes the scanning study of England, Germany, Norway and the Netherlands to review best practices in right-of-way and utilities services.
Online: http://international.fhwa.dot.gov/eurorightofway/rowdoc.pdf

p-858 Wildlife Habitat Connectivity Across European Highways
This report addresses how habitat and wildlife resources around the world have diminished to the point that transportation agencies are being asked to address impacts to these resources when implementing improvements to transportation systems.
Online: http://international.fhwa.dot.gov/Pdfs/wildlife_web.pdf

p-859 Signalized Intersection Safety in Europe (*FHWA* December 2003)
The objective of this study was to identify safety practices and evaluate their applicability to the United States. The scanning team studied four countries. Through meetings with representatives from each country, site visits, and field observations, the team identified programs and strategies that could work in the United States and potential barriers to their success. This report presents the scan team's observations, findings, and recommendations. (105 pages)

p-860 Identification of Driver Errors: Overview and Recommendations (*FHWA* August 2002)
This report describes an effort to gather more specific information about the driver errors that lead to crashes including recommendations for improvements to traffic control devices, roadway delineations, and accident reporting forms.

p-862 In-Vehicle Display Icons and Other Information Elements; Volume I: Guidelines (*FHWA* September 2004)
This is one of a series of reports produced as part of a contract to develop precise and detailed human factors design guidelines for in-vehicle display icons and other information elements. The contractual effort consists of three phases: analytical, empirical, and integrative. This report is a product of the integrative phase. This handbook summarizes human engineering data, guidelines and principles for use by designers during the development and evaluation of in-vehicle icons and other information elements. (FHWA Sept 2004) (200 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/03065/03065.pdf

p-865 Accessible Rights of Way (US Architectural and Transportation Barriers Compliance Board1999)
This design guide consists of two parts. Part I contains an overview of ADA Title II obligations, particularly as they affect new construction and alterations in the public right-of-way. Part II contains best practices recommendations—and the rationale behind them-for the design, construction, alteration, and retrofit of public pedestrian facilities. (143 pages)

p-866 Accessible Public Rights-of Way, Planning and Designing for Alterations (*PROWAAC* July 2007)
This technical assistance publication has been developed to provide guidance in the planning and design of pedestrian improvements constructed as part of an alteration project. Its text, illustrations, and case studies aim to expand the reader's body of knowledge in accessible right-of-way design. (107 pages)

p-867 Field Guide for Accessible Public Rights-of-Way 2009 Edition Revised (Idaho T2 2009)
This guide is intended for use by department personnel who are trained and skilled in the application of its contents. Contents include sidewalks on public right-of-way, Perpendicular curb ramps, Parallel curb ramps, blended transitions, curb ramp transitions, driveways, pushbutton, protrusions, obstructions, crosswalk, transit facilities. (23 pages)

p-870 Improving Traffic Safety Culture in the United States, The Journey Forward (*AAA* December2007)
Contains many insightful observations and recommended practices relating to traffic safety culture. It contains highlighted examples that might be worth following, mistakes to avoid repeating, and avenues yet unexplored with regards to addressing the nebulous concept of "safety culture" from the diverse perspectives of more than 20 top researchers from fields including public health, public policy, social psychology, and civil engineering. (11 pages)

p-875 The W.I.S.E. Guide to Wilderness Survival (*Wilderness Institute of Survival Education* 1992)
Within this book you will find information about what you need to stay alive; what is important and what isn't; how to build shelter; how to build a fire; how to signal for help. These things will keep you alive until someone comes to take you home, but they must be put to use properly. By becoming familiar with each area, you will build confidence in your ability to beat the odds and stay alive. (85 pages)

p-877 Family Emergency Preparedness Manual (Bozeman Montana Stake, Church of Jesus Christ of Latter-Day Saints 2009)
This manual will help you and your family plan for an emergency, prepare your home, supplies and equipment for an emergency and be informed on what to do for the most likely emergencies to occur in our area. It will also provide essential information to neighbors or emergency personnel who may be trying to help your family.(47 pages)

p-880 Fourth Quarterly Campaign Safe and Sober: Speeding: Driving Too Fast for Conditions (*US DOT and FHWA* 1995)
The theme for our Fourth Quarterly Planner is "Speeding: Driving Too Fast for Conditions,." We are emphasized speed b/c it is a contributing factor in 31 percent of all fatal crashed. Unfortunately, few drivers view speeding as a personal safety risk. This failure to perceive the inherent danger in speeding presents a challenge to all of us who work to improve public safety. This Planner includes brochures, articles, and information on safety and speeding. (~30 pages)

p-881 Speeding: Driving Too Fast for Conditions (*National Highway Traffic Safety Administration* 1996)
This folder includes brochures and documents discussing traffic safety facts, programs, and the Campaign Safe and Sober.
Online: http://www.nhtsa.gov/people/injury/enforce/pub/speed96.pdf

p-882 Intersection Safety: A Manual for Local Road Owners (FHWA 2011)
This document provides information on effectively identifying intersection safety issues in local areas, choosing the countermeasures that address them, and evaluating the benefits of those treatments. (60 pages)

p-883 Roadway Departure Safety: A Manual for Local Road Owners (FHWA 2011)
This document provides information on effectively identifying roadway departure safety issues in local areas, choosing the countermeasures that address them, and evaluating the benefits of those treatments. (68 pages)

p-884 Road Safety Information Analysis: A Manual for Local Road Owners (FHWA 2011)
This document was developed to provide data collection and analysis techniques as well as other processes applicable to the local practitioner to help improve the safety of local rural roads. (46 pages)

p-885 Crash Modification Factors (CMFs) in Practice Series (FHWA June 2013)
The purpose of the CMFs in Practice series is to illustrate the value of CMFs in various activities and demonstrate the practical application of CMFs. This series includes five separate guides that identify opportunities to consider and quantify safety in specific activities. Each guide in the series includes a step-by-step demonstration of how CMFs can be applied in the specific activity, a case study to show real-world application of CMFs, discussion of potential challenges in applying CMFs, and opportunities to overcome those challenges.
Available electronically:
http://safety.fhwa.dot.gov/tools/crf/resources/cmfs/index.cfm

p-886 Assessment of Local Road Safety funding, Training, and Technical Assistance (FHWA August 2013)
This report compiles and documents State department of transportation (DOT) practices used to develop and deliver local road safety initiatives.
Online: http://safety.fhwa.dot.gov/local_rural/training/fhwasa13029/lclrdsfy.pdf

p-887 Systemic Safety Project Selection Tool (FHWA July 2013)
The Systemic Safety Project Selection Tool (Systemic Tool) provides supporting information for state transportation departments and local government agencies to incorporate a systemic planning component into their existing safety management programs. (87 pages)
Online: http://safety.fhwa.dot.gov/systemic/fhwasa13019/sspst.pdf

p-888 SHSP Evaluation Process Model (FHWA March 2013)
This document provides an evaluation process model (EPM) that States can use to support a program evaluation of their Strategic Highway Safety Plan (SHSP). Program evaluation looks at the overall SHSP and helps States assess their SHSP's process and performance. (64 pages)
Online: http://safety.fhwa.dot.gov/hsip/shsp/epm/pdf/shsp_epm_report.pdf

Traffic Control and Work Zones

p-900 Using Traffic Calming to Create Walkable Communities (*LTAP National Conference* July 1999)
This publication overviews traffic calming, then gives specific details on traffic calming devices, then referencing traffic calming policies.

p-901 Traffic Calming: State of the Practice (*ITE* August 1999)
Covers what traffic calming is, history of it, engineering and aesthetics, impacts, legal authority and liability, project selection procedures and public involvement. Focuses on the activities and experience of 20 U.S. communities involved in traffic calming.
Online: http://www.ite.org/traffic/tcstate.asp

p-902 Guidebook on Statewide Travel Forecasting, (*FHWA* July 1999)
Reviews the state-of-the-practice of statewide travel forecasting. It focuses on those techniques that have been considered essential to good statewide travel forecasting. (131 pages)
Online: http://www.fhwa.dot.gov/planning/statewide/swtravel.pdf

p-903 Guidance on the Use of Automated Flagger Assistance Devices (FHWA July 2012)
This document only summarizes guidelines for when AFADs may be an appropriate option. Check with the MUTCD if you wish to use an AFAD along with State and local agencies for most current version governing authority's policy or standard specifications. (10 pages)
Online:

http://www.workzonesafety.org/files/documents/training/fhwa_wz_grant/atssa_afad.pdf

p-905 Managing Travel Demand: Applying European perspectives to U.S. practice (*FHWA* September 2006)
This study analyzes the programs and policies used to manage travel demand in Germany, Italy, the Netherlands, Sweden and the United Kingdom. This was to help develop a strategy to address the negative consequences of traffic congestion in the U.S. They found a different way of thinking that attempts to influence travelers before they get in their vehicles to travel. The recommendations for U.S. implementation include demonstration projects on congestion and demand management measures observed in Europe, technical support and training. (76 ps)
Online: http://international.fhwa.dot.gov/traveldemand/pl06015.pdf

p-906 A Toolbox Approach to Residential Traffic Management *(D)*(*ITE Journal* 1996)
While there are many books and articles on calming traffic in residential neighborhoods, researching, evaluated and presenting viable options to a specific neighborhood group is time consuming. This article presents one approach to organizing, presenting and comparing options for managing traffic in residential areas. (6 pages)

p-908 Work Zone Safety Inspection Training Course- Course Administrators Book (*FHWA* October 1997)

p-909 Quality Standards for Work Zone Traffic Control Devices (*ATSSA*)
Traffic controls are a necessary part of highway work zones to warn motorists of hazards, advise them of the proper path through the zone, delineate areas where they may not operate, and to separate them from works. The standards in this publication should aid in the determination of the quality of used devices. (30 pages)

p-910 A Study Concerning Drivers' Attitudes Toward Construction Zones *(D)* *(John Deere* 1990)
The purpose of this study is to determine how motorists view Construction Zones. Fatalities in Construction Zones are a major problem in the United States, affecting both the construction worker and the motorist. It is believed that motorists comprise the group hardest hit by accidents in Construction Zones. Despite this, it is obvious to all concerned with highway safety that motorist tend to ignore basic safety consideration in Construction Zones. This study was commissioned to determine why motors act as they do in these surroundings. (28 pages)

p-911 Work Zone Traffic Control Safety Certification--Study Guide (*International Municipal Signal Association* 1995)
This course establishes principles to be observed in the design, installation, and maintenance of traffic control devices and identifies standards where applicable. The course stuffy guide was also developed to be used as a reference. (~1000 pages)

p-912 Traffic Signals (*FHWA* September 2007)
The introduction to this issue brief provides an overview of traffic signals (purpose, warrants for signal installation, advantages, disadvantages, and factors to consider) followed by an introduction to the contents of this issue brief (crash reduction factors, presentation of the crash reduction factors, and using the Tables). (7 pages)
Online:
http://www.ite.org/safety/issuebriefs/Traffic%20Signals%20Issue%20Brief.pdf

p-913 Level I Traffic Signal Technician Certification Course--Participant Notebook
This seminar and participant notebook is structured to aid you in preparation for the Level I Traffic Signal Technician Certification Examination, developed by both the International Municipal Signal Association and the Institute of Transportation Engineers. This notebook contains a representation of the visual aids and associated course notes for each section.

p-914 A Guidebook for Residential Traffic Management (RTM) (*Washington DO*T December 1994)
This report provides a comprehensive reference on initiating and running a residential traffic management program. Aimed at smaller cities, town and counties, this guidebook takes a "toolbox" approach to implementing traffic management projects, with various RTM devices and procedure being the "tools" in each box. The Guidebook is illustrated with over 30 photographs of RTM devices in place, plus extensive references for further details.

p-915 NACE Action Guide Volume III-2: Traffic Operations (*NACE* 1995)
This guide summarizes current traffic engineering information and practices generally applicable to problems encountered by county engineers, such as: common types of traffic studies, traffic control facilities, traffic control procedures for construction and maintenance operations and traffic control procedures for school, parking areas, and other specialized

p-918 AASHTO Guidelines for Traffic Data Programs (*AASHTO* 1992)
The objective of the Guidelines is to improve the quality of the traffic information that supports decisions at all levels of the transportation profession. To realizes this objective this guide provides a reference for professional traffic monitoring and establishes a process for adoption of national traffic monitoring standards. (113 pages)

p-921 Flagger's Handbook (North Carolina State University Institute for Transportation Research and Education March 1995)

p-922 Traffic Control Systems Handbook (*FHWA* February 1996)
The Traffic Control Systems handbook: 1) Serves as a basic reference in planning, designing, and implementing effective traffic control systems. 2) Provides and updated compendium of existing traffic control technology for the advanced designer and user 3) Describes existing and evolving traffic control system technology and 4) Aids understanding and facilities training in the traffic control system field.
Online:
http://www.spcregion.org/downloads/ops/FHWA_TrafficControlSystemsHandbook_10-2005-FINAL.pdf

p-923 MDT Flaggers Handbook *($3 each) (MDT* March 1998)
This traffic flaggers handbook has been designed as a quick reference guide, a readily accessible source of information and guidance for people responsible for flagging traffic. (28 pages)

p-924 MDT Guidelines for Work Zone Safety *($3 each) (MDT* October 1994)

p-926 Creating Safety Work Zones (5 Brochures) (*FHWA* 2007)
This packet includes five brochures on: Work Zone Safety for Drivers, Trucking Safety through Work Zones, Accommodating Pedestrians in Work Zones, Worker Safety and Visibility, and Improving Traffic Control for Night Work Zones. (5 pages)

p-925 Automatic Counters (*MDT Traffic Operations Section* 1991)
This report contains a brief, concise summary of traffic patterns at each permanent traffic

counter that was in operation during the year 1991 in the state of Montana. The traffic volumes for each month and day of the week compared to the average daily traffic for the year. A total of 60 automatic traffic counters were in operation during this time. (124 pages)

p-927 Work Zone Operations: Improving Mobility and Safety on Both Sides of the Barrel- Best Practices Guidebook (*FHWA* April 2000)
This guidebook is the first release of a resource designed to give state and local transportation agencies, construction contractors, transportation planners, trainers and others with interest in work zone operations access to information and points of contact about current best practices for achieving work zone mobility and safety. The guidebook includes three forms to make the guidebook more useful. They include a registration for, a best practices submission for and a best practices review and comment form.

p-928 Meeting the Customer's Needs for Mobility and Safety During Construction and Maintenance Operations (*FHWA* September 1998)
This review focused on the Federal Highway Administration's (FHWA) leadership role in providing mobility and safety during construction and maintenance operations, the principles and approaches presented in the report are equally applicable to all transportation agencies.
Online: http://www.fhwa.dot.gov/reports/bestprac.pdf

p-929 Judicial Enforcement of Variable Speeds (*NCHRP* March 2002)
This report examines the impact of judicial decisions and judicial enforcement on the likely success of enforcing an expanded variable speed limit program

p-930 South Dakota Low Volume Roads Signing Manual (*South Dakota LTAP* 2002)
The Standard, Guidance, Option, and Support material described in this edition of the MUTCD provides the transportation professional with information needed to make appropriate decisions regarding the use of traffic control devices on streets and highways.

p-931 Basic Traffic Control for Utility Operations: Guide to Temporary Traffic Control for Utility Operations (*ATSSA* June 2002)
This small guide offers a quick reference to utility companies working with temporary traffic control. (49 pages – booklet size)

p-932A Traffic Analysis Toolbox Volume I: Traffic Analysis Tools Primer (*FHWA* June 2004)
This primer provides an overview of traffic analysis tools in the transportation analysis process. There are three volumes to this report. (34 pages)
Online: http://ops.fhwa.dot.gov/trafficanalysistools/tat_vol1/Vol1_Primer.pdf

p-932B Traffic Analysis Toolbox Volume II: Decision Support Methodology for Selecting Traffic Analysis tools (*FHWA* June 2004)
The purpose of this Volume II is to provide an overview of the role of traffic analysis tools in transportation analyses and to present a detailed methodology for selecting the appropriate tool for the job at hand. The report describes the selection process including selection criteria and worksheets that can be used in applying the selection process. (108 pages)
Online:
http://ops.fhwa.dot.gov/trafficanalysistools/tat_vol2/Vol2_Methodology.pdf

p-932C Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic

Microsimulation Modeling Software (*FHWA* June 2004)
This Volume III provides a recommended process for using traffic simulation software in transportation analyses. The guidelines provide the reader with a seven-step process that begins with project cope and ends with the final project report. (135 pages)
Online:
http://ops.fhwa.dot.gov/trafficanalysistools/tat_vol3/Vol3_Guidelines.pdf

p-933 Work Zone Training Law Enforcement Course: Safe and Effective use of Law Enforcement Personnel in Work Zones (*FHWA* August 2006)
This reference notebook contains an instructor's manual (136 pages), participant's manual (46 pages) and training modules (hard copies). These training materials will provide officers with useful, east to understand information to help them manage and safely operate within work zones. Contact for this manual is John Balser, FHWA, Office of Safety, at 202-366-9212, john.balser@fhwa.dot.gov

p-935 Speed Zone Guidelines (*ITE* 1993)
The purpose of speed zoning as state in the Uniform Vehicle Code is to establish a speed limit that is "reasonable and safe for a given section of roadway." There are at least two difficulties when interpreting this statement. The first is a question of "reasonable to whom?" and the second is the implication that there is truly a cause and effect relationship between speed limits and safety. The following pages discuss these issues and make judgments on ideal speed zones. (7 pages)

p-936 Speed Management Workshops – Restoring Credibility to Speed Setting: Engineering, Enforcement, & Educational Issues (*FHWA* January 2000)
This pamphlet outlines the speed management workshop for 2000. The conference addressed the following: engineering, enforcement, judicial, public, and policy issues.
Online: http://www.nhtsa.gov/people/injury/enforce/workshop%20report.pdf

p-937 Survey of Speed Zoning Practices (*ITE* 2001)
The objective of ITE Traffic Engineering Council Technical Committee TENC-97-12 was to identify and summarize the speed zoning practices used by agencies in the United States. The specific objectives of this committee were to determine speed zoning guidelines used, the types of adjustments made to speed zones, individual variations to the guidelines and the differences between the speed zoning guidelines and the differences between the speed zoning guidelines and speed zoning implementation. The committee focused on speed zoning practice at the city, county an state levels. Agencies from across the county were surveyed to obtain a geographical representation of the guidelines. Material fro this repot was obtained through informal requests and a survey of city, county and state transportation officials. (26 pages)

p-938 Speed Management Resources (*FHWA* 2000)
This folder contains several articles on speeding, speed management, and speed related fatal accidents. (13 pages)

p-939 Guidance for the Use of Dynamic Lane Merging Strategies (ATSSA November 2012)
This document shows how two merging strategies, known as early merging and late merging, can be used either individually or cooperatively to reduce delay and increase safety at highway lane closures. (22 pages) Online not available at this time.

