

CURRICULUM VITAE

RAJIB B. MALLICK, PH.D., PE

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EDUCATION

Ph.D., Civil Engineering, Auburn University, AL, USA, 1997  
M.S., Civil Engineering, Auburn University, AL, USA, 1993  
BCE (Hons.), Civil Engineering, Jadavpur University, Calcutta, India, 1989

WORK EXPERIENCE

2004 - Present, Associate Professor, Civil and Environmental Engineering, Worcester Polytechnic Institute (WPI), Massachusetts, USA  
1998 - 2004, Assistant Professor, Civil and Environmental Engineering, WPI  
1996 - 1998, Senior Research Associate, National Center for Asphalt Technology (NCAT), Auburn University, Alabama  
1992 - 1996, Graduate Research Assistant, NCAT, Auburn University, Alabama.  
1989 - 1992, Assistant Civil Engineer, Ghosh, Bose and Associates, Calcutta, India

RESEARCH INTERESTS

My main research interests are in the optimum utilization of natural resources, understanding the interaction of the built environment and nature, and sustainable construction, specifically related to the pavement industry.

My work focuses on experiments and modeling/simulation on understanding of thermal profiles in paving materials, reducing the urban heat island effect, and harvesting energy from pavements, and understanding and modeling the behavior of recycled materials to effectively reach 100 percent recycling in the pavement industry.

For these topics, I am either the only one or the earliest one to start research in the US.

RESEARCH GRANTS

- Capturing Solar Energy and Reducing Urban Heat Island Effect of Pavements, Massachusetts Technology Collaborative
- Warm Mix Asphalt Pavement for 100% Recycled Pavements, Maine Department of Transportation
- Development of Specification Guidelines for Full Depth Reclamation Using the Ground Penetrating Radar and Portable Seismic Property Analyzer, Maine Department of Transportation
- MRI: Acquisition of Non Destructive Testing Equipment for Pavement Research and Education, National Science Foundation
- Development of a Rational and Practical Mix Design System for Full Depth Reclamation (FDR), Federal Highway Administration

- Development of Rut Resistant Hot Mix Asphalt (HMA) for Logan International Airport, Massport
- Joint Networked Research Center on Highways and Airport Pavement Engineering, Indo-US Science Forum
- Permeability of Asphalt Pavements, and Development of a Field Permeameter, New England Transportation Consortium
- Use of Manufactured Waste Shingles in Paving Mixtures, Chelsea Center for Recycling and Economic Development, University of Massachusetts
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- Use of Synthetic Aggregates from Waste Fly Ash and Plastics in Paving Mixes, Chelsea Center for Recycling and Economic Development, University of Massachusetts
- Improved Performance of Longitudinal Joints on Asphalt Airfield Pavements, Federal Aviation Administration
- Instrumentation and Analysis of Pavement Response Data and Use of Nondestructive Testing to Improve Pavement Design, Maine Department of Transportation
- Evaluation of Subgrade Soils in Maine and Verification of Full Depth Reclamation Mix Design System, Federal Highway Administration/Maine Department of Transportation
- Structural Strength and Design of Recycled Layers in Pavements, Maine Department of Transportation

Total funding generated in ten years: \$1.9 million

#### PATENTS

US Patent 6,622,569: Instrumented Mold for Use in Material Testing Equipment for Measurement of Material Properties

#### TEACHING INTERESTS

Pavement engineering and topics that explore the effects of paving on the environment, and ways to minimize the impact of paving on the environment.

Pavement Engineering: Materials, Design, Construction and Management; Soil Mechanics

Advanced concepts for design, materials and construction of highway and airport pavement

Environmental Factors Affecting Civil Engineering Structures: Theory and Measurement

Effective use of Environmental/Climatic data sources for understanding the effect of civil engineering projects on the environment and developing energy efficient, energy producing and environment friendly solutions

Recycling, green house gas emissions from paving, and guide for green engineering pavements

*Selected funded teaching projects:*

Development of a Guide for Green Pavements (LEED system) in Canada (Stantec)

Research Experience for Undergraduates – Environmental and Transportation Engineering for Women and Minorities (Co-PI with Professor Jeanine Plummer, NSF)

Using Kolb's Cycle to Develop Skills for Life Long Learning (NSF)

Development of a Laboratory and Field Based Coursework for Asphalt Technology (NSF)

Development of Pavement Recycling Training Course (FHWA)

Total educational projects related funding generated in ten years: \$495K from NSF and FHWA.

Teaching Related Publications

**Text book:** Rajib B. Mallick and Tahar El-Korchi. Pavement Engineering: Principles and Practice. Taylor and Francis/CRC Press LLC, ISBN-10: 1420060295, ISBN-13: 978-1420060294, September, 2008.

**Book Chapter:** Rajib B. Mallick. Chapter on Emerging Materials in Asphalt, in Emerging Materials for Civil Infrastructure: State of the Art, Roberto A. Lopez-Anido, Editor and Tarun R. Naik, Editor, American Society of Civil Engineers, 2000.

**Reference Manual:** Prithvi S. Kandhal and Rajib B. Mallick. Recycling of Asphalt Pavements, for State and Local Government, Participant's Reference Book, Publication for the Federal Highway Administration, FHWA-SA-98-042, Washington, D. C, 1998.

