**Dr. Shakir Shatnawi, Ph.D., P.E.**
**President, Shatec Engineering Consultants, LLC**
**7064 Tarvisio Way**
**El Dorado Hill, CA 95762**
**916-990-6488**

***Public and private expertise in transportation/pavement/highway/traffic engineering, highway geometric design, materials, repairs, maintenance, rehabilitation, friction-skid resistance, construction quality control-assurance, dispute resolution, failure investigations, safety, sight distance & roadside hazards.***

**License**
California Professional Engineer's License #52795

**Education**
1987-1990: Ph.D. – Civil Engineering (Transportation &Pavement Engineering)
University of Arkansas at Fayetteville, Fayetteville, Arkansas

1984-1985: M.S. – Civil Engineering (Construction Engineering & Management)
San Jose State University, San Jose, California

1978-1982: B.S. – Civil Engineering
California State University, Sacramento, California

**Relevant Experience Highlights**
2010-Present: President
Shatec Engineering Consultants, LLC, El Dorado Hills, CA, California

1991-2010: From Transportation Engineer to Division Chief (progressive promotions)
California Department of Transportation (Caltrans): D-10 (Stockton), District 4 (Oakland), and Headquarters (Sacramento), California.

1993-1999: Adjunct Professor
California State University, Sacramento, California

1997-1999: Adjunct Professor
National University, Sacramento, California

1989-1990: Research Fellow
Turner-Fairbank Highway Research Center, FHWA, McLean, Virginia.

**Professional Summary**

Dr. Shakir Shatnawi is an expert witness who has successfully assisted legal entities on a variety of cases. He is a registered professional engineer in California, and is currently the president of Shatec Engineering Consultants, LLC since May 2010. In this position, he directs the engineering operations, performs pavement studies and investigations and conducts presentations and seminars on various pavement engineering issues.

Shakir has extensive highway and transportation expertise. The following is a list of major categories for his expertise:

- Highway and Transportation Engineering
- Highway Safety, Surface Defects, Roadside Hazards, Obstructions and Work Areas
- Traffic Engineering, speed requirements, driver behavior and reaction
- Motorcycle safety and dynamics in relation to highway characteristics and defects.
- Roadway surface characteristics such as roughness, raveling, potholes, friction, skid resistance and loose gravel
- Roadway geometric standards including highway alignment, sight distance requirements, curvature design criteria, superelevation, clear recovery zone and braking distance
- Pavement and Geotechnical Standards, maintenance and repairs
- Concrete Materials
- Asphalt Materials
- Soil and aggregate Materials
- Highway Construction
- Construction Defects
- Construction Quality
- Construction Disputes
- Highway Maintenance standards and safety procedures and manuals
- Engineering specifications, standards and manuals
- ADA requirements
- Forensic/Failure investigations
- Construction materials characteristics and testing

Shakir received his Ph.D. in civil engineering (Transportation/Pavement Engineering) from the University of Arkansas (1990), and received his M.S. in civil engineering (Construction Engineering and Management) from San Jose State University (1985), and B.S. degree in Civil Engineering from California State University, Sacramento (1982).

Dr. Shatnawi has over 27 years in professional engineering experience encompassing public agencies (Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans), academia (California State University, National University) and industry with over 200 technical publications. He taught at California State University and at National University from 1993 to 1999 various classes such as transportation and highway engineering including geometric

design standards, traffic engineering and safety hazards as well as statistics. He taught university graduate and undergraduate students as well as advised graduate students through their research studies.

Shakir served as a principal investigator on multi-million dollar projects. While working for Caltrans from 1991 to 2010, he was involved at various high level engineering capacities such as being the Chief of Pavement Research, the QC/QA program manager, the chief of the Pavement Design and Rehabilitation and the chief of Pavement Preservation, and served as the Caltrans State Pavement Engineer. He directed Caltrans' Pavement Program as a Division Chief and oversaw over 50,000 lane miles with a budget of over $200 million in pavement maintenance and over $500 million in pavement rehabilitation. Previous to this experience, Shakir worked at the FHWA Turner-Fairbank Highway Research Center in McLean, Virginia as a research fellow.

Shakir has been providing expert witness services, expert testimony and litigation support to attorneys and legal entities on cases related to accident reconstruction, analysis, design standards, construction specifications, guidelines, policies, public agency practices, transportation, roads, pavements, airports, materials, highway geometric design, drainage, asphalt, concrete, soil, repairs, maintenance, inspections, rehabilitation, construction quality control - quality assurance, construction claims, inspection, settlement, dispute resolution, pavement surface conditions such as friction, skid resistance, surface discontinuities, cracking, rutting, defects, potholes and roughness, failure investigations, forensic engineering, traffic, safety standards, construction work zone accidents, construction safety, safety operating procedures, roadside hazards, signage, sight distance requirements, ADA requirements, code violations, and engineering analysis.