p-940 Full Road Closure for Work Zone Operations: A Cross-Cutting Study (*FHWA* August 2003)
The report provides a summary of how departments of transportation in Oregon, Kentucky, Michigan, Ohio, Washington State,, and Delaware each used a full closure approach to

conduct a road rehabilitation/reconstruction project.For each project, information provided includes a project description, why the state decided to use full closure, the benefits experienced, and lessons learned. The report also contains a brief discussion of alternative strategies.
Online:http://ops.fhwa.dot.gov/wz/resources/publications/FullClosure/CrossCutting/its.htm

p-941 Work Zone Travel Time System Case Study (*ITS* October 2004)
Reducing Congestion with the Use of a traffic Management Contract Incentive During the Reconstruction of Arizona State Route 68. This is a case study in a series of documents that examines the use of Intelligent Transportation Systems (ITS) in work zones. This case study present information gathered through interviews with key personnel on the Arizona State Route (SR) 68 project in Kingman, Arizona, as well as information and photographs obtained during a site visit. (16 pages)

p-942 Real-Time Work Zone Traffic Control System (*ITS* October 2004)
Using an Automated Traffic Information System to Reduce congestion and Improve Safety During Reconstruction of the I-55 Lake Springfield Bridge in Illinois. This is a case study in a series of documents that examines the use of Intelligent Transportation Systems (ITS) in work zones. This case study present information gathered through interviews with key personnel on the Lake Springfield Bridge project on Interstate 55 south of Springfield, Illinois. (16 pages)

p-943 Dynamic Lane Merge System (*ITS* October 2004)
Reducing Aggressive Driving and Optimizing Throughput at Work Zone Merges in Michigan. This is a case study in a series of documents that examines the use of Intelligent Transportation Systems (ITS) in work zones. This case study present information gathered through interviews with key personnel involved with an Interstate 94 reconstruction project in Detroit, Michigan, as well as information and photos obtained during a site visit. (16 pages)

p-944 Full Road Closure for Work Zone Operations: A Case Study – Interstate 95 in Wilmington, Delaware (*FHWA* October 2004)
One of three case studies intended to provide transportation agency personnel and elected officials with a better understanding of the considerations necessary to implement full road closure on a project, and the benefits that can be obtained. Each case study describes the project specifications and why the State decided to use full closure, how the State planned for the full closure, operational strategies used during the full closure, benefits and impacts, and issues and lessons learned. (10 pages)
Online: http://ops.fhwa.dot.gov/wz/docs/Delaware_v3/index.htm

p-945 Full Road Closure for Work Zone Operations: A Case Study –I-84 Banfield Freeway in Portland, Oregon (*FHWA* December 2004)
One of three case studies intended to provide transportation agency personnel and elected officials with a better understanding of the considerations necessary to implement full road closure on a project, and the benefits that can be obtained. Each case study describes the project specifications and why the State decided to use full closure, how the State planned for the full closure, operational strategies used during the full closure, benefits and impacts, and issues and lessons learned. (10 pages)
Online: http://ops.fhwa.dot.gov/wz/docs/Portland_v3/index.htm

p-946 Full Road Closure for Work Zone Operations: A Case Study –M-10 Lodge Freeway in Detroit, Michigan (*FHWA* December 2004)
One of three case studies intended to provide transportation agency personnel and elected officials with a better understanding of the considerations necessary to implement full road closure on a project, and the benefits that can be obtained. Each case study describes the project specifications and why the State decided to use full closure, how the State planned for

the full closure, operational strategies used during the full closure, benefits and impacts, and issues and lessons learned. (10 pages)
Online: http://ops.fhwa.dot.gov/wz/docs/Detroit_v5/index.htm

p-947 Traffic signal Preemption for Emergency Vehicles, A Cross-cutting Study; Putting the "First" in "First Response" (*FHWA* January 2006)
The purpose of this study is to increase awareness among stakeholders—including police, fire, rescue and emergency medical services (EMS)—about the benefits and costs of emergency vehicle preemption. This study reports information gathered during a review of publications and site visits to three jurisdictions operating emergency vehicle preemption systems. (46 pages)
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/14097_files/14097.pdf

p-948A Traffic Detector handbook: Third Edition Volume I (*FHWA* October 2006)
The objective of this Handbook is to provide a comprehensive resource for selecting, designing, installing and maintaining traffic sensors for signalized intersections and freeways (Volume I). (288 pages)
Online: http://www.tfhrc.gov/its/pubs/06108/06108.pdf

p-948B Traffic Detector Handbook: Third Edition Volume II (*FHWA* October 2006)
The objective of this Handbook is to provide a comprehensive resource for selecting, designing, installing and maintaining traffic sensors for signalized intersections and freeways (Volume II). (394 pages)
Online: http://www.tfhrc.gov/its/pubs/06139/06139.pdf

p-950 Implementing the Rule on Work Zone Safety and Mobility (*FHWA* 9/2005)
This is one of four guides to assist transportation agencies understand and implement the provisions of the updates to the work zone regulations at 23 CFR 630 Subpart J (applies to all State and local governments that received Federal-aid highway funding). Transportation agencies are required to comply with the provisions of the Rule by October 12, 2007. This Guide is the main Rule Implementation Guide and provides a general overview of the Rule and overarching guidance for implementing the provisions of the Rule. This document includes guidelines and sample approaches, examples from transportation agencies using practices that relate to the Rule, and sources for more information. (92 pages)
Online: http://ops.fhwa.dot.gov/wz/rule_guide/index.htm

p-951 Work Zone Public Information and Outreach Strategies (*FHWA* 11/2005)
This Guide is intended to help transportation agencies plan and implement effective public information and outreach campaigns for work zones. It is the second of four guides intended to support implementation of the Work Zone Safety and Mobility Rule. (63 pages)
Online:
http://ops.fhwa.dot.gov/wz/info_and_outreach/public_outreach_guide.pdf

p-952 Developing and Implementing Transportation Management Plans for Work Zones (*FHWA* December 2005)
This guide is intended to serve as a technical resource to help transportation agencies design and implement effective transportation management plans(TMPs) for work zones. It is the third of four guides used to support implementation of the Work Zone Safety and Mobility Rule. (117 Pages)
Online:
http://ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf

p-953 Synthesis of Traveler Choice Research: Improving Modeling Accuracy for Better Transportation Decisionmaking (FHWA August 2013)
This report provides a synthesis of the state of knowledge in travel behavior research and identifies gaps in existing data, methods, and practices that must be filled to meet the analysis needs of an emerging class of supply- and demand-side interventions that seek to leverage the opportunities of real-time information. (55 pages)
Online:
http://www.fhwa.dot.gov/publications/research/operations/13022/13022.pdf

p-954 Objectives and Strategies for Improving Safety at Unsignalized and Signalized Intersections (*FHWA* September 2008)
Brochure identifying 77 intersection safety countermeasures described in NCHRP Report 500, volumes 5 and 12, with individual guide sheets sited in brochure. (Notebook style 78 pages)
Online: http://safety.fhwa.dot.gov/intersection/resources/intsafestratbro/inter_guide_key.pdf

p-955 Innovative Intersection Safety Improvement Strategies and Management Practices: A Domestic Scan (*FHWA* September 2006)
The purpose of this document is to serve as an information and technology transfer tool on intersection safety practices used by State, regional and local transportation officials for the benefit of motorists, pedestrians and bicyclists. (81 pages)
Online:
http://safety.fhwa.dot.gov/intersection/resources/fhwasa06016/fhwasa06016.pdf

p-956 Traffic Monitoring in Recreation Areas (FHWA August 2010)
Key findings from three primary tasks are briefly described below and are related to: national guidance for traffic monitoring in recreational areas, vehicle classification, recreational traffic monitoring as described in the literature, and recreation traffic monitoring as observed in practice. (38 pages)
http://www.wfl.fhwa.dot.gov/programs/td/publications/documents/tm-recreational-areas.pdf

p-957 Two Low-Cost Safety Concepts for Two-Way STOP-Controlled, Rural Intersections on High-Speed Two-Lane, Two-Way Roadways (FHWA September 2008)
This paper documents an evaluation of the operational and safety effectiveness of two conceptual strategies addressing rural intersection safety. (24 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/08063/08063.pdf

p-958 Low Cost Local Road Safety Solutions (ATSSA March 2006)
Seventeen low cost safety solutions are covered in this manual for local roadway safety problems. (40 pages)

p-960 Active Traffic Management: The Next Step in Congestion Management (*FHWA* July 2007)
The purpose of this scanning study was to examine the congestion management programs, policies, and experiences of other countries that are in the planning stages, have been implemented, or are operating on freeway facilities. (73 pages)
Online: http://international.fhwa.dot.gov/pubs/pl07012/atm_eu07.pdf

p-961 Commercial Motor Vehicle Size and Weight Enforcement in Europe (*FHWA* July 2007)
This scanning study evaluated procedures and technologies for enforcing commercial motor vehicle size and weight laws in Belgium, France, Germany, the Netherlands, Slovenia, and Switzerland. (100 pages)
Online: http://international.fhwa.dot.gov/pubs/pl07002/vsw_eu07.pdf

p-965 Toolbox of Countermeasures and Their Potential Effectiveness for Intersection

Crashes (*FHWA* September 2007)
This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to intersection crashes. (14 pages)
Online:
http://www.ite.org/safety/issuebriefs/Intersection%20Issue%20Brief.pdf

p-966 Alternate Strategies for Safety Improvement Investments (Part of NCHRP Project 17-18, Task 19, January 2010)
This report contains some practical and timely information on safety efforts and funding scenarios from nine states. Project 17-18 is intended to fund studies to aid in implementing the AASHTO Strategic Highway Safety Plan. The focus of the safety programs should be on severe crashes, because the factors that contribute to them are different than crashes as a whole. Because local systems account for as much as 90% of total road miles and 60% of fatal crashes, states need new partners in a more comprehensive approach to safety. (40 pages)

p-970 Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes (*FHWA* September 2007)
This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to roadway departure crashes and other non-intersection crashes. (14 pages)
Online:
http://www.ite.org/safety/issuebriefs/Roadway%20Departure%20Issue%20Brief.pdf

p-972 Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices (NHTSA 2008)
This guide is a basic reference in selecting effective, science-based traffic safety countermeasures. The guide describes major strategies and countermeasures that are relevant to state highway safety offices; summarizes their use, effectiveness, costs, and implementation time; and provides references to the most important research summaries and individual studies. The nine areas included are Alcohol-Impaired Driving; Seat Belts; Aggressive Driving and Speeding, Distracted and Fatigued Driving; Motorcycle Safety; Young Drivers; Older Drivers; Pedestrians; and Bicyclists. (289 pages)
Online:
http://www.ghsa.org/html/publications/pdf/countermeasures5_2010.pdf

p-975 Positive Guidance and Older Motorists- Guidelines for Maintenance Supervisors (*Southwest Region University Transportation Center 1997*)
This field manual designed for maintenance supervisors and resident engineers responsible for repair and replacement of traffic control devices on highway and streets. Standards and practices have not always take in account the realities for the performance to be expected from a growing minority in the United States, older motorists. After describing some aspects of older motorist performance in basic term, sections are presented on signing, signals, pavement markings, and other traffic control provisions. Suggestions are offered for improving the flow of information from the highway to the older motorist, which indirectly makes driving easier for everyone. (101 pages)

p-977 Temporary Traffic Control for Building and Maintaining Single and Multi-Lane Roundabouts (ATSSA Jan 2013)
This document provides considerations and typical applications to assist field staff in setting up temporary traffic control for both new construction and maintenance activities. (36 pages)
https://www.workzonesafety.org/files/documents/training/fhwa_wz_grant/roundabts.pdf

p-979 Guidelines on Rolling Roadblocks for Work Zone Applications (ATSSA July 2013)
http://www.workzonesafety.org/fhwa_wz_grant/atssa/atssa_rolling_roadblocks

p-978 Guidance for the use of Temporary Rumble Strips in Work Zones (ATSSA Sept 2013)
Objectives of this document include to provide information on the use of temporary rumble strip types and configurations for work zones and their benefits and limitations; to discuss when and how to implement temporary rumble strips in work zones; to present other key aspects to consider before and during implementation; and to provide a list of reference materials. (55 pages)
http://www.workzonesafety.org/files/documents/training/fhwa_wz_grant/atssa_temporary_rumble_strips.pdf

p-979 Guidelines on Rolling Roadblocks for Work Zone Applications (ATSSA July 2013)
This manual outlines what a rolling roadblock is, where they are used, and how to plan and coordinate a rolling roadblock, with a planning checklist. (19 pages)
http://www.workzonesafety.org/fhwa_wz_grant/atssa/atssa_rolling_roadblocks

p-980 Work Zone Safety Data Collection and Analysis Guide (ATSSA January 2013)
This guide is designed to assist highway agencies in developing techniques and strategies to successfully collect and analyze work zone safety-related data for the purpose of making work zones safer for motorists and workers. (54 pages)
Online:
https://s3.amazonaws.com/media.atssa.com/rsti/B12++Final+WZ+Safety+Data+Collection+and+Analysis+Guide.pdf

p-981 Nighttime Lighting Guidelines for Work Zones (ATSSA April 2013)
This document provides a procedure for designing a nighttime lighting system in work zones where no formal lighting plan exists. Engineers, designers, and contractor personnel can use this process without the need to be an expert in illumination. (20 pages)
Online:
https://s3.amazonaws.com/media.atssa.com/rsti/Nightime+Guideline+Doc+428232.pdf

p-982 Guidance on the Use of Automated Flagger Assistance Devices (ATSSA July 2012)

This document is not intended to act as a book of State and/or Federal standards; rather, it summarizes guidelines for when AFADs may be an appropriate option. It is important for anyone wishing to use an AFAD to refer to the MUTCD in addition to checking with their State and local agencies for the most current version of their governing authority's policy or standard specifications. (10 pages)
http://www.workzonesafety.org/files/documents/training/fhwa_wz_grant/atssa_afad.pdf

p-985 Pilot Car Escort Guidelines – 3 books (FHWA Oct 2004)

- •Training Manual (FHWA Oct 2004) FHWA-HOP-04-028 (120 pages)
- •Best Practices w/Power Point CD (FHWA Oct 2004) FHWA-HOP-04-026 (16 pages)
- •Law Enforcement (FHWA Oct 2004) FHWA-HOP-04-027 (12 pages)

The guidelines summarize the results of extensive research and analysis of existing formalized pilot car escort training materials. The analysis culminated in the identification of the noted "Best Practices" for pilot car escort assisted movement of permitted oversize/overweight loads. All three manuals and power point provide a comprehensive Pilot Car Escort Training Program.

Signs and Markings

p-1000 Durable Pavement Marking Materials Workshops (*FHWA* November 1981)
This publication summarizes presentations on the evaluation of six durable pavement marking material as reported at 1981 workshops. Each material is discussed separately regarding its characteristics, application technique(s), and performance. Their advantages, disadvantages, and ranges of cots are also reviewed. The information presented at these five workshops was based on field testing of the materials in several States.

p-1001 Signs & Markings Level I--Study Guide (parts 1-3) (*International Municipal Signal Association* June 1993)
The International Municipal Signal Association's foremost objective in developing and implementing certification programs for traffic operations personnel is to assist public agencies in assuring that the individuals responsible for handling, installing, repairing, and maintaining traffic control devices have the appropriate level of knowledge and experience in their particular are of specialization to carry out their responsibility to the public completely, correctly, and efficiently. This is the visual study guide containing review material, broken down into sections.

p-1002 Guidelines on the Use of Changeable Message Signs (*FHWA* July 1991)
The report is intended to provide guidance on 1) selection of the appropriate type of Changeable Message Sign (CMS) display, 2) the design and maintenance of CMSs to improve target values and motorist reception of messages, and 3) pitfalls to be avoided, and it updates information contained in the Manual. The guidelines and updated information are based on research results and on practices being employed by highway agencies in the US, Canada, and Western Europe. CMS technology developments since 1984 are emphasized. Since the use of matrix-type CMSs, particularly light-emitting technologies, has increased in recent years, matrix CMSs have received additional attention in this report. (250 pages)

p-1003 Road Delineation Practices Handbook (*FHWA* August 1994)
This publication was developed to assist design, traffic, and maintenance engineering personnel in making determinations about roadway delineation systems, including the appropriate system fro a given situation, when a system has reached the end of is useful life, and how to maintain a quality delineation system. It may also be valuable to consulting engineers, educators, and students. (250 pages)

Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/93001/93001.pdf

p-1005 Maintenance of Small Traffic Signs (*FHWA* April 1991)
This handbook is intended to help maintenance workers do a good job of maintaining small traffic signs. Maintaining small signs is important for driver safety. Three kinds of signs help direct traffic flow safely and efficiently. (38 pages)
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/90002/90002.pdf

p-1006 Maintenance of Signs and Sign Supports – A Guide for Local Highway and Street Maintenance Personnel (FHWA January 2010)
This guide, which is an update to the same titled guide published in 1990, is intended to help local agency maintenance workers ensure their agency's signs are maintained to meet the needs of the road user. The guide succinctly covers the following topics: a description of sign types, sign materials and sign supports; sign installation and the elements of a sign management system including inventory, inspection, preventive maintenance, repair and replacement, and recordkeeping. (58 pages)
Online:
http://safety.fhwa.dot.gov/local_rural/training/fhwasa09025/fhwasa09025.pdf

p-1007 Service Life of Retroreflective Traffic Signs (*FHWA* October 1991)
This report summarizes the results of a research study on the deterioration of retroreflective sheeting. This study is part of a comprehensive retroreflectivity research program undertaken by the Federal Highway Administration. The goals of this program are to establish minimum in-service retroreflectivity requirements for traffic signs and provide the management tools and measurement devices necessary to implement these requirements. (105 pages)

p-1008 Object Markers on Narrow Bridges on Low Volume Rural Roadways (*Kansas DOT* September 1998)
Based on the results of the literature review, the surveys of current practices and the field observations, several alternative signing strategies for low volume bridges were formulated. Must also consider safety of road use

p-1009A MUTCD (Manual on Uniform Traffic Control Devices) 1983

p-1009 B MUTCD (Manual on Uniform Traffic Control Devices) Part IV: Signals 1983
Part IV: Signals is a chapter out of the MUTCD 1983 1009A that is available in an individual copy. This signals section covers many different topics like the types of traffic signals, the purpose of them, basic controls, how to determine signal control need, operational requirements, traffic control signal equipment, implementation considerations, traffic signal timing, traffic signal control systems, and maintenance. (151 pages)

p-1010 MUTCD (Manual on Uniform Traffic Control Devices) 1986 Edition

p-1011 A MUTCD (Manual on Uniform Traffic Control Devices) 1988 Edition
The need for high uniform standards was recognized long ago. The necessity for unification of the standards applicable to the different classes of road and street systems was obvious. To meet this need a revised edition was published. (~1000 pages)

p-1011B MUTCD (Manual on Uniform Traffic Control Devices) 1988 Edition, Revision 3, September 1993
The criteria of this part are intended to apply to both rural and urban areas. Part VI displays several diagrams that depict common applications of standard temporary traffic control

devices. The traffic control selected for each situation should be based on type of highway, traffic conditions, durations of operation, physical constraints, and the nearness of the work space to traffic. This guide provides diagrams and information on how to properly set up and implement work zones. (195 pages)

p-1012 MUTCD (Manual on Uniform Traffic Control Devices) 2000 Edition
This manual is incorporated by reference in 23 Code of Federal Regulations and hall be recognized as the national standard for traffic control devices on all public roads open to public travel in accordance with 23 U.S.C. 109(d) and 402 (a). The policies and procedures of the Federal Highway Administration to obtain basic information of traffic control devise shall be described in 23 CFR 655, Subpart F. (~1000+ pages)

p-1013 MUTCD (Manual on Uniform Traffic Control Devices) 2003 Edition
This manual is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and shall be recognized as the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109 (d) and 402(a). There were eight previous editions of the MUTCD, starting back in 1927, and several of those editions were revised one or more times. FHWA 2003
Online: http://mutcd.fhwa.dot.gov/pdfs/2003r1/Ch1.pdf

p-1014 MUTCD (Manual on Uniform Traffic Control Devices) 2009 Edition
This manual is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and shall be recognized as the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109 (d) and 402(a). The Manual is comprised of nine parts and each part has one or more chapters. (816 pages)

p-1016 Read Your Road (*US DOT and FHWA* 1995)
This guide is packed with useful information. It focuses on some to the less well-known safety messages the road offers you. Subject such as: pavement marking, traffic signs, signals, sharing the road, navigating the road, dangers and hazards. (72 pages)
Online: http://safety.fhwa.dot.gov/ped_bike/docs/ryr.pdf

p-1017 Guidelines for Evaluating Fluorescent Strong Yellow Green Crossing Signs (*FHWA* June 1993)
This manual was prepared to assist Sates and local highway agencies in consulting filed studies to determine the effects of fluorescent strong yellow green crossing signs on motorist behavior at pedestrian, bicycle, and school crossing. These guidelines were developed to utilize existing personnel and equipment with a modest time expenditure. A before and after study with comparison site experimental design is recommended for the effectiveness evaluation. Filed data collection using tow observers and readily available inexpensive equipment is suggested. (31 pages)

p-1018 Retroreflective Sheeting Materials on Highway Signs (*Minn DOT* February 1996)
The purpose of this project was to compare legibility distances for street name signs based on four different types of sheeting material. Legibility distances were collected form 3 different sites, at night, and all subjects were older drivers. Analysis of the data revealed that the use of Diamond Grade and VIP Diamond Grade sheeting material resulted in similar legibility distances which were significantly greater than for High Intensity Grade which in turn were significant greater than for Engineering Grade sheeting material. Further data is explored within the report. (36 pages)

p-1019 Telespar Square Tube Sign Support Systems-includes 3.5" disk (*UNISTRUT* 1996)