Course Developed

**Course Developed at WPI:** Undergraduate courses: Pavement Engineering, Bituminous Materials Laboratory; Graduate courses: Advanced Pavement Design for Highways and Airports, Pavement Material Characterization

**Course Developed at the National Center for Asphalt Technology (NCAT) (with Elton Ray Brown):** Professor Training course on Asphalt Technology

**Papers in Journals and Conference Proceedings:**

Rajib B. Mallick and Paula. Quinn. Use of Kolb Cycle and Digital Video Lectures for Enhancement of Learning and Learning Attitude. Proceedings of the ASEE Regional Conference, Worcester, MA, March, 2006.

Rajib B. Mallick, Paul Mathisen and Malcolm Fitzpatrick. Opening the Window of Sustainable Development to Future Civil Engineers, ASCE Journal of Professional Issues in Engineering Education and Practice, Volume 128, No. 4, October 2002.

Rajib B. Mallick. Development of a Field and Laboratory Based Coursework in Asphalt Technology. Proceedings of the ASEE Annual conference in Albuquerque, NM, June, 2001.

ORGANIZATIONAL WORK

Co-director of Indo-US Joint R & D Networked Center on Highway & Airport Pavement Engineering, with IIT-Kharagpur and IIT-Madras, India, and University of Texas, El Paso, 2008-

2010.

Co-organized, with Dr. Animesh Das of IIT-Kanpur, India, the first national workshop on pavement recycling in India, February, 2005.

Chaired session in the First International Symposium on Long Lasting Asphalt Pavements, Auburn University, June 2004.

Chaired session in the Conference on Environmentally Conscious Manufacturing, Boston, November 2000.

Chaired session for Recycling of Asphalt Pavement at the 5<sup>th</sup> ASCE Materials Engineering Conference in Cincinnati, OH, 1999.

#### UNIVERSITY SERVICE

Member of the Presidential commission on Graduate Studies and Research for WPI

Member of Committee on Graduate Studies and Research at WPI

Member of Curriculum Assessment Committee (CAC) of Civil and Environmental Engineering (CEE) Department at WPI

#### HONORS

Runner-up for W.J. Emmons Award for Best Technical Paper, Association of Asphalt Paving Technologists.

Three senior projects have been awarded the Provost's award at WPI

Appointed as an Associate Graduate Faculty Member in the Civil and Environmental Engineering Department, University of Maine, Orono

#### REFEREE SERVICES

Journal of Transportation Research, Transportation Research Board

ASCE Journal of Construction Engineering and Management

ASCE Journal of Materials in Civil Engineering

ASTM Journal of Testing and Materials

Association of Asphalt Paving Technologists (AAPT)

International Journal of Pavement Engineering,

#### MEMBERSHIP

American Society for Testing and Materials, Committee E 60 on Sustainability, and Committee D04, Road and Paving Materials

International Society for Asphalt Pavements (ISAP), Committee on New Technologies and Special Environment Aspects of Asphalt Pavements

Transportation Research Board Committee AFK30, Characteristics of Non-bituminous Components of Bituminous Paving Mixtures

Association of Asphalt Paving Technologists

ASCE Transportation and Development Institute (T&DI) Airfield Committee

Bituminous Mix Testing and Evaluation Consortium for MassPort's Logan International Airport

Sigma Xi

### CONSULTANT WORK

Assessment of FAA HMA Overlay Procedures, Applied Pavement Technology, Inc, Federal Aviation Administration/AAPTP Project 06-07

Pavement Design and Construction for Rehabilitation of Runway for Logan International Airport, Boston, MA, HNTB

Alternative, Environment Friendly (Warm Mix) Asphalt for Logan International Airport, Boston, MA, Stantec

Design and testing of high performance paving mixes for airport pavement in Logan International Airport, Boston, MA, ATC

Relationship between Superpave Gyrotory Compaction Properties and Permanent Deformation of Pavements in Service. Asphalt Institute, National Cooperative Highway Research Project (NCHRP) 9-16.

Fuel Resistant Airport Pavements, CITGO

### **RESEARCH PUBLICATIONS**

#### *Refereed Journals*

1. Bao-Liang Chen, Sankha Bhowmick, and Rajib B. Mallick. A Laboratory Study on Reduction of the Heat Island Effect of Asphalt Pavements. Accepted for Publication in the Journal of Asphalt Paving Technologists Association, AAPT, Volume 78, 2009.
2. Rajib B. Mallick, Prithvi S. Kandhal and Richard L. Bradbury. Using Warm Mix Asphalt Technology to Incorporate High Percentage of Reclaimed Asphalt Pavement (RAP) Material in Asphalt Mixtures. Journal of Transportation Research Board, National Research Council, Washington, D.C, 2008 (in print).
3. Bao-Liang Chen, Laura Rockett and Rajib B. Mallick. Laboratory Investigation of Temperature Profiles and Thermal Properties of Asphalt Pavements with Different Subsurface Layers. Journal of Association of Asphalt Paving Technologists (AAPT), Volume 77, 2008.
4. Sudip Bhattacharjee, Rajib B. Mallick and Jo Sias Daniel. Small Scale Accelerated Pavement Testing in the Laboratory for the Fatigue Characterization of Hot Mix Asphalt. Geotechnical Special Publication. American Society of Civil Engineers, 2008.