Shakir's education and experience demonstrates a wealth of engineering knowledge stretch in transportation and pavement analysis, design, rehabilitation, materials and construction in concrete, asphalt, soils, earth structures and foundations. As a recipient of many acknowledgements from the government and industry, Dr. Shatnawi has an impeccable reputation within the industry for his significant professional contributions. As an expert orator, he frequently shares his knowledge at major conferences.

**Professional Achievements**

<u>National and International Leadership</u>

- Envisioned and co-chaired the First International Pavement Preservation Conference in collaboration with Caltrans partners (industry, local agencies and FHWA). The conference drew over 300 attendees from many countries.

- Envisioned and established the California Pavement Preservation Center (CP2 Center). The Center became the focal point for innovation and promotion of pavement preservation.
- Envisioned and established the California Pavement Preservation Task Group (PPTG) in collaboration with Caltrans partners. The PPTG grew to 22 subtask groups with over 250 members.
- Envisioned and established the annual California Pavement Preservation Conference in collaboration with Caltrans partners. This annual conference started in 2004 with over 300 attendees every year.
- Championed and co-chaired the International Asphalt Rubber 2006 conference in California while working closely with industry. This conference started in 2000 with over 300 attendees every year.

Technical Leadership

- Led the Caltrans Pavement Program as the State Pavement Engineer responsible for over 50,000 lane miles and $500 Million budget in roadway maintenance and pavement rehabilitation.
- Led the technical efforts during the initiation and the implementation of the long life pavement program including the I-10 long life rigid pavement project and the 710 Freeway long life flexible pavement project.
- Led the development of key performance tests with the Strategic Highway Research Program (SHRP) technology; including developing a cyclic reflective cracking device and a repetitive fatigue device.
- Directed and led the development of the Maintenance Technical Advisory Guide in 2003 for Flexible Pavement and in 2007 for Rigid Pavement. This document was adopted by FHWA and became a national document.
- Led the evaluation of the SHRP Superpave technology in California.
- Coached and mentored over 500 of Civil Engineering professionals over the last 25 years.
- Authored and published many publications.
- Led the Caltrans Accelerated Pavement Testing Program.

Honors and Awards

- Received the Leadership in Transportation and Quality Pavements in 2010.
- Received the Individual of the Year Award in 2008 for outstanding contribution to pavement preservation activities in California.
- Received the Director's Superior Accomplishment Award in 2006 for outstanding accomplishments in pavement preservation.
- Received the Director's Award in Innovation in 2004 for outstanding contribution to pavement warranties.

- Received the Excellence in Transportation Award in 2003 from District 7 Director for outstanding contribution to the first long life rigid pavement project on I-10 near Pomona and the successful use of fast-setting hydraulic cement and dowel bar retrofit.
- Received the Long Life Pavement Award of Excellence in 1999 for outstanding contribution to the 710 long life pavement projects
- Received the Dwight Eisenhower Transportation Research Fellowship, 1989-1990