Telespar square steel tubular posts were developed in the 1960s by Unistrut engineers. This folder covers issues surrounding Telespar Sign Support Systems such as: product literature, specifications, FHWA approval, competition, salt spray tests, and windload programs.

p-1020 Eval. Findings of All Stop Sign Products, Inc. Polycarbonate Stop Sign *(D) (Highway Innovative Technology* 1998)

THE objective of this evaluation report is to present the results of series of laboratory, field, and analytic evaluations of a plastic stop sigh for All Sign Products Inc. These evaluations were designed to test the product's retro reflectivity, color, and appearance under normal conditions, and the effects of weathering and graffiti. (10 pages)

p-1021 Impacts on State and Local Agencies for Maintaining Traffic Signs Within Minimum Retroreflectivity Guidelines (*FHWA* April 1998)

The report presents data on percentage of signs by the various types of retroreflective sheeting for both States and local agencies, a distribution of age of signs by type of sheeting, and the percentage of signs that would not meet the minimum retroreflectivity values. The report also presents a summary of the data and comments provided by the participating agencies related to the minimum retroflectivity values. Vase don additional sign inventory information provided by a small sample of State and local jurisdictions, an estimate of the number of signs by type per mile was determined. This data, with the data on sign replacement and replacement costs, were used to estimate the total cost for replacing signs on the Nation's highways to meet the proposed minimum retroreflectivity values. (44 pages)

p-1022 Minimum Retroreflectivity Levels for Blue and Brown Traffic Signs (*FHWA* April 2008)
This report contains information on the recommendations for the minimum maintained retroreflectivity levels for traffic signs with blue and brown backgrounds. This report also includes investigation on retroreflectivity levels for the brown and blue traffic signs with glare from headlights and fixed lighting upon them. (37 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/08029/08029.pdf

p-1023 Retroreflective Sheeting ID Guide (*FHWA* November 2001)
This laminated one-page double-sided guide lists a variety of retroreflective sheeting patterns listed as ASTM Type. Various web sites are listed for contacts. Developed by FHWA.

p-1024 FHWA Retroreflective Sheeting Identification Guide (*FHWA* September 2005)
One sheet explaining Rigid sign surfaces made with glass beads; prisms; non-signing applications, and flexible signs. There is also a contact list regarding retroreflective sheeting on the guide. (FHWA 9/2005) One sheet – two-sided information

p-1024A FHWA Retroreflective Sheeting Identification Guide (FHWA 2011)
This document is intended to help identify sign sheeting materials for rigid signs and their common specification designations. It is not a qualified product list. FHWA does not endorse or approve sign sheeting materials. Many other sheeting materials not listed here are available for delineation and construction/work zone uses
Online:
http://safety.fhwa.dot.gov/roadway_dept/night_visib/sign_visib/sheetguide/

p-1025 Summary of Evaluation Findings for 30-meter Handheld and mobile Pavement Marking Retroreflectometers (*HITEC* March 2001)
This report summarizes the results of detailed evolutions performed on the four handed and tow mobile pavement marking retroreflectometers that were evaluated in the program. The evaluations were designed to test the measurement bias, repeatability, and reproducibility of handheld and mobile retroreflectometers produced by several manufacturers. (60 pages)

p-1026 Preliminary Guidelines for Implementation of Minimum Retroreflectivity Requirements for Traffic Signs (*FHWA* June 1995)
Traffic signing is a critical component of any road because it is the medium by which the highway agency communicates with the users, providing information related to regulations, warnings, and directional guidance. Given the importance of retroreflectivity properties of a sign to meet motorists detection and legibility needs, the FHWA is considering issuing guidelines on a minimum level of retroreflectivity required for certain types of signs. (50 pages)

p-1027 Older Driver Highway Design Handbook: Recommendations and Guidelines (*FHWA* December 1998)
This report contains highway design information that will help accommodate the needs and capabilities of older road users. Specifically, it cantinas the recommendations sections of a larger report titled *Older Driver Highway Design Handbook.* These recommendations do not constitute a new standard of required practice. (35 pages)
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/older/intro/index.htm

p-1028 Safe Mobility for a Maturing Society: Challenges and Opportunities (*US DOT* November 2003)
This report provides a vision of safe transportation for the future. It has been based on a national dialogue concerning the transportation needs of an aging population. This report attempts to lay out strategies for evaluation that encompass a 10- to 15-year perspective. (54 pages)
Online: http://ostpxweb.dot.gov/policy/data/safemobility.pdf

p-1029 A Impact Assessment of Revised Retroflectivity Requirements for the State of Montana: Phase I- Final Report (*MSU- Dept of CE* February 1995)
This report focuses on the collection and analysis of a sample of traffic signs, delineated according to MDT District and sign type, on the State highway system. These samples were collected on the Montana highway system, focusing on non-Interstate, non-urban areas. (33 pages)

p-1029 B Impact Assessment of Revised Retroflectivity Requirements for the State of Montana: Phase II- Final Report (*MSU- Dept of CE* February 1997)
This report focuses on the collection and analysis of a sample of traffic signs, delineated according to MDT District and sign type, on the State highway system. These samples were collected on the Montana highway system, focusing on non-Interstate, non-urban areas. (37 pages)

p-1030 Maintenance of Signs and Sign Supports for Local Road and Streets – A Guide for Street and Highway Maintenance Personnel (*FHWA and US DOT* 2001)
This handbook is intended to help maintenance workers understand the importance of well maintained signs and provide information that will help them in accomplishing that task.
Online:
http://safety.fhwa.dot.gov/local_rural/training/fhwart0000/fhwart0000.pdf

p-1031 What is Driving the Signing Inventory Boom? (*Bryan Everard—Traffic and Parking Control* December 2002)
Article on the GASB#34 & the Sign Inventory & Inspection Software (SIIS) Version3.

p-1032 Safety Evaluation of Red-Light Cameras (*FHWA* April 2005)
The objective of this final study was to determine the effectiveness of red-light-camera (RLC) systems in reducing crashes. The analysis showed an aggregate crash cost benefit of RLC systems. A disaggregate analysis found that the greatest economic benefits are associated with the highest total entering average annual daily traffic, the largest ratios of right-angle to rear end crashes, and the with the presence of protected left turn phases. There were weak indications of a spillover effect that points to a need for a more definitive, perhaps prospective, study of this issue. (90 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/05048/05048.pdf

p-1033 Maintaining Traffic Sign Retroreflectivity: Impacts on State and Local Agencies (FHWA April 2007)
This report analyzes the impacts that might be expected from the adoption of proposed minimum maintained retroreflectivity levels for traffic signs to improve night visibility. The report evaluates the broad spectrum of concerns expressed by State and local agency staff at four workshops held during the summer of 2002. These include administrative, fiscal, implementation, and tort liability concerns. (38 pages)

p-1034 Sign Retroreflectivity Guidebook (FHWA Sept 2009)
This document was developed to assist small-sized agencies without traffic engineering staff in meeting the new Federal requirements for maintaining traffic sign retroreflectivity on roads open to public travel. By considering the needs and capabilities of small agencies, this document provides the necessary information needed to be in compliance with the new traffic sign retroreflectivity requirements. Two products were produced. One is a stand-alone computer-based package (known as the Traffic Sign Retroreflectivity Toolkit) and the second product is a hard copy of the computer-based package, without many of the features included in the CD.

p-1035 Sign Installation Guide (*USFS* July 2003)
This 18-page guide contains information needed to install traffic control signs on National Forest System Roads in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) and EM-7100-15, Sign and Poster Guidelines for the Forest Service. It provides a quick visual reference to field personnel placing and maintaining the most often used signs and markers. It does not include every type of sign or marker used, but should give contractors, cooperators, volunteers and Forest Service personnel a clear picture of how signs should be installed.
Online:
http://www.fs.fed.us/t-d/pubs/pdfpubs/pdf03712812/pdf03712812dpi72.pdf

p-1036 Evaluation of LS-DYNA Soil Material Model 147 (*FHWA* November 2004)
This report documents the evaluation of a soil material model that has been implemented into the dynamic finite element code, LSL-DYNA, beginning with version 970. (There is also another publication regarding the manual for LSY-DYNA. P-1037) This report will be of interest to research engineers associated with the evaluation and crashworthy performance of roadside safety structures, particularly those engineers responsible for the prediction of the crash response of such structures when using the finite element code LS-DYNA. Although extensive progress has been made on the soil material model, there is considerably more to be accomplished before the model would be effective in most roadside safety applications. (77 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/04094/04094.pdf

p-1037 Manual for LS-DYNA Soil Material Model 147 (*FHWA* November 2004)
This report documents a soil material model that has been implemented into the dynamic finite element code, LS-DYNA, beginning with version 970. This material model was developed specifically to predict the dynamic performance of the foundation soil in which roadside safety structures are mounted when undergoing a collision by a motor vehicle. This report will be of interest to research engineers associated with the evaluation and crashworthy performance of roadside safety structures, particularly those engineers responsible for the prediction of the crash response of such structures when using the finite element code LS-DYNA. (60 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/04095/04095.pdf

p-1038 Evaluation of LS-DYNA Wood Material Model 143 (*FHWA* August 2005)
This report documents the evaluation of a wood material model that has been implemented in the dynamic finite element code LS-DYNA, beginning with version 970. This material model was developed specifically to predict the dynamic performance of wood components used in roadside safety structures when undergoing a collision by a motor vehicle. 141 pages
Online:
http://www.fhwa.dot.gov/publications/research/safety/04096/04096.pdf

p-1039 Manual for LS-DYNA Wood Material Model 143 (*FHWA* August 2007)
An elastoplastic damage model with rate effects was developed for wood and was implemented into LS-DYNA, a commercially available finite element code. This manual documents the theory of the wood material model, describes the LS-DYNA input and out put formats, and provides example problems for use as a learning tool. (163 pages) Companion report is *Evaluation of LS-DYNA Wood Material Model 143 (August 2005)*– p-1038 in Montana LTAP's library.
Online:
http://www.fhwa.dot.gov/publications/research/safety/04097/04097.pdf

p-1040 Portable Changeable Message Sign Handbook (*FHWA* 2005)
This 5"x4" pocket handbook present basic guidelines for the use of portable changeable message signs. It illustrates the principles of proper PCMS use but notes that it is not intended to be a standard which can be found in the MUTCD at http://mutcd.fhwa.dot.gov/. If interested in looking at in on-line, go to www.tfhrc.gov/pavement/ltpp/reports/03066/index.htm (25 pages)
Online: http://www.tfhrc.gov/pavement/ltpp/reports/03066/

p-1045 Roadway Safety Hardware Asset Management Systems Case Studies (*FHWA* October 2005)
This report addresses asset management of roadway safety hardware in the United States. This study provides information to State DOT's on roadway safety hardware management systems that would help increase their use of state-of-the-practice techniques. 84 pages
Online:
http://www.fhwa.dot.gov/publications/research/safety/05073/05073.pdf

p-1050 Safer Sign Supports: Are Yours Breakaway Yet? (*FHWA* 2006)
This brochure covers the MUTCD Section 2A-19 regarding ground-mounted sign supports in the clear zone and the deadline of January 2013 for replacement. There is also addition resources listed for more information on this topic. (brochure)\
Online: http://www.t2.unh.edu/video_pub/safersigns.pdf

p-1060 Evaluation of Sign and Marking Alternatives for Displaced Left-Turn Lane Intersections (*FHWA* 2009)
This document describes research conducted by the FHWA to support guidance on the signing and marking of displaced left-turn lane intersections (DLT)- also known as continuous flow intersections (CFI) (16 pages)

Pedestrians

p-1200 The National Bicycling and Walking Study Final Report (*FHWA* 1994)
The current report draws upon all of the work completed to date in outlining a plan of action to promote bicycling and walking as viable transportation options for more Americans. The goals of doubling the current percentage of bicycling and walking trips and reducing by ten percent the number of pedestrians and bicyclists killed or injured are challenging, yet obtainable, and would reap significant transportation as well as other societal benefits. (132 pages)

p-1201 Pedestrian Facilities Users Guide: Providing Safety and Mobility
This users guide provides useful information on how to identify the safety and mobility needs of pedestrians within roadway rights-of-way
Online:
http://drusilla.hsrc.unc.edu/cms/downloads/PedFacility_UserGuide2002.pdf

p-1202 Accessible Sidewalks and Street Crossings – an informational guide (*FHWA* 2003)
The intent of this guide is to focus on some of the emerging accessibility issues and the design parameters that affect sidewalk and street crossing design and operation. A large poster-size hand-out is included with this 38-page book
Online: http://www.bikewalk.org/pdfs/sopada_fhwa.pdf

p-1203 Pedestrian and Bicyclist Intersection Safety Indices (*FHWA* April 2007)
The primary objective of this study was to develop safety indices to allow engineers, planners, and other practitioners to proactively prioritize intersection crosswalks and intersection approaches with respect to pedestrian and bicycle safety. (59 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/pedbike/06129/06129.pdf

p-1204 Pedestrian and Bicyclist Intersection Safety Indices – Final Report (*FHWA* November 2006)
The primary objective of this study was to develop safety indices to allow engineers, planners, and other practitioners to proactively prioritize intersection crosswalks and intersection approaches with respect to pedestrian and bicycle safety. Practitioners will be able to use these models on a small or large scale to determine where best to focus efforts to improve pedestrian and bicyclist safety. (96 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/pedbike/06125/06125.pdf

p-1205 Designing Sidewalks & Trails for Access (*FHWA* September 2001)
This guidebook was created to provide planners, designers, and transportation engineers with a better understanding of how sidewalks and trails should be developed to promote pedestrian access for all users including people with disabilities. (~600 pages)
Online: http://www.fhwa.dot.gov/environment/sidewalks/sidewalks.pdf

p-1206 Guide for the Planning, Design, and Operation of Pedestrian Facilities (*AASHTO* July 2004)
The purpose of this guide is to provide guidance on the planning, design, and operation of pedestrian facilities along streets and highways. It focuses on identifying effective measure for accommodating pedestrians on public rights-of way. (AASHTO 7/2004) 127 pages

p-1207 Guide to Promoting Bicycling on Federal Lands (*FHWA* September 2008)
Federal lands, including units of the National Park Service, National Forest, National Wildlife Refuges, and Bureau of Land Management are at a critical juncture. Increasing numbers of automobiles in some areas have led to many problems. This report provides guidance to Federal land managers on how to promote bicycling. This report presents benefits, successful programs, supporting policies, issues and challenges, and useful resources. (214 pages)
Online:http://drusilla.hsrc.unc.edu/cms/downloads/01_promoting_bicycling_entire_document.pdf

p-1209 4 Safety's Sake Teacher's Guide: A Guide to Help Teach and Promote School Zone Safety (*Utah DOT* 1992)
This teacher guide was established to help with teaching students about safe pedestrian practices, the dangers that can be avoided, the importance of car, and bus safety, and skateboard, rollerblade, and bicycle safety. (12 pages)

p-1210 Safe Routes to School Guidebook (*MDT* June 2007)
This guidebook discusses elements of successful Safe Routes To School programs and shows how Montana's SRTS Program can help you make a difference in the quality of life for children and in school neighborhoods. (115 pages)
Online:
http://www.mdt.mt.gov/pubinvolve/saferoutes/docs/safe_routes_guidebook.pdf

p-1211 Evergreen Schools, Safe Routes to School Study (*Robert Peccia & Associates* May 2007)
The development of this study, coupled with the recommendations to improve student safety, are the primary subject matter included within this report. It is the hope and desire of the MDT, and the author, tat this short yet succinct report will serve as a blueprint for improving student safety at the Evergreen Schools (Kalispell) over the coming years. (105 pages)

p-1212 Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations (*FHWA* September 2005)
The purpose of this study was to determine whether marked crosswalks at uncontrolled locations are safer than unmarked crosswalks under various traffic and roadway conditions. Another objective was to provide recommendations on how to provide safer crossings for pedestrians. (112 pages)
Online:
http://www.fhwa.dot.gov/publications/research/safety/04100/04100.pdf

p-1213 Getting to School Safety Community Action Kit

p-1214 School Crossing Protection Manual (State of Montana) (*MT Office of Public Instruction Division of Traffic Education* June 1994)
The state of Montana has recognized for some time that it is imperative that a firm and uniform policy on school child protection should be followed throughout the state. The through and comprehensive studies that have been made of school crossings in Montana, the factual studies made elsewhere in the United States, and the successful policies used in a variety of communities are the basis for the methods recommended in this manual. (18 pages) (formerly p-824)

p-1215 Moving Kids Safely-Strengthening Safe Communities (*US DOT* April 1997)

p-1300 Applying the Americans with Disabilities Act in Work Zones: A Practitioner Guide (FHWA Fall 2012)
This guide outlines how all pedestrians, including the disabled, should be provided with safe, accessible, and reasonably convenient paths that replicate as nearly as practical the most desirable characteristics of the existing pedestrian circulation facilities when temporary traffic control (TTC) zones are planned and set up.(35 pages, includes CD)
Online: https://s3.amazonaws.com/media.atssa.com/rsti/ADA.pdf

p-1400 Technological Innovations in Transportation for People with Disabilities Workshop Summary Report (FHWA September 2011)
The objectives of the February 2011 workshop were to identify areas of focus where research could lead to radical new approaches in personal mobility, and assess technological viability and capabilities.(36 pages)
Online: http://www.fhwa.dot.gov/advancedresearch/pubs/11041/11041.pdf