5. Lauren Swett, Rajib B. Mallick and Dana Humphrey. A Study of Temperature and Traffic Load Related Response in Different Layers in an Instrumented Flexible Pavement. International Journal of Pavement Engineering, October 2007.
6. Rajib B. Mallick, Julie E. Bradley and Richard L. Bradbury. An Evaluation of Heated Reclaimed Asphalt Pavement (RAP) Material and Wax Modified Asphalt for Use in Recycled Hot Mix Asphalt (HMA). Journal of Transportation Research Board, 1998, National Research Council, Washington, D.C 2007.
7. Rajib B. Mallick, Julie E. Bradley and Soheil Nazarian. Evaluation and Recommendation of a Fast Nondestructive Test and Analysis Method for In-Place Determination of Stiffness of Subsurface Reclaimed Layers in Thin Surface Hot Mix Asphalt (HMA) Pavements. In Journal of Transportation Research Board, TRR 1949, National Research Council, Washington, D.C. 2006.
8. Rajib B. Mallick and Jo Daniel, Development and Evaluation of a Field Permeameter as a Longitudinal Joint Quality Indicator International. Journal of Pavement Engineering, Volume 7, Number 1, March 2006.
9. Rajib B. Mallick, A. Das and S. Nazarian. Use of a Fast Non Destructive Field Test Method for Determination of Stiffness of Subsurface Layer in Thin Surface Hot Mix Asphalt (HMA) Pavement. Journal of Transportation Research Board No. 1905, National Research Council, Washington, D.C., 2005.
10. Rajib B., Mallick, Robert Pelland and Frederick Hugo. Use of Accelerated Loading Equipment for Determination of Long Term Moisture Susceptibility of Hot Mix Asphalt, International Journal of Pavement Engineering, Volume 6, Number 2, June, 2005.
11. Sudip Bhattacharjee, Jonathan S. Gould, Rajib B. Mallick, Frederick Hugo. An Evaluation of Use of Accelerated Loading Equipment for Determination of Fatigue Response of Asphalt Pavement in Laboratory. In the International Journal of Pavement Engineering, Volume 5, Number 2, June 2004.
12. Rajib B. Mallick and Grant Hendrix, Jr. Use of Foamed Asphalt in Recycling Incinerator Ash for Construction of Pavement Base Course. Journal of Resources, Conservation and Recycling 42, ELSEVIER, 2004.
13. Rajib B. Mallick and Elton Ray Brown. An Evaluation of Superpave Binder Aging Methods. International Journal of Pavement Engineering, Volume 5, Number 1, March, 2004.
14. Rajib B. Mallick, Fred Hooper, Sean O'Brien, Mohsen Kashi. Evaluation of Use of Synthetic Lightweight Aggregate (SLA) in Hot Mix Asphalt. Journal of Transportation Research Board No: 1891, Transportation Research Board, National Research Council, Washington, D. C., 2004.
15. Jonathan Gould, Yamini V. Nanagiri, Rajib B. Mallick and William C. Crockford. An Evaluation of Use of Rapid Triaxial Test in Quality Control of Hot Mix Asphalt (HMA), Journal of Transportation Research Board No: 1832, Transportation Research Board, National Research Council, Washington, D. C., 2003.
16. Sudip Bhattacharjee and Rajib B. Mallick. An Alternative Approach for the Determination of Bulk Specific Gravity and Permeability of Hot Mix Asphalt (HMA). International Journal of Pavement Engineering, Volume 3, Number 3, September 2002.
17. Rajib B. Mallick, David S. Bonner, Jamie Andrews, Rick Bradbury, Prithvi S. Kandhal, and Edward Kearney. Evaluation of Performance of Full Depth Reclamation (FDR) Mixes, Journal of

Transportation Research Board No: 1809, Transportation Research Board, National Research Council, Washington, D. C., 2002.

18. Rajib B. Mallick, Matthew Teto, Edward Kearney, Prithvi S. Kandhal, Rick Bradbury and Elton Ray Brown. A Laboratory Study of Full Depth Reclamation (FDR) Mixes. Journal of Transportation Research Board No: 1813, Transportation Research Board, National Research Council, Washington, D. C., 2000.

19. Rajib B. Mallick, Prithvi S. Kandhal, Matthew Teto, Rick Bradbury and Edward Kearney. Development of a Rational and Practical Mix Design System for Full Depth Reclamation Mixes. Journal of Association of Asphalt Paving Technologists, Volume 69, 2000.

20. Prithvi S. Kandhal and Rajib B. Mallick. Effect of Mix Gradation on Rutting Potential of Dense Graded Asphalt Mixtures. Journal of Transportation Research Board No: 1767, Transportation Research Board, National Research Council, Washington, D. C., 2001.

21. Rajib B. Mallick, Allen Cooley, Matthew Teto and Rick Bradbury. Development of a Simple Test for Evaluation of In-Place Permeability of Asphalt Mixes. International Journal of Pavement Engineering, Volume 2, Number 2, July, 2001.

22. Rajib B. Mallick, Allen Cooley, Matthew Teto and Rick Bradbury. Evaluation of Factors Affecting Permeability of Superpave-Designed Pavements. Catalog of Practical Papers, Transportation Research Board, National Research Council, Washington, D. C, 2001.

23. Rajib B. Mallick, Prithvi S. Kandhal, Allen Cooley and Don Watson, Design and Construction and Performance of New-Generation Open-Graded Friction Courses. Journal of the Association of Asphalt Paving Technologists, Volume 68, 2000.

