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Research Areas of Interest

Concrete Pavement Design & Performance Evaluation, Concrete Materials Characterization, Forensic Investigations of Concrete Pavement Failures, Preservation and Rehabilitation of Rigid Pavement, Pavement Deterioration Mechanisms

Educational Background

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| Ph.D. | Civil Engineering, May 1989, The University of Texas at Austin, Austin, Texas Major: Transportation Engineering |
| MS | Civil Engineering, December 1987, The University of Texas at Austin, Austin, Texas Major: Transportation Engineering |
| BS | Civil Engineering, February 1984, Seoul National University, Seoul, South Korea |

Research/Teaching Experience

2008 – Present: Department of Civil and Environmental Engineering, College of Engineering, Texas Tech University

- Associate Professor: Conducting research projects related to concrete materials and pavements. They include the development of mechanistic-empirical rigid pavement design, post-tensioned concrete pavement, concrete curing, and horizontal cracking in concrete pavement. Also teaching courses on advanced reinforced concrete design, advanced concrete materials, and rigid pavement design.

2004 – 2008: Department of Civil, Architectural and Environmental Engineering, Center for Transportation Research, College of Engineering, The University of Texas at Austin

- Conducted research projects on concrete pavement design, materials, construction, pavement performance, and rehabilitation. Also taught a course on rigid pavement design.

1994 – 2004: Texas Department of Transportation (TxDOT)

- Principal Investigator: TxDOT Research Project 0-4183 (2000 – 2004: \$396,000) Investigated premature deterioration of concrete pavements and structures due to alkali silica reaction and delayed ettringite formation.
- Principal Investigator: TxDOT Research Project 0-1887 (1998 – 2004: \$170,720) Evaluated the causes of good and poorly performing concrete pavements.
- Researcher: TxDOT Research Project 0-3995 (1997 – 2002: \$127,000) Developed a water/cement ratio test method.
- Principal Investigator: TxDOT Research Project 0-1753 (1996 – 1998: \$67,052) Conducted research studies on the use of recycled concrete aggregates for concrete pavement.

1990 – 1990: The University of Texas at Austin

- Research Engineer: Developed a computer program for the reinforcing steel design for airport runway. Also developed a computer design program for continuously reinforced concrete pavement.

1984 – 1988: The University of Texas at Austin

- Graduate Research Assistant: Conducted research on concrete pavement design and performance. Developed a computer program for the mechanistic analysis of continuously reinforced concrete pavement.

Industrial Experience

1990 – 2004: Texas Department of Transportation (TxDOT)

- Materials/Pavement Design Engineer (1999 – 2004): Provided technical assistance to TxDOT districts on concrete materials- and concrete pavement-related issues.
- Research Engineer (1994 – 1999): Managed TxDOT's research program in pavements, materials, and roadway design area.
- Materials Engineer (1992 – 1994): Supervised daily operations of the engineering section of TxDOT's Houston District Laboratory and Soils & Aggregates Section of the Materials & Tests Division in Austin.
- Design Engineer (1990 – 1992): Developed pavement design and roadway design elements such as horizontal and vertical alignment, traffic control, ramps, retaining wall & drainage.

1989 – 1989: Korea Institute of Construction Technology, Seoul, Korea

- Project Manager: Conducted research studies on highway traffic safety and concrete pavement.

Licenses. Registrations and Certificates

EIT - August, 1988

PE - July, 1993 (Texas No. 76918)

Honors

Graduated Magna Cum Laude from Seoul National University

February 1984

Current Professional Membership

Member, American Concrete Institute (ACI)

Member, American Society of Civil Engineers (ASCE)

Member, TRB Committee AFN20 – Properties of Concrete

Member, TRB Committee ASF60 – Subsurface Drainage

Thesis & Dissertation

Dissertation: Mechanistic Analysis of Continuously Reinforced Concrete Pavement Considering Material Characteristics, Variability, and Fatigue. The University of Texas at Austin, May 1989 (Supervisor: Dr. B. Frank McCullough)

Thesis: Evaluation of Proposed Texas SDHPT Design Standards for Continuously Reinforced Concrete Pavement. The University of Texas at Austin, December 1987 (Supervisor: Dr. B. Frank McCullough)

Publications

a. Journals

1. Choi, S. and Won, M. (2010) "Thermal Strain and Drying Shrinkage of Concrete Structures in the Field," ACI Materials Journal, Vol. 107, No. 5, pp. 498-507.
2. Choi, S. and Won, M. (2010) "Time-Dependent Behavior of Post-tensioning Concrete Pavements under Environmental Loading," *Transportation Research Record 2154*, Transportation Research Board, National Research Council, Washington D.C., pp. 44-56.
3. Ha, S., Choi, S. and Won, M. (2010) "Behavior of Tied Multiple-Lane Portland Cement Concrete Pavement: Effects of Environmental Loading and Dowel Bar Use," *Transportation Research Record 2154*, Transportation Research Board, National Research Council, Washington D.C., pp. 57-77.

