# Appendix I - Outcomes of Phase I

## Reports:

1. Flintsch, G.W., and McGhee, K.K, de León Izeppi, E.D., and Najafi, S., *The Little Book of Tire Pavement Friction, Version 1.0*, September 2012.
2. de León Izeppi, E.D., Flintsch, G.W., and McGhee, K.K, *Field Performance of High-Friction Surface*, Virginia Transportation Research Council,, VTRC 10-CR6, , Jun 2010, Charlottesville, VA, 28 pp.

## Peer-reviewed journal and conference papers produced based on the consortium studies:

1. Mogrovejo, D., Flintsch, G.W., Katicha, S.W., de León Izeppi, E.D., and McGhee, K.K., “Enhancing Pavement Surface Macrotexture Characterization by Using the Effective Area for Water Evacuation,” 2016, *Journal of the Transportation Research Board*, vol. 2591, pp. 80-93.
2. McCarthy, R., Flintsch, G.W., Katicha, S., McGhee, K. and Medina-Flintsch, A. “A New Approach for Managing Pavement Friction and Reducing Road Crashes,” 2016, *Journal of the Transportation Research Board Journal of the Transportation Research Board*, vol. 2591, pp. 23-32.
3. McGhee, K.K., de León Izeppi, E.D., Flintsch, G.W., and Mogrovejo, D.E., “Virginia Quieter Pavement Demonstration Program,” *Journal of the Transportation Research Board*, 2016, vol. 2571, pp. 49-58.
4. Najafi, S., Flintsch, G.W., de León Izeppi, E., McGhee, K., Katicha, S., “Evaluation of Repeatability and Reproducibility of Continuous Friction Measuring Equipment using Cross-Correlation,” 2016, *International Journal of Pavement Engineering*,
doi: 10.1080/10298436.2015.1095908, published online.
5. Najafi, S., Flintsch, G.W., and Khalleghianc, S., “Fuzzy logic inference-based Pavement Friction Management and real-time slippery warning systems: A proof of concept study,” *Accident Analysis & Prevention*, 2016, Vol 90, pp 41-49,
doi: 10.1016/j.aap.2016.02.007, published online.
6. Saleh, M., Abbot, A.L. and Flintsch, G.W. “3D Pavement Surface Spherical Representation and Reconstruction,” Paper No. 16-3987*, 95th Annual Meeting of the Transportation Research Board*, Jan 10-14, 2016, Washington, DC.
7. D’Apuzzo, M., Evangelisti, A., Flintsch, G.W., de León Izeppi, E., Mogrovejo, D., Nicolosi, V., “Evaluation of variability of Macrotexture measurement with Different Laser-based Devices,” *Airfield & Highway Pavement Conference 2015*, Miami, FL, June 7-10, 2015.
8. Najafi, S., Flintsch, G.W., and Medina, A., “Linking roadway crashes and tire–pavement friction: a case study,” *International Journal of Pavement Engineering*, 2015,DOI: 10.1080/10298436.2015.1039005, published online.
9. Katicha, S.W., Mogrovejo, D.E., Flintsch, G.W., and de León Izeppi, E.D. “Adaptive Spike Removal Method for High Speed Pavement Macrotexture Measurements by Controlling the False Discovery Rate,” *Journal of the Transportation Research Board*, 2015, vol. 2525, pp. 100-110., doi: <http://dx.doi.org/10.3141/2525-11>.
10. Mogrovejo, D.E., Flintsch, G.W., de León Izeppi, E.D., and McGhee, K.K. “Tire-Pavement Noise Evaluation and Equipment Comparison Using On Board Sound Intensity Methodology over Several Pavement Surfaces in Virginia,” 2014, *Journal of the Transportation Research Board*, vol. 2403, pp. 17-27.
11. Evangelisti, A., Katicha, S., de Leon, E., Flintsch, G.W., D’Apuzzo, M., Nicolosi, V., “Measurement Error Models (MEM) regression method to Harmonize Friction Values from Different Skid Testing Devices,” *Transport Research Arena*, Apr 14-17, 2014, Paris, France.
12. D’Apuzzo, M., Evangelisti, A., de León Izeppi, E.D., Flintsch, G.W., “Estimation of Pavement Macrotexture from Hot-Mix Asphalt Properties,” *17th International Road Federation World Meeting & Exhibition*, Nov 10-14, 2013, Riyadh, Kingdom of Saudi Arabia.
13. Najafi, S., Flintsch, G.W., de León, E., McGhee, K.K, “Assessment of Operational Characteristics of Continuous Friction Measuring Equipment (CFME),” *International Journal of Pavement Engineering*, 2013, Vol. 14(8), pp 706-714, Taylor & Francis, DOI: 10.1080/10298436.2012.667097.
14. de León Izeppi, E., Flintsch, G.W., and McGhee, K.K. “Effect of Water, Speed, and Grade on Continuous Friction Measurement Equipment (CFMEs),” ASTM STP 1555 *Pavement Performance: Current Trends, Advances, and Challenges*, 2013 (Choubane, B., Editor).
15. Mogrovejo, D.E., Flintsch, G.W., de León Izeppi, E.D., and McGhee, K.K. “Effect of Air Temperature and Vehicle Speed on Tire/Pavement Noise Measured with On-Board Sound Intensity Methodology,” paper 13-3765, *92nd Annual Meeting of the Transportation Research Board*, Jan 13-17, 2013, Washington, DC.