24. Prithvi S. Kandhal, Rajib B. Mallick and Mike Huner. Measuring Bulk-Specific Gravity of Fine Aggregates: Development of New Test Method. Journal of Transportation Research Board No 1721, Transportation Research Board, National Research Council, Washington, D. C., 2000.

25. Rajib B. Mallick, Prithvi S. Kandhal, Rick Bradbury and Wade McClay. A Rational Approach of Specifying The Voids In Mineral Aggregate For Dense-Graded Hot Mix Asphalt. Catalog of Practical Papers, Transportation Research Board, National Research Council, Washington, D. C 2000.

26. Elton Ray Brown, Dale Decker, Rajib B. Mallick and John Bukowski. Superpave Construction Issues and Early Performance Evaluations. Journal of the Association of Asphalt Paving Technologists, Volume 67, 1999.

27. Rajib B. Mallick. Use of Superpave Gyrotory Compactor to Characterize Hot Mix Asphalt (HMA). Journal of Transportation Research Board No. 1681, Transportation Research Board, National Research Council, Washington, D. C., 1999.

28. Elton Ray Brown and Rajib B. Mallick Development of a Method for Early Prediction of the Asphalt Content of Hot Mix Asphalt (HMA) by Ignition Test. Journal of Transportation Research Board No. 1654, Transportation Research Board, National Research Council, Washington, D. C., 1999.

29. Elton Ray Brown and Rajib B. Mallick. An Initial Evaluation of  $N_{\text{design}}$  for Superpave Gyrotory Compaction of Hot Mix Asphalt. Journal of the Association of Asphalt Paving Technologists, Volume 66, 1998.
30. Prithvi S. Kandhal, Rajib B. Mallick and Kee Y. Foo. A Critical Review of VMA Requirements for Hot Mix Asphalt (HMA). Journal of Transportation Research Board No. 1609, Transportation Research Board, National Research Council, Washington, D. C., 1998.
31. Elton Ray Brown and Rajib B. Mallick An Evaluation of Superpave Gyrotory Compactor. Journal of Transportation Research Board No. 1638, Transportation Research Board, National Research Council, Washington, D. C., 1998.
32. Prithvi S. Kandhal, Frazier Parker and Rajib B. Mallick Aggregate Tests for Asphalt Paving Mixtures: State of the Practice in North America. Journal of the Canadian Technical Asphalt Association, 1997.
33. Elton Ray Brown, Rajib B. Mallick, John Haddock, and Todd Lynn. Performance of Stone Matrix Asphalt (SMA) in the United States. Journal of the Association of Asphalt Paving Technologists, Volume 66, 1997.
34. Elton Ray Brown, John Haddock, Rajib B. Mallick and Todd Lynn. Development of a Mix Design Procedure for Stone Matrix (SMA) Asphalt Mixture. Journal of the Association of Asphalt Paving Technologists, Volume 66, 1997.
35. Rajib B. Mallick, Elton Ray Brown and Shane Buchanan. An Evaluation of SHRP Gyrotory Compaction of HMA. Journal of Transportation Research Board No. 1543, Transportation Research Board, National Research Council, Washington, D. C., 1996.
36. Prithvi S. Kandhal and Rajib B. Mallick. A Study of Longitudinal Joint Construction Techniques in HMA Pavements. Journal of Transportation Research Board No. 1543, Transportation Research Board, National Research Council, Washington, D. C., 1996.
37. Rajib B. Mallick, Elton Ray Brown and Randy Ahlrich. Potential of Dynamic Creep to Predict Rutting, ASTM STP 1265, American Society for Testing and Materials, 1996.
38. Douglas I Hanson, Kee Y. Foo and Rajib B. Mallick. SHRP Properties of Asphalt Cement. Journal of Transportation Research Board No. 1488, Transportation Research Board, National Research Council, Washington, D. C., 1995.
39. Elton Ray Brown and Rajib B. Mallick. A Laboratory Study on Draindown of Asphalt Cement in Stone Matrix Asphalt (SMA). Journal of Transportation Research Board No. 1513, Transportation Research Board, National Research Council, Washington, D. C., 1995.
40. Elton Ray Brown and Rajib B. Mallick. An Evaluation of Stone-on-Stone Contact in Stone Matrix Asphalt. Journal of Transportation Research Board No. 1492, Transportation Research Board, National Research Council, Washington, D. C., 1995.
41. Douglas I Hanson, Rajib B. Mallick and Elton Ray Brown. Five Year Evaluation of HMA Properties at the AAMAS Test Projects. Journal of Transportation Research Board No. 1454, Transportation Research Board, National Research Council, Washington, D. C., 1994.