4. Choi, S. and Won, M. (2009) "Design of Tie Bars in Portland Cement Concrete Pavement Considering Nonlinear Temperature Variations," *Transportation Research Record 2095*, Transportation Research Board, National Research Council, Washington D.C., pp. 24-33.
5. Yeon, J.H., Choi, S. and Won, M. (2009) "Effect of Relative Humidity on Coefficient of Thermal Expansion of Hardened Cement Paste and Concrete," *Transportation Research Record 2113*, Transportation Research Board, National Research Council, Washington D.C., pp. 83-91.
6. Chen, D.H., Won, M. and Hong, F. (2009) "Investigation of Settlement of a Jointed Concrete Pavement" *Journal of Performance of Constructed Facilities*, ASCE. Vol. 23, Issue 6, pp. 440-446. Nov/Dec 2009.
7. Chen, D.H., Won, M. and Zhang, Q. and Scullion, T. (2009) "Field Evaluations of the Patch Materials for Partial-Depth Repairs" *Journal of Materials in Civil Engineering*, ASCE Vol. 21, Issue 9, pp. 518-522. Sep 2009.
8. Chen, D.H., Suh, C. and Won, M. (2009) "Lessons Learned from Field and Laboratory Testing of a DBR Project" *Journal of Performance of Constructed Facilities*, ASCE. Vol. 23, Issue 3, pp. 175-180. May/June 2009.
9. Chen, D.H., Won, M. and Zha, X. (2008) "Performance of Dowel Bar Retrofit (DBR) Projects in Texas" *Journal of Performance of Constructed Facilities*, ASCE. Vol. 22, Issue 3, pp. 162-170. May/June 2008.
10. Chen, D.H. and Won, M. (2008) "Field Performance Monitoring of Repair Treatments on Joint Concrete Pavements" *Journal of Testing and Evaluation*, ASTM Volume 36, Number 2. pp. 119-127. March 2008.
11. Chen, D.H. and Won, M. (2007) "Field Investigations of Cracking on Concrete Pavements" *Journal of Performance of Constructed Facilities*, ASCE. Vol. 21, Issue 6, pp. 450-458. Nov/Dec 2007.
12. Nam, J., Kim, D., Choi, S., and Won, M. (2007) "Variation of Crack Width over Time in Continuously Reinforced Concrete Pavement," *Transportation Research Record 2037*, Transportation Research Board, National Research Council, Washington D.C., pp. 3-11.
13. Joh, S.H, Kang, T.H., Kwon, S.A., Won, M. (2006) "Accelerated Stiffness Profiling of Aggregate Bases and Subgrades for Quality Assessment of Field Compaction" *Transportation Research Record 1975*, Transportation Research Board, National Research Council, Washington D.C., pp. 63-72.
14. Nam, J., Kim, S., and Won, M. (2006) "Measurement and Analysis of Early-Age Concrete Strains and Stresses: Continuously Reinforced Concrete Pavement under Environmental Loading," *Transportation Research Record 1947*, Transportation Research Board, National Research Council, Washington D.C., pp. 79-90.
15. Won, M.C. (2005) "Improvements of Testing Procedures for Concrete Coefficient of Thermal Expansion," *Transportation Research Record 1919*, Transportation Research Board, National Research Council, Washington D.C., pp. 23-28.
16. Chen, D.H., Scullion, T., Bilyeu, J. and Won, M. (2005) "Detailed Forensic Investigation and Rehabilitation Recommendation on Interstate Highway-30" *Journal of Performance of Constructed Facilities*, ASCE. Vol. 19, Issue 2, pp. 155-164. May 2005.
17. Kim, S. M., and Won, M. C. (2004) "Horizontal Cracking in Continuously Reinforced Concrete Pavements," *ACI Structural Journal*, Vol. 101, No. 6, 2004, Nov.-Dec., pp. 784-791
18. Kim, S.-M., Won, M. C. and McCullough, B. F. (2003). "Mechanistic Modeling of Continuously Reinforced Concrete Pavement," *ACI Structural Journal*, Vol. 100, No. 5, American Concrete Institute, pp. 674-682.
19. Kim, S.M., Won, M. & McCullough, B.F. (2002). "Dynamic Stress Response of Concrete Pavements to Moving Tandem-axle Lloads," *Transportation Research Record 1809*, Transportation Research Board, National Research Council, Washington D.C., pp. 32-41.
20. Kim, S.M., Won, M. & McCullough, B.F. (2000). "Three-Dimensional Analysis of Continuously Reinforced

Concrete Pavements," *Transportation Research Record 1730*, Transportation Research Board, National Research Council, Washington D.C., pp. 43-52.