Guardrails and Barriers

p-2000 An Evaluation of Laboratory Test Results for the U.S. Gypsum Sight and Sound Screen System
Online:
http://www.book2down.com/An+Evaluation+of+Laboratory+Test+Results+for+the+U.S.+Gypsum+Sight+and+Sound+Screen+System-doc-1.html

p-2001 Use of Guardrail on Low-Volume Roads According to Safety and Cost Effectiveness (*Kansas DOT* May 1997)
The objective of this study was to develop guidelines for the use of guardrail on low-volume roads (LVR) in Kansas according to safety and cost effectiveness
Online: http://ntl.bts.gov/data/num/778822.pdf

p-2002 Summary Report on Selected Guardrails (*FHWA* June 1992)
This report summarizes the crash test results as well as the construction, maintenance, and accident experience observed for thee types of guardrails: the modified South Dakota 3-cable guardrail is similar to the stand G1 cable guardrail except the at lighter, less expensive 4-lbs per foot flange-channel past is used instead of the standard s3x5.7 post. The modified Minnesota 3-cable guardrail uses closer post spacing and wooden posts with a weaning hole. This hole helps minimize the chance of causing a small car to roll over. The modified thrie beam guardrail is a variation of the stander g9 thrie beam guardrail. The development of these systems is summarized and the basic design principals are explained. (39 pages)

p-2003 Summary Report on Selected Bridge Railings (*FHWA* June 1992)
This report summarizes the development, testing and field experience for three bridge railing designs: the F-shape concrete bridge railing, the vertical wall bridge railing and the Illinois 2399-1 steel tube bridge railing. Descriptions of these appurtenances and an explanation of the design principals is included along with estimates of the construction coast. (29 pages)

p-2004 Summary Report on Aesthetic Bridge Rail and Guardrails (*FHWA* June 1992)
Providing safe roadside barrier hardware on scenic roadways and parkways is as important as safety on more typical roads. Recently a number of guardrails and bridge railings have been developed for these types of scenic roads. This report summarizes the development, testing and field experience for three aesthetic bridge railings designs and three guardrail designs: the glue-laminated wood bridge railing, the Federal Lands Highways Modified Kansas corral bridge railing, the stone masonry bridge rail, the steel-backed timber guardrail, the stone masonry guardwall and the pre-cast simulated stone guardwall. This report describes the history of each barrier system and summarizes the crash tests. The features and components of each system are discussed and drawings are presented. (41 pages)

p-2005 W-Beam Guardrail Repair and Maintenance (*FHWA* 1990)
This small publication discusses the following : 1) guardrail safety 2) site review 3) estimating parts and materials for rail on wood and steel posts 4) equipment and tools 5) manpower 6) repair sequence guidelines 7) traffic control and tips and repairs. (34 pages)
Online: http://www.atssa.com/galleries/default-file/W-Beam_Guardrail_Repair-Booklet-6-16-09.pdf

p-2006 Crash Testing and Evaluation of Retrofit Bridge Railings and Transition (*FHWA* June 1997)
An assortment of retrofit bridge railings and retrofit transition were evaluated through full-scale crash testing. The assortment include: 1) A w-beam retrofit railing for a concrete baluster bridge railing 2) A w-beam transition for the bridge railing above 3) A double-tube

pedestrian/bicycle railing mounted on the Illinois 2399-1 traffic railing 4) A vandal protection fence on the New Jersey concrete safety shape bridge railing 5) A thrie beam retrofit railing, a Delaware design, mounted on a 203-mm-high safety curb. All of the designs demonstrated acceptable performance. (171 pages)

p-2010 Barrier Guide For Low Volume and Low Speed Roads (*FHWA* November 2005)
This guide is intended to provide assistance in the warranting, selection, and design of roadside barriers. The guidelines present practical and useful guidance for common conditions and situations encountered in the design of roadside barriers for Federal Lands Highway projects. (152 pages)
Online: http://www.t2.unh.edu/nltapa/Pubs/barrier_guide.pdf

p-2015 W-Beam Guardrail Repair - Revised (FHWA 2008)
This guide is an update of the original one published in 1990 by FHWA (p-2005). This guide provides highway and maintenance personnel with up-to-date information on how to repair damaged W-Beam guardrail. Three levels of damage are described and guidance is provided on the need and procedure for appropriate repairs. (54 pages)
Online: http://www.atssa.com/galleries/default-file/W-Beam_Guardrail_Repair-Booklet-6-16-09.pdf

Liability and Risk Management

p-2033 Risk Management Guidelines for Roadway Tort Liability- (*Montana LTAP* December 1995)
This workshop notebook is to acquaint roadway engineers, technicians, supervisors and public officials with the legal responsibilities of public service and to further present some guidelines for the protection of agencies and individuals in the area of tort claims.(178 pages)

p-2034 Tort Liability Workshop--Participant's Manual (*US DOT and FHWA* 1996)
This workshop is designed to review the basic concepts of tort liability and how it relates to local governments in the area of highways. The course traces their history of sovereign immunity and tort claims acts. Legal definitions are presented along with a review of the concept of risk management as it pertains to reducing tort exposure in the area of highway maintenance and operation. The report goes on defining high risk areas and procedures for litigating a tort liability lawsuit. (81 pages)

P-2035 Report to Congress - The Effect of Increased Speed Limits in the Post-NMSL Era (*FHWA* February 1998)
The NHS Act, among other things, established the National Highway System and eliminated the Federal mandate for the National Maximum Speed Limit. Section 347 of the NHS Act required the Secretary of Transportation to study the impact of states' actions to raise speed limit at about 55/65 MPH and report to Congress. Based upon the analyses conducted in this study on the first year of experience with higher speed limit, was it is estimated that Interstate fatalities in the states that increased speed limits, it is estimated that Interstate fatalities in the state's that increased speed limits experienced approximately 350 more fatalities than would have been expected. The details of the study are discussed. (~75 pages)

Mailboxes and Utility Poles

p-2047 NCHRP Report 350 Crash Testing and Evaluation of the S-Square Mailbox System (January 2010) Research/Test Report 0-5210-7
Texas DOT desired to evaluate an alternate mailbox support system for use in

Texas. The S-Square Tube Products mailbox system successfully passed all requirements of NCHRP Report 350 and is considered ready for field implementation in single, dual, and multiple mailbox configurations. (80 pages)
Online: http://tti.tamu.edu/documents/0-5210-7.pdf

p-2048 Safe Mailbox Installation and Support (*FHWA* June 1994)
This folder contains several documents on crash worthy mailbox supports. (~50 pages)

p-2049 Recipient Services (*USPS January 2011*)
This updated document; #508 Recipient Services procedures, provides the latest from USPS and discusses mail boxes under Section 3.0 – Customer Mail Receptacles. (40 pages)

p-2050 A Guide to Mailbox Safety in Montana (*USPS & MT DOT* 2004)
This publication discusses the many aspects of mailbox safety including: the law, the risk, the cost, the solution, the details, cautions, turnouts and multiple mailboxes, newspaper tubes, commercially available supports, and other aspects along with diagrams and designs.
(20 pages)
Online:
http://www.mdt.mt.gov/publications/docs/brochures/safety/mailbox_safety.pdf

p-2051 A Guide to Mailbox Safety in Montana (*FHWA & MT DOT* 1994)
This publication discusses the many aspects of mailbox safety including: the law, the risk, the cost, the solution, the details, cautions, turnouts and multiple mailboxes, newspaper tubes, commercially available supports, and other aspects along with diagrams and designs.
(9 pages)

p-2052 Breakaway Timber Utility Pole Installations in Kentucky (*FHWA* January 1991)
This report describes the instillation of ten breakaways timber utility poles in Lexington, Kentucky. Installations were made by Kentucky Utilities Company personnel and monitoring has been performed by Kentucky Transportation Center investigators. Retrofit hardware is described and locations of modified poles are detailed. Modified poles have not been struck by vehicles to date. Monitoring will continue until September 1991 at which time a final report will be issued. (20 pages)

p-2053 The Breakaway Timber Utility Pole: A Survivable Alternative: The Massachusetts Experience (*FHWA* March 1993)
This report provides information about the history, design, site locations, installation, and evaluation of the Massachusetts' breakaway timber utility pole instillations. Nineteen poles were installed at different locations around Boston, and evaluated for more than 2 years. (49 pages)

p-2054 Guide for Accommodating Utilities Within Right-of-Way for Counties and Small Cities in Kansas (*Kansas LTAP & Kansas University Transportation Center* March 2007)
This guide examines current issues and practices in Kansas and provides general recommendations that cities and counties can use to manage their right-of-way in the best interest of the traveling public, public agencies, and utilities. This guide benefits counties and cities that do not have regulations in place, or that need to update these regulations and procedures. (34 pages)
Online: http://www.kutc.ku.edu/pdffiles/ROWguide2007.pdf

Train Crossings

p-2101 Railroad Highway Grade Crossing Handbook (*FHWA* September 1986)
This handbook provides general information railroad – highway crossings, characteristics of the crossing environment and users, and the physical and operational improvements that can be made at railroad-highway grade crossings to enhance safety and operation of both highway and rail traffic over crossing intersections. The guidelines and alternative improvements presented in this handbook are primarily those that have proven to be effective and that are accepted nationwide. (261 pages)
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/86215/86215.pdf

ADMINISTRATION

Management

p-2201 Asset Management and Safety Peer Exchange (*FHWA October 2011*)
This report summarizes the proceedings of the Asset Management and Safety Peer Exchange hosted by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO). The peer exchange was held in Cheyenne, WY on August 2, 2011. The peer exchange addressed various aspects of asset management and safety – How can one improve safety performance through better asset management? What are effective ways to manage safety assets? How do agencies plan, prioritize, and budget safety asset needs? Managers from state DOTs and FHWA gathered to dialogue on best practices, challenges, and sharing of experiences. (53 pages)
Online: http://www.fhwa.dot.gov/asset/hif12005/hif12005.pdf

p-2202 Smart Moves: A Decision-Maker's Guide to the Int. Transportation Infrastructure (*US DOT and Public Technology Inc.*1996)
The purpose of this guide is to help you understand the concept of the ITI, its components, and how those components can be integrated to improve our mobility and enhance our communities for years to come. You will learn how traffic congestion affects the community, solutions, and financing options. (62 pages)

p-2203 Small Highway Department Management (*Kenneth C Griffin* September 1990)
This workbook covers seven highway department administrative responsibilities that are important for a well-run department. All highway departments perform each of these seven responsibilities to some extent. This workbook is especially designed for use by smaller highway departments with 10 to 25 employees. (96 pages)

p-2204 Safety Management Systems Reference Manual (Book 1) and Participation Workbook (Book 2) (NHI & FHWA January/ February 1995)
The objective of these manuals is to supplement materials being assembled and prepared for a training course on the development, implementation, and administration of a Highway Safety Management System (SMS). The reference manual should be used as a support to the participant workbook by administration. (224 pages)

p-2205 Basic Guide for GASB-34 – Phase III Local Governments (*US DOT* June 2003)
This handbook describes Government Accounting Standards Board's requirements under Statement 34 for state and local governments on infrastructure investments and accounting.

p-2207 NACE Action Guide Volume I-1: Organization (*NACE* 1992)
The purpose of this guide is to provide information and guidance on general organization and

management methods and practices that can be used in all counties, regardless of their size. Basic concepts of organization, the county engineer's position as a manager, and the office plan and facilities are discussed. (16 pages)

p-2208 NACE Action Guide Volume I-2: Personnel (*NACE* 1992)
The purpose of this guide is to provide information and guidance on general personnel. Basic concepts of recruitment, compensation, promotion, training, employee records, performance reviews, disciplinary action, separation, and labor unions are covered. (~50pages)

p-2209 NACE Action Guide Volume I-4: Financial Management (*NACE* 1992)
The purpose of this guide is to provide information and guidance on general financial management. Basic concepts of cost information, accounting systems, developing and managing a budget, and special purpose financial management are covered. (~50 pages)

p-2210 NACE Action Guide Volume I-5: Maintenance Management (*NACE* 1992)
The purpose of this guide is to provide information and guidance on general maintenance management. Basic concepts of developing work programs, budgeting, work scheduling, reporting and evaluation performance, implementing the system, computer applications, and variations in system concepts and procedures are all covered. (~50 pages)

p-2211 NACE Action Guide Volume I-6: Administration of Bridge Inspection (*NACE* 1992)

p-2212 NACE Action Guide Volume I-7: Tort Liability (*NACE* 1992)
The purpose of this book is to acquaint county engineers with tort liability. The book describes the trend of the lay today and tells readers how to minimize the risk of liability suits, how to reduce the dollar exposure that a government agency may face in liability claims against it, and how to rescue other costs associated with lawsuits, such as costs for investigation, research of records, preparation of legal defense, and time in the courtroom. (~50 pages)

p-2214 Needs Assessment for Small City and Rural Com. Pub. Works Departments *(D) (APWA* 1998)

-APWA's recently completed Needs Assessment identifies a clear consensus on those issues of primary concern to the nation's smaller public works departments. More than 50% of respondents identified storm sewers and road maintenance as the most challenging issues facing their departments. When asked what they perceived as barriers to the exchange of ideas, information, expertise, etc., the recurring themes were lack of funds and time. Lack of funds manifests itself in numerous ways. Time is a major issue in smaller public works departments. Many smaller communities sense that tier concerns do not receive the attention they deserve from state and federal authorities. The highlights of the survey and the Needs Assessment results are included. (7 pages)

p-2218 NACE Action Guide Volume III-1: Road Surface Management (*NACE* 1992)

This guide covers aspects of road surface management that are not covered elsewhere, such as, pavement designs, conditions assessment, maintenance and rehabilitation techniques, and quality assurance. (~50 pages)

p-2219 NACE Action Guide Volume III-4: Safety Improvements (*NACE* 1992)

This guide has been prepared to assist county agencies with highway responsibilities, including an engineer, assistant engineer, or read superintendent whose work with local roads is just beginning. It is intended to help identify various road hazards which may be present and to help develop safety improvements. Ways to evaluate the seriousness of hazards and develop priority lists are suggested. Standards of construction are indicated and some comments made on financing. (~50 pages)

p-2220 NACE Action Guide Volume III-5: Drainage (*NACE* 2000)

p-2221 NACE Action Guide Volume III-7: Subsurface Soils Exploration (*NACE* 1992)

p-2222 NACE Action Guide Volume III-8: Soil Erosion and Water Pollution Prevention (*NACE* 1992)

This document is designed to help prevent erosion and water pollution. It dedicates a chapter to the following topics: erosion, design for erosion prevention, erosion control during construction, permanent roadside stabilization, maintenance and erosion repair, winter salting and the roadside environment. (~60 pages)

p-2223 Federal-Aid Guidelines for Local Public Officials (*Idaho DOT* June 1993)

These guidelines describe the general process involved in applying for a federal-aid highway project to obtain feral reimbursement of eligible project costs and the process involved in administering the project. Although the scope of work on a project can be quite detailed and take a considerable amount of time to administer many local public agencies have found the federal-aid programs to be very worthwhile.

p-2227 APWA Red Book on Qualifications-Based Selection: Guidelines for Public Agencies (APWA August 2006)

While this book is oriented to specific needs of public agency officials, it also provides insight regarding how consultants approach selection and used by public agency clients. The emphasis is on local agencies, but much is also applicable to other types of public agencies. (37 pages)

p-2228 Right-of-Way Project Development Guide (*FHWA* September 1992)
This guide has been designed to provide information necessary to complete a typical Federal-aid highway right-of-way project. This guide has 5 objectives. 1) To improve program delivery of Federal-aid funds in the right-of-way acquisition phase of the Federal-aid highway program. 2) To examine existing FHWA project development procedures and explore and emphasize the flexibility available to acquiring agencies responsible for implementation. 3) To present those "best practices" of State and local agencies and others in the right-of-way field and through technology transfer, share such information with all acquiring agencies. 4) To provide a mechanism to share innovative concepts and idea concerning effective project development activities that have been developed by State or local agencies, FHWA, or others. 5) To discuss new policy areas and innovative techniques that can be used to enhance the acquisition, relocation, and property management programs. (~500 pages)
Online: http://www.fhwa.dot.gov/realestate/pdg.htm

p-2229 NACE Handbook on Training for Road Departments (*NACE* 1998)
The purpose of this training guide is to give you information you can use for training your foreman and crews. You may want to do the training yourself, or you may want to take advantage for the many government and community resources available for training. The choice will depend on your department's needs, and of course, your budget. This guide is meant to help you make that choice. (66 pages)

p-2230 NACE Trainer's Guide (*NACE* 1986)
This guide provides some tips to help you become an effective trainer. These tips cover: planning for training, preparing for training, and performing training. (19 pages)

p-2231 How to Run Seminars and Workshops (*Robert L. Jolles* 1993)
Covers all the bases of seminars and workshops, including research and preparation, questioning techniques, pacing, visual aids, interest holding, evaluation and support, feedback, and self-monitoring of effectiveness. Also includes real-life stories and scenarios. (239 pages)

p-2232 Managing for Excellence: The Guide to Developing High Performance in Contemporary Organizations(*David Bradford & Allan Cohen* 1984)
Managing for excellence is a new approach to managing people that enables you to raise performance from merely good to positively outstanding. This is not a soft management, but a tough, pragmatic way to get commitment, build high performance, and develop people for greater responsibility. (301 pages)

p-2233 How to Talk and Communicate at the Same Time (*NACE* 1986)
This guide offers tips on how to talk and communicate at the same time. Some of the tips apply to you as the manager in daily contact, while other apply to your crew members and can help them communicate with each other and with you. (31 pages)

p-2234 NACE Improving Traffic Maintenance (*NACE* 1986)
In a few words, plus some pictures, this guide gives you some basic information to pass onto your multipurpose crews doing traffic maintenance work. (30 pages)

p-2242 Building on the Past, Traveling to the Future - ISTEA Transportation Enhancement (*FHWA and National Trust for Historic Preservation* 1994)
The primary goal of this booklet is to provide a general understanding of the way the Transportation Enhancement provision within the Intermodal Surface Transportation Efficiency Act works at both Federal and State levels. This is both a how-to as well as an information booklet written with a special focus on the preservation community. It also attempts to answer such questions as, What are Transportation Enhancements? What is the application process for funding? What should I know or be aware of before apply for the funding? What should I expect as a project sponsor? To whom do I go for assistance? (80 pages)
Online: http://www.enhancements.org/misc/nthp.pdf

p-2243 A Guide to Metropolitan Transportation Planning Under ISTEA: How the Pieces Fit Together (*FHWA* 1995)
The FHWA and FTA have prepared this guide for transportation professionals, elected officials, and policy makers, as well as community and business interest, who want to understand and participate in the transportation planning and decision-making process. We have two o objectives is publishing this guide: first, to provide a framework for linking the various elements of ISTEA's transportation planning process together in a comprehensive manner; and second, to provide information, suggestions, and examples of ways to carry out the metropolitan planning process. (42 pages)
Online: http://ntl.bts.gov/DOCS/424MTP.html

p-2244 Risk-Based Transportation Asset Management: Evaluating Threats, Capitalizing on Opportunities (FHWA June 2012)
The Federal Highway administration (FHWA) Office of asset Management offers this report as the first of five that will explore what risk management is and how it can be applied to transportation asset management. the use of risk management among U.S. transportation agencies largely is limited to managing risk during construction. These five brief reports will describe how the benefits of risk management can be expanded to programs that manage existing highway assets. (36 pages)
Online:http://www.fhwa.dot.gov/asset/pubs/hif12035.pdf

p-2246 Ohio Transportation Technology Transfer: Shaping its Future (*Ohio State University* December 1996)
The purpose of the survey was to gather information relative to the programming and service needs for Center clients that would assist the Center to transfer technology of the greatest perceived benefit to local transportation agencies in formats, locations, and schedules that most closely matched client preferences. Information gathered form the survey further enabled the Center to compare client needs to current programs and to effectively ensure that program and services were responsive to the specific needs co clients. Built into the survey was that ability to record and analyze client awareness of the Center and its programs, thus assisting the Center in identifying those constituencies that may require further information and/or targeting of programs. (50 pages)

p-2247 Advanced Tools for Technology Transfer in Transportation (*Minn DOT* 1998)
This federally funded study aimed to identify and document advanced tools which have potential to be utilized for transportation technology transfer in Minnesota. The study concentrated on tools that had not yet been utilized for T2 in Minnesota, though were in use in other locations. (70 pages)

p-2248 A Guide for Local Agency Pavement Managers (*Washington DOT* 1994)
This guide is meant to serve as a tool to assist agencies in understanding how a pavement management system functions and how to implement one. The guide combines an explanation of the various PMS components and other supporting materials to help local agencies understand and implement a system that will work for them. (~250 pages)
Online: http://www.wsdot.gov/NR/rdonlyres/45F132CE-69AA-47B5-8BDE-3DD54D318E0E/0/GuideLAPavementManagers.pdf