Refereed Conference Proceedings

1. Rajib B. Mallick, John E. Bergendahl and Margaret Pakula. A Laboratory Study on CO<sub>2</sub> Emission Reductions Through the Use of Warm Mix Asphalt. Accepted for presentation and publication in the proceedings of the 88<sup>th</sup> Annual Meeting of Transportation Research Board, National Research Council, Washington, DC, 2009.
2. Mingjiang Tao and Rajib B. Mallick. An Evaluation of the Effects of Warm Mix Asphalt Additives on the Properties of Reclaimed Asphalt Pavement (RAP) Material. Accepted for presentation and publication in the proceedings of the 88<sup>th</sup> Annual Meeting of Transportation Research Board, National Research Council, Washington, DC, 2009.
3. Sudip Bhattacharjee, Rajib B. Mallick and Jo Sias Daniel. Effect of Loading and Temperature on Dynamic Modulus of Hot Mix Asphalt Tested under MMLS3. 2008 T&DI Pavement Specialty Conference. Airfield and Highway Pavements. ASCE. October 15-18, 2008, Seattle, Washington.
4. Rajib B. Mallick, Bao-Liang Chen, Sankha Bhowmick and Michael Hulen. Capturing Solar Energy from Asphalt Pavements. International Symposium on Asphalt Pavements and Environment, International Society for Asphalt Pavements, Zurich, Switzerland, 2008.
5. Tahar El-Korchi, Rajib B. Mallick and Jose Fragachan, A New Accelerated Test For Evaluating Pavement Patching Materials. Proceedings of the 87<sup>th</sup> Annual Meeting of the Transportation Research Board, Washington DC, 2008.
6. Prithvi Kandhal and Rajib B. Mallick. Evaluation of Various Longitudinal Joint Construction Techniques for Asphalt Airfield Pavements. Presented at the 2007 FAA Worldwide Airport Technology Transfer Conference, Atlantic City, New Jersey, April, 2007.
7. Lauren Swett, Rajib B. Mallick and Dana Humphrey. Experience and Results from the First Fully Instrumented Flexible Pavement Test Section in Maine. Presented and published in the proceedings of the 2007 Annual Meeting of the Transportation Research Board, Washington, DC.
8. Tahar El-Korchi and Rajib B. Mallick. Accelerated Testing Methodology for Evaluating Pavement Patching Materials. Presented and published in the proceedings of the 2007 Annual Meeting of the Transportation Research Board, Washington, DC.
9. Kenneth Maser, Rajib B. Mallick and Soheil Nazarian. Detection of Stripping in Asphalt Pavement by Combining GPR and Seismic Methods. Presented and published in the proceedings, NDE Conference on Civil Engineering The American Society for Nondestructive Testing , St. Louis MO, August, 2006.
10. Rajib B. Mallick, Sara Fowler and Brian Marquis. Use of Mechanistic Empirical Pavement Design Software for Proper Design and Construction of Reclaimed Pavements in Northern Maine. Presented and published in the proceedings of the 13<sup>th</sup> International Conference on Cold Regions Engineering, American Society of Civil Engineers (ASCE), University of Maine, Orono, July 23–26, 2006.
11. Rajib B. Mallick, Julie E. Bradley, Sara Fowler and Brian Marquis. Comprehensive Analysis of Properties and Performance of Reclaimed Pavements in Maine with the Use of Nondestructive Testing and Mechanistic-Empirical Pavement Design Software. Presented and published in the proceedings of the 85<sup>th</sup> Annual Meeting of the Transportation Research Board, National Research Council, Washington, D. C., 2006.

12. Rajib B. Mallick, Robert Pelland, Edmund Dawes and Christopher Bowker, Jr. Research and Implementation of Research Results for Improving Airfield Asphalt Pavements, Presented and published in the proceedings of the 85th Annual Meeting of the Transportation Research Board, National Research Council, Washington, D. C., 2006.
13. Jo Sias Daniel and Rajib B. Mallick. Development of a Longitudinal Joint Permeameter as a QC/QA Tool for HMA Pavements, 42<sup>nd</sup> Petersen Asphalt Research Conference 2005, Cheyenne, Wyoming, June 20-24, 2005.
14. Rajib B. Mallick and A Das. An approach to rehabilitation of low traffic volume flexible pavement, International Conference on Structural and Road Transportation Engineering, IIT Kharagpur, January 3-5, 2005, Kharagpur, India.
15. Sudip Bhattacharjee, Jonathan S. Gould, Rajib B. Mallick, Frederick Hugo. Use of MMLS3 Scaled Accelerated Loading for Fatigue Characterization in the Laboratory. Paper presented and published at the 2nd International Conference on Accelerated Pavement Testing in Minneapolis, September, 2004.
16. Yamini V. Nanagiri, Rajib B. Mallick and Walaa S. Mogawer. Development of Mix Design Criteria for Low Traffic Volume Hot Mix Asphalt Roads. Proceedings of the Annual Meeting of the Canadian Technical Asphalt Association, November 2003.
17. Robert Pelland, Jonathan Gould and Rajib B. Mallick. Selecting a Rut Resistant Hot Mix Asphalt for Boston-Logan International Airport. Presented and published at the 2003 ASCE Airfield Specialty Conference, Las Vegas, Nevada, September 21-24, 2003.
18. Rajib B. Mallick and Grant Hendricks, Jr. Use of Foamed Asphalt in Recycling incinerator Ash. Presented and published at the Transportation Research Board Committee on Waste Management (A1F07) Sponsored Summer 2003 Workshop on Beneficial Use, Sustainability and Pollution Prevention in Transportation Infrastructure, New Hampshire, June 29-July 1, 2003.
19. Rajib B. Mallick, Matthew Teto and John E. Haddock. Use of the Concept of Pore Pressure in Unsaturated Soils for Evaluation of Rutting Potential of Asphalt Paving Mixes, Presented and published at the 2002 International Conference on Asphalt Pavements in Copenhagen, August 2002.
20. Rajib B. Mallick, Allen Cooley, Matthew Teto and Rick Bradbury. Evaluation of Permeability of Superpave designed Mixes, Presented at the 80<sup>th</sup> Annual Meeting of the Transportation Research Board, Paper published in Catalog of Practical Papers, Transportation Research Board, National Research Council, Washington, D. C., 2001.
21. Rajib B. Mallick, Matthew Teto, Edward Kearney, Prithvi S. Kandhal and Rick Bradbury. Mix Design and Performance of Full Depth Reclamation (FDR) mixes. Beneficial Use of Recycled Materials in Transportation Applications, Editor: Taylor Eighmy, 2001. Proceedings of the conference on Beneficial Use of Recycled Materials in Transportations Applications, in Arlington, VA, November, 2001.
22. Rajib B. Mallick, Matthew Teto, Walaa S. Mogawer and Jody Siegel. Use of recycled shingles in hot mix asphalt, Presented and Published at the Conference on Environmentally Conscious Manufacturing, Boston, November, 2000.

