Gonzalo Rada, PE, PhD

Principal Pavement Engineer

Professional Summary

Dr. Rada has devoted his entire career to the field of pavement engineering and is an expert in the areas of pavement design, evaluation, maintenance, materials, rehabilitation, and management systems. He has published more than 100 technical papers and reports and has made numerous presentations throughout the U.S. and internationally in Argentina, Brazil, Canada, Mexico, New Zealand, Norway, Peru, South Africa, Taiwan and Venezuela. The topics of his publications and presentations are broad ranging and have included: the Strategic Highway Research Project (SHRP) Long-Term Pavement Performance (LTPP) program; pavement management systems and GIS applications; traffic mix analysis and traffic control devices; pavement structural and rehabilitation design; pavement materials, construction, and maintenance; and quality assurance and control programs. Dr. Rada's international work experience has included Australia, Brazil, Canada, The Bahamas, Bahrain, El Salvador, England, France, Cayman Islands and Saudi Arabia.

As a specialist pavement engineer and project manager, Dr. Rada has been involved in a variety of airport, highway, port and bridge pavement design, pavement management, and research projects. He has been involved in numerous highway and airfield pavement analyses, special topic research, quality control reviews, and development of operational procedures. He has effectively performed project management of multi-million dollar projects for the federal government in matters dealing with pavement studies across the United States and Canada, as well as a number of other pavement research studies. In addition, he has developed pavement design and analysis methodologies and developed pavement design and analysis software for a number of public agencies and national trade organizations.

Dr. Rada has also developed and implemented over 100 highway and airfield pavement management systems in the U.S. and throughout the world. His project responsibilities have included the evaluation and development of rehabilitation recommendations for thousands of miles of roads, airfield and port pavements. Dr. Rada has also served as an expert consultant and expert witness on a number of projects both in the US and abroad.

Dr. Rada has worked for Wood for nearly 30 years and for FUGRO Consultants, Inc. for 3 years in various roles including senior principal engineer, senior project manager,

Years of Experience

35 (29 with Wood)

Office of Employment

East US - Beltsville

Languages

- English - Fluent
- Spanish - Fluent

Professional Associations

- Member, American Society for Testing and Materials
- Member, American Society of Civil Engineers
- Member, Transportation Research Board

Areas of Expertise

- Civil Engineer - Expert
- Pavement Engineer - Expert

senior consultant and assistant vice president. Prior to that he served for 5 years as faculty research associate at the University of Maryland, where he taught classes in pavements and materials and performed research. Among his major research projects at the university are the overview and integration planning for the Strategic Highway Research (SHRP), development of a project level pavement management system life cycle cost model for the Maryland State Highway Administration, and dynamic characterization of typical Maryland base and subbase materials. He also served as training coordinator for the University of Maryland's Transportation Studies Center and performed consulting services for DAMA, Inc. and the American Railroad Association.

Dr. Rada' work experience is best divided into the following four general pavement areas: Pavement Research; Pavement Management Systems; Pavement Evaluation, Design and Rehabilitation; Expert Consultant and Witness; and Teaching and Training. The following is a summary of his experience in each of the four areas.

Pavement Research

Dr. Rada's most visible accomplishment in the pavement research field has been that of Principal Investigator on the Long-Term Pavement Performance (LTPP) Technical Support Services Contract, a role he held from 1992 to 2008. The LTPP program began under the National Academy of Science, Strategic Highway Research Program (SHRP) in 1987. At the end of the 5-year SHRP effort, the administration of this 20-year research program was continued under the Federal Highway Administration. In his role as Principal Investigator, he was responsible for overview of the technical assistance provided in the areas of pavement engineering, traffic engineering and information/database management. In addition, he was tasked with special assignments such as leading the assessment of the LTPP program to produce priority products from its research, development of position papers on key program issues, and coordination with highway agency officials, and other LTPP contractors, including numerous technical presentations on all aspects of the LTPP program at national LTPP meetings, TRB committees, National Academy of Sciences Expert Task Groups, LTPP Advisory Committee, and at industry conferences.

Dr. Rada's experience with the LTPP study dates back to before the start of the program. From 1985 to 1986, he served as Project Manager for the Overview and Integration Planning of the SHRP Pre-Implementation activities under NCHRP Project Number 20-20(2). He was responsible for providing a general overview of the all-inclusive SHRP research plan and the study culminated with the preparation of the SHRP Overview and Integration Report, included in the final "Strategic Highway Research Program: Research Plans," published in May 1986. From 1987 to 1990, he served as Materials and Pavement Engineer on the SHRP LTPP P-001 Technical Assistance Contract. His efforts during this time period focused on deflection testing, materials field sampling and testing and laboratory testing, and assistance with management of the LTPP pavement performance monitoring activities. From 1990 to 1992, he served as Co-Principal Investigator for the SHRP LTPP P-001B Technical Assistance Contract. In this role, he provided technical and management services in support of SHRP in the development and conduct of the LTPP program, with particular emphasis on pavement performance monitoring, which included all those activities related to distress, profile, deflection, seasonal monitoring and climatic data collection. From 1992 to 2008, he served as Principal Investigator for the FHWA LTPP Technical Assistance (1992 to 1997) and Technical Support Services (1997 to 2008) Contracts, which provided technical and management support services to the FHWA LTPP Team staff for management of the LTPP program. In that role, he was involved on all phases of the program including pavement monitoring and instrumentation, materials testing, information managements system, LTPP experiments, regional operations, and coordination activities. From 2003 to 2008, he also served as Technical Advisor to the FHWA LTPP Specific Pavement Sites (SPS) Weigh-in-Motion Sites Assessment and Performance Evaluations Contract. In this role, he was

responsible for providing technical expertise and program support to ensure that the assessment, calibration and performance evaluation of the LTPP SPS weigh-in-motion sites adheres to guidelines and methods developed as part of the LTPP program. From 2008 to 2011, he served as Senior Engineer for the LTPP Southern Regional Support Contract (SRSC), where he has been involved in coordination and data analysis activities as well as the preparation of various draft chapters of the LTPP 20-year report. Finally, from 2011 to date, Dr. Rada has served as Senior Engineer for the LTPP TSSC contract, where he has been involved in the preparation of strategic plans and other higher-order activities.