21. Kim, S.M., Won, M. & McCullough, B.F. (1998). "Numerical Modeling of Continuously Reinforced Concrete Pavement Subjected to Environmental Loads," *Transportation Research Record 1629*, Transportation Research Board, National Research Council, Washington D.C., pp. 76-89.
22. Won, M. & Fu, C. (1996). "Evaluation of Laboratory Procedures for Aggregate Polish Test," *Transportation Research Record 1547*, Transportation Research Board, National Research Council, Washington D.C., pp. 23-28.
23. Won, M. & Ho, M. (1994). "Effect of Antistrip Additives on Polymer-Modified Asphalt Binders and Mixtures," *Transportation Research Record 1436*, Transportation Research Board, National Research Council, Washington D.C., pp. 108-114.

b. Refereed Conference Proceedings

1. Choi, S. and Won, M. (2010) "Time-Dependent Behavior of Post-tensioning Concrete Pavements under Environmental Loading," *Proceedings of the 89th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
2. Ha, S., Choi, S. and Won, M. (2010) "Behavior of Tied Multiple-Lane Portland Cement Concrete Pavement: Effects of Environmental Loading and Dowel Bar Use," *Proceedings of the 89th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
3. Choi, S. and Won, M. (2009) "Design of Tie Bars in Portland Cement Concrete Pavement Considering Nonlinear Temperature Variations," *Proceedings of the 88th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
4. Yeon, J.H., Choi, S. and Won, M. (2009) "Effect of Relative Humidity on Coefficient of Thermal Expansion of Hardened Cement Paste and Concrete," *Proceedings of the 88th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
5. Won, M., Choi, S. and Nam J. (2008) "Behavior and Performance of Continuously Reinforced Concrete Pavement" *Proceedings, 9th International Conference on Concrete Pavements*, San Francisco, California
6. Won, M. (2008) "Use of Crushed Concrete as Coarse Aggregates in Concrete Pavement" *International Workshop on Best Practices for Concrete Pavements*, Brazil
7. Choi, S., Cho, Y., Won, M. and Claros, G (2008) "Rehabilitation of Continuously Reinforced Concrete Pavement with Bonded Overlay" *International Workshop on Best Practices for Concrete Pavements*, Brazil
8. Won, M. Ceylan H. and Barenberg, E. (2008) "Evaluation of Optimum Longitudinal Steel Reinforcement in CRCP from Field Experiments" *International Workshop on Best Practices for Concrete Pavements*, Brazil
9. Choi, S., Cho, Y, Kwon, S. and Won, M. (2008) "Innovative Tie Bar and Transverse Steel Designs in Portland Cement Concrete Pavement" *7th International Conference on Sustainable Aggregates, Asphalt Technology and Pavement Engineering*, Liverpool, England
10. Nam, J., Kim, D.H., Choi, S.C., and Won, M.C. (2007) "Variation of Crack Width over Time in Continuously Reinforced Concrete Pavement," *Proceedings of the 86th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
11. Kim, D.H., Choi, S.C., Cho, Y.H., and Won, M.C. (2007) "Long-term Performance of Thin Bonded Concrete Overlay in Texas," *Proceedings of the 86th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)