23. Prithvi S. Kandhal and Rajib B. Mallick. Testing of Hot Mix Asphalt (HMA) with the Asphalt Pavement Analyzer, Presented and published at the International Conference on Accelerated Pavement Testing in Reno, 1999.
24. Prithvi S. Kandhal, Kee Y. Foo and Rajib B. Mallick. Binder Selection for Asphalt Pavement Recycling, Published in the Proceedings of the 5<sup>th</sup> ASCE Materials Engineering Conference in Cincinnati, 1999.
25. Prithvi S. Kandhal and Rajib B. Mallick. Effect of Aggregate Gradation on Permanent Deformation Potential of Dense Graded Hot Mix Asphalt, Presented and Published at the Seventh Conference on Asphalt Pavements for Southern Africa, 1999.
26. Elton Ray Brown, Rajib B. Mallick and Prithvi S. Kandhal. Design and Construction of Hot Mix Asphalt Pavement Intersections in Hot Climate, Presented and Published at the 1<sup>st</sup> International Conference on Performance of Roads, Bridges and Airport Pavements in Arid and Hot Climates, in Dubai U.A.E., March 24-25, 1998.
27. Rajib B. Mallick, Elton Ray Brown and Noel McCauley An Evaluation of Change in Aggregate Properties after Ignition Test for Asphalt Content Determination, Presented at the 77<sup>th</sup> Annual Meeting of the Transportation Research Board held in Washington, D. C. (January, 1998). Published in the Stone Review, June, 1998.
28. Prithvi S. Kandhal and Rajib B. Mallick. Longitudinal Joint Construction Techniques for Asphalt Pavements, Presented and Published at the Eighth International Conference on Asphalt Pavements in Seattle, Washington August, 1997.

#### Research Reports

1. Rajib B. Mallick, Yamini V. Nanagiri, Edward J. Kearney, Mike Marshall, Richard L. Bradbury, Brian Marquis and Dale Peabody, Use of Foamed Asphalt in Recycling of Pavements. Transportation Research Board Circular, by the Committee on Pavement Rehabilitation (AFD70), National Research Council, Washington, D.C., 2009 (In Print).
2. Mingjiang Tao and Rajib Mallick. A Study of Warm Mix Asphalt Pavement with Recycled Asphalt Pavement: Laboratory Study and Field Evaluation. First Year Report to Maine department of transportation, November, 2008.
3. Christine Conron and Rajib B. Mallick. Analysis of Traffic, Temperature and Strain in Asphalt Pavements in Maine. Second Annual Report to Maine Department of Transportation, September, 2008.
4. Rajib B. Mallick, Prithvi S. Kandhal, Randy Ahlrich and Skip Parker. Project 04-05: Improved Performance of Longitudinal Joints on Asphalt Airfield: Airfield Asphalt Pavement Technology Program (AAPT). Final report to Federal Aviation Administration (FAA), July, 2007.
5. Rajib B. Mallick, Kenneth Maser and Soheil Nazarian. Guidelines for the Use of Ground Penetrating Radar (GPR) and Portable Seismic Property Analyzer (PSPA) in Full Depth Reclamation Projects. Final Report to Maine department of Transportation, April, 2007.
6. Rajib B. Mallick, Lauren Swett and Dana Humphrey. Analysis of Pavement Response Data and Use of Nondestructive Testing for Improving Pavement Design and Adoption of Mechanistic-Empirical Pavement Design Procedure Using the Gilford Route 15 Instrumented Pavement Test Section: First Annual Report to Maine Department of Transportation, August, 2006.