In summary, Dr. Rada's involvement with the LTPP program covers more than 20 years, in excess of $40 million in fees, and the following nine contracts:

- U.S. Federal Highway Administration Technical Support Services Contract for the Long-Term Pavement Performance (LTPP) Program. 2011 to date.
- U.S. Federal Highway Administration Long-Term Pavement Performance (LTPP) Southern Regional Support (RSC) Contract. 2008 to 2011.
- U.S. Federal Highway Administration Long-Term Pavement Performance (LTPP) Specific Pavement Sites (SPS) Weigh-in-Motion Sites Assessment and Performance Evaluations Contract. 2003 to 2008.
- U.S. Federal Highway Administration Long-Term Pavement Performance (LTPP) Program Pavement and Traffic Engineering Technical Support Services Contract. 2002 to 2009.
- U.S. Federal Highway Administration Nationwide Long-Term Pavement Performance (LTPP) Studies and Traffic Engineering Services Contract. 1997 to 2002.
- U.S. Federal Highway Administration Long-Term Pavement Performance (LTPP) Program Technical Assistance Contract. 1992 to 1997.
- SHRP P-001B Technical Assistance to Long-Term Pavement Performance (LTPP) Program Contract. 1990 to 1992.
- SHRP P-001 Technical Assistance to Long-Term Pavement Performance (LTPP) Program. 1987 to 1990.
- NCHRP 20-20 (2) Overview and Integration Planning - National Strategic Highway Research (SHRP) Plan. 1985 to 1986.

Dr. Rada has also dedicated significant time to a number of other important state and national research projects. He is presently serving as Principal Investigator and/or Project Manager for the following projects:

- FHWA's "Guidance for Quality Management of Pavement Surface Condition Data Collection and Analysis." The objective of this research is to develop Quality Management Plan (QMP) guidelines for pavement surface condition data collection and analysis. Completion of the work is anticipated by September 2022 and Dr. Rada is serving as co-Principal Investigator leading technical activities associated with the project.
- NCHRP 20-50(19) "LTPP Data Analysis: Feasibility of Using LTPP Data to Develop Relationships Between Laboratory- and Field-Derived Properties of Unbound Materials." The objective of this research is to evaluate the feasibility of using Long-Term Pavement Performance (LTPP) data for developing relationships between laboratory and field derived properties of unbound materials used in pavements. Completion of the work is anticipated by July 2019 and Dr. Rada is leading all technical and management activities associated with the project.
- FHWA's "Interstate Highway Pavement Sampling." The objectives of the study are to: (1) collect a follow-up unbiased dataset for a statistically significant sample of the IHS and produce report indicating condition on IHS nationally and each State where data were collected, (2) further investigate whether or not HPMS is an unbiased representation of pavement condition on the IHS, (3) recommend further

improvements to HPMS data collection and reporting to either make HPMS unbiased or improve its precision and (4) pursue additional investigations such as performing a temporal analysis of 2015 and 2016 HPMS and LTPP data as compared to the data previously collected in 2015 for the Interstate Pavement Condition Sampling project. Completion of the work is anticipated by June 2019 and Dr. Rada is leading technical activities associated with the project.

- FHWA's "Development of Models and a Framework for a Unified Pavement Distress Analysis and Prediction System (UPDAPS) for Federal Highway Administration." The objective of this study is to gather user requirements, identify and adapt pavement distress analysis models and develop a framework to implement them in computer shared library or service that meets the technical requirements for UPDAPS for use within FHWA when using pavement distress data and making predictions of future conditions with or without treatments. The framework is to serve as a blueprint to implement the pavement distress analysis models in computer shared library or service that meets the technical requirements for a UPDAPS in a follow-on effort. Completion of the work is anticipated by July 2019 and Dr. Rada is leading technical activities associated with the project.
- Washington State DOT: "LTPP Forensic Evaluations." The purpose of this project is to investigate LTPP test sections as they prepare to go out-of-service, capturing data on exactly why the section failed and had to be removed from service. The range of activities that could potentially be carried out under this project include trenching and coring, measuring lift deflection, and lab testing of field samples for materials characteristics. Completion of the work is anticipated by October 2019 and Dr. Rada is leading all technical and management activities associated with the project.
- NCHRP 14-38 "Guide for Timing of Asphalt-Surfaced Pavement Preservation." The objective of this project is to develop a guide for identifying the timing for preservation of asphalt-surfaced pavements considering condition and non-condition-based factors. Completion of the work is anticipated by May 2018 and Dr. Rada is leading all technical and management activities associated with the project.
- FHWA's "Design of Pavement Preservation Experiment for the LTPP Program." The objective of this project is to design a pavement preservation experiment for the LTPP program, which when implemented will enable the pavement community to obtain long-term performance data on pavements that make use of the pavement preservation technology and which in turn will permit verification that pavement preservation is a viable technology over the long-term period. Completion of the work is anticipated by October 2017 and Dr. Rada is leading all technical and management activities associated with the project.

In addition, Dr. Rada is presently serving as Senior Engineer or Principal Engineer in the following research projects:

- NCHRP Project 20-07 Task 411 "Review and Update of AASHTO Standard Practice R 87." The objective of this project is to review and evaluate the provisions of AASHTO R87 standard practice pertaining to rutting and cross slope and recommend changes to the standard, as needed. The work is anticipated to be completed by July 2019 and Dr. Rada is responsible for will provide independent assurance of the work undertaken for the project.
- NCHRP Project 20-50(18) "LTPP Data Analysis: Significance of As-Constructed Asphalt Pavement Air Voids to Pavement Performance," The objective of this project is to determine the effect of in-place air voids on the performance of asphalt pavements using data from the LTPP program and other appropriate sources. The research will focus on four primary distress types related to asphalt pavement performance: rutting, fatigue cracking, transverse cracking, and ride. The work is anticipated to be completed by November 2019 and Dr. Rada is responsible for the direction and management of the

technical work conducted by the Wood team under contract to the University of Auburn's National Center for Asphalt Technology.

- FHWA's "EDC-4 Pavement Preservation When Where Support." The objectives of this project are to: (1) develop a Synthesis of Guidance for selection and evaluation of programs that include preservation as a strategic investment for pavements, (2) develop an effective tool for analyzing the long-term effectiveness of preservation strategies as investment program alternatives, (3) provide technology transfer to State agencies in strategic application of preservation practices, (4) research the emerging concepts of strategic investment as related to pavement preservation and preparing guidance and fundamental analysis procedures for including pavement preservation concepts in asset management, planning and programming strategies in transportation agencies, and (5) develop a synthesis of metrics used to calculate performance of preserved pavements and to determine network-level cost effectiveness of pavement preservation strategic programs. The work is anticipated to be completed by September 2019 and Dr. Rada is responsible for the direction of technical work conducted under Task 2 Preservation Guidance Materials.