16. Zhao, G., Flintsch, G.W., “Comparative Analysis on Promising Algorithms for Pavement Homogeneous Segmentation,” paper 13-4650, *92nd Annual Meeting of the Transportation Research Board*, Jan 13-17, 2013, Washington, D.C.
17. De León, E., Flintsch, G.W., McGhee, K.K., “Limits of Agreement Method for Comparing Pavement Friction Measurements,” *Journal* *of the Transportation Research Board*, 2012, vol. 2306, pp. 188-195.
18. Fuentes, L.G., de León, E., Flintsch, G.W., Martinez, G., “Determination of Pavement Macrotexture Limit For Use in The International Friction Index (IFI) Mode,” *Journal* *of the Transportation Research Board*, 2012, vol. 2306, pp. 138-143.
19. de León Izeppi, E.D., Flintsch, G.W., Archilla, A.R., Sequeira, W., “[Data Processing and Analysis Software for Continuous Friction Measurement Equipment](http://trb.metapress.com/content/g5j72832840l8nw4/),” *Journal of the Transportation Research Board*, 2011, TRR 2227, pp. 163-170.
20. El Gendy, A., Shalaby, A, Saleh, M, Flintsch, G.W., “Stereo-vision applications to reconstruct the 3D texture of pavement surface,” *International Journal of Pavement Engineering*, 2011, Vol. 12(3), pp. 263-273.
21. Flintsch, G.W., de León Izeppi, E., Saleh, H, “Infrared Stereo Vision for Pavement Texture Analysis,” *First T&DI Congress – Integrated Transportation and Development for a Better Tomorrow* (presentation only), Mar 13-16, 2011, Chicago, IL.
22. Najafi, S., Flintsch, G.W., de León, E.D., McGhee, K.K., “Implementation of Cross-Correlation to Compare Continuous Friction Measuring Equipment,” paper [11-2](http://pressamp.trb.org/conferenceinteractiveprogram/PresentationDetails.aspx?ID=34536)083, *90th Annual Meeting of the Transportation Research Board*, Jan 23-27, 2011, Washington, DC.
23. Saleh, M., Flintsch, G.W., de León, E.D., McGhee, K.K., Abbott, A.L., “Pavement Texture Analysis Using Infrared Stereo Vision,” paper 11-[27](http://pressamp.trb.org/conferenceinteractiveprogram/PresentationDetails.aspx?ID=34536)39, *90th Annual Meeting of the Transportation Research Board*, Jan 23-27, 2011, Washington, DC.
24. Flintsch, G.W., de León Izeppi, E.D., McGhee, K.K., Najafi\*, S., “Speed Adjustment Factors for Locked-Wheel Skid Trailer Measurements,” *Journal of the Transportation Research Board*, 2010, TRR 2155, pp. 117-123.
25. Flintsch, G.W., de León Izeppi, E.D., McGhee, K.K., Shetty, S.S., “Profiler Certification Process at the Virginia Smart Road, paper [10-2513](http://pressamp.trb.org/conferenceinteractiveprogram/PresentationDetails.aspx?ID=34536), *89th Annual Meeting of the Transportation Research Board*, Jan 10-14 2010, Washington, DC.
26. Flintsch, G.W., de León Izeppi, E.D., McGhee, K.K., Roa, J.A., “Review of High-Friction Surface Technologies: Constructability and Field Performance,” paper [10-2072](http://pressamp.trb.org/conferenceinteractiveprogram/PresentationDetails.aspx?ID=34536), *89th Annual Meeting of the Transportation Research Board*, Jan 10-14 2010, Washington, DC.
27. Flintsch, G.W., de León, E.D., McGhee, K.K., Roa, J.A., “ “Field Performance Evaluation of High-Friction Surfaces,” International Seminar, *Maintenance Techniques to Improve Pavement Performance*, World Road Association (PIARC), Aug 24-26, 2009, Cancun, Mexico.
28. de León, E.D., Flintsch, G.W., Saleh, M.I., McGhee, K.K., “Stereo Vision Application for Macrotexture Measurement,” scheduled for presentation at the *Sixth International Conference on Maintenance and Rehabilitation of Pavements and Technological Control (MAIREPAV6)*, Jul 8-10 2009, Torino, Italy.
29. de León Izeppi, E., Flintsch, G.W., Saleh, M., and McGhee, K.K., “Area-Based Macrotexture Measurements: A Stereo Vision Approach.” Paper 09-3067, *88th Meeting of the Transportation Research Board*, Jan 2009, Washington, DC (CD-ROM).
30. Flintsch, G.W., de León, E., Izeppi, Roa, J., McGhee, K.K., and Swanlund, M., “Evaluation of the International Friction Index Coefficients for Various Devices,” *6th Symposium on Pavement Surface Characteristics*, *SURF 2008,* October 20-22, Portoroz, Slovenia (CD-ROM)..
31. Flintsch, G.W., de León, E., Izeppi, Saleh, M., McGhee, K.K., and Swanlund, M., “Area-Based Macrotexture Measurements using Stereo Vision,” *6th Symposium on Pavement Surface Characteristics*, *SURF 2008,* October 20-22, Portoroz, Slovenia (CD-ROM).
32. Trifirò, F., Flintsch, G.W., Guerrera, G., de León E. and McGhee, K.K., “Comparison of Friction Measuring Devices and Preliminary Evaluation of the International Friction Index Coefficients,” paper [08-1816](http://www.trb.org/am/ip/paper_detail.asp?paperid=21393), 87th *Annual Meeting of the Transportation Research Board*, Jan. 13, 2008 , Washington, DC (CD-ROM).