12. Nam, J., Kim, S.-M., and Won, M.C. (2006) "Measurement and Analysis of Early-Age Concrete Strains and Stresses: Continuously Reinforced Concrete Pavement Under Environmental Loading," *Proceedings of the 85th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
13. Won, M.C. (2005). "Improvements of Testing Procedures for Concrete Coefficient of Thermal Expansion," *Proceedings of the 84th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
14. Kim, S.-M., Cho, Y. H. and Won, M. C. (2003). "Effects of coarse aggregates on continuously reinforced concrete pavement behavior and performance," *World Transport Research: Selected Proceedings of the 9th World Conference on Transport Research*, Elsevier Science Ltd. (CD-ROM). (In press).
15. Won, M. (2003). "Premature Concrete Deterioration due to ASR/DEF in Texas," *11th Annual Symposium Proceedings*, International Center for Aggregates Research, Texas A & M University and The University of Texas at Austin, Austin, Texas. (CD-ROM)
16. Kim, S. M., Won, M. & McCullough, B. F. (2003). "CRCP-10 computer program for mechanistic analysis of continuously reinforced concrete pavements," *Proceedings of 2003 Structures Congress & Exposition*, ASCE, Seattle, Washington. (Submitted).
17. Won, M. & Seiders, J. (2002). "Investigation of alkali silica reactivity and delayed ettringite formation in concrete," *10th Annual Symposium Proceedings*, International Center for Aggregates Research, Texas A & M University and The University of Texas at Austin, Baltimore, Maryland.
18. Kim, S. M., Won, M. & McCullough, B. F. (2002). "Behavior of plate on viscoelastic foundation under moving harmonic loads," *Proceedings of the 15th Engineering Mechanics Conference*, ASCE, New York, New York. (CD-ROM)
19. Kim, S. M., Won, M. & McCullough, B. F. (2002). "Airport pavement response under moving dynamic aircraft loads," *Proceedings of the 27th International Air Transport Conference*, ASCE, Orlando, Florida. (CD-ROM)
20. Won, M., Kim, S. M., Merritt, D. & McCullough, B. F. (2002). "Horizontal cracking and pavement distress in Portland cement concrete pavement," *Proceedings of the 27th International Air Transport Conference*, ASCE, Orlando, Florida. (CD-ROM)
21. Kim, S. M., Won, M. & McCullough, B. F. (2002). "Dynamic stress response of concrete pavements to moving tandem-axle loads," *Proceedings of the 81st Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
22. Won, M. (2001). "Effect of Coarse Aggregate on Concrete Pavement Performance," *9th Annual Symposium Proceedings*, International Center for Aggregates Research, Texas A & M University and The University of Texas at Austin, Austin, Texas. (CD-ROM)
23. Kim, S. M., Cho, Y. H. & Won, M. C. (2001). "Effects of coarse aggregates on continuously reinforced concrete pavement behavior and performance," *Proceedings of the 9th World Conference on Transport Research*, Seoul, Korea. (CD-ROM).
24. Kim, S.M., Won, M., & McCullough, B.F. (2001). "Development of CRCP-9 Computer Program for Analysis of CRC Pavements," *Proceedings of the 80th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington D.C. (CD-ROM)
25. Won, M. & Morgan, E. (2001). "Determining Water-Cement Ratio of Hardened Concrete Using Semi-Automated Image Analysis," *Proceedings of the 80th Annual Meeting of Transportation Research Board*, Transportation Research Board, National Research Council, Washington D.C. (CD-ROM)
26. Kim, S.M., Won, M., & McCullough, B.F. (2000). "Effect of Transverse Reinforcement on CRC Pavement Response to Thermal Load," *Proceedings of the 2nd International Symposium on 3D Finite Element for Pavement Analysis, Design, and Research*, Charleston, West Virginia, pp. 43-64.

27. Kim, S.-M., Won, M. C. and McCullough, B. F. (2000). "Three-dimensional analysis of continuously reinforced concrete pavements," Proceedings of the 79th Annual Meeting of Transportation Research Board, Transportation Research Board, National Research Council, Washington, D.C. (CD-ROM)
28. Won, M. (1999). "Use of Recycled Concrete as Aggregates for Pavement Concrete," 7th Annual Symposium Proceedings, International Center for Aggregates Research, Texas A & M University and The University of Texas at Austin, Austin, Texas, pp. G4: 1-10.
29. Won, M. (1999). "Use of Recycled Concrete as Aggregates for Pavement Concrete," Proceedings of the 78th Annual Meeting of Transportation Research Board, Transportation Research Board, National Research Council, Washington D.C. (CD-ROM)
30. McCullough, B.F. & Won, M. (1991). "Steel Design Algorithm for Continuously Reinforced Concrete Pavements for Highways," Proceedings of the 9th National Conference on Microcomputer in Civil Engineering, University of Central Florida, Orlando, Florida, pp. 36-40.
31. Won, M., McCullough, B.F., Nam, Y. (1991). "Mechanistic Simulation Modeling of Continuously Reinforced Concrete Pavements," Proceedings of the 22nd National Modeling and Simulation Conference, University of Pittsburgh, Pittsburgh, Pennsylvania, pp. 2605-2611.
32. McCullough, B.F., Won, M. & Hankins, K. (1989). "Long-Term Performance Study of Rigid Pavements," Proceedings of the Forth International Conference on Concrete Pavement Design and Rehabilitation, Purdue University, West Lafayette, Indiana, pp. 455-465.