Dr. Rada also served as Principal Investigator and Project Manager on the following recently completed projects:

- NCHRP 14-38 "Guide for Timing of Asphalt-Surfaced Pavement Preservation." The objective of this project was to develop a guide for identifying the timing for preservation of asphalt-surfaced pavements considering condition and non-condition-based factors. The work was completed in August 2018 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Design of Pavement Preservation Experiment for the LTPP Program." The objective of this project was to design a pavement preservation experiment for the LTPP program, which when implemented will enable the pavement community to obtain long-term performance data on pavements that make use of the pavement preservation technology and which in turn will permit verification that pavement preservation is a viable technology over the long-term period. The work was completed in October 2018 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Long-Term Pavement Performance Data Analysis Program – Validation of Pavement Performance Measures." The objective of this study was to use LTPP data to validate pavement performance indicator(s) and demonstrate their use within asset management. The work was completed in October 2017 and Dr. Rada is leading all technical activities associated with the project.
- FHWA's "Interstate Pavement Condition Sampling." The objectives of this project were to: (1) collect an unbiased baseline study of a statistically significant sample of the entire Interstate Highway System (IHS) and to produce a report indicating the pavement condition on the HIS nationally and in each State where data were collected, (2) determine if HPMS is an unbiased representation of the pavement condition of the HIS and (3) recommend improvements to HPMS data collection and reporting that are necessary to either make HPMS unbiased or to improve its precision. The work was completed in July 2017 and Dr. Rada led all technical and management activities associated with the project.
- NCHRP 14-33 "Pavement Performance Measures that Consider the Contributions of Preservation Treatments." The objectives of this research were to (1) identify and/or develop pavement performance measures that consider the contributions of preservation to performance, service life, and life-cycle costs and (2) prepare a guide document to facilitate implementation of these measures by state highway agencies. For the purpose of this research, preservation treatments are treatments applied to preserve an existing roadway, slow future deterioration, and maintain and improve its functional condition

(without substantially increasing structural capacity). The work was completed in April 2017 and Dr. Rada led all technical and management activities associated with the project.

- FHWA's "Identification of Effective Next Generation Pavement Performance Measures and Asset Management Methodologies to Support MAP-21 Performance Management Requirements." The objectives of this project were to (1) identify or conceptually develop more strategic performance measures, and their means of collection, in order to strengthen performance management and better link investments to long term performance and (2) identify or conceptually develop methodologies to enable full implementation of a comprehensive asset management plan, including trade-off analysis from a common ground among disparate assets that are traditionally individually assessed and managed. The work was completed in September 2016 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Application and Validation of Remaining Service Interval Framework to Pavements." The objectives of this project were to (1) developed detailed analysis methodologies for the new Pavement Remaining Service Interval (RSI) concept developed under the FHWA research effort titled "Definition and Determination of Remaining Service and Structural Life" and (2) apply and validate the developed methodologies using PMS data from a minimum of two State DOTs and the HPMS 2010+ data sets for national level analyses. The work was completed in August 2016 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Pavement Structural Evaluation at the Network Level." The objectives of this project were (1) to assess, evaluate and validate the capability of the RWD and the TSD (or other pavement response devices that can be reliably related to pavement structural condition) for pavement structural evaluation at the network level for use in pavement management application and decision making and (2) if one or more of the available devices are considered viable, to develop analysis methodologies for enabling their use in pavement management. The ultimate goal of the project was to establish a reliable measure of the structural condition of the pavement layer (all bound layers above the unbound base layer) as it deteriorates over time under traffic and environmental loading, based on moving pavement deflection technology. The work was completed in April 2015 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Development of Pavement Management Roadmap Implementation Plan." The objective of this effort was to develop and carry out a plan for the implementation of the FHWA's Pavement Management Roadmap, which was to rely on the creativity and resourcefulness of all those working in the pavement management community if the vision for pavement management over the next 10 years is to be realized. The work was completed in March 2014 and Dr. Rada led all technical and management activities associated with the project.
- FHWA's "Technologies to Determine Indicators for Pavement Preservation Strategies." The objective of this project was to identify those indicators that better characterize pavement condition, predict future deterioration (early/long-term indicators) and demonstrate their applicability in the selection and timing of pavement preservation strategies. In some cases, the technologies may already exist but not be generally used for pavement preservation programs; others include evaluation of tools under development such as GPR or RWD and how advances in other fields can be applied to pavement preservation needs. The work was completed in September 2013 and Dr. Rada led all technical activities associated with the project.
- NCHRP 01-49 "Guidelines for Conducting Forensic Investigation of Highway Pavements." The goal of this project was to develop guidelines for state departments of transportation for conducting forensic investigations of highway pavements. These investigations were to address acquiring and evaluating data to (1) identify the cause(s) of premature pavement failure, (2) understanding the factors

contributing to longevity of pavements, and (3) document/understand observed performance and support development and/or calibration of pavement performance prediction models (e.g., for use in local calibration of the Mechanistic-Empirical Pavement Design Guide (MEPDG)). The work was completed in November 2012 and Dr. Rada led all technical and management activities associated with the project.