**Selected Publications**

1. Shatnawi, S. and Sousa, J., "Reduced Thickness Design of Asphalt Rubber – Myth or Reality," Paper prepared for the RAR15 International Conference, Las Vegas, Nevada, October 2015.
2. Shatnawi, S. "Proactive Preservation Prevents Pavement Safety Hazards," Journal of Pavement Preservation, Summer 2014.
3. Shatnawi, S. "When Managing Pavements, Manage Friction As Well," Journal of Pavement Preservation, Winter 2012.
4. Shatnawi, S. "Implementation of Polyester Concrete Grout in Dowel-Bar Retrofit of Jointed Plain Concrete Pavements," Proceedings, International Conference on Concrete Pavements, Quebec, Canada, July 2012.
5. Stein, B., Kramer, B., Ryan, R., Shatnawi, S. "Full-Depth Replacement of Concrete Pavements with Rapid Strength Concrete Pavements," Proceedings, International Conference on Long-Life Concrete Pavements, Seattle, USA, September 2012.
6. Shatnawi, S. "Comparisons of Rubberized Asphalt Binders-Asphalt-Rubber and Terminal Blend," Proceedings, Asphalt Rubber 2012 Conference, Munich, Germany, October 2012.
7. Shatnawi, S. "Life-Cycle Cost Analysis of Flexible Pavement Systems Rehabilitated with the Use of Asphalt Rubber Interlayers," Proceedings, Asphalt Rubber 2012 Conference, Munich, Germany, October 2012.
8. Shatnawi, S. "Superior Aging Characteristics of Asphalt Rubber," Proceedings, Asphalt Rubber 2012 Conference, Munich, Germany, October 2012.
9. Shatnawi, S. "Implementing In-Place Recycling Technologies," Journal of Pavement Preservation, Fall 2012.
10. Shatnawi, S. "Composite Layering Systems for Asphalt Rubber Overlays," Journal of Pavement Preservation, Summer 2012.
11. Pais, J., Minhoto, M. and Shatnawi, S. "Multi-Cracks Modeling in Reflective Cracking," Proceedings, 7th RILEM International Conference on Cracking in Pavements, Delft, The Netherlands, June 2012.
12. Shatnawi, S., Pais, J., Minhoto, M., "Asphalt Rubber Interlayer Benefits on Reflective Crack Retardation of Flexible Pavement Overlays," Proceedings, 30th Southern African Transport Conference (SATC), Pretoria, South Africa, July 2011.
13. Shatnawi, S. and Hennings, C., "Polyester Polymer Concrete has Potential as Backfill Grout in Dowel Bar Retrofits," Journal of Pavement Preservation, Winter 2011.

14. Shatnawi, S., Rouen, R., Hicks, R.G. and Cheng, D., "Pavement Preservation in the State of California – Protecting Our Investment," Proceedings, 11th International Conference on Asphalt Pavements, Nagoya, Japan, August 2010.
15. Stein, B., Kramer, B., Pyle, T. Kumar, T. and Shatnawi, S., "Rapid Strength Concrete for Rehabilitation and Improvement of Pavements," Proceedings, First International Conference on Pavement Preservation, Newport Beach, California, April 2010.
16. Cheng, D., Hicks, R.G., Johnson, S., and Shatnawi, S., "Promoting Asphalt Rubber Application through Education", Proceedings, Asphalt Rubber 2009 Conference, Nanjing, China, October 2009.
17. Way, G., Hicks, R.G., Shatnawi, S., "Performance of Rubberized Asphalt Concrete Open Graded Mixes in California," Proceedings, International Asphalt Rubber 2009 Conference, Nanjing, October 2009.
18. Shatnawi, S. and Hicks, G., "In-Place Recycling Preserves Caltrans Pavements," Journal of Pavement Preservation, Summer 2009.
19. Shatnawi, S., Stroup-Gardiner, M., "Rubberized Asphalt Concrete Open-Graded High Binder Courses Serve Well in California," Journal of Pavement Preservation, Spring 2009.
20. Stroup-Gardiner, M. and Shatnawi, S., "The Economics of flexible Pavement Preservation," Transportation Research Board (TRB), Washington, D.C., January 2009.
21. Shatnawi, S., Stroup-Gardiner, M., R., Stubstad, R., "California's Perspective on Concrete Pavement Preservation," Proceedings, National Concrete Pavement Conference, Kansas City, 2008.
22. Shatnawi, S., Zhou, H, and Hicks, R.G., "Innovative Pavement Preservation Practices in California," Proceedings, AATT, May 2007.
23. Shatnawi, S., Stonex, A and Hicks, R.G., "An Update on the Asphalt Rubber Pavement Preservation Strategies Used in California," Proceedings, Asphalt Rubber 2006 Conference, Palm Springs, California, October 25-27, 2006.
24. Shatnawi, S., Marsh, R., Hicks, R.G., and Zhou, H., "Pavement Preservation Strategy Selection in California," Proceedings, 11th AASHTO-TRB Maintenance Management Conference, Charleston, South Carolina, July 2006.
25. Antunes M., Visser A., Shatnawi S., and Batisa, F., "Asphalt Rubber Experience on Three Continents," World Road Association (PIARC) Magazine-Routes/Roads, France, 2005.
26. Shatnawi S., Antonucci C., and Hicks, R. Gary, "The Development of the Caltrans Maintenance Technical Advisory Guide," TRB First National Workshop on Roadway Pavement Preservation for Surfaced and Unsurfaced Roads, Kansas City, Missouri, 2005.
27. Tolleson A., Shatnawi S. and Washington K., "Pavement Distress Rating Using Automated Feature Extraction," 5th Symposium on Pavement Surface Characteristics – Roads and Airports, SURF 2004, Toronto, Canada, 2004.