7. Rajib B. Mallick. Development of Moisture Resistant Hot Mix Asphalt (HMA) for Logan International Airport, Boston, MA. Final Report to Massport, August, 2005.
8. Walaa S. Mogawer and Rajib B. Mallick. Final Report, Design of Superpave Hot Mix Asphalt (HMA) for Low Volume Roads. Project NETC 01-3. New England Transportation Consortium. University of Connecticut, 2004.
9. Walaa S. Mogawer, Rajib B. Mallick and William C. Crockford. Final Report, Development of a Testing Protocol for Quality Control/Quality Assurance of Hot Mix Asphalt. Project NETC 01-2. New England Transportation Consortium. University of Connecticut, 2004.
10. Rajib Mallick. Structural Strength of Roadway Recycled with Foamed Asphalt. Final Report to the Recycled Materials Resource Center/Federal Highway Administration, December, 2003.
11. Rajib B. Mallick. Use of Synthetic Lightweight Aggregates Produced from Waste Fly Ash and Plastics in Paving Mixes. Final report to Chelsea Center for Recycling and Economic Development, University of Massachusetts, June, 2003.
12. H.J. Miller and Rajib B. Mallick. Final Report, Field Evaluation of a New Compaction Monitoring Device. Project NETC 01-6. New England Transportation Consortium. University of Connecticut, 2003.
13. Mike Anderson, Pamela Turner, Robert Peterson and Rajib B. Mallick. Relationship of Superpave Gyrotory Compaction Properties to HMA Rutting Behavior. NCHRP Report 478, TRB, National Research Council, Washington DC, 2002.
14. Walaa S. Mogawer, Rajib B. Mallick and William C. Crockford. Evaluation of Permeability of Superpave Mixes. Final Report, Project NETC 00-2. New England Transportation Consortium. University of Connecticut, 2002.
15. Rajib B. Mallick, Prithvi S. Kandhal, Elton Ray Brown, Richard L. Bradbury and Edward Kearney. Development of a Rational and Practical Mix Design System for Full Depth Reclamation (FDR) Mixes. Final Report to the Recycled Materials Resource Center/Federal Highway Administration, November, 2002.
16. Rajib B. Mallick, Prithvi S. Kandhal, Larry Allen Cooley and Donald Watson. Design, Construction, and Performance of New-Generation Open Graded Friction Courses. NCAT Publication No. 00-01, Auburn University, Alabama, 2000.
17. Prithvi S. Kandhal, Rajib B. Mallick and Michael Huner. Development of A New Test Method for Measuring Bulk Specific Gravity of Fine Aggregates. NCAT Publication No. 99-07, Auburn University, Alabama, 1999.
18. Matthew Teto and Rajib B. Mallick. An Evaluation of Permeability of Superpave Mixes used in Maine, Maine Department of Transportation, Augusta, ME 1999.
19. Prithvi S. Kandhal and Rajib B. Mallick. Evaluation of Asphalt Pavement Analyzer for HMA Mix Design, NCAT Report # 99-4, Auburn University, June 1999.
20. Prithvi S. Kandhal and Rajib B. Mallick. Open Graded Asphalt Friction Courses: State of the Practice, Transportation Research Circular, E-C005. Transportation Research Board, National Research Council, Washington, D. C., 1999.

21. Prithvi S. Kandhal, Frazier Parker and Rajib B. Mallick. Aggregate Tests for Hot Mix Asphalt: State of the Practice, Transportation Research Circular, Number 479, Transportation Research Board, National Research Council, Washington, D. C., 1999.
22. Prithvi S. Kandhal, Rajib B. Mallick and Elton R. Brown. Hot Mix Asphalt for Intersections in Hot Climate. NCAT Publication No. 98-06, Auburn University, Alabama, 1998.
23. Rajib B. Mallick, Shane Buchanan, Elton Ray Brown and Michael Huner. An Evaluation of Superpave Gyrotory Compaction of Hot Mix Asphalt. NCAT Publication No. 98-05, Auburn University, Alabama, 1998.
24. Prithvi S. Kandhal, Kee Foo and Rajib B. Mallick. A Critical Review of VMA Requirements in Superpave. NCAT Publication No. 98-01, Auburn University, Alabama, 1998.
25. Prithvi S. Kandhal and Rajib B. Mallick. Longitudinal Joint Construction Techniques for Asphalt Pavement. NCAT Publication No. 97-04, Auburn University, Alabama, 1997.
26. Elton Ray Brown, John E. Haddock, Rajib B. Mallick and Todd A. Lynn. Development of a Mixture Design procedure for Stone Matrix Asphalt (SMA). NCAT Publication No. 97-03, Auburn University, Alabama, 1997.
27. Elton Ray Brown and Rajib B. Mallick. Stone Matrix Asphalt – Properties Related to Mix Design, NCAT Publication No. 94-2, Auburn University, Alabama, 1994.

#### Media Reports

- Solar Asphalt System provides Green-Heat Energy Source. ENR, September 15, 2008
- Cientistas estudam uso de asfalto para gerar energia. BBC Brasil, August 15, 2008
- Just Follow the Solar Brick Road. Discovery News, August 25, 2008
- Solar Collector Could Change Asphalt Roads into Renewable Energy Source. Science Daily, August 14, 2008.
- Research team discovers way to turn highways, parking lots into solar energy source. Better Roads, June 2008.
- Renewable Energy Collectors May be Right Under our Feet. renewableenergyworld.com, August 26, 2008
- How to get energy out of hot asphalt pavements and car parking spaces. Radio New Zealand, August 23, 2008
- Scorching asphalt and solar power. POWER, October 15, 2008

#### INVITED PRESENTATIONS

1. 100% Recycling, Maine Department of Transportation, 2008.
2. Research on pavement Instrumentation and Warm Mix Asphalt, Maine Department of Transportation, 2007.