- FHWA's "Improving FHWA's Ability to Assess Highway Infrastructure Health." The objectives of this project are to define a consistent and reliable method to document infrastructure health with a focus on pavement and bridges on the Interstate System and to develop tools to provide FHWA and State DOTs ready access to key information that will allow for better and more complete assessments of infrastructure health nationally. The ultimate goal is to evaluate how performance/condition data can be used for corridor and system management, and facilitate analysis of performance measures and system health for multi-state Interstate highway corridor. The work was completed in June 2013 and Dr. Rada provided support with the various activities, including leading a pilot study rutting bias study as well as development of the next generation pavement performance measure.
- FHWA's "Definition and Determination of Remaining Service and Structural Life." The objectives of this project was to develop broad definitions for remaining service life (RSL) that are consistent and unambiguous, review current and future data availability in defining the measures and processes for determining RSL, and develop procedures for determining RSL at both the project and network level to meet objectives in light of current and emerging design, contracting, maintenance and management practices. The work was completed in August 2012 and Dr. Rada provided support with the development of the guidelines for implementation of new procedures for determining RSL.
- FHWA's "Relating Ride Quality and Structural Adequacy for Pavement Rehabilitation/Design Decisions." The goal of this project is to identify and verify the relationship between ride quality and structural support or ride deterioration and structural adequacy, if any, using the LTPP and other pavement performance data sources to improve evaluation and use of pavement condition data in pavement rehabilitation and design decisions. The work was completed in April 2012 and Dr. Rada led all technical and management activities associated with the task order.
- FHWA's "The State-of-the-Technology of Moving Pavement Deflection Testing." The goals of this project were to determine whether or not the current moving deflection testing devices or those that may become available within the next five years can be put to good practical use and, if so, to provide guidelines on how best to utilize the available devices. Accomplishment of these goals required documenting the state-of-the-technology in moving deflection testing and assessing the best uses of the available technology as well as further research needs. The work was completed in January 2011 and Dr. Rada led all technical and management activities associated with the project.
- Wisconsin DOT's "Evaluation of Design Criteria and Field Performance of Rubblized Concrete Pavement Systems in Wisconsin." The objectives of this project are to develop guidance for pre-overlay concrete joint repair and consideration of the rubblized material in pavement design. This guidance is needed as a result of the poor performance of a number of HMA overlay over rubblized PCC pavements throughout the state. Completion of this work is anticipated by January 2015 and Dr. Rada is leading all technical and management activities associated with the project.

Dr. Rada has also recently served as Senior Engineer on the following FHWA projects:

- "Evaluation of LTPP Climatic Data for use in Mechanical-Empirical Pavement Design Guide (MEPDG) Calibration and other Pavement Analysis." The objectives of this project were to examine current and emerging needs in climate data collection and engineering indices for use in MEPDG calibration and other pavement analysis; to develop a methodology for characterizing location-specific historic climate

indices and to apply this new methodology to update the climate statistics in the LTPP database; to examine the need to add a climate-soils parameter such as the Thornthwaite Moisture Index (TMI) to the LTPP database; and to examine the need for continued location-specific solar radiation measurements to capture the effect of climate change on pavement and other infrastructure performance. This work was completed in June 2016 and Dr. Rada provided support with the various project activities.

From 2007 to 2008, Dr. Rada served as Principal Investigator for the U.S. Airfield Asphalt Pavement Technology Program's (AAPTP) "Performance Based Specifications for HMA Airfield Pavements" project. The objective of this study was to develop comprehensive guidance that ties operational requirements or airfield pavements to the technical specifications and discussions provided in FAA Specification P-410 and EB-59A Plant Mix Bituminous Pavement (SuperPave). Completion of this work was intended to will lay the foundation for development of performance based P-401 specifications that are based upon providing characteristics that satisfy the long-term operational needs of the airfield pavement users. In his role as Principal Investigator, he provided guidance, overview and quality assurance for all project activities including the literature search and interview with airport operators and aircraft manufacturers that will result in the initial definition of airport pavement performance based specifications; development of the operational characteristics that HMA pavements must provide throughout their life; identification of pavement performance measures during construction that will ensure that the operational characteristics will be maintained; documentation of relationship between operational requirements and pavement measures; identification of tests and/or methods to provide pavement characteristics related to the operational performance criteria; identification of additional research needs; preparation of reports; and coordination with the client.

From 2005 to 2007, Dr. Rada served as Principal Investigator under contract to the U.S. Federal Highway Administration—Central Federal Lands Highway Division for development of "Guidelines for Falling-Weight Deflectometer (FWD) Testing and Data Analysis." The purpose of this project was to develop a set of guidelines to ensure that FWD data collected for project development purposes as well as the associated analysis results are consistent, high-quality and responsive to the needs of the government. He was responsible for the research team charged with development of the guidelines. He provided guidance, overview and quality assurance for all project activities including state-of-the-art literature review, state-of-the-practice survey of highway agencies, coordination with the client, and technical work on development of the guidelines. During this same time period, he also served as Developer/Instructor under subcontract to the U.S. Federal Highway Administration for development of the National Highway Institute's course on "Analysis of New and Rehabilitated Pavement Performance with Mechanistic-Empirical Design Guide Software." In this role, he was involved in the development of the course material intended for training of highway agency personnel on the use of the "Mechanistic-Empirical Pavement Design Procedure" software that resulted from the NCHRP 1-37A project.

From 1998 to 2004, Dr. Rada served as Senior Transportation Specialist under subcontract to the U.S. Federal Highway Administration for "Professional Services and Program Support for OTA Program Development, Analysis, Conduct and Evaluation." His efforts on this project focused exclusively on helping the District of Columbia's Department of Transportation, in partnership with the Federal Highway Administration, to develop and implement a performance-based contract for the preservation and maintenance of assets comprising the District's National Highway System. This approach was the first of its kind in an urban setting. Dr. Rada was responsible for the team charged with the pavement structures component of the assets. He was directly involved in and provided guidance, overview and quality assurance for all project activities including development of the pavement performance measures and

levels of service for each performance measure; validation of the performance measures and levels of service based on a baseline condition assessment; review of quality of work and compliance of the preservation and maintenance contractor with performance measures as checked through annual condition assessments, which included the collection of pavement distress and roughness data for approximately 400 lane-miles within District of Columbia; and preparation of reports.

During the period of 1995 to 1998, Dr. Rada served as Principal Engineer and Project Manager for two projects under contract to the Montana Department of Transportation. In the first project, he was responsible for the development of an automated deflection analysis procedure (ADAP) to substantially automate the process of backcalculating layer moduli from measured deflection data in order to assess the structural capacity of pavement structures in Montana. For the second project, he was charged with the development of a procedure for the for correcting the temperature of asphalt concrete layers based on readily available weather station air temperature information and the measured surface temperature of the pavement. The resulting model was implemented within the automated deflection analysis procedure. In both projects, Dr. Rada was directly involved in as well as provided guidance, overview and quality assurance for all project activities including literature reviews; data analyses; procedure, model and software development; integration of software with the Montana DOT pavement asset database; coordination with the client, and preparation of reports.