## Publications from other projects that used data from the consortium (not a comprehensive list):

1. de Leon Izeppi, E., Katicha, S., Flintsch, G.W., and McGhee, K. “Pioneering the use of continuous pavement friction measurements to develop new Safety Performance Functions, improve the accuracy of crash count predictions, and evaluate possible treatments for the roads in Virginia.” *Journal of the Transportation Research Board*, 2016, TRR 2583, pp. 81-90.
2. Tang\*, L.J., Xue, W., Flintsch, G.W., Medina-Flintsch A., “Distribution of Wet Exposure within the United States,” Paper No. 16-6093*, 95th Annual Meeting of the Transportation Research Board*, Jan 10-14, 2016, Washington, DC.
3. Katicha, S.W., El Khoury, J., and Flintsch, G.W. “Assessing the Effectiveness of Probe Vehicle Acceleration Measurements in Estimating Road Roughness,” *International Journal of Pavement Engineering,* 2015, published online,
doi: 10.1080/10298436.2015.1014815.
4. Bryce, J., Katicha, S., Flintsch, G.W., Sivaneswaran, N., Santos, J. “Probabilistic Lifecycle Assessment as a Network-Level Evaluation Tool for the Use and Maintenance Phases of Pavements.” *Journal of the Transportation Research Board*, 2015, vol. 2455 (1), pp. 44-53.
5. Fuentes, L.G., Flintsch, G.W., de León Izeppi, E.D., “Evaluation of the Use of the International Friction Index on Skid Data obtained using Friction Models, *Journal of Testing and Evaluation*, Nov. 2014, Vol. 42(6), DOI: 110.1520/JTE2013006.
6. Bryce, J., Joao Santos, Gerardo Flintsch, Samer Katicha, Kevin McGhee, and Adelino Ferreira, 2014. “Analysis of Rolling Resistance Models to Analyze Vehicle Fuel Consumption as a Function of Pavement Properties.” *12th International Conference on Asphalt Pavements,* Kim, R. (ed.), June 2014, pp. 263-273. Taylor and Francis Group: London
7. Viner, H., Hargreaves, D., Dunford, A., Nesnas, K., Parry T., and Flintsch, G.W., “Development of a Prediction Model for Splash and Spray,” proceedings of the *7th Symposium on Pavement Surface Characteristics* (SURF 2012), Sep. 18-21, 2012, Norfolk, VA
8. Tang, L., Flintsch, G.W., and Viner, H., “Exposure Model For Predicting Splash and Spray,” *Proceedings of the 7th Symposium on Pavement Surface Characteristics* (SURF 2012), Sep. 18-21, 2012, Norfolk, VA*.*
9. Flintsch G.W., Williams, B., Gibbons, R., Viner, H., “Assessment of the Impact of Splash and Spray on Road Users - Controlled Experiment Results,” *Journal* *of the Transportation Research Board*, 2012, vol. 2306, pp. 151-160.
10. Flintsch, G.W., Valeri, S., Katicha, S.W., de Leon, E.D., Medina-Flintsch, A., “Pilot Demonstration of the Use Probe Vehicle Dynamic Signatures to Measure Road Smoothness,” *Journal of the Transportation Research Board*, 2012, vol. 2304, pp. 158-165.

