Shadi Hanandeh

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Dr. Shadi Hanandeh is a professional researcher, consultant, and instructor with more than 15 years of broad experience in the geotechnical and pavement engineering fields. His areas of expertise include soil stabilization, using sustainable materials in geotechnical engineering; and the application of geosynthetics in geotechnical and pavement engineering. He earned his Ph.D. degree in Civil Engineering from Louisiana State University in December 2016, and his M.Sc. degree in Civil Engineering (Geotechnical Engineering) from Jordan University for Science and Technology, Jordan, in June of 2007, and his B.Sc. in Civil Engineering from Al-Mustansiriya University, Iraq, in September of 2000. Since January 2017, he has been working as an Associate Professor at Al-Balqa Applied University, where his duties involve teaching undergraduate and graduate courses; conducting research studies in multiple geotechnical and pavement engineering streams; drafting and publishing reports and scientific articles; advising undergraduate and graduate students; quality assurance and accreditation; and training and consulting services. Dr. Hanandeh has led and participated in numerous consulting, research, and capacity-building projects supported by national and international organizations such as the Scientific Research and Innovation Support Fund/Ministry of Higher Education Jordan. Between Jan 2012 and Aug 2017, Dr. Hanandeh worked at Louisiana Transportation Research, where he was a key member of the research team that undertook several projects. Dr. Hanandeh served as a civil engineer in Dubai Municipality, UAE-Building Department as a supervisor engineer between 05/2008 and 12/2010. Dr. Hanandeh served as project engineer at the Ministry of Municipal Affairs from 1/4/2002 to 30/04/2008. Dr. Hanandeh have a concrete background in geo-technical risk identification, quantification, and mitigation, and I am also very familiar with all the design parameters of tunnels and sub-surface structures. In addition, Dr. Hanandeh is also very adept at using computer applications such as PLAXIS-3D, all pile, Slide unisettle, LPILE, APILE, GROUP, Shaft, and Dyna5. Dr. Hanandeh has solid experience in soil profile investigation and instrumentation types. Hands-on experience in report making on monitoring instruments, intervention locations, and soil profile investigation. Solid experience in nondestructive pavement evaluation such as falling weight deflectometer, lightweight deflectometer, seismic pavement analyzer, dynamic cone penetrometer, ground penetrating radar, resilient modulus, nuclear density gauge, and Van Shear test. Dr. Hanandeh has an extensive experience in subsurface exploration, in-situ and laboratory soil testing, and geotechnical instrumentation, analysis geotechnical lab testing, interpretation of laboratory and field geotechnical tests, soil characterization, estimating and costing of construction, and geotechnical data and design reporting.

Education

- (2012-2016) **Louisiana State University, USA**
  Ph.D. Department of Civil Engineering
  Dissertation title: Performance Evaluation of Instrumented Geosynthetics Reinforced Paved Test Sections Built over Weak Subgrade Using Accelerated Load Testing.
- (2004-2007) **Jordan University for Science and Technology, Jordan**
  MS. in Civil Engineering (Geotechnical Engineering)
  Thesis title: Estimation of Rock Mass Deformation Modulus by Artificial Neural Network.
- (1995-2000) **Al- Mustansiriya University, Republic of Iraq** B.S. in Civil Engineering.

Research Interests

- Sustainable pavement technologies
- Uncertainty and reliability analysis in pavement engineering
- Pavement instrumentation
- Laboratory and in-situ testing and equipment development
- Accelerated Loading and Non-destructive Testing
- Pavement Design and Performance Evaluation
- Implementation of Mechanistic-Empirical Pavement Design
- Numerical Modeling of Pavement Structure
- Geosynthetic reinforced base layer for pavement and advanced geosynthetic technologies for sustainable geo-construction.
- Life Cycle Assessment
- Sustainable geotechnical technologies
- Unsaturated soil mechanics
- Uncertainty and reliability analysis in geotechnical engineering
- Geotechnical instrumentation
- Laboratory and in-situ testing and equipment development
- Warm mix asphalt
- Application of Artificial Neural Network in pavement Engineering.