In the role of Project Manager, Dr. Rada has also been responsible for the development of pavement design and analysis methodologies and developed pavement design and analysis software for a number of public agencies and national trade organizations. Between 1988 and 1991, for example, he was a member of the team that developed guidelines and methodologies for the rehabilitation of rigid pavement using asphalt concrete overlays for the National Asphalt Pavement Association, which were incorporated in the 1986 AASHTO Pavement Design Guide and are still in use throughout the country. This project entailed a comprehensive literature review; collection of pavement deflection and distress data at more than 100 sites throughout the country; data analysis and interpretation; model development and calibration; and report preparation. During the same period, 1988 to 1992, he was part of the team that developed a guide for the design of interlocking concrete paver block pavements for the National Concrete Masonry Association (now Interlocking Concrete Paver Institute), which is still presently used throughout the U.S. This project entailed a literature review; model and design software development; and report preparation. In addition, a follow-up project evaluated the performance of interlocking concrete paver block pavements at sites throughout the U.S. and Canada, which included the collection and analysis of pavement deflection and distress data.

Dr. Rada's first research effort after joining the consulting world was the non-destructive investigation of cracked and seated portland cement concrete pavements at Suffolk Municipal Airport in Suffolk, Virginia for the U.S. Federal Aviation Administration. His role was that of Project Manager and he was directly involved in and provided guidance, overview and quality assurance for all project activities including a literature review; pavement deflection and distress data collection activities; data analysis and interpretation; and report preparation. Although limited in scope, this project was the precursor to the work that eventually led to the National Asphalt Pavement Association (NAPA) guidelines and methodologies for the rehabilitation of rigid pavement using asphalt concrete overlays.

Between 1980 and 1986, while at the University of Maryland, Dr. Rada was involved in three important research efforts. The first one, in the role of Project Manager, was the development and implementation of a microcomputer solution of the project level PMS life cycle cost model for the Maryland State Highway Administration. The results from this project served as the basis for his Ph.D. dissertation. The second one, in the role of Research Assistant, was the dynamic characterization of typical base materials for the

Maryland State Highway Administration. The results from this effort have been incorporated into the various versions of the AASHTO Pavement Design Guide since 1986, including the soon-to-be-released Mechanistic-Empirical Pavement Design Guide developed under the NCHRP 1-37A project. The results from this effort also provided the basis for his Master's Thesis. The third one, in the role or Project Manager, was the overview and integration planning of the Strategic Highway Research Program (SHRP) pre-implementation activities under NCHRP Project Number 20-20(2), which led to the 20-year Long-Term Pavement Performance (LTPP) program.

Pavement Management Systems

Dr. Rada has been a leading figure and a world-renowned expert in the field of pavement management systems (PMS), having been involved in the development and/or implementation of more than 100 airfield, highway, port and bridge pavement management systems in the U.S. and throughout the world, either in role of Project Manager and/or Principal Engineer. His initial efforts in this area date to 1986, with the implementation of the PAVER mainframe system at Peterson Air Force Base in Colorado. A year later, in 1987, he worked on the development and implementation of a prototype Integrated Airport Pavement Management System (IAPMS) for J.F. Kennedy International Airport in New York for the Port Authority of New York & New Jersey (PANY/NJ). The success of this initial effort let to further development of and enhancements to the IAPMS as well as implementation at two other PANY/NJ airports in 1989: Newark Liberty International Airport in New Jersey and LaGuardia Airport in New York. Since then, Dr. Rada has continued to work on numerous PMS related activities at the PANY/NJ. In addition, starting in the early 1990s, his pavement management development and/or implementation work activities expanded to numerous other airport, highway, port, and bridge clients. They include:

- City of Chicago – Department of Aviation, Illinois, U.S.: O'Hare International and Midway International Airports.
- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: J.F. Kennedy International, Newark Liberty International and LaGuardia Airports.
- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: Port Newark and Port Elizabeth.
- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: George Washington Bridge, Bayonne Bridge, Goethals Bridge and Outerbridge Crossing.
- Dade County Aviation Administration, Miami, Florida, U.S.: Miami International Airport.
- Maryland Aviation Administration, U.S.: Baltimore/Washington International Airport.
- British Airport Authority, London, England: Heathrow and Gatwick International Airports
- Bahrain Civil Aviation Affairs, Bahrain: Bahrain International Airport.
- Brazilian Aeronautical Commission (INFREARO), Brazil: network of 62 airports including Rio de Janeiro's Galeao and Sao Paolo's Guarulhos International Airports.
- Maryland State Highway Administration, Maryland, U.S.: statewide highway pavement network.
- Port Authority of New York/New Jersey, New York and New Jersey, U.S.: J.F. Kennedy International Airport roadway pavement network.
- Delaware Department of Transportation, Delaware, U.S.: statewide highway pavement network.
- Peterson Air Force Base, Colorado, U.S.: airfield, roadway and parking pavement networks.
- Maryland State Highway Administration, Maryland, U.S.: Baltimore county roads.
- City of Lakeland, Florida, U.S.: city pavement network.
- Roanoke Regional Airport, Virginia, U.S.: airfield and roadway pavement networks.
- Toll Road Investors Partnership II (TRIP II), Virginia, U.S.: Dulles Greenway toll road pavement network.

- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: George Washington Bridge.
- Port Authority of New York and New Jersey, New York and New Jersey, U.S: La Guardia International Airport PMS traffic update.
- Cheyenne Mountain Air Force Station, U.S. Air Force, Colorado Springs, Colorado, U.S.: roadway and parking lot pavements.
- Vandenberg Air Force Base, U.S. Air Force, Lompoc, California, U.S.; airfield pavements.
- Beale Air Force Base, U.S. Air Force, Marysville, California, U.S.; airfield, road and parking lot pavements.
- Joint Base San Antonio - Fort Sam Houston, San Antonio, Texas, U.S.; roadway and parking lot pavements.
- Camp Bullis, San Antonio, Texas, U.S.; roadway and parking lot pavements.
- Avon Park Air Force Range, Avon Park, Florida, U.S., airfield, road and parking lot pavements.
- Cape Canaveral Air Force Station, Cape Canaveral, Florida, airfield pavements.
- Patrick Air Force Base, Melbourne, Florida; airfield, road and parking lot pavements.
- Keesler Air Force Base, Harrison County, Mississippi; airfield, road and parking lot pavements.
- Seymour Johnson Air Force Base, Wayne County, North Carolina, U.S.; airfield, road and parking lot pavements.
- Los Angeles Air Force Base, El Segundo, California, U.S.; road and parking lot pavements.
- Nellis Air Force Base, Las Vegas, Nevada, U.S.; airfield, road and parking lot pavements.
- Shaw Air Force Base, Sumter, South Carolina; airfield, road and parking lot pavements.
- Ascension Auxiliary Air Field on Ascension Island, U.S.; airfield, road and parking lot pavements.
- Buckley Air Force Base in, Aurora, Colorado, U.S.; road and parking lot pavements.
- United States Air Force Academy, Colorado Springs, Colorado, U.S.; airfield, road and parking lot pavements.
- Randolph Air Force Base, San Antonio, Texas, U.S.; airfield, road and parking lot pavements.
- Columbus Air Force Base, Columbus, Mississippi, U.S.; airfield, road and parking lot pavements.
- Shuqualak Auxiliary Airfield (Shuqualak), Shuqualak, Mississippi, U.S.; airfield pavements.
- Robins Air Force Base, Warner Robins, Georgia, U.S.; road and parking lot pavements.
- Holloman Air Force Base, Alamogordo, New Mexico, U.S.; airfield pavements
- Spangdahlem Air Base, Spangdahlem, Germany; airfield, road and parking lot pavements.
- Aviano Air Base in Aviano, Italy; airfield, road and parking lot pavements.
- Royal Air Force Lakenheath, Lakenheath, United Kingdom; airfield, road and parking lot pavements.
- Pittsburgh International Airport Air Reserve Station, Pittsburgh, Pennsylvania, USA; airfield pavements.
- Maxwell Air Force Base, Montgomery, Alabama, USA; road and parking lot pavements.
- Hill Air Force Base, Ogden, Utah, USA; road and parking lot pavements.
- Kirtland Air Force Base, Albuquerque, New Mexico, USA; road and parking lot pavements.
- Air Force Plant 42 (Plant 42), Palmdale, California, USA; road and parking lot pavements.
- Edwards Air Force Base, Rosamond, California, USA; road and parking lot pavements.
- Tinker Air Force Base, Oklahoma City, Oklahoma, USA; road and parking lot pavements.
- Eglin Air Force Base - Duke Field, Crestview, Florida, USA; road and parking lot pavements.
- Eglin Air Force Base, Niceville, Florida, USA; road and parking lot pavements.
- Royal Air Force Base Fairford, Fairford, United Kingdom; road and parking lot pavements.
- Royal Air Force Mildenhall, Suffolk, United Kingdom; airfield pavements.
- Morón Air Base (Morón), Sevilla, Spain; airfield, road and parking lot pavements.
- Barksdale Air Force Base in Bossier City, Louisiana, U.S.; airfield, road and parking lot pavements.

- Hurlburt Field, Mary Esther, Florida, U.S.; airfield, road and parking lot pavements.
- Joint Base San Antonio-Lackland Air Force Base / Kelly Field, near San Antonio, Texas, U.S.; airfield, road and parking lot pavements.
- Yokota Air Base, Fussa, Japan; airfield, road and parking lot pavements.
- Ramstein Air Base, Kaiserslautern, Germany; road and parking lot pavements.
- Little Rock Air Force Base, Jacksonville, Arkansas, USA; airfield, road and parking lot pavements.
- Offutt Air Force Base, Omaha, Nebraska, USA; road and parking lot pavements.
- Luke Air Force Base and Gila Bend Auxiliary Airfield, Phoenix, Arizona, U.S.; airfield, road and parking lot pavements.
- Incirlik Air Base, Adana, Turkey; airfield, road and parking lot pavements.
- Misawa Air Base near Misawa, Japan; road and parking lot pavements.

The above list of projects includes many of the largest and busiest airports in the world, including J.F. Kennedy International Airport in New York, O'Hare International Airport in Illinois, Miami International Airport in Florida and Heathrow International Airport in London, which are in the top ten. In summary, Dr. Rada's involvement with pavement managements systems covers more than 30 years, in excess of $15 million in fees, and dozens of contracts.

In all of his PMS-related projects, Dr. Rada has been/is directly involved and provided/provides guidance, overview and quality assurance for all activities including pavement inventory and condition data collection and ground truth surveys; data analyses; development of maintenance and rehabilitation (M&R) policies, priority schemes and cost information; update of PMS database; generation of multi-year M preparation of reports; client coordination activities; and training of client staff. In addition, for many of the referenced clients, he has been a key part of the team responsible for the development and/or customization of the PMS software, including its database, analysis and forecasting routines, and reporting capabilities.

Pavement Evaluation, Design and Rehabilitation

Dr. Rada's project responsibilities have included the evaluation and development of rehabilitation recommendations for thousands of miles of roads, airfield and port pavements. From 1986 to 1987, in his first pavement evaluation and rehabilitation project, he served as Project Manager on the "Interstate and Primary Road Rehabilitation Investigations" for the Virginia Department of Highways and Transportation. This project involved the evaluation of hundreds of miles of interstate and primary roads using non-destructive deflection testing to assess the structural capacity of the pavements, and on the basis of those data, to develop rehabilitation recommendations. Besides the collection and analysis of data, this project also involved the preparations of numerous reports and the coordination with Virginia highway personnel, both at the state and district levels.

Dr. Rada's next pavement evaluation and rehabilitation project, from 1986 to 1987, involved the structural evaluation of thousands of miles of paved and unpaved roads in Texas, New Mexico, Arizona and Montana as part of the U.S. Air Force Ballistic Missile Office's "Midgetman Missile Deployment Roads (Small Inter-Continental Ballistic Missiles) – Life Cycle Cost Analyses" project. He served as Senior Pavement Engineer on the project and was responsible for the collection and analysis of thousands of FWD tests; development of sophisticated software to assess the load-carrying capability of the roads in real time taking into account actual on-site environmental conditions; advance roadway structural analyses and life cycle cost analyses; and the preparation of numerous reports.