p-2249 Local Agency Pavement Management Application Guide (*Washington DOT* January 1997)
This guide should serve as a tool to assist local agencies in utilizing a pavement management system to its fullest extent. It was developed to serve as companion guide to the previously published A Guide for Local Agency Pavement Managers, which provides and excellent framework for implementing a MPS. The guide focuses on how to maximize the benefits of a PMS once it has been implemented. (~250 pages)
Online: http://nwpma-online.org/resources/Pmag.pdf

p-2253 NACE Action Guide Volume I-3: Purchasing Authority (*NACE* 1995)
As a public official, a county engineer is obligated to accomplish engineering responsibilities at a high level of quality in an effective and efficient manner. This Action Guide provides an overview of purchasing and procurement procedures. (24 pages)

p-2254 NACE Action Guide Volume I-8: Public Awareness and Support (*NACE* 1995)
This document discusses the following aspects of public awareness and support: communicating with the public, building the program, community involvement, the news media, engineer—board relations, governmental relations, public hearings and meetings, and components of information outreach. (~40 pages)

p-2257 NACE Action Guide Volume II-5: Solid Waste Management (*NACE* 1995)
In many counties, solid waste management is the third largest local expenditure, ranking only behind schools and roads. Unfortunately, solutions to the problem are more complex than merely budget increases. This guide is intended to identify the basis behind and procedures for development and operation of a sold waste management program by county engineer and other official responsible for these activities. The guide is organized as a step-by-step process, including applicable legislative and regulatory provisions, planning a solid waste management program, financing and funding option, integrated solid waste management, special wastes, and collection and transportation. (30 pages)

p-2261 Directory of Information Resources for Improving Transportation Technology (*FHWA* 1997)
This pamphlet acts as a directory providing one with the contact information for multiple services as well as a brief description of the program and the services it provides. (20 pages)

p-2265 Guide to Seeking Transportation Enhancement Program Funds (*FHWA & National Park Services* 2001)
The purpose of this guide is to help Federal Agencies gain a basic understanding of the Transportation Enhancements (TE) program and how the funding process works. (9 pages)
Online: http://www.fws.gov/refuges/roads/pdfs/Draft_FWS_TE_guidance.pdf

p-2266 International Guide To Highway Transportation Information (FHWA March 2001)
This final report is a compilation of multi-volume set of Guides that provides highway transportation information resources for domestic and international professionals. The Guides are useful for the traffic engineer, transportation planner, and intelligent transportation systems specialist, as well as academics, applied researchers, administrative officials, and highway transportation information and library professionals. The Guides are also useful for civil engineers or other professionals in highway construction, operations, and materials, as well as highway safety and human factors engineers; psychologists; and social scientists. (270 pages)

p-2267 Transportation Quarterly: An Independent Journal for Better (*ENO Transportation Foundation, Inc.* Winter 1995)
The following articles were published in this issue: 1) Public-Private partnership in U.S. Highway Finance: ISTEA and Beyond 2) A Surface Transportation Agency: The Time Has Come, 3) U.S. Maritime: Can It Compete? 4) Transportation Management Associations: An Update, 5) ITS-A Revolution in the I-95 Corridor 5) The Trucking Industry in a New Transportation Era: A TQ Interview with ATQ's Thomas J. Donohue, 6) Secondary Boycotts—Airlines, Railroads 7) Measuring Transportation Performance 8) Are Drivers' Manuals Understandable? 9) Making Transit Irresistible: Lessons from Europe 10) Unregulated Taxicabs (152 pages)

p-2268 National Quality Initiative: Long Range Plan (FHWA June 1994)
"Is the quality of highways improving?" In order to address this issue and ensure that the quality of highways remains a focal point of all aspects of the highway program, a long-range plan that will provide direction, focus, and continuous emphasis on the NQI must be developed. The purpose of the NQI long-range plan is to identify actions to be taken by the various segments of the highway community that will accomplish the objectives of the "National Policy on the Quality of Highways." (36 pages)

p-2270 NACE Tips for Conserving the Environment and Energy (*NACE* 1994)
Included in this guide are some tips to help you and your multipurpose crews protect and improve our environment and conserve energy. Many of the tips come from fellow, employees in other public works departments. It should be noted, however, that some of these tips are a matter of policy and should be fully discussed with those responsible for operational policy decisions. (52 pages)

p-2275 Traveler Information Systems in Europe (*FHWA* August 2003)
US transportation agencies are developing traveler information products that are coupled with weather, location, event, and emergency information. The scan team visited 8 European cites that have stabled traveler information products and services that reflect all transportation modes. The timing for the tour also allowed the team to examine European practices that could be applied in implementing "511" telephone traveler information services in the US. The scan team evaluated findings in information content, customer needs, business/cost recovery models, technology application, consistency and standards, and legal and policy issues and made specific recommendation for application in the US. (100 pages)
Online: http://international.fhwa.dot.gov/travelinfo/

Career/Personal Development

p-2302 The 7 Habits of Highly Effective People (*Stephanie R. Covey* 1990)
The author of this work presents a holistic, integrated principle-centered approach for solving personal and professional problems. with penetrating insights and pointed anecdotes, Covey reveals a step-by-step pathway for living with fairness, integrity, honesty and human dignity—principles that give us the security to adapt to change, and with wisdom and power to take advantage of the opportunities that change creates. (358 pages)

p-2303 First Things First

p-2304 Managing Stress in the Workplace (*Oklahoma State University* December 1994)
This document covers the following issues: 1) What is stress? 2) What are the physical signs of stress? 3) Signs and symptoms of burnout 4) 5 stress coping strategies 5) Stress management training programs and 6) Legal aspects of stress. (27 pages)

p-2305 NACE How to Talk and Communicate at the Same Time (*NACE* 1986)
This guide offers tips on how to talk and communicate at the same time. Some of the tips apply to you as the manager in daily contact with a crew. Some tips apply to your crew members and can help them communicate with each other and with you. This manual can help state, city, township, as well as county public works departments better provide the public with the service it needs and pays for. (31 pages)

p-2306 Effective Communication Skills (for Highway and Public Works Officials) *(D) (Cornell Local Roads Program* 1993)
We prepared this workbook for a training course on effective communication primarily for highway officials to provide them some basic guidelines for getting along effectively with the public, the media, local governing boards, and each other. The workbook is organized into two main parts: basic skills and tools for effective communication, and how to use those tools to communicate successfully in specific situation. (52 pages)

p-2307 The Tiny Warrior: A Path to Personal Discovery and Achievement *(D.J. Eagle Bear Vanas* 2003)
Inside all of us, there is a tiny warrior—not the destructive image we've seen on TV and in movies but a positive force that goes to battle every day to get us through challenges in our careers, in our lives, and within ourselves. DJ Vanas (Andrews McMeel Publishing—2003)

p-2308 Improving Your Public Relations *(D) (Cornell Local Roads Program* 1993)
This workbook and the one-day training workshop are organized in two main parts: basic skills and tools for effective communication, and how to use those tools to communcatie successfully in specific situations. (50 pages)

p-2309 Effective Communication Skills (Nevada T2 Center and University of Nevada- Reno 1999)
This workbook and on-day training course on effective communication is designed to provide you some basic guidelines for getting along with the public, local governing bodies and each other. The first section is on developing skills of an effective communicator, and the second is on how these new techniques can be used. (27 pages)

p-2310 Enhancements to Effective Motivations of Highway Maintenance (*TRB* June 2003)
This project is basically a thorough review of the material produced by NCHRP 14-11 and of the panel comments to assist in developing an enhanced package for training for Effective Motivation of Highway Maintenance Personnel, while recognizing the very real institutional and financial constrains/issues. We developed a sharp, modern format, with graphics and icons and trigger videos. The course was revised with more discussion and less writing. (34 pages)

p-2320 European Practices in Transportation Workforce Development (*FHWA* June 2003)
The FHWA, AASHTO, and NCHRP sponsored a scanning tour of many European countries to investigate how those countries deal with transportation workforce development issues. The scanning team's recommendation for U.S. application included developing industry-wide programs to encourage transportation careers, design leadership roles in a changing industry and establishing a leadership development council, establish and program for collecting and disseminating best practices in workforce development, and formalizing relations with the educational institution that are key sources of transportation workers. (52 pages)
Online: http://international.fhwa.dot.gov/pubs/pl03007/pl03007.pdf

p-2321 Spirit on the Run by D. J. Vanas (2013)
This is a compelling story of a man coming to terms with a devastating loss. With an intense, emotionally honest voice, D.J. Vanas deftly weaves together suspense, family drama, and spiritual adventure for a truly captivating read – *Kirk Farber*. (197 pages)

Planning

p-2345 ITS/Operations Resource Guide 2002 (*FHWA* 2002)
This guide provides the many available ITS and Operations resources in over 300 documents, videos, websites, training courses, software tools, and points of contact related to innovative transportation operations strategies.

p-2346 ITS/Operations Resource Guide (*FHWA* 2002)
This is a comprehensive listing of over 400 documents, websites, training courses, software tools, and points of contact related to innovative transportation operations strategies such as intelligent transportation systems (ITS). (328 pages)

p-2347 ITS/Operations Resource Guide 2006 (*FHWA* 2006)
This Guide is a comprehensive listing of over 400 documents, videos, websites, training courses, software tools and points-of-contact related to innovative transportation operations strategies such as ITS. (362 pages)
Online: http://ntl.bts.gov/lib/jpodocs/rept_mis/14245_files/toc.htm

p-2348 ITS/Operations Resource Guide 2008 (*FHWA* 2008)
This Guide is a comprehensive listing of over 500 documents, videos, websites, training courses, software tools and points-of-contact related to innovative transportation operations strategies such as ITS. (455 Pages)
Online: http://www.resourceguide.its.dot.gov/default.asp

p-2349 Subsurface Utility Engineering (*FHWA* May 1993)
The purpose of this notebook is to provide basic information about SUE, including: SUE background, a SUE flyer, sample state request letter for interest, sample state request for proposals, suggested FHWA criteria for evaluating firms that provide SUE services, two sample state/consultant agreements, quality levels of service information, savings information, costs information, copies of published articles, information about SUE videotape, SUE slides, SUE provided.(~250 pages)

p-2350 NACE Action Guide Volume II-2: Road Programming (*NACE* 1992)
The aim of road programming is efficient road management, serving the public by providing adequate, safe, yet economical road travel. This guide describes the six steps in road programming; inventory, classification, measuring improvement needs, financial planning, priority analysis, and program assembly. (50 pages)

p-2351 Highway/Utility Guide (*Office of Technology Applications* June 1993)
For many years there ahs been a need to assemble, under one cover, state-of-the-knowledge guidance on the better practices being employed to address the full array of issues which can arise form highway and utility facilities sharing common right-of-way. The Highway/Utility Guide is such a document. It provides useful information relevant to join use issues, a historical perspective, and good current practices. Issues addressed in the Highway/Utility Guide include: planning and coordination, design, permits, information management and mapping, notification procedures, legal, safety, construction, maintenance, reimbursement, and others. (298 pages)

p-2352 Highway Capacity Manual Special Report 209 (*TRB* 1992)
This document is the third issue of the Highway Capacity Manual, originally published in 1950 by the then Bureau of Public Roads as a guide to the design and operational analysis of highway facilities. The procedures and methodologies of this manual have been developed from a wide range of empirical research conducted since the mid-1960's. Procedures reflect North American operating experience, and may not be representative of operation in other parts of the world. (~500 pages)

p-2353 Transit Planning and Research Programs (*FHWA* April 1993)
This Directory contains brief descriptions of Transit Planning and Research Projects initiated during Fiscal Year 1993 by the Federal Transit Administration, U.S. Department of Transportation. Its purpose is to inform the public, and especially the transit industry of the nature and scope of work underway to assist State and local agencies in improving services and reducing the cost of public transit. (85 pages)

p-2354 Transportation Action: A Local Input Model to Engage Community Transportation Planning (*FHWA* April 1996)
The Transportation Action Model seeks to marry technical information with a decision making process that assists rural communities in transportation planning. The process includes creating public dialogue, identifying transportation issues, and developing solutions. Successful completion of the program should provide a blueprint for local action. (~250 pages)

p-2355 NACE Action Guide Volume II-3: Impact of Land Development on County and Local Transportation System Planning (*NACE* 1995)
This guide is intended for use by county engineers and other local government officials responsible for local transportation planning in association with land use and development activities. In addition to emphasizing transportation planning activities, including traffic projection and safety configurations, transportation plans describe legislative and environmental concerns and procedures for mitigations of traffic conditions resulting from land development. (~30 pages)

p-2356 NACE Action Guide Volume II-4: Rural Transportation Planning (*NACE* 1995)
The objective of this publication is to provide and overview of rural transportation services and the planning, coordination, and implementation activities involved in providing these services. The county transportation processes is also described in detail. (28 pages)

p-2357 Redevelopment for Livable Communities (*Washington State Energy Office* 1995)
This report addresses the challenges that redevelopment poses for local government, citizens, and developers. For redevelopment to work on a significant scale in WA State, a new era of proactive planning will need to succeed the current contentious mode of development that often place citizens in a defensive posture. (85 pages)

p-2358 Travel Time Models for Forest Roads (*USFS* February 1996)
A method used by the USDA Forest Service for predicting the travel time of commodity haul vehicles on forest roads, referred to as BNG, is compared to with tow computer-based vehicle performance simulations, OTTO and TRUCK, and with observed travel times. Results show BNG is a relatively good predictor of travel time and that factors difficult to quantify including variation among drivers may preclude prediction with better results. (41 pages)

p-2359 The Mini Capital Improvements Plan for Small Towns (*Montana Department of Commerce* March 1996)
This handbook is deigned for small towns (under 10,000) that need to make water, sewer, and street repairs and improvements and County Water and Sewer Districts in rural areas that need to make water or sewer repairs and improvements. The purpose of this handbook is to set forth a step-by-step procedure which can be followed by small communities to develop a capital improvements plan for sewer and water facilities and streets. (200 pages)

p-2360 Planning Considerations for Roads, Highways and Bridges *(D)* (*US EPA* 1995)
This paper discusses the planning and construction for roads, highways, and bridges in accordance with the Coastal Zone Reauthorization Act to limit runoff and non-point source pollution. (4 pages)
Online: http://www.epa.gov/owow/NPS/education/planroad.html

p-2361 Community Impact Assessment: A Quick Reference for Transportation (*FHWA* September 1996)
The community impact assessment process alerts affected communities and residents, as well as transportation planners and decision makers, to the likely consequences of a project, and ensures tat h human values and concerns receive proper attention. This manual discusses these concerns along with the following: defining the project, developing a community profile, collecting data, analyzing community impacts, selecting analysis tools, identifying solutions, using public involvement, and document findings. (40 pages)
Online: http://www.dot.ca.gov/ser/vol4/envhb4.pdf

p-2362 Public Involvement Techniques for Transportation Decision-Making (*FHWA* September 1996)
For the transportation community, involving the public in planning and project development poses a major challenge. Often the public finds both metropolitan and statewide transportation improvement programs incomprehensible. This report gives agencies access to a wide variety of tools to involve the public in developing specific plans, programs, or projects through their public involvement processes. (225 pages)
Online: http://www.fhwa.dot.gov/REPORTS/PITTD/contents.htm

p-2363 Planning and Environmental Resources Catalog (*FHWA* September 1996)

p-2364 Communities on the Grow (*Alberta Economic and Development* Guide August 1993)
Councils often seek economic development because they need more tax revenues to pay for services demanded. A diversified take base can enhance a community by providing better services. This manual provides information on how to increase economic development and the advantages of economic development. (200 pages)

p-2365 A Training Guide for Rural Tourism Development (*Tourism Center University of Minnesota* 1991)
This packet extensively covers the following subjects: 1)training others 2)introduction 3)organization 4) local involvement 5)attractions development 6)community appearance 7)tourist services 8)public services 9)marketing 10)and funding. (~500 pages)
Online:
http://extension.usu.edu/files/publications/publication/pub__5885350.pdf

p-2365-B Community Tourism Assessment Handbook (Oregon State University: Western Rural Development Center 1994)

p-2366 Flexibility in Highway Design (*US DOT and FHWA* 1997)
This guide is about designing highways that incorporate community values and are safe, effective mechanisms for the movement of people and goods. This Guide encourages highway designers to expand their considerations in applying the Green Book criteria. It shows that having a process that is open, includes public involvement, and fosters creative thinking is an essential part of achieving good design. This Guide should be viewed as a useful tool to help highway designers, environmentalist, and public move further along the path to sensibly designed highways and streets. (193 pages)
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-PD-97-062.pdf

p-2367 Colorado Project Priority Programming Process (*Colorado DOT* August 1994)
The CO DOT has held annual hearings with delegations form each county choosing to participate, in order to formulate the general policy with respect to the management, construction, and maintenance of Colorado's public highways and to receive that county's priorities relative to project requests for the development of the Department's Five Year Plan. This process is outlined in the following pages. (13 pages)

p-2368 Smart Partnerships-A Shared Commitment to Improve Technology (*FHWA* 1997)
The ultimate benefit of the FHWA's partnering ventures is advancement toward better, safer roads at the lowest cost possible. Whether governmental, private-sector, or academic entities, all partners are driven by this underlying goal. The articles that follow describe collaborations that exemplify the FHWA's work toward providing a safe, efficient, environmentally sound highway system. (57 pages)
Online: http://ntl.bts.gov/lib/6000/6200/6242/smart.pdf

p-2369 Partnerships for Effective Technology Transfer (*TRB* 1997)
Three aspects of technology transfer (T^2) are covered in this volume. IN the first paper, the approach to T^2 at the Pennsylvania LTAP is presented, along with a new T^2 integration model that provides a framework for integrating strategic objectives among partners. The second paper discuses as system called, TEL8, it is used to facilitate information exchange and distance-learning activities among the participants. The final paper describes plans within the People's Republic of China to develop six T^2 centers to obtain information from the United States. Establishing these centers is expected to facilitate more technical cooperation between the two countries and increase the export of U.S. technology and road-building equipment to the growing Chinese market. (25 pages)

p-2370 FHWA Every Day Counts 2 – Alternative Contracting Methods – Summit Participant Workbook: PDSM – Project Delivery Selection Matrix (FHWA Fall 2012)
This Participant Workbook was available at the Fall EDC Portland Conference for the training session for Alternative Contracting Methods. Includes report prepared by University of Colorado construction Engineering Management Program, Boulder, CO, (50 pages)
Online: www.colorado.edu/ceae/TCM.