28. Shatnawi S. and Holleran G., “Asphalt Rubber Maintenance Treatments in California,” Proceedings, Asphalt Rubber 2003 Conference, Brasilia, Brazil, 2003.
29. Shatnawi S., “An Evaluation of Rigid Pavement Design Features,” The Second International Conference on Materials, San Jose, California, August 2001.
30. Long B. and Shatnawi S., “Structural Evaluation of Rigid Pavement Test Sections.” The International Journal of Road Materials and Pavement Design, Volume 1 – Issue 1/2000.
31. Shatnawi S. and Long B., “Performance of Asphalt Rubber as Thin Overlays,” The proceedings of the Asphalt Rubber 2000 conference, Vilamoura, Portugal, November 2000.
32. Shatnawi S., “The Performance of Asphalt Rubber Mixes in California,” The International Journal of Pavement Engineering, London, England 1999.
33. Shatnawi S., “Fatigue Evaluation of Asphalt Concrete Mixes Using a New Repetitive Direct Tension Device,” The California Department of Transportation, March 1988.
34. Shatnawi S. and Lancaster F., “Field and Laboratory Evaluation of Superpave Level One Mix Design in California,” Progress of Superpave: Evaluation and Implementation, ASTM STP 1322, R.N. Jester, Ed., American Society for Testing and Materials, 1997.
35. Shatnawi S. and Sousa J., “Forensic Evaluation of a Catastrophic Rutting Failure,” International RILEM Symposium on Mechanical Test for Bituminous Materials,” Lyon, France, May 1997.
36. Harvey J., Shatnawi S. and Weissman S., "Evaluating Rutting in the CAL/APT Program," Proceedings of the Fourth Materials Engineering Conference, ASCE, Washington, D.C., November, 1996.
37. Sousa J., Shatnawi S. and Cox J. , “An Approach for Investigating Reflective Fatigue Cracking in Asphalt-Aggregate Overlays,” Proceeding of the Third International Conference on Reflective Cracking, Maastricht, October 1996, pages 103-112.
38. Shatnawi S., "An Approach for Evaluating Reflective Cracking," Proceedings of the Fourth Materials Engineering Conference, ASCE, Washington, DC, November, 1996.
39. Shatnawi S., "Pavement Damage Caused by Heavy Haul Trailers," California Department of Transportation, Sacramento, CA, October 1995.
40. Harvey J., Plessis L., Long F., Shatnawi S., Scheffy C., Tsai B., Guada I, Hung D., Coetzee N., Riemer M., and Monismith C., "Initial CAL/APT Program: Site Information, Test Pavements Construction, Pavement Materials Characterizations, Initial CAL/HVS Test Results, and Performance Estimates," Institute of Transportation Studies, University of California, Berkeley, September 1995.
41. Shatnawi S., Nagarajaiah M. and Harvey J., "Moisture Sensitivity Evaluation of Binder-Aggregate Mixtures," Transportation Research Record, Washington, DC, January 1995.

42. Hannon J., Wells G. and Shatnawi S., "Alternative Flexible Overlay Strategies for Cracked and Seated PCC Pavements," Transportation Research Board, Washington, D.C., January 1995.
43. Shatnawi S. and Van Kirk J., "The Effect of Lime on Reducing Moisture Damage in Asphalt Concrete Mixtures," Fourth International Conference on the Bearing Capacity of Roads and Airfields, Minneapolis, MN, July 1994.
44. Shatnawi S., "Feasibility of Modifying Current Specification Limits for Asphalt Content in AC Mixes," California Department of Transportation, Sacramento, CA, March 1993.
45. Shatnawi S. and Van Kirk S., "Premature Asphalt Concrete Pavement Distress Caused by Moisture Induced Damage," Transportation Research Record 1417, Washington, DC, January 1993.
46. Shatnawi S., "Premature AC Pavement Distress - District 2 Investigation," California Department of Transportation, Sacramento, CA, December 1992.
47. Shatnawi S., "An Evaluation of the Potential Use of Indirect Tensile Testing for Asphalt Mix Design," Ph.D. Dissertation, University of Arkansas, Fayetteville, AR, December 1990.
48. Shatnawi S., "An Evaluation of the Repeated Load Indirect Tensile Test," Turner-Fairbank Highway Research Center, Federal Highway Administration, McLean, VA, August 1990.
49. Shatnawi S., "Characterization of the Stiffness Properties of the OECD Test Section, "Turner-Fairbank Highway Research Center, Federal Highway Administration, June 1990.