Subsequent to those initial projects, he has performed numerous other evaluations, design and rehabilitation projects involving dozens of clients and millions of dollars in fees. His role on these projects has been that of Program Manager and/or Principal Engineer, and his list of clients and projects includes:

- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: Pavement smoothness testing and inspection services for John F. Kennedy International, LaGuardia and Newark International Airports as well as bridges and tunnels in New York and New Jersey.
- City of Chicago – Department of Aviation, Illinois, U.S.: Pavement evaluation of Runway 13C/31C and "Bullseye" at Midway International Airport and development of rehabilitation recommendation including construction sequencing, preliminary engineering estimate and scheduling for recommended options.
- Miami Dade County Aviation Administration, Florida, U.S.: Pavement condition evaluation of Homestead Air Force Base.
- Bovis Construction Ltd., England: London Heathrow International Airport - Terminal T5 aircraft pavement options study.
- Sir Alexander Gibb & Partners Ltd, England: Verification of airfield pavement designs for the Al Yamamah Project, Sulayyil Air Base in Saudi Arabia.
- Delaware Department of Transportation, Delaware, U.S.: Roughness and surface distress condition testing for more than 1,100 miles of the state's roadway network.
- Maryland State Highway Administration, Maryland, U.S.: Pavement testing and evaluation of four asphalt overlay projects on State Highways 355 and 191 in Montgomery County to assess functional/structural conditions and develop rehabilitation recommendations.
- Metropolitan Washington Airport Authority, Washington, D.C., U.S.: Non-destructive deflection testing and structural evaluation of pavements at Ronald Reagan Washington National Airport.
- Miami Dade Aviation Department, Florida, U.S.: Pavement evaluation studies at Miami International Airport.
- Miami Dade Aviation Department, Florida, U.S.: Master Record Update for Miami International Airport (MIA) Runways: ACN/PCN Values.
- Reliable Mechanical, Inc., Delaware, U.S.: Pavement evaluation of Dover Air Force Base in Delaware.
- Toll Road Investors Partnership II (TRIP II), Virginia, U.S.: Pavement inspections of Dulles Greenway toll road network.
- Maryland Port Authority Development, Maryland, U.S.: Development of Port Pavement Analysis System (PortPAS) software for Dundalk Marine Terminal facilities to enable rapid analysis of impact of traffic changes and utilization changes on existing or new pavement structures and provide initial rehabilitation schemes for structurally deficient pavements.
- Misener Marine Construction, Inc., Freeport, Bahamas: Nondestructive deflection testing of concrete paver block pavements at 644 test locations (basins, joints and corners) for container facility at the Port of Freeport.
- Massachusetts Turnpike Authority, Massachusetts, U.S.: Pavement profile testing and analysis for 356 lane miles of the Massachusetts Turnpike.
- Williamsport Municipal Airport, Montoursville, Pennsylvania, U.S.: Pavement condition survey and development of M&R recommendations for runway experiencing flooding during extreme weather conditions.
- Ontario County, New York, U.S.: Non-destructive structural evaluation for 13 lane-miles of County Road 6.
- Dulles Greenway, Virginia, U.S.: Non-destructive deflection and profile testing to determine the structural capacity, subgrade modulus and ride quality of the toll road pavement network.

- Atlantic County, New Jersey, U.S.: Pavement structural and remaining life evaluation of five county roads.
- Transportation Engineering, Inc. for U.S. Army Corps of Engineers, Florida, U.S.: Pavement evaluations over time along a 7-mile stretch of SW 8th Street in Miami, Florida to determine impacts of rising ground water table.
- Australian Road Research Board, Australia: Pavement consulting services and provision of equipment required to establish the FWD calibration center in Australia in accordance with the Federal Highway Administration's Long-Term Pavement Performance protocol.
- Dynatest Calibration Center Quality Assurance Review, Starke, Florida, U.S.: Quality assurance (QA) reviews of Dynatest FWD calibration center to ensure adherence with the Federal Highway Administration's Long-Term Pavement Performance protocol.
- Misener Marine Construction, Inc., Bahamas: PCC pavement evaluations at the Port of Freeport.
- Maryland Port Authority, Maryland, U.S.: Pavement study of Dundalk Marine Terminal.
- Metropolitan Washington Airport Authority, Washington, D.C., U.S.: Design of overlay for Runway 18-36 at Washington National Airport.
- Port Authority of New York and New Jersey, New York and New Jersey, U.S.: Dynamic characterization of subgrade soils at J.F. Kennedy International, LaGuardia and Newark International Airports from FWD deflection data.
- Port Authority of the Cayman Island, Grand Cayman, Cayman Islands: Evaluation of pavements at the Port Authority Cargo Distribution Center and development of remedial measures to restore pavements.
- Consolidated Rail Corporation, Pennsylvania, U.S.: Evaluation of pavements at Riverside Drive in Bethlehem, Pennsylvania.
- Airborne Express, Ohio, U.S.: Pavement evaluation of Airborne Airpark.

In most of these projects, Dr. Rada has been directly involved and provided guidance, overview and quality assurance for all activities including data collection activities and review of resulting data; pavement structural and functional evaluations; development of rehabilitation alternatives and recommendation of optimal solution based on life-cycle cost analyses and project constraints; preparation of reports; and client coordination activities.

Expert Consultant and Witness

Throughout his career, Dr. Rada has been involved in a number of expert consultant and witness projects both in the U.S. and abroad. In 2007, the law firm of Gilbert + Tobin retained his services to prepare a report of expert opinions on the pavement engineering aspects of airfield pavements as they relate to the dispute between Virgin Blue Airlines Pty Limited (Virgin Blue) and Sidney Airport Corporation Ltd. (SACL) concerning the basis for utilization charges to the airline at Sydney (Kingsford Smith) Airport (Sydney Airport) in Australia. Virgin Blue, through the Australian Competition and Consumer Commission (Commission), wanted to have SACL change its methodology for user charges of the domestic airside services at Sydney Airport from a "per passenger" basis to one based on "maximum take-off weight" (MTOW) with specified charges on a per ton basis. The expert report he prepared on behalf of Virgin Blue addressed his opinions on two matters: (1) pavement engineering basis for allocating airfield pavement costs, and more specifically the cost of constructing the airfield pavement and maintaining those pavements and (2) statements made by the SACL hired independent expert regarding airfield costs and cost drivers. The parties involved in the arbitration proceedings settled, with both agreeing to revert to a weight-based charge for take-off and landing at a price acceptable to both parties.

In 2002, the law firm of Charles F. Mertz & Associates, PLLC retained Dr. Rada as an expert witness to provide testimony on the matter of "Reliable Mechanical, Inc. vs. Materials Testing, Inc., Case No. 99-CI-

02800, Jefferson Circuit Court, Louisville, Kentucky" concerning pavement failures at Dover Air Force Base in Delaware, U.S. As part of the dispute, he provided expert testimony on behalf of Reliable Mechanical, Inc. for several hours under deposition as well as reviewed and commented on the opinions of the expert retained by Materials Testing, Inc. The dispute was scheduled to go to trial in 2003, but it was postponed without resolution due to the bankruptcy filings by one of the parties involved.