p-2371 Innovative Approaches to Transportation—A Guidebook (*USFS* December 2001)
This document outlines a strategy to better integrate transportation planning activities conducted by the States, local transportation officials, and the USDA Forest Service for federally funded projects that provide access to or within national forest land. (73 pages)
Online: http://www.fws.gov/refuges/roads/pdfs/FSGuidebook.pdf

p-2372 Improving Transit Equity; Streamlining Operations – Technologies that Benefit the Transportation Disadvantaged (*FHWA* 2006)
This brochure reviews how several Federal agencies came together in 2004 to create the United We Ride program. It also outlines a variety of technologies that can help address safety and security for both passengers and transit providers. (brochure)
Online: http://ntl.bts.gov/lib/jpodocs/brochure/14139_files/14139.pd

p-2373 Transportation Asset Management in Australia, Canada, England, and New Zealand (*FHWA* November 2005)
In this study, the US team observed that asset management as an organizational culture and decision-making process is critical to transportation programs facing significant capital renewal and preservation needs and that successful programs require top-level commitment. (This report is also available at international@fhwa.dot.gov or www.international.fhwa.dot.gov) pages
Online: http://international.fhwa.dot.gov/assetmanagement/2005tam.pdf

p-2374 Transportation Planning and Asset Management (*FHWA* 2006)
This brochure outlines TAM, getting started, how to apply transportation asset management and benefits. (brochure)
Online: http://www.fhwa.dot.gov/infrastructure/asstmgmt/tpamb.cfm

p-2375 Highway Improvements and Rural Growth: An Annotated Bibliography (*US DOT and FHWA* January 2001)
The historical variation in research studies on rural growth and highway improvement over the last 40 years in both topical and methodological. One of the key difficulties in conceptualizing the relationship between rural growth and transportation improvement has been the complexity of rural growth. Population growth is part of rural growth, but since population growth depends directly on economic growth, these concepts have been intertwined since the 1950s. Similarly, economic and population growth affect land use changes. Thus, we conducted a very broad search of the literature to characterize the very multidimensional concept of rural growth and its relationship to the highway transportation system. In the report, we review the most significant of these studies and describe their findings. (110 pages)

p-2376 Contract Administration: Technology and Practice in Europe (*FHWA* October 2002)
This report combines definitions and illustrative case study examples of contracting techniques in Europe with critical analysis of the applicability of these techniques to U.S. contracting.
Online: http://ttap.colostate.edu/Library/FHWA/FHWA-PL-03-002.pdf

p-2377 Better Public Transportation Options for Everyone: Technologies to Improve Accessibility and Service of Public Transportation (*FHWA* 2006)
This brochure highlights the benefits of ITS technologies to transit passengers and shows that technologies that benefit human services transportation improve operations for all passengers. (brochure) Online: http://ntl.bts.gov/lib/jpodocs/brochure/14138_files/14138.pdf

p-2378 Profitability and Mobility in Rural America (*Pennsylvania State University Press* 1989)
-This book looks at both the critical problems faced by rural regions and the successful approaches that have been used to help state and local government, as well as rural enterprises, deal with those problems. 246 pages

p-2379 Journal of Public Transportation (*Center for Urban Transportation Research* 2001)
In this article, analyses are carried out at two resolutions to address this question. Aggregate data from the San Francisco Bay Area revel compact, mixed-use settings with minimal obstructions are conducive to walk-and-ride rail patronage. A disaggregate-level analysis of access trips to Washington Metro rail services by residents of Montgomery Country, Maryland, shows that urban design, and particularly sidewalk provisions and street dimensions, significantly influence where someone reaches a rail stop by foot or not. Elastics are presented that summarize findings. The article concludes that conversion of park-and-ride lots to transit-oriented developments holds considerable promise for promoting walk-and-ride transit usage in years to come. (96 pages)

p-2380 Movements in Land-Use Regulations (*Arizona DOT* June 2001)
-Overall, more open space, the continued need to travel between the nodes for networking, the need to move goods due to the globalization of retail and manufacturing, and the declining costs of transportation that is implied but technological advances, will all work to increase the number of mile s traveled. Thus, just as communities are now searching for ways to ensure that the benefactors of new development cover the cots of providing transportation services. (35 pages)
Online:
http://www.azdot.gov/TPD/ATRC/publications/research_notes/PDF/507(2)RN.pdf

p-2381 Arizona Local Gov. Safety Project Analysis Model (*Arizona DOT* June 2001)
This report is divided into three primary sections. The first, Safety Project Evaluation provides background information on the safety project evaluation process. The second section contains a discussion of the Arizona Local Government Safety Project Model developed to facilitate site identification and safety project selection by local jurisdiction and planning organizations. A sample study is provided in the third section of the report. The case study includes background information on the numerous jurisdictions in the region, historical summaries of motor vehicle travel and crash data. (136 pages)
Online:
http://www.azdot.gov/TPD/ATRC/publications/research_notes/PDF/504RN.pdf

p-2382 GIS Data Conversion Handbook (*Minn Extension Program* 1993)
A very useful definition of GIS that we will adopt in this publication is: a GIS is a computerized, integrated system used to compile, sort, manipulate and output mapped station data. Later in this publication this definition will be discussed in detail. The intended audience for this publication includes GIS novices as well as those who are interested in getting stared with GIS. By exploring this systems based definition and expanding on it, you will be given a succinct, yet comprehensive view of this technology. (100 pages)

p-2383 Simplified Guide to the Incident Command System for Transportation Professionals (*FHWA* February 2006)
The purpose of this Guide is to introduce ICS to stakeholders who may be called upon to provide specific expertise, assistance, or material during highway incidents but who may be largely unfamiliar with ICS organization and operations. These stakeholders include professionals at transportation agencies, companies involved in towing and recovery, as well as elected officials and government agency managers at all levels.
Online: http://www.ops.fhwa.dot.gov/publications/ics_guide/ics_guide.pdf

p-2384 ITS Applications for Coordinating and Improving Human Services Transportation: A Cross-Cutting Study: Improving Service for the Transportation Disadvantaged (*FHWA* August 2006)
This report highlights technologies that improve accessibility for the transportation disadvantaged. A special emphasis is placed on those technologies that improve coordination of agencies, services, functions, or modes because coordination can result in greater efficiency and service delivery improvements. (74 pages)
Online:
http://www.cta.ornl.gov/cta/Publications/Reports/ITS_Applications_for_Disadvantaged-Cross_Cutting_Study.pdf

p-2385 CVISN Electronic Credentialing for Commercial Vehicles in Washington State: Easier Licensing and Credentials Processing for the Motor Carrier Industry (*FHWA* September 2004)
The Federal Motor Carrier Safety Administration's (FMCSA) Commercial Vehicle Information Systems and Networks (CVISN) program brings together information systems from a variety of public and private stakeholders to support commercial vehicle operations. This case study describes benefits, successful practices and lessons learned in operations and management from the point of view of early adopting states. The benefits these states have experienced are impressive. (34 Pages)
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13980_files/washington.pdf

p-2386 CVISN Safety Information Exchange for Commercial Vehicles in Connecticut, A Case Study: Increasing Inspection Efficiency Through Wireless Data Access at the Roadside (*FHWA* September 2004)
The Federal Motor Carrier Safety Administration's (FMCSA) Commercial Vehicle Information Systems and Networks (CVISN) program brings together information systems from a variety of public and private stakeholders to support commercial vehicle operations. This case study describes benefits, successful practices and lessons learned in operations and management from the point of view of early adopting states. The benefits these states have experienced are impressive. (34 Pages)
Online: http://cvisn.fmcsa.dot.gov/WhatsNew/Connecticut/Connecticut.htm

p-2390 Optimal Procedures for Quality Assurance Specifications (*FHWA* April 2003)

This manual is comprehensive guide that a highway agency can use when developing new, or modifying existing, acceptance plans and quality assurance specifications. It provides necessary instruction and illustrative examples to lead the agency through the entire process of acceptance plan development. (347 pages)

Online: http://www.tfhrc.gov/pavement/pccp/pubs/02095/02095.pdf

p-2391 Optimal Procedures for Quality Assurance Specifications (*FHWA* October 2004)

This report is a companion to p-2390, *Optimal Procedures for Quality Assurance Specifications*, which provided guidance to highway agencies. It summarizes the research work that was performed and contains the analyses to explain and justify the provided guidance. This report will be of interest to those materials, construction, specifications, and research engineers who wish to gain a better understanding of any specific procedures recommended in the manual.

Online: http://www.fhwa.dot.gov/pavement/pccp/pubs/04046/04046.pdf

p-2395 Audit Stewardship and Oversight of Large and Innovatively Funded Projects in Europe (*FHWA* March 2007)

The scan team observed that the terms of public-private partnership contracts have evolved as the European countries have gained experience in their use, and business models and evaluations have become an integral part of project selection and monitoring. (56 pages)

Online: http://international.fhwa.dot.gov/pubs/pl07001/pl07001.pdf

p-2396 Transportation Invest in Our Future: Revenue Sources to Fund Transportation Needs (*AASHTO* April 2007)

This report addresses questions which frame the background for the revenue options to be considered, and a needs assessment summary; revenue crisis Congress will have to address in 2009; short-term federal revenue options for the Highway Trust fund; short-term federal revenue options outside the Highway Trust fund; state and local government revenue options; and long-term federal revenue options. (52 pages)

Online: http://www.transportation1.org/tif4report/TIF4-1.pdf

p-2397 Transportation Invest in Our Futures: Surface Transportation Policy Recommendations (*AASHTO* March 2007)

This report reviews AASHTO's surface transportation policy recommendations, highway improvements needed, transit improvements needed, addresses rail needs, transportation safety needs, transportation revenue needs, and recommendations for the federal program. (95 pages)

Online: http://downloads.transportation.org/tif2-1.pdf

p-2398 At the Crossroads, Preserving Our Highway Investment (*National Center for pavement Preservation* 2007)

This document was written to stimulate serious discussion about the nation's highways, including their role, extent, how they are financed, constructed, maintained, and to explore more effective and efficient ways of achieving our transportation objectives. This document should be of greatest interest to policy and decision makers such as elected officials, agency administrators, and senior technical personnel such as engineers and planners who have broad responsibility for making program and project-level decisions. (65 pages)

p-2399 Scenic Byways Advisory Committee Report (*FHWA* 1993)
The National Scenic Byways Advisory Committee was given the duty to "develop and make to the Secretary recommendations regarding minimum criteria for use by State and Federal agencies in designating highways as scenic byways and as All-American Roads for purposes of a national scenic byways program to be established under title 23, US Code." This document presents their recommendations. (34 pages)

Drug and Alcohol

p-2400 Drug Abuse and Alcohol Misuse Training for CDL Drivers (*CTTS/Safety Products Inc*. 1996)
This work covers the following issues related to drug and alcohol use and abuse: history, who must comply under FMCSR 49 CFR, regulations, prohibitions, facts about the drugs covered in the act, over the counter and prescription drugs, drug testing procedures, alcohol, alcohol testing procedures, types of tests, refusal to submit, penalties, referral, evaluation, and treatment. (41 pages)

p-2401 Alcohol and Drug Testing Rules for Transportation Employees (*Channing L. Bete* 1994)
This pamphlet provides information on The Omnibus Transportation Employee Testing Ac. IT reviews the laws about usage, employee responsibilities, employee testing rights, consequences, and symptoms of possible drug use and/or abuse. (15 pages)

TRIBAL

p-2420 Indian Reservation Road (IRR) Cost to Improve *(D) (US DOT and FHWA* 1994)
This is a compliment of all information to be used to calculating the distribution of the IRR Funding Allocations for FY 94. (15 pages)

p-2421 Indian Reservation Road (IRR) System Mileages *(D) (US DOT and FHWA)*
This is a compliment of all information regarding road system mileages. (25 pages)

p-2422 Indian Reservation Road (IRR) Formula Mileages *(D) (US DOT and FHWA)*
This is a compliment of all information regarding road system formula mileages. (25 pages)

p-2423 Directory of Grant Support and Technical Assistance for Native American Initiatives (*Center of Economic Development Research and Assistance at New Mexico State University* 1995)
This directory outlines applicant requirements, available assistance, and contact information for grant and technical assistance for Native American Initiatives. This information is provided for the following areas: conservation, cultural activity and the arts, economic development, education, health care, human resources, infrastructure development, research development, and federal area and regional addresses. (528 pages)

p-2424 BIA Road Inventory Update with PMS Applications (*BIA* 1996)
THE BIA Public Road System, which is within IIR system, contains approximately 25,000 miles of roads of which it is estimated 6,000 miles are paved. The road system is spread out among 32 states and located mainly on Indian reservations IT is the desire of the BIA to identify the BIA IRRR inventory perform a complete inventory of the BIA Public Road System and perform a cursory inventory of all other roads on the BIA IRR inventory.(~300 pages)

p-2425 Telecommunications Technology and Native Americans (*Office of Technical Assistance, Congress of the United States* August 1995)

Telecommunications technology offers many opportunities to help Native Americans deepen their cultural roots, empower their communities, strengthen Native governments, and address daunting challenges such as very high unemployment and poverty rates and poor health conditions. Indeed, if Native Americans, collectively, do not gain better understanding and control of this technology, the result could be to further undermine Native culture, communities, sovereignty, and self-determination. This report references many types of technology their relationship to Native American Culture, community-building, policy, and policy framework. (163 pages)

p-2426 Assessing Transportation Needs on Indian Reservations (*Mountain-Plains Consortium* August 1993)

The Center for Urban and Regional Affairs was asked to submit a proposal to conduct a pilot survey on one reservation in Minnesota and develop an assessment of transportation needs. This document covers the findings and presents 5 major recommendations, which will require that the provision of improved transportation for the residents of rural reservations becomes a clearly stated high priority by tribal, local, and state government. The potential is great for major steps forward in the provision of improved transportation on these reservations. (40 pages)

p-2427 Transportation Guide for Indian Tribal Governments (Washington DOT April 1995)

This guide is meant to serve as a tool to assist agencies and Indian tribal governments in understanding transportation related funding, planning, rules and regulations, and processes. This guide is especially oriented towards issues and concerns of Indian tribal governments as related to transportation. (~100 pages)

p-2428 20% Planning Funding Proposal (*FHWA and US DOT* 1993)

The statement of work described herein is based on the experiences of TAI in performing transportation services for Indian Tribes. The variety of work involved entails the need for several professional disciplinarians working together toward a common goal. TAI's staff provides for the integration of physical development with economic and social development. Out approach in developing a plan of this nature is to derive priorities and needs from the local level on up. A complete and responsible job is required to ensure not only that the Jicarilla Apache Tribe receives all of the available funding each year from federal, state, and local programs, but also to prepares a plan to utilize, wherever possible, leverage and match those dollars with other programs for the maximum benefit of the tribal member s and tribal government. (~500 pages)

p-2429 Partnering for Indian Employment in Highway Construction (*FHWA and US DOT* 1997)

This course includes material which will help increase the employment and retention of American Indianans in the highway construction workforce. A variety of instruction techniques is employed, including lecturettes, group discussion, team consensus, and visual aids. Emphasis will be placed on the creation of an "Action Plan" for the host State to increase the employment of American Indians in highway construction. (~200 pages)

p-2430 Indian Task Force Report: Guidance on Relations with Am. Indian Tribal Governments *(D) (FHWA* February 1998)
The Presidents' Executive Memorandum of April 29, 1994, recognizes the unique legal relationship between the Federal government and Indian tribal governments. The intent of this FHWA guidance is to better assist the agency in carrying out its Federal Lands and Federal-aid day-to-day operations relative to highway program administration involving Indian tribal governments. It is FHWA's intent that this guidance, coupled with internal operating procedures will further tribal participation in the Federal Lands and Federal-aid Highway programs. (10 pages)

p-2431 Guidelines for Evaluating and Documenting Traditional Properties (US Department of the Interior National Park Service Interagency Resources Division 1994)
This bulletin is intended to be an aid in determining whether properties thought or alleged to have traditional cultural significance are eligible for inclusion in the National Register. It is also responsive to the American Indian Religious Freedom Act of 1978, which requires the National Park Service, like other federal agencies, to evaluate its policies and procedures with the aim of protecting the religious freedoms of Native Americans. (20 pages)
Online: http://www.nps.gov/history/nr/publications/bulletins/pdfs/nrb38.pdf

p-2432 Survey on the Status of Sovereign Immunity in the States—1992 (*Administrative Subcommittee on Legal Affairs* 1993)
Forty-two of the 52 AASHTO member departments responded to at least one of the survey questions. The survey sought information in the areas of sovereign immunity, claims procedures, claims statistics, attorneys, alleged roadways deficiencies, employee liability, legislation, contractor identification, insurance, training and risk management. The findings of the survey are presented. (131 pages)

p-2433 Transportation Planning Manual for Small Local and Tribal Governments (*Montana LTAP* 1996)
Transportation planning is the procedure for determining, as accurately as possible, current and future transportation needs and the most practical ways to satisfy these needs. Transportation planning may be one of the most complex endeavors in which a community can become involved. The primary objectives of transportation planning are to determine the needs for both new and existing transportation facilities and lay the groundwork for scheduling transportation improvements. This document covers the different aspects of transportation planning. (~75 pages)

p-2435 Extracts from Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Relating to Indian Tribes and Lands (*ISTEA* 1991)

p-2436 Indian Tribes Performing IRR Work Under the Indian Self-Determination Act, P.L. 93-638, as Amended *(D) (US DOT and FHWA* 1993)
This 3 pages outlines just briefly discusses general comments, functions, and provisions under the Indian Self-Determination Act.

p-2438 Statement of Work "Draft" Road Inventory Update *(D) (US DOT and FHWA)*
The Bureau of Indian Affairs Public Road System contains approximately 25,000 miles of roads. This road system is spread out among 32 states and located mainly on Indian Reservations. It is the desire of the BIA to do a complete inventory of the BIA Public Road System and determine many of the physical features as well as condition and a cursory inventory of all other roads on the Indian Reservation Road System. (12 pages)

p-2439 FHWA/USDA 2nd Exploratory Conference on Transportation Issues Affecting Tourism and Recreational Travel *(D) (FHWA & USDA* 1994)
This packet includes the minutes to the FHWA/USDA 2nd Exploratory Conference on Transportation Issues Affecting Tourism and Recreational Travel. The packet also includes several attachments: updated participant list, OuR-TOWN: A Community-based Tourism Development Pilot Program, a Tourism Power-Point Presentation, Four Corners Heritage Council Fact Sheet (March 1994), Delta Heritage Tourism Project: Southern Louisiana Loop, and The Tourism Connection (Jan and Feb 1994). (50 pages)

p-2441 Community Tourism Assessment Handbook ($10 each) (Western Rural Development Center April 1994)
The purpose of this manual is to guide communities through a process that not only helps them determine their actual tourism potential, and but also requires them to estimate the costs as well as benefits of tourism development before deciding it is a strategy worth pursuing. (~200 pages)
Online:
http://extension.usu.edu/files/publications/publication/pub__5885350.pdf

p-2442 Traffic Collision Workbook for Tribal Roadways-Crow Reservation (*Montana TTAP- Crow Reservation* 1999)
The purpose of this training program is to provide a practical procedure that can be used to identify, analyze, and correct safety deficiencies on relatively low volume roadways. The specific objectives are to provide a concise and practical procedure for the following: 1) Identifying where and when highway safety studies are needed 2) selecting appropriate highway safety studies 3)conducting the safety studies 4) analyzing results of the safety studies 5) determining probably safety deficiencies 6) developing potential safety and operational improvements and 7) selecting appropriate improvement. (~350 pages)

p-2443 Traffic Collision Workbook for Tribal Roadways (*Montana TTAP- Northern Cheyenne Reservation* 1999)
This training program is intended for those individuals that have been given the traffic engineering responsibilities for rural and small urban areas. The purpose of this training program is to provide a practical procedure that can be used to identify, analyze, and correct safety deficiencies on relatively low volume roadways. (~300 pages)

p-2444 Customer Driven Service – Learner's Guide (RTAP – June 2011)
This guide focuses on teaching transit staff that interact with customers the importance of customer service, as well as providing them with the tools and training they need to provide excellent customer service regardless of the situation or who the customer may be. This learner's guide offers fast facts, best practices, exercises, quizzes and other guidelines to help drivers, dispatchers and other transit staff cultivate the best attitude for truly excellent customer service. (26 pages plus CD)
Online:
http://www.nationalrtap.org/FeatureDetails.aspx?id=438&org=a2GSpnDbruI

p-2445 TCRP Project H-38: Developing, Enhancing, and Sustaining Tribal Transit Services: Native Americans on the Move – Challenges and Successes (*TRB Dec 2011*)
This booklet provides an overview of the state of tribal transit programs throughout the country based on preliminary observations from the research effort. The intent is to provide tribal leaders and planners with basic information about the variety of tribal transit programs, challenges they are likely to face, how other tribes have overcome these challenges, and resources which are available to tribal governments. (16 pages)