Teaching Interests

- Pavement Design
- Soil mechanics
- Foundation engineering
- Highway materials
- Highway Maintenance
- Geotechnical instrumentation

- Reliability design in geotechnical engineering
- Mechanics of materials
- Geotechnical engineering testing
- Design with geosynthatics
- Advanced characterization of materials

GRADUATE STUDENTS ADVICEMENT:

I advised and co-advised the following graduate students:

    M.S. Students (3)

- Reem Atef Abu Salim, M.S. student. Working on Investigating the Dynamic Creep and the Indirect Tensile Performance of Zeolite-Modified Warm Asphalt Mixtures. Jordan University of Science and Technology, 2020.

- Feda'a Mohammad Saleh, M.S. student. Working on the Use of Artificial Neural Networks to Predict the Increase with Time in Ultimate Capacity of Driven Piles in Sandy Soil. Jordan University of Science and Technology, 2021.

- Sojoud Faris Al-Manaseer, M.S. student. Working on Effect of Using Water Treatment Sludge on Geotechnical Properties of Lime-Stabilized Expansive Soil, Jordan University of Science and Technology 2022.

Work Experience

- **Associate Professor, Civil Engineering Department, Al-Balqa Applied University, Sept/2022 – Present.**

- **Assistant Professor, Civil Engineering Department, Al-Balqa Applied University, Jan 2017 – Sept/2022.**

- **Louisiana Transportation Research Centre (LTRC), USA, May 2012 – Dec 2016.**
- Performed pavement design/analysis using ELMOD and MEPDG software's and preparing the technical reports
- Mechanistic Pavement Design and Analysis Nondestructive testing.
- Performed quantitative modelling of geosynsthtics reinforcement and stabilization in pavement by using MEPDG.
- Perform the in-situ testing for pavement characterization materials
- Investigating the applicability of various soil stabilization techniques in five different types of soil in Louisiana.

- Performing various laboratory tests (Atterberg limit tests, UCS, Tri-axial tests etc.) on untreated as well as treated/stabilized soils at different moisture contents as per ASTM as well as AASTHO standard.
- Extensive laboratory test on five different soils to evaluate the level I design input parameters to be used in new Mechanistic Empirical Pavement Design Guidelines (MEPDG) and AASTHO-1993 for Louisiana Department of Transportation and Development (LADOTD).
- Evaluation of effect of moisture content and stabilizer content in resilient characteristic of the subgrade soil by resilient modulus as well as permanent deformation tests.
- FB-Multipier analysis of the I-10 Twin Span Bridge over Lake Pontchartrain to evaluate the pile capacity based on the field load test and CPT data for the design of pile foundation as a project work in Deep foundation.
- Instrumentation and Data Acquisition.
- Delivered 'Soil mechanic laboratory' course to give students hands-on experience with soil engineering lab tests.
- Graduate Research Assistant
- Accelerated Pavement full scale testing
- Cyclic loading testing
- **Dubai municipality/UAE** - Building Department as supervisor engineer UAE 05/2008 - 12/2010.
- Supervise & develop laboratory and field technical staff.
- **Ministry of Municipal Affairs/ Jordan** as project engineer from 1/4/2002 to 30/04/2008.

- Bidding process, contractor selection, and contract award.
- Preparing quantity take-off sheets, concrete delivery order quantities, and sample testing result tables.
- Reviewed specific cases of change in duration, cost, and scope of public infrastructure investment projects.
- Reported on daily progress and highlighted potential delay causes at the Extension, and Rehabilitation.
- Municipal affairs management

- **Al-Majal Consultant Office** from 20/5/2001 to 14/2/2002.
- Performed site supervision, inspection, contract administration, payment certification, and claim review.
- Structural design.
- **AL-Kadumi Consultant** Office since 5/10/2000 to 18/5/2001.
    - Preparing weekly and monthly reports to client and senior management.

Publications

Journal Articles

- **Hanandeh, S.**, Ardah, H., Ardah, A. and Abu-Farsakh, M., 2022. Prediction of the Resilient Modulus of Stabilized Weak Subgrade for Pavement Design Structure. Transportation Geotechnics, p.100856.

- Ghunimat, D., Alzoubi, A.E., Alzboon, A. and **Hanandeh, S.**, 2022. Prediction of concrete compressive strength with GGBFS and fly ash using multilayer perceptron algorithm, random forest regression and k-nearest neighbor regression. Asian Journal of Civil Engineering, pp.1-9.

- Al-Rawashdeh, M., Alzoubi, A., **Hanandeh, S.**, Yousef, I. and Al-Nawaiseh, M., 2022. Performance of Mortar Incorporating Heat-Treated Drinking Water Treatment Sludge as a Silica-Sand Replacement. Civil Engineering Journal, 8(8), pp.1639-1652.