In 1998, the Inter-American Development Bank (IDB) retained the services of Dr. Rada as an independent consultant to provide expert opinions related to pavement failures that occurred on "La Cuchilla-Sonsonate-Acajutla" and "Acajutla-La Libertad" roadway rehabilitation projects, which represent the primary links between San Salvador (the nation's capital) and Acajutla and La Libertad (the country's two main ports) in El Salvador. As part of this engagement, he reviewed construction information as well as laboratory and field test data provided by the IDB; performed various pavement damage analyses and formulated possible pavement failure mechanisms; visited the projects in question and requested additional field data to confirm failure mechanisms; and prepared an expert report. After completion of the report, he returned to El Salvador to present his opinions to government personnel, including El Salvador's Transportation Minister (Secretary), as well as IDB staff and representatives of the construction parties involved in the two rehabilitation projects. Many of his recommendations were adopted subsequent to his presentation of expert opinions.

Between 1985 and 1986, Dr. Rada was part of the team retained by the law firm of Kirkland-Ellis/in Chicago, Illinois on behalf of the AMOCO Oil Company to provide expert testimony relating to road damages associated with AMOCO-Cadiz oil spill off the coast of Normandy, France. His participation on this effort included support with planning of pavement condition data collection activities; analyses of field data as well as life cycle cost analyses and Monte Carlo simulations; and preparation of testimony material. The team's effort resulted in a significant reduction in moneys requested by and awarded to the government of France for retribution of damages caused to the roads by the AMOCO-Cadiz oil spill.

In addition to his expert project work, Dr. Rada has also been invited to participate in a number of important expert workshops intended to set the course of research and/or state-of-the-practice in the U.S. They include:

- FHWA/NSF Workshop on Future Directions for Long-Term Bridge Performance (LTBP) Monitoring, Assessment, and Management, Las Vegas, Nevada, January 9-10, 2007.
- Workshop on Pavement Smoothness, NCHRP Project 20-50 (01), Irvine, California, August 26-28, 2001.
- Simple Performance Tester for SuperPave Mix Design Workshop, NCHRP Project 9-29, Washington, D.C., May 30, 2001.
- Strategic Plan for Pavement Research Workshop, NCHRP Project 20-7 (127), Irvine, California, October 1-3, 2000.
- Workshop on Improved Pavement Design, NCHRP Project 20-7 (77), Irvine, California, March 24-26, 1996.

The FHWA/NSF workshop, for example, represents a part of the pre-implementation activities for the twenty-year, multi-million-dollar Long-Term Bridge Performance (LTBP) program, which is intended to answer the questions of how bridges perform and why they perform as they do as well as to provide bridge engineers and managers with the tools for better designing, maintaining, rehabilitating and managing bridges. Likewise, the two NCHRP Project 20-7 workshops provided much of the vision, guidance and foundation that went into the eventual development of the Mechanistic-Empirical Pavement Design Guide by the NCHRP 1-37A team.

Early in his career, in 1981, Dr. Rada also served as a consultant to the American Railroad Association, dealing exclusively with issues relating to disputes between the railroad and trucking industries concerning pavement damage.

Teaching and Training

Dr. Rada has done extensive teaching and training throughout his career. In 1990, he was a Visiting Lecturer at the University of Maryland's Department of Civil engineering where he taught two courses: Highway and Airfield Pavement Design (Spring 1990) and Fundamental of Engineering Materials (Fall 1990), which was carried on the university's instructional television system. Prior to that, from 1980 to 1986, he served as Faculty Research Associate at the University of Maryland's Department of Civil Engineering and was responsible for teaching the same two courses: Highway and Airfield Pavement Design (Spring 1986) and Fundamental of Engineering Materials (Spring and Fall 1981; Spring, Summer and Fall 1982; Spring and Summer 1983; and Spring 1985). He also served as Teaching Assistant during that same time period, and was involved in teaching various classes for a number of courses including Dynamic Testing of Pavement Materials (Spring 1984), Advanced Pavement Design (Springs of 1983 and Spring 1984), Highway and Airfield Pavement Design (Springs of 1980, 1981, 1983 and 1984) and Engineering Soil Tests (Spring 1981).

While at the University of Maryland, Dr. Rada also served as Training Coordinator for the Department of Civil Engineering's Transportation Studies Center from 1983 to 1986. Among his various responsibilities were the coordination and arrangement of following two- to four-day short-courses: Traffic Control Devices (September 1983); Traffic Engineering Short Course (October 1983 and October 1984); Marshall Mix Design for Asphalt Concrete (January 1984, 1985 and 1986); Critical Lane Analysis (February 1984); Asphalt Pavements, Maintenance and Management (October 1984); and Project Level PMS Life Cycle Cost Model (May 1985).

Dr. Rada has also provided training at various other courses and workshops throughout his career. They include:

- Pavement Rehabilitation and Construction Course, University of Wisconsin-Madison, Madison, Wisconsin, 1993.
- Effective Pavement Rehabilitation Course, University of Wisconsin-Madison, Madison, Wisconsin, 1991.
- Airfield Structural Pavement Design Workshop, the Asphalt Institute, College Park, Maryland, 1988.
- Highway Structural Pavement Design Workshop, the Asphalt Institute, College Park, Maryland, November 1988.
- Asphalt Pavement Thickness Design Seminar, the Asphalt Institute, Annapolis, Maryland, 1997 and Pittsburgh, Pennsylvania, 1987.
- Asphalt Pavements – Materials, Construction, Maintenance and Pavement Management, Short-Course, the Asphalt Institute, Baltimore, Maryland, 1987.

In addition, Dr. Rada has provided extensive training as part of his pavement research and PMS projects work. He has, for example, taught numerous training sessions for LTPP headquarter and contractor staff and has made numerous technical presentations on all aspects of the LTPP program at local and national LTPP meetings, TRB Committees, National Academy of Sciences Expert Task Groups, LTPP Advisory Committee and at industry conferences. He has also made dozens of technical presentations on a broad range of pavement engineering topics and at venues throughout the world; a list of these presentations is provided in the next section.

Continued...

Qualifications

Education

- Doctor of Philosophy (PhD), Civil Engineering, University of Maryland, 1985
- Master of Science, Civil Engineering, University of Maryland, 1981
- Bachelor of Science, Civil Engineering - cum laude, University of Maryland, 1979

Registrations / Certifications / Licenses

- Professional Engineer - Civil, IL, 62-047592
- Professional Engineer - Civil, MD, 19700
- Professional Engineer - Civil, VA, 023674
- Professional Engineer - Civil, FL, 63759
- Professional Engineer - Civil, NY, 085169