METRICATION

p-2452 Estimating Highway Maintenance Work (Metric Format) (D) (Bureau of Maintenance Ohio Department of Transportation US DOT and FHWA 1993)
Estimating amounts of material, work done, size of crews, or number of trucks needed for road maintenance requires the skill for working with NUMBERS and MEASUREMENTS. By using addition, subtraction, multiplication, division and some basic rules, you can do some figuring ahead of time to make your crews look better. People feel better about themselves when they're doing a good job, their friends do too, and so does the motoring public. (~40 pages)

p-2453 Metrication Pocketbook of Facts and Figures (D) (New Mexico State Highway and Department of Transportation US DOT and FHWA 1994)
This booklet provides useful information on the metric system, how to write in it, conversions, general civil engineering, and rules for measurement. (20 pages)

p-2454 Metric (SI) Training for Highway Agencies--Participant's Workbook (*FHWA* October 1993)
The material included in this document is designed to support the NHI training course and be a stand-alone reference document. The Federal Government is now required to convert its operations to the metric system of measurements. These materials are part of the Federal Highway Administration's efforts to assist other in the conversation process, specially State highway agencies. The course materials are targeted towards engineers and others with a technical background. (154 pages)

p-2455 Metric (SI) Training for Highway Agencies--Instructor's Guide (1193) (*FHWA* October 1993)
The material included in this document is designed to support the NHI training course and be a stand-alone reference document. The Federal Government is now required to convert its operations to the metric system of measurements. These materials are part of the Federal Highway Administration's efforts to assist other in the conversation process, specially State highway agencies. The course materials are targeted towards engineers and others with a technical background. (219 pages)

p-2456 Metric Guide for Federal Construction: 1st Edition (*National Institute of Building Sciences* 1993)
This book introduces the metric system, why it is an appropriate form of measurement, the metric system in construction, and the basics of metric usage, along with supporting documents of drawings and specifications. (33 pages)

p-2457 Standard Practices for Use of the International System of Units (SI): The Modernized Metric System (*ASTM* 1992)
This book gives guidance for the application of The International System of Units, developed and maintained by the General Conference Weights and Measures. Information in the book include SI, a limited list of non-SI unites recognized for use with SI units, and a list of conversion factors from non-SI to SI units, together with general guidance on proper style and usage. (35 pages)
Online: http://www.wbdg.org/ccb/VA/VAMETRIC/guide.pdf

p-2458 Guide to Metric Conversion (*AASHTO* 1993)
This guide was written to provide an explanation of the need for change, and to prvide an outline that transportation age3ncies may use in designing their own conversion programs. This guide does not provide details, but does provide the major steps in conversion, examples of how other nations accomplished conversion, helpful hints, and general guidelines. (106 pages)

RULES & REGULATIONS

p-2482 1994 Driver License Administration Requirements and Fees (*US DOT & FHWA* 1994)
This is a biennial report covering the legal requirements and fees regarding driver licensing as reported by State, Province, and Territory motor vehicle agencies. This report has been published since 1967. (51 pages)

p-2487 Montana Community Development Block Grant Program (Parts I & II) Application Guidelines For Economic Development Projects (*Montana Department of Commerce* 1997)
The economic development category of Montana's Community Development Block grant Program is designed to stimulate economic development activity by assisting the private sector, in order to recreate or retain jobs for low and moderate income persons. DBG funds, which are received annually form the U.S. Department of Housing and Urban Development, are intended to be used in situation where a funding gap exists and alternative sources of public and private financing are not adequate. This packet explains the application process to receive grant money. (~50 pages)
Online: http://comdev.mt.gov/content/CDBG/docs/GrantAdmin/CHAP07.pdf

p-2490 Real Estate Acquisition Guide for Local Public Agencies (FHWA 1993)
The purpose of this guide is to provide a basic understanding of the acquisition process, the Federal laws and regulations which govern in cases were Federal-aid is involved, and to provide a basic reference for persons involved in the acquisition of private property for public purposes. (117 pages)
Online: http://www.fhwa.dot.gov/realestate/lpaguide/reag.pdf

MISCELLANEOUS

p-2511 Assessment of Border Crossings and Transportation Corridors for North American Trade (*FHWA* 1991)
Section 1089 of the ISTEA requires the Department to conduct a study of the need for and feasibility of a program for border crossings that in discretionary and that streamlines infrastructure improvements. A report of the results and recommendations to the Congress is also required of this study. The focus of the study is on border crossings and other ports of entry that link the United States with Canada and Mexico. Detailed data and analysis is included. The organizations of this report follows the key parts of the study plan—existing patterns of trade and transportation, existing and planned status of physical and institutional infrastructure at the borders, projections of further trade and traffic trends, and perceptions of the existing and future conditions by the public and private sectors. (150 pages)
Online: http://transweb.sjsu.edu/mtiportal/research/publications/documents/99-02.pdf

p-2527 Contract Administration Techniques for Quality Enhancement Study Tour (CATQUEST) (*FHWA* June 1994)
The Contact Administration Techniques for Quality Enhancement Study Tour was initiated to further explore techniques identified by the pavement tours and the TRB study. The primary objective of the CATQEST was to attempt to link innovative contract administration practices to the high levels of highway quality in Europe. If such linkage was identified, it was a further objective of the study to determine if such innovative practices have potential for application to the highway program in the United States. For the purpose of the study tour, innovative highway practices are considered to be those which are not routinely practiced in the US. (30 pages)

p-2531 Creating Bicycle Transportation Networks: A Guidebook (*Minn DOT* 1996)
This guide presents a practical planning model for bicycle transportation in cities, suburbs and small towns. It focuses on the use of networks of specialized bicycle friendly zones to support and promote the use of bicycles for transportation. A model classification system for bicycle facilities is presented that is similar to the "functional classification of streets" for motor vehicle roadways. Detailed planning parameters are recommended for assembling the different types of bicycle facilities into integrated systems to support bicycle use for utilitarian transportation. Planning guidelines for bicycle friendly zones are presented, along with a step-by-step process that describes how communities can plan for bicycle transportation. (141 pages)

This report contains selected information on toll facilities in the United States. The information is based on s survey of facilities in operation, financed, or under construction as of January 1, 1995. (27 pages)

p-2536 Who Does What With Montana's Water? (Montana State University Water Resource Center and The Montana Watercourse 1994 & 1995)
This edition includes independent section on: Federal Agencies, State Agencies, Tribal Agencies, The University System, Regional Commission and River Associations, Private Nonprofit Organizations, and Maps and Water Words. A new addition is a listing of water researchers within the Montana University System along with tier specialties and interests. (~100 pages)

p-2543 Pomes By a Cow Psychologist (*Mark Forman* 2008)
Humorous poems by Custer County local rancher.

p-2544 Eddy Hulbert, Montana Silversmith (*Shell Reid* 1998)
Historical biography of a Montana silversmith in the Big Horn Country. (82 pages)

p-2545 Never Summer –Poems from Thin Air (*Chris Ransick* 2002)
Chris Ransick's first full length collection of poetry has been hailed by one critic who described the work as "accessible, haunting, echoing familiar emotions in brilliant language that, quite frankly, is amazing." (264 pages)

p-2546 Montana Access Guide to Federal and State Lands (*Montana Bureau of Land Management* 1995 & 1996)
The Montana Access Guide provides helpful information to people who use federal and state lands for recreation, and to private landowners who may be affected by recreational users. Information in this guide is consistent with laws and regulations as of July 31, 1994. (33 pages)
Online: http://fwpiis.mt.gov/content/getItem.aspx?id=31422

p-2548 U.S. Department of Transportation Procurement Forecast Fiscal Year 1996 (*US DOT* 1996)
Public Law 100-6556, Section 501 requires that The Department of Transportation (DOT), along with other Federal agencies make available its Procurement Forecast to the Small Business Administration and to interested business owners. This forecast is for informational and marketing purposes only and does not constitute a specific offer or commitment by the DOT to fund in whole or in part any of the procurements referenced herein. (89 pages)
Online: http://www.fhwa.dot.gov/legsregs/directives/orders/44203a.htm

p-2549 U.S. Department of Transportation Marketing Information Package (*US DOT* November 1995)

Included in this package, you will find the most current DOT Procurement Forecast and information on the DOT's Short Term Lending and Bonding Assistance Programs. The Procurement Forecast can be very valuable marketing and informational tool as it contains the following information for each planned procurement: 1) the procuring office and phone number 2) brief description of the procurement 3) estimated dollar range, and 4) anticipated solicitation date. (~750 pages)

p-2550 Guidelines for the Testing of Seismic Isolation and Energy Dissipating Devices (*HITEC* March 1996)

This report outlines the HITEC Technical Evaluation Plan for seismic isolation and energy dissipating systems. The pal is designed to characterize the fundamental properties and performance characteristics of a wide range of devices produced by U.S. and global manufactures. It describes a program of full scale dynamic tests, the results of which should provide guidance to the highway community regarding the selection, design and use of seismic isolation and energy dissipating devices for different levels of performance. (25 pages)

p-2551 Evaluation Findings for Seismic Energy Products, L.P. Elastomeric Isolation Bearings (*HITEC* May 2001)

This Evaluation Findings Report summarizes and presents data collected during the HITEC Isolator and Energy Dissipater Characterization Program (HITEC Evaluation Plan) on the five isolators submitted by Seismic Energy Products, L.P. (SEP), and describes the performance characteristics of the units that were evaluated. (37 pages)

p-2552 Traffic Information Program Series (TIPS) (*Florida T² Center* June 1996)

The Florida Section of ITE develops and maintains a series of one page explanations of commonly asked transportation related questions. Our center distributes these free and has found them to be quite popular. We hope that your center will dine them useful. (85 questions)

Online: http://www.floridasectionite.org/Resources/TIPS_complete_0407.pdf

p-2554 On One Hand, Poetry of the Plains (*Larry Ross*)

Variety of poetry from one of Montana's own!

p-2556 National Highway User Survey (*National Quality Initiative Steering Committee* May 1996)

The National Quality Initiative Steering Committee commissioned a survey, funded by the Federal Highway Administration, to determine the general public's satisfaction with the nation's highway system and to identify the public's priorities for highway improvement. This report provides the results of this survey. The Committee believes that the findings will provide valuable framework for federal, state and industry officials work collaboratively in the pursuit of quality in our highway system. They also believe that this first nationwide customer satisfaction survey provides a valuable base line against which to measure improvements. (20 pages)

p-2558 Step Frequency Ground Penetrating Radar characterization and Federal Evaluation Tests (FHWA October 2010)
Step frequency ground penetrating radar (SF GPR) technology offers unprecedented subsurface three-dimensional (3D) imaging capabilities. Subsurface material deterioration, void imaging, and precise material and geometry measurements of civil infrastructure are all accurately and efficiently carried out using this specialized technology. Through previous evaluations and reports, the FHWA has determined that SF GPR can be applied to subsurface infrastructure evaluation problems to meet needs in the national interest. In addition to infrastructure applications described in these reports, it is notable that land mines, runway pavements, and buried historic sites can be imaged using SF GPR. (81 pages)

p-2559 Planning and Financing Community Water and Sewer Systems in Montana (*Montana Department of Commerce* July 1997)
This publication is written for Montana local government officials d technical staff. IT is designed to provide an overview of the process of financing a water or sewer system. Financing a local water and sewer system requires local government officials and technical staff to make many policy and financial decisions. This publication provides suggestions on how to better manage the facility financing process. (133 pages)

This report presents data which can be used in evaluation of the highway safety performance of the States. The data were submitted by the States through the Highway Performance Monitoring system operated by the Federal Highway Administration. (95 pages)

p-2563 Environmental Research – Linking Transportation, the Environment and the Future (*US DOT & FHWA* 1998)
This booklet discuses briefly the connection between transportation and the environment, and what environmentally friendly actions we can take in the future. (32 pages)

p-2564 Highway Statistics 1998 (*FHWA* 1998)
This is an annual report containing analyzed statistical data on motor fuel; motor vehicles; driver licensing; highway-user taxation; State highway finance; highway mileage; Federal aid for highways; highway finance data for municipalities; counties; townships; and other units of local government, select tables/charts from the 1995 Nationwide Personal Transportation Survey; and international data.

p-2565 Extrapolation of Pile Capacity From Non-Failed Load Tests (*FHWA* December 1999)
This report presents the procedures, anticipated accuracy, and a recommended method of analysis allowing the prediction of the ultimate bearing capacity of a driven pile from proof tests.

p-2566 Rest Area Forum: Summary of Proceedings (*FHWA* December 1999)
This is a summary of the proceedings of the Rest Area Forum in Atlanta, GA. Topics covered include provision of safe, adequate parking for commercial drivers and their vehicles. Also covered was alternate parking sites, ability to meet parking needs and locations of public rest areas.
Online: http://www.tfhrc.gov/safety/00034.pdf

p-2577 Evaluation of Measurement Specialties, Inc. Piezoelectric Weigh-in-Motion Sensors (*HITEC* December 2001)
This report describes the results for the sensors manufactured by Measurement Specialties, Inc. (65 pages)

p-2578 Evaluation of Thermocoax Piezoelectic Weigh-in-Motion Sensors (*HITEC* December 2001)
This report describes the results for the sensors manufactured by Thermocoax.

p-2580 Corrosion Costs and Preventive Strategies in the United States (summary) (*FHWA* March 2002)
This technical summary announces the key findings of a Federal Highway Administration study that is fully documented in P-2581
Online: http://www.corrosioncost.com/pdf/techbreif.pdf

p-2581 Corrosion Costs and Preventive Strategies in the United States (*FHWA* March 2002)
This report describes the annual total cost of metallic corrosion in the United States and preventive strategies for optimum corrosion managements.
Online: http://www.corrosioncost.com/pdf/techbreif.pdf

p-2590 International Conference on High-Occupancy Vehicle Systems – 2 part: Conference Proceedings and Compendium of Technical Papers (*FHWA* August 2000)
These reports document the proceedings and technical papers from the 10th International High-Occupancy Vehicle Systems Conference held in Dallas, Texas on August 27-30, 2000.

p-2600 4th Integrated Transportation Management Systems (ITMS) Conference – A Key Strategy to Optimize Surface Transportation System Performance – 2 part: Conference Proceedings and White Papers (*FHWA* July 2001)
These reports document the proceedings and technical papers from the 4th ITMS Conference in Newark, New Jersey on July 15-18, 2001.
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13662.pdf

p-2630 Modifications of Air Pollution Models for Complex Site Geometries,V.I & II (*FHWA* September 2002)
This is a two-volume study to improve air pollution dispersion models for depressed highway sites.

p-2638 Sunshine to Dollars (*Steven E. Harris* 2003)
This 22-page booklet covers fast, easy, visual solar heating, cooling cooking and experiments. (2003)

p-2640 Freight Transportation: The Latin American Market (*American Trade Initiative* August 2003)
Online: http://international.fhwa.dot.gov/latinamer/freight_transp.pdf

p-2650 Software Reliability: A Federal Highway Administration Preliminary Handbook (*FHWA* 2004)
This handbook presents new software V&V techniques to address special needs related to highway software such as wrapping (using embedded code to make a program self-verifying); SpecChek ™, a V&V tool to check software with its specifications; real-time computation of error propagation; and phased introduction of new software to minimized failures.
Online:
http://www.fhwa.dot.gov/publications/research/safety/04080/04080.pdf

p-2655 America's Highways 1776-1976 (*FHWA* 1976)
This book has been written to record for posterity the story of highway development in the United States, beginning in the early years of the new Nation and expanding with the growing country as it moved into undeveloped areas west of the original colonial States, and ultimately evolving into the Federal-aid highway program in which the State and Federal Governments have worked cooperatively and successfully for the past 60 years. (FHWA 1976) 553 pages

p-2656 Are We There Yet? Building America's Transportation Infrastructure Network (*John Yow, ARTBA* 2002)
As it celebrates is 100th anniversary, the American Road and Transportation Builders Association (ARTBA) is uniquely qualified to present this remarkable history of the transportation revolution that pwoe4red the progress of 20th century America. (176 pages)

p-2700 57th Annual Road Builders' Clinic 2006 Proceedings (*Washington State University and University of Idaho* March 2006)
These proceedings provide a complete listing of presenters, their papers, and addresses. (Washington State University and University of Idaho 3/2006) 286 pages

p-2705 County Road Advisors "You Show Us- 2000" Contest for South Dakota, Wyoming, Montana, Colorado, Nebraska, North Dakota, and Utah. Regional and State Winners (*Wyoming Technical Transfer Center* 2000)
The results of the "You Show US" contest in 2000 with descriptions and pictures of every regional and state winners ideas. (27 pages)

p-2706 Build a Better Mousetrap National Competition (FHWA LTAP/TTAP 2010)
This National Entry Booklet has all the descriptive entries for 2010 with photos and winners. (46 pages)
Online:
http://www.ltap.org/resources/downloads/NationalEntryBooklet2010.pdf

p-2710 Fundamentals of Fluid Mechanics: 2nd Edition (*Bruce Munson, Donald Young, & Theodore Okiish* 1994)
This textbook was made to help engineering students who are interested in learning some fundamental aspects of fluid mechanics. (893 pages)

p-2725 Specification Writers' Guide (FHWA 5//2008)
This document contains guidelines to help writers develop specifications for the Federal Highway Administration's Federal Lands Highway program. Topics addressed include specification writing style, organization and format, proper terminology and phrasing, capitalization and abbreviation, and punctuation and grammar rules. (44 pages)
Online: http://flh.fhwa.dot.gov/resources/manuals/swg/documents/swg.pdf

CATALOGS

p-3000 Cornell Local Roads Program: 2001 Video Catalog (*New York LTAP* 2001)
This is a list of all the videos which are available from NY LTAP.

p-3001 Research, Development, and Technology Performance Plan 2006-2007 (*Turner-Fairbank Highway Research Center* 2006)
This report describes who RD&T are, outlines their research and goals for the next two years. (35 pages)
Online: http://www.tfhrc.gov/about/perfplan0607/06037.pdf

p-3002 The National Highway Institute 1998 Course Catalog (*NHI* 1998)
The National Highway Institute (NHI) is the technical training organization of the Federal Highway Administration. Created in 1970 by federal legislation, the NHI develops and administers transportation-related training and education programs that assist in applying new technologies to the planning, design, construction, maintenance, and rehabilitation of our Nations transportation infrastructure. This catalog lists all courses available along with: course number, title, fee, length, size, description, objectives, target audience, and contact information. (200 pages)

p-3003 2005 OPCD Annual Report (*FHWA* January 2006)
This annual report illustrates the efforts of OPCD, Office of Professional and Corporate Development, and the many contributions of their partners and stakeholders during 2005 to improve all aspects of transportation. (FHWA, Rec'd 1/2006) 34 pages

p-3004 Transportation Training Resources (*NHI* 2002)
The National Highway Institute is the technical training organization of the Federal Highway Administration (FHWA). NHI's mission is to provide proactive leadership, expertise, resources, and information to improve the quality of the U.S. highway system in order to enhance economic growth, quality of life, and the environment. NHI develops and administers transportation-related training and education programs that assist in applying new technologies to the planning, design, construction, maintenance and rehabilitation of our nation's transportation infrastructure. This is a catalog of all the courses offered by the NHI.