3. Warm Mix Asphalt – 100 % RAP recycling. Presented at the Northeast Asphalt User Producer Group meeting, Delaware, October, 2006.
4. Eight (8) one-hour lectures in the First National Workshop on Recycling and other Pavement Rehabilitation Methods at Indian Institute of Technology (IIT), Kanpur, India, 2005.
5. Research on Pavement Materials and Construction, Maine Department of Transportation, Augusta, Maine, November 14, 2005.
6. Pavement Engineering Issues, Connecticut Transportation Institute, University of Connecticut, September 20<sup>th</sup>, 2005.
7. Pavement Engineering – Progress and Challenge, Northeastern University, March 18<sup>th</sup>, 2005.
8. Hot Mix Asphalt Pavements. Baystate Roads Programs for Massachusetts Highway Department Engineers, 2004.
9. Pavement Engineering Research at WPI. Presented for the Northeast Asphalt User Producer Group, Annual NEAPG Meeting, Portsmouth, NH, October 2004.
10. Education and Research on Pavement Engineering. Presented for Massachusetts Aggregate and Asphalt Pavement Association (MAAPA), October, Framingham, MA, October 2004.
11. Use of Nondestructive testing for design, analysis and management of pavements. Presented for Connecticut Department of Transportation, Rocky Hill, CT, August 2004.
12. Pavement Analysis and Design. Presented for Maine Department of Transportation, May 2004.
13. Development of Longitudinal Joint Permeameter. Presented at Federal Highway Administration Office, Providence, RI, April 2004.
14. Foamed Asphalt Mix Design. Presented in the Annual Meeting of Massachusetts Highway Engineers, in April, 2004.
15. Hot Mix Asphalt Pavements. Presented for Baystate Roads Programs for Massachusetts Highway Department Engineers in February and March, 2004.
16. Different types of pavement materials for Logan International Airport. Federal Aviation Administration (FAA) Airport Pavement Workshop in Waltham, Massachusetts, 2003.
17. Use of foamed asphalt in recycling incinerator ash. Presented in June at the TRB Committee A1F07 Sponsored Summer 2003 Workshop on Beneficial Use, Sustainability and Pollution Prevention in Transportation Infrastructure, Portsmouth, New Hampshire, 2003.

18. Use of foamed asphalt in recycling of pavements. Presented at Seminar for Public Works Engineers, Parsippany, New Jersey, June, 2003.
19. Full Depth Reclamation, Maine Department of transportation (DOT), Augusta, 2002.
20. Research on pavements, Massachusetts Aggregate and Asphalt Pavement Association, Marlboro, MA. 2001
21. Design of Low Volume Roads. Expert Task Group Meeting, Permeability of Hot Mix Asphalt. Northeast State Materials Engineers Agency (NESMEA) Conference in Albany, NY, 2001
22. Results of research on full depth reclamation. Maine Department of Transportation, Augusta, ME, 2001
23. Invited lecture at University of Rhode Island Transportation Center, URI, 2001
24. Research in Highway Infrastructure Program. International Conference on Beneficial Use of Recycled Materials, Washington, D.C., 2001.
25. Development of in-place permeameter. Northeast Asphalt User Producer Group, Albany, NY, 2001.
26. Northeast State Materials Engineers Agency (NESMEA) Conference in Portland, ME, 2000. 2 presentations on Full Depth Reclamation and Use of Accelerated loading and Testing
27. Use of Recycled Shingles in Hot Mix Asphalt. Chelsea Center for Recycling and Economic Development, 2000
28. Use of Instrumented Mold for Characterization of Hot Mix Asphalt. Expert Task Group, Federal Highway Administration, 2000
29. Worcester Department of Public Works, 2000 – 2 presentations on using proper type of Hot Mix Asphalt and preventing distress in city roads.
30. Update on research on HMA. Maine Department of Transportation, Augusta, ME, 2000.
31. Update on research on HMA. National Center for Asphalt Technology, Auburn, Alabama, 1999
32. Scope of research on HMA. Maine Department of Transportation, Augusta, ME, 1999.
33. Current issues on research on HMA. New Hampshire Department of Transportation, Concord, NH, 1999
34. Use of testing for improving paving mixes. Massachusetts Aggregate and Asphalt Pavement Association (MAAPA) Board Meeting, Marlboro, MA, 1999
35. Application of research results for improving paving mixes. Pike Industries, Belmont, NH, 1999.
36. HMA research at WPI. Bardon Trimount Inc., Saugus, MA, 1999

37. Use of Stone Matrix Asphalt (SMA) for Preventing Ruts in Airfield Pavements. Massport, Logan International Airport, Boston, MA, 1999
38. Permeability of HMA. New York Department of Transportation, Albany, NY, 1999
39. HMA Testing and Research. Advanced Asphalt Testing, Campbell Hall, NY, 1999
40. Density of HMA. TransTech Industries, Schenectady, New York, 1999.
41. Research and Implementation of Results for Improving Road Conditions. District 3 Office, Massachusetts Highway Department, Worcester, MA, 1999.
42. Pavement Recycling. Region 1 Pavement Managers Conference, Providence, RI, 1998.
43. Recycling of Hot Mix Asphalt. Northeast State Materials Engineers Agency (NESMEA) Conference at Waterbury, CT, 1998.
44. Scope of Research on HMA. Maine Department of Transportation, at Bangor, ME, 1998.
45. Research on HMA. Massachusetts Research Showcase, in Boston, MA, 1998.
46. Effect of Aggregate Gradation on Performance of HMA. Alabama DOT Conference, Montgomery, AL, 1998.
47. Federal Highway Administration, FHWA Workshops on Recycling of Asphalt Pavement for state and local engineers at (1997):
  - a) Gainesville, FL,
  - b) Waterbury, CT,
  - c) Columbus, OH,
  - d) Salt Lake City, UT,
  - e) Las Vegas, NV, and
  - f) Duluth, MN,
48. Use of Asphalt Pavement Analyzer – NCAT Experience. Southeastern User Producer Group Meeting, Williamsburg, VA, 1997.