- Alhomaidat, F., Hasan, R.A., **Hanandeh, S**. and Alhajyaseen, W., 2022. Using driving simulator to study the effect of crash fact signs on speeding behaviour along freeways. International journal of injury control and safety promotion, pp.1-11.

- **Hanandeh, S**.M., Al-Bodour, W.A. and Hajij, M.M., 2022. A Comparative Study of Soil Liquefaction Assessment Using Machine Learning Models. Geotechnical and Geological Engineering, 40(9), pp.4721-4734.

- Abu-Farsakh, M.Y., Chen, Q., **Hanandeh, S**. and Saghebfar, M., 2022. Quantifying the Benefits of Geosynthetics Reinforcement in Flexible Pavement Design Using Cyclic Plate Load Testing. Transportation Research Record, p.03611981221084691.

- **S. Hanandeh**, I. Khliefat, R. Hanandeh, F. Alhomaidat , 2022. Modelling the Free Flow Speed and 85th Percentile Speed Using Artificial Neural Network (ANN) and Genetic Algorithm. Journal International Review of Civil Engineering (IRECE). Vol 13 n°4.

- **Shadi Hanandeh**, 2022, Introducing mathematical modeling to estimate pavement quality index of flexible pavements based on genetic algorithm and artificial neural networks. Case Studies in Construction Materials, Vol. 16, P, e00992.

- W Al Bodour, **S Hanandeh**, M Hajij, Y Murad, 2022, Development of Evaluation Framework for the Unconfined Compressive Strength of Soils Based on the Fundamental Soil Parameters Using Gene Expression

Programming and Deep Learning Methods. Journal of Materials in Civil Engineering, Vol. 34.issue 2.   P, 04021452(1-12)

- Ahmed Ashteyat, Yasmeen Obaidat, Aseel Btoush, **Shadi Hanandeh**, 2021, Experimental and numerical study of strengthening and repairing heat-damaged RC circular column using hybrid system of CFRP. Case Studies in Construction Materials, Vol. 15, P, e00742
- Alzoubi, D. Ghunimat, M. Al-Rawashdeh, S. **Hanandeh,** (2020). The potential of using water purification wastes as fine aggregates in concrete mixes: an initial study. Australian Journal of Civil Engineering, 1-7
- **Hanandeh**, S., Alabdullah, S. F., Aldahwi, S., Obaidat, A., & Alqaseer, H. (2020). Development of a Constitutive Model for Evaluation of Bearing Capacity from CPT and Theoretical Analysis Using ANN Techniques. International Journal, 19(74), 229-235.
- Ashteyat, A. M., **Hanandeh**, S., & Al-Btoush, A. Y. (2020). Behavior of heat damaged circular reinforced concrete columns repaired using Carbon Fiber Reinforced Polymer rope. Journal of Building Engineering, 101424.
- **Hanandeh**, S., Ardah, A., & Abu-Farsakh, M. (2020). Using artificial neural network and genetics algorithm to estimate the resilient modulus for stabilized subgrade and propose new empirical formula. Transportation Geotechnics, 100358.
- Q Chen, S **Hanandeh**, M Abu-Farsakh, L Mohammad, Performance evaluation of full-scale geosynthetic reinforced flexible pavement, Geosynthetics International , December 2017
- **S Hanandeh**, M Abu-Farsakh, L Mohammad, Q Chen, Performance of Geosynthetic-Reinforced Pavements Built over Soft Soil under Cyclic Plate Loads, Geotextiles and Geomembranes (2016) Accepted.
- X Tang, M Abu-Farsakh, **S Hanandeh**, Q Chen, Performance of Reinforced and Stabilized Unpaved Test Sections Built over Native Soft Soil Under Full-Scale Moving Wheel Loads.Transportation Research Board 94th Annual Meeting.
- S **Hanandeh** , O Mughieda , K Bani-Hani, Estimation of Rock Mass Deformation Modulus by using Artificial 1 Neural Network, Transportation Research Board 96th Annual Meeting(Submitted)
- M Abu-Farsakh, S **Hanandeh** ,L Mohammad, Q Chen, Performance Evaluation of Geosynthetic Reinforced Flexible Pavement using Full-Scale Accelerated Loading Test. Geosynthetics International (2017).
- **S Hanandeh**, M Abu-Farsakh, Q Chen, Instrumentation of Full Scale Geosynthetics Reinforced Pavement Test Section by using Accelerated Load Facility. (Preparation).