p-3005 Arizona Intelligent Vehicle Research Program-Phrase one: 1997-2000 (*Arizona DOT* 2001)
This project report is presented in two sections. Section 1 gives a general history of the program, describing Arizona's interest and involvement in AHS and Intelligent Vehicle technologies thought the summer 2000. Section II of this report focuses in more detail on the Caltrans partnership, the site selection, the development of the magnet infrastructure in Arizona, and the tow initial tow winters of testing and operational evaluations. The ADOT-Caltrans partnerships, and the project, are ongoing in 2001 and 2002. (136 pages)
Online:
http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ473(1)/AZ473(1)-Intro.pdf

p-3008 Preliminary Human Factors Guidelines for Traffic Managements Centers
Online: http://www.fhwa.dot.gov/tfhrc/safety/pubs/99042/99042.pdf

p-3015 VISTA- Vehicles with Intelligent Systems for Transport Automation (*Arizona DOT* November 2000)
This report documents the work performed on the project *Research Program on Vehicles with Intelligent Systems for transport Automation* (VISTA). The effort, to develop and demonstrate a control architecture for Intelligent Vehicles that is deployable within the next 5 to 10 years, was funded by the AZ State Legislature and administered by the AZ DOT. (25 pages)
Online: http://www.sie.arizona.edu/ATLAS/vistaPR/index.htm

p-3020 Technical Publications Catalog, October 1998-September 2003 (*FHWA* 2003)
This 58-page catalog lists over 300 publications generated from FHWA Turner-Fairbank Highway Research Center. It 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. Most publications listed can be accessed online at www.tfhrc.gov/techpubcat/index.htm or a copy ordered from the source listed. (FHWA)
Online: http://www.tfhrc.gov/techpubcat/pubcatalog.pdf

p-3100 Manual on Uniform Traffic Control Devices January 2001 *(D)* (January 2001)
Online: http://mutcd.fhwa.dot.gov/pdfs/2003r1r2/mutcd2003r1r2complet.pdf

p-3104 MR Sign (*M-R Sign Company* 1992)
-This catalog is a collection of signs that conform to the MUTCD standards to provide reference when ordering signs and related products. (137 pages)
Online: http://www.mrsigncompany.com/catalog/default.php

p-3105 Asphalt Recycling & Reclaiming Association Directory 1999-2000
This 1999-2000 directory is a reference for members in Asphalt Recycling and Reclaiming Association. (92 pages)

p-3106 Asphalt Emulsion Manufacturers Association Directory 1999-2000
This 1999-2000 directory is reference for members in the Asphalt Emulsion Manufacturers Association.

p-3107 Asphalt Recycling & Reclaiming Association Directory 2006-2007
Lists committees, awards, and addresses of ARRA members. (catalog)

p-3108 Bowd Summit Report (University of Rhode Island: West Greenwich 2007)
The BOWD (Business Opprutuni9ty and Workforce Development Program) Summit was held in November of 2007 in partnership with the FHWA. This program gives an outline of what was included at the summit. (58 pages)

p-3118 2009 NHI Catalog, Training the Transportation Workforce *(NHI* 2008)
This is the National Highway Institute's 2009 catalog listing all courses available from them, course title, outcomes, target audience, training level, fee, length, class size.(272 pages)

p-3119 2008 NHI Catalog, Training the Transportation Workforce *(NHI* 2008)
This is the National Highway Institute's 2008 catalog listing all courses available from them, course title, outcomes, target audience, training level, fee, length, class size.(280 pages)

p-3120 NHI Training Catalog – Transportation Training Resources Catalog – (*FHWA* 2006)
This is the 2006 Course Catalog for classes offered by the National Highway Institute. (198 Pages)

p-3121 National Highway Institute 2007 Training Catalog: Transportation Training Catalog (*FHWA* 2007)
Lists all of NHI courses, length, costs, class size, and instructor for 2007. (239 pages)

p-3125 Communications Reference Guide (*FHWA* May 2004)
This document presents guidelines for research and development publications. (102 pages)
Online: http://www.tfhrc.gov/qkref/qrg.pdf

P3130 2008 ARTBA Membership Directory & Buyers' Guide (*ARTBA* 2008)
This publication lists ARTBA member firms and organizations, elected leaders and the association's operations. (276 pages)

p-3200 Humboldt Catalog, Testing Equipment for asphalt, Concrete & Soil
Their Catalog #7 lists over 2,000 items for use in materials testing labs and on the jobsite.
Online: http://www.humboldtmfg.com/store.php

p-3201 Sweet's Engineering & Retrofit: Mechanical, Electrical, Civil/Structural - 1997 Catalog File (Vol. I-III) (1997)
Volume I: General Data, Site work, Concrete, Masonry, Metals
Volume II: Woods/Plastics, Thermal/Moisture Protection, Doors/Windows, Finishes, Specialties, Equipment, Furnishings, Special Construction, Conveying Systems, Mechanical
Volume III: Mechanical (cont.), Electrical, Directory

p-3202 Sweet's Directory 1999 (McGraw-Hill Construction Information Group 1999)

p-3210 Road Quake: Temporary Portable Rumble Strips (*Plastic Safety Systems* 2009)
Information on the Road Quake Temporary Rumble Strips and contact information. (1 page)
Online: http://www.plasticsafety.com/road-quake-construction-rumble-strips

p-3211 Seal Master: Pavement Products & Equipment (*Seal Master* 2009)
Seal Master : Pavement Products & Equipment Catalog 2009. Includes: Pavement sealers, sealer additives, crack fillers, repair products, traffic paints, concrete products, sport surfacing, and equipment/parts. (88 pages)
Online: http://www.sealmaster.net/

p-3212 RI Lampus Company: Rosetta Walls, Steps, & Accents and Eco-Tek Permeable Paving System & Turfstone (*R.I. Lampus Company* 2009)
The Rosetta wall collection is an engineered system featuring interlocking components. Information on different Rosetta products. Eco-Tek Permeable Paving System interlocking paving systems allow permeable pavers to effectively improve the quality of storm water as it is filtered through the paving system and absorbed into the ground. (5 pages)

p-3213 GeoPlan: GIS Solution (GeoDecisions: A Division of Gannet Flemming 2009)
A Comprehensive data management and geographic information system (GIS) solution for municipalities, cities, and counties. (3 pages)
Online: http://www.geodecisions.com/geoplan/

p-3214 Deighton (*Deighton* 2009)
Software information on how Deighton software can support all aspects of infrastructure asset management. Information includes: Deighton's vision, community and strategic alliances, sustainable solutions and Deighton's Total Infrastructure Asset Management Solution, Enterprise/Desktop solutions, internet solutions, return on investments, implementation and post-implementation, and training. (8 pages)
Online: http://www.deighton.com/

p-3215 Transportation Design & Construction Leadership Directory & Buyers' Guide 2012 (ARTBA 2012)
Leadership directory is a list of who's who of companies and individual that work in the transportation development arena. The Buyers' guide describes each firm's capabilities allowing you to learn about and connect with a wide variety of material suppliers, manufacturers, design firms and contractors.
Online: http://www.artba.org/mediafiles/about2012buyersguide.pdf

p-3216 Freight Facts and Figures 2012 (FHWA)
This is a snapshot of the volume and value of freight flows in the United States, the physical network over which freight moves, the economic conditions that generate freight movements, the industry that carries freight, and the safety, energy, and environmental implications of freight transportation.
Online:
http://www.princeton.edu/~alaink/Orf467F13/FreightFacts&Figures2012.pdf

ITS/IVHS

p-3501 National Program Plan for Intelligent Transportation Systems Synopsis (*ITS* November 1994)
Together the "IVHS AMERICA Strategic Plan for Intelligent Vehicle-Highway Systems in the United States" and the "Intelligent Vehicle-Highway System Strategic Plan" describe a long-range program for using modern communications, information processing, control, and electronics technologies to improve the operation of surface transportation systems across the nation. The Strategic Plans recognized that the United States and its major economic competitors worldwide have become information- and communications-intensive societies. The Plans predicted that travel in the U.S. could reach new levels of safety and efficiency by improving conventional transportation infrastructure with new information and communication capabilities.
Online: http://ntl.bts.gov/lib/jpodocs/repts_pr/3845.pdf

p-3508 National Program Plan for Intelligent Transportation Systems Volume 2 (*ITS* November 1994)
Chapters one through seven cover the following topics: travel and transportation management, travel demand management, public transportation operations, electronic payment, commercial vehicle operations, emergency management, and advanced vehicle control and safety systems.
Online: http://ntl.bts.gov/lib/jpodocs/repts_pr/3786.pdf

p-3510 ITS Peer To Peer Program Pamphlet (*ITS* 2002)
Pamphlet outlines the Peer to Peer Program that delivers short term assistance according to your ITS needs. (5 pages)

p-3512 ITS Architectures Development Program (*US DOT* November 1994)
This document provides the latest information on the ITS Architecture Development Program, highlighting the four architectures being developed. Readers are welcome to submit feedback, which will help refine the architecture and identifying issues for future consideration. (106 pages)

p-3515 Intelligent Transportation Systems (ITS) Projects (*FHWA* January 1995)
This report describes these ITS projects that are wholly or partially funded by the Department of Transportation's modal administrations, including the Federal Highway Administration the Federal Transit Administration, and the National Highway Traffic Safety Administration. The report is a complement to the National ITS Program Plan, and is organized to describe those DOT-sponsored activities which support the development of user services, national compatibility planning, deployment support, and program assessment. (500 pages)

p-3519 National Intelligent Vehicle Highway Systems (IVHS) Program Plan-Report to Congress (*US DOT* June 1994)
The IVHS Strategic Plan, transmitted to Congress in December 1992, presented the goals and objectives of the national IVHS program and described the program delivery process. This report builds on the Strategic Plan and describes the achievements of DOT in the IVHS arena, including early activities predating official establishment of the IVHS program in 1991. Future implementation reports to Congress will describe DOT's progress in implementation of the National IVHS Program Plan. (29 pages)

p-3520 Meeting 21st Century Challenges of System Performance Through Better Operations (*US DOT & FHWA* August 2003)
- Meetings the nation's mobility needs in the 21st century requires moving from a construction-based focus to an emphasis on systems operations across all transportation modes. The Federal Highway Administration, American Association of State Highway and Transportation Officials, and National Cooperative Highway Research Program sponsored a scanning study of several European countries to investigate current and planned strategies for sustaining good system performance and operational practices in those countries. The findings and recommendations are presented. (53 pages)
Online:
http://international.fhwa.dot.gov/Pdfs/converted_to_html/scan_summaries/21STcentops.htm

p-3521 The Status and Applicability of Intelligent Transportation Systems in Montana (*ITS* September 2002)

p-3522 Using Metropolitan ITS Deployment Tracking For Regional ITS Planning (*ITS* August 2002)
This report evaluates the utility of deployment tracking data and indicators to local planners by evaluating the ITS deployment planning experience in Tucson, Arizona.
Online:
http://www.itsdocs.fhwa.dot.gov//JPODOCS/REPTS_TE/13606_files/13606.pdf

p-3523 Metropolitan ITS Integration, A Cross-Cutting Study (*ITS* November 2002)
The purpose of this report is to inform transportation managers and decision-makers of the value of ITS integration.
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13672_files/13672.pdf

p-3525 Intelligent Transportation Systems in Work Zones (*ITS* January 2004)
This report is to enable other regions to benefit from experience gained by state department of transportation that have been early developers of ITS in work zones.
Online: http://ops.fhwa.dot.gov/wz/technologies/michigan/index.htm

p-3526 Best Practices of Rural and Statewide ITS Strategic Planning (*ITS* July 2002)
This document supports those agencies and groups that are beginning the process of Rural or Statewide ITS deployment planning.
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13608.pdf

p-3527 Intelligent Transportation Systems in Work Zones, A Case Study in Albuquerque, NM (*ITS* January 2004)
This case study reflects information gathered in interviews with key personnel on the Big I construction project in Albuquerque, New Mexico, as well as information and photos obtained during a site visit. (14 pages) (USDT January 2004)
Online: http://ops.fhwa.dot.gov/wz/technologies/albuquerque/index.htm

p-3530 Rural ITS Solutions – Rural ITS Toolbox (*FHWA* November 2001)
This document is intended to support agencies and groups that are beginning the process of rural or statewide ITS deployment by making the body of experience associated with various ITS application deployments accessible to potential new users.

p-3531 Safety Applications of Intelligent Transportation systems in Europe and Japan (*FHWA* January 2006)
This scanning study of intelligent transportation systems (ITS applications was deployed in France, Germany, and Japan to understand how they mitigated traffic safety problems. (FHWA 1/2006) 52 pages
Online: http://international.fhwa.dot.gov/ipsafety/ipsafety.pdf

p-3532 Transportation Research Program Administration in Europe and Asia (*FHWA* 2009)
The scanning studies of Europe and Asia to review transportation research program administration practices. (64 pages)
Online: http://www.international.fhwa.dot.gov/pubs/pl09015/pl09015.pdf

p-3535 Intelligent Transportation Systems Benefits and Costs (*FHWA* 2003)
The increasing demand for travel by highway and public transit in the U.S. is causing the transportation system to reach the limits of is existing capacity. Intelligent transportation Systems can help ease this strain through the application of modern information technology and communications. This report is a continuation of a series of reports providing a synthesis of the information collected but he U.S. DOT ITS Joint Program Office on the impact that ITS projects have on the impetration of the surface transportation network. (152 pages) vicariously amazing
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13772_files/13772.pdf

p-3540 Benefits and Costs of Full Operations and ITS Deployment – 2003 Simulation for Cincinnati, OH (*FHWA* July 2006)
US DOT sponsored research using the latest simulation techniques to assess the potential benefits and costs of "full deployment" of ITS and transportation operations in three cities. This document covers the 2003 simulation for Cincinnati, OH. This simulation focuses on varying weather and work zone conditions as well as traffic conditions. (32 Pages)

p-3541 Benefits and Costs of Full Operations and ITS Deployment – 2003 Simulation for Seattle (*FHWA* July 2006)
US DOT sponsored research using the latest simulation techniques to assess the potential benefits and costs of "full deployment" of ITS and transportation operations in three cities. This document covers the 2003 simulation for Seattle, WA. This simulation focuses on decreasing travel times, delays, and improving flow of traffic. (32 Pages)
Online: http://ntl.bts.gov/lib/jpodocs/repts_te/13977.htm

p-3542 Benefits and Costs of Full Operations and ITS Deployment – 2025 Forecast for Tucson, AZ *(FHWA* July 2006)
US DOT sponsored research using the latest simulation techniques to assess the potential benefits and costs of "full deployment" of ITS and transportation operations in three cities. This document analyzes Tucson, AZ using a forecast for traffic in 2025. (32 Pages)

p-3543 Archived Data Management Systems – A Cross-Cutting Study: Linking Operations and Planning Data (*FHWA* December 2005)
This document is one in a series of products designed to help you provide ITS solutions that meet your local and regional transportation needs. We have developed a variety of formats to communicate with people at various levels within your organization and among your community stakeholders. (40 pages)

p-3544 Intelligent Transportation Systems (ITS) – Benefits, Costs, and Lessons Learned. (*FHWA* 2005 Update)
This report is a continuation of a series of reports providing a synthesis of the information collected by US DOT ITS Joint Program Office on the impact that ITS projects have on the operation of the surface transportation network, and the costs of the ITS deployment and operations and evaluation experience. (192 Pages)
Online:
http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/14073_files/14073.pdf

p-3545 Recent International Activity in Cooperative Vehicle-Highway Automation Systems (FHWA December 2012)
This report summarizes the current state of the art in cooperative vehicle-highway automation systems in Europe and Asia based on a series of meetings, demonstrations, and site visits, combined with the results of literature review. (89 pages)
Online: http://www.fhwa.dot.gov/advancedresearch/pubs/12033/12033.pdf

p-3546 Literature Review on Recent International Activity in Cooperative Vehicle-Highway Automation Systems (FHWA December 2012)
This literature review supports the report, Recent International Activity in Cooperative Vehicle-Highway Automation Systems. This review covers work performed in Europe and Japan, with application to transit buses, heavy trucks, and passenger cars. (28 pages)
Online: http://www.fhwa.dot.gov/advancedresearch/pubs/13025/13025.pdf

SHRP PUBLICATIONS

Asphalt Analysis

SHRP-A-335 Binder Characterization and Evaluation by Nuclear Magnetic Resonance Spectroscopy (Strategic Highway Research Council: National Research Council- SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-335.pdf

SHRP-A-341 Fundamental Properties of Asphalt-Aggregate Interactions Including Adhesion and Absorption (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-341.pdf

SHRP-A-367 Binder Characterization and Evaluation Volume 1 (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-367.pdf

SHRP-A-368 Binder Characterization and Evaluation Volume 2: Chemistry (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-368.pdf

SHRP-A-369 Binder Characterization and Evaluation Volume 3: Physical Characterization (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-368.pdf

SHRP-A-370 Binder Characterization and Evaluation Volume 4: Test Methods (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/shrp-a-370.pdf

SHRP-A-379 The Super active Mix Design System Manual of Specifications Test Methods and Practices (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-379.pdf

SHRP-A-382 The Application of Small Nuclear Magnetic Resonance Spectrometers to Quality Asphalt-Aggregate Mixes (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-382.pdf

SHRP-A-383 Selection of Laboratory Aging Procedures for Asphalt-Aggregate Mixtures (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-383.pdf

SHRP-A-384 Aging: Binder Validation (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-384.pdf

SHRP-A-388 Stiffness of Asphalt-Aggregate Mixtures (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-388.pdf

SHRP-A-390 Laboratory Aging of Asphalt-Aggregate Mixtures: Field Validation (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-390.pdf

SHRP-A-396 Field Validation of the Environmental Conditioning System (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-396.pdf

SHRP-A-398 Stage 1 Validation of the Relationship Between Asphalt-Aggregate Mix Performance (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-398.pdf

SHRP-A-399 Low-Temperature Cracking: Binder Validation (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-399.pdf

SHRP-A-400 Low-Temperature Cracking: Test Selection (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-400.pdf

SHRP-A-401 Low-Temperature Cracking: Field Validation of the Thermal Stress Restrained Specimen Test (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-401.pdf

SHRP-A-402 Water Sensitivity: Binder Evaluation (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-402.pdf

SHRP-A-403 Water Sensitivity of Asphalt-Aggregate Mixes: Test Selection (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-403.pdf

SHRP-A-404 Fatigue Response of Asphalt-Aggregate Mixes (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-404.pdf

SHRP-A-408 Level One Mix Design: Materials Selection Compaction and Conditioning (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-408.pdf

SHRP-A-409 Validation of Relationships Between Specification Properties and Performance (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-409.pdf

SHRP-A-410 Superior Performing Asphalt Pavements (Superpave): The Product of the SHRP Asphalt Research Program (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-410.pdf

SHRP-A-415 Permanent Deformation Response of Asphalt Aggregate Mixes (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-415.pdf

SHRP-A-417 Accelerated Performance-Related Tests for Asphalt-Aggregate Mixes and Uses In Design and Analysis (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-417.pdf

SHRP-A-626 Bibliographies for Physical Properties of Asphalt Cement (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-92-626.pdf

SHRP-A-637 Analysis of the Integrated Model of Climate Effects on Pavements
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-637.pdf

SHRP-A-641 Direct Tension Test Experiments (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-641.pdf

SHRP-A-645 SHRP Materials Reference Library: Asphalt Cements: A Concise Data Compilation (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-645.pdf

SHRP-A-646 The SHRP Materials Reference Library (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-646.pdf

SHRP-A-648 A Weather Database for the Superpave Mix Design System (SHRC:NRC 1994)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-648A.pdf

SHRP-A-649 Fluorometric Characterization of Asphalts (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-649.pdf

SHRP-A-650 Summary of Health Practices: the Use of Petroleum Asphalt in the Hotmix Paving Industry (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-650.pdf

SHRP-A-656 Development of an Asphalt Core Tomographer (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-656.pdf

SHRP-A-663 Size Exclusion Chromatography and Ion Exchange Chromatography Separations of Asphalts (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-663.pdf

SHRP-A-667 Analysis of Sulfur Compound Types in Asphalt (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-667.pdf

SHRP-A-675 The Characterization of Asphalt and Asphalt Recyclability (SHRC:NRC 1993)
Online: http://onlinepubs.trb.org/onlinepubs/shrp/SHRP-A-675.pdf

SHRP-A-682 Application of Acoustic Emission to Study the Cohesive and Adhesive Strength of Asphalt (SHRC:NRC 1994)
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