## Other presentations based on the results of the consortium:

1. McGhee, K., “PSC Consortium - Phase II Updates,” *28th RPUG Conference*, San Diego, Ca, Nov 2-5, 2015.
2. de León Izeppi, E., “Using continuous pavement friction measurements to develop Safety Performance Functions, improve the accuracy of crash count predictions, and evaluate possible treatments for the roads in Virginia,” *27th RPUG Conference*, Raileigh, NC, Nov 2-5, 2015.
3. de León Izeppi E., Toom, P., “Achieving High Correlations of Inertial Profilers with Reference Profilers at the Smart Road,” *Pavement Evaluation 2014*, Blacksburg, VA, Sept 15-18, 2014.
4. Katicha, S., “Enhancing Pavement Surface Macrotexture Characterization by Using the Effective Area for Water Evacuation,” 27th RPUG Conference, Raileigh, NC, Nov 2-5, 2015.
5. Flintsch, G.W., “Some Lessons Learned from Surf3ace Properties Research at the Virginia Smart Road,” 2013 H.W. Kummer Lecture, *ASTM Committee E17 on Vehicle - Pavement Systems*, Jacksonville, FL, Dec 10, 2013.
6. Flintsch, G.W. “Using Profile Data for Supporting Asset Management Decisions,” invited presentation, *1st European Road Profiler User Group Meeting*, Copenhagen, Denmark, Sep 10-12, 2013.
7. S. Katicha, G.W. Flintsch, “Use of Probe Vehicles to Measure Road Ride Quality,” *Road Profiler User Group Meeting*, San Antonio, TX, Sep. 16 to 19, 2013.
8. E. de León Izeppi, G.W. Flintsch, “[Profiler Certification Process at the Virginia Smart Road](http://www.rpug.org/download/2013/6-3-Edgar%20de%20Le%C3%B3n%20Izeppi.pdf),” *Road Profiler User Group Meeting*, San Antonio, TX, Sep. 16 to 19, 2013.
9. de León, E.D., Flintsch, G.W., “Continuous Friction Measuring, Equipment (CFME) Loan Program: GripTester and DYNATEST HFT,” *Pavement Evaluation 2010*, Roanoke, VA, Oct 24-26, 2010.
10. Najafi, S., Flintsch, G.W., de León, E.D., “Performance Characteristics of Continuous Friction Measurement Equipment (CFME),” *Pavement Evaluation 2010*, Roanoke, VA, Oct 24-26, 2010.
11. de León, E.D., Flintsch, G.W., “Continuous Friction Measuring, Equipment (CFME) Loan Program: GripTester and DYNATEST HFT,” *Pavement Evaluation 2010*, Roanoke, VA, Oct 24-26, 2010.
12. Najafi, S., Flintsch, G.W., de León, E.D., McGhee, K.K., “Speed Adjustment Factors for the Locked-wheel Skid Trailer,” *The* *21st Annual Road Profiler Users' Group Meeting*, Dec. 9-11, 2009, Atlanta, GA.
13. Shetty, S.S., Flintsch, G.W., de León Izeppi, E.D., McGhee, K.K., “Preliminary Results from the Profiler Certification Exercise at the Virginia Smart Road,” *The* *21st Annual Road Profiler Users' Group Meeting*, Dec. 9-11, 2009, Atlanta, GA.