Peer-reviewed Conference Proceedings (full paper review)

- X Tang, M Abu-Farsakh, **S Hanandeh**, Q Chen, Use of Geosynthetics for Reinforcing/Stabilizing Unpaved Roads under Full-Scale Truck Axle Loads. SHALE ENERGY ENGINEERING 2014, 591.
- Tang, X., Abu-Farsakh, M., **Hanandeh, S.**, and Chen, Q. (2014) Evaluation of Geosynthetics in Unpaved Roads Built over Natural Soft Subgrade Using Full-Scale Accelerated Pavement Testing. Geo-Congress 2014 Technical Papers: pp. 3035-3043.
- X Tang, **S Hanandeh**, Accelerated Load Testing of Geosynthetic–Reinforced/Stabilized Unpaved Roads Built over Native Soft Soil 2 Annual Meeting and Publication in the Transportation Research Record 38, 39.
- M. Abu-Farsakh, **S. Hanandeh**, L Mohammad, Q. Chen, Evaluation of Geosynthetic Reinforced/Stabilized for Pavement Built over Soft Subgrade Soil Using Cyclic Plate Loading Testing. Geosynthetics 2015 February 15-18, Portland, Oregon.
- **S Hanandeh**, M Abu-Farsakh, L Mohammad, Q Chen and Saghebfar, Full-Scaled Accelerated Load Testing of Geosynthetics Reinforced/Stabilized Paved Roads built over Native Soft Subgrade. GeoAmerica 2016.
- M. Abu-Farsakh, S **Hanandeh**, X Tang, Chen, Q. (2016) Sustainability Evaluation of Geosynthetic Stabilized Soft Subgrade Soil in Unpaved Test Sections. Geo-Chicago 2016, At Chicago.

- S **Hanandeh**, O Mughieda, K Bani-Hani, Evaluation The Deformation Modulus of Rock Masses by using Artificial Neural Network. Advanced in Sustainable Construction Materials & Civil Engineering Systems (ASCMCES-17) University of Sharjah, United Arab Emirates. 18-20 April 2017.

Work in Progresses
- Estimation of Rock Mass Deformation Modulus by using Artificial Neural Network
- Using finite element to predict the permanent deformation in flexible pavement.
- Using non-linear regression to predict resilient modulus for soil subgrade

Presentations

- "Evaluation of Geosynthetic Reinforced/Stabilized for Pavement Built over Soft Subgrade Soil Using Cyclic Plate Loading Testing" Geosynthetics 2015 February 15-18, Portland, Oregon.
- "Full-Scaled Accelerated Load Testing of Geosynthetics Reinforced/Stabilized Paved Roads built over Native Soft Subgrade." GeoAmerica 2016.

Professional Affiliations

- Friend Member: TRB Committee on Exploration and Classification of Earth Materials (AFP20)

- Member: American Society of Civil Engineers

Professional Service

- Paper reviewer: Transportation Research Record
- Paper reviewer: Geosynthetics 2015
- Paper reviewer: GeoCongress 2014, ASCE
- Technical report reviewer: LADOTD

Honors/Awards

- 2nd place I graduate student poster presentations, organized by LSU
- LTRC research assistant,2012-2016

Teaching Experience

Assistant Instructor

- Soil Mechanics Fall 2014
- Shallow Foundation Engineering Spring 2013
- Deep Foundation Design Fall 2012
- Statics
- Strength of materials

Course Work

Civil Engineering Department Courses

- Principle of Soil Behavior
- Critical State Soil Mechanics
- Soil Improvement and stabilization
- Shallow foundation and Deep foundation
- Pavement Analysis and Design
- Continuum Mechanics
- From Quantum to Micro Mechanics
- Applied Geophysics
- Shearing Properties of Soil
- Advanced Geotechnical Engineering I
- Advanced Geotechnical Engineering II
- Advanced Pavement Design
- Design with Geosynthetics
- Advanced Geotechnical in Situ Testing
- Pavement Evaluation and Rehabilitation
- Advanced characterization materials.

Computer skill

- Statistical software: SAS & Minitab
- Pavement applications: MEPDG, Elmod5, KENLAYE
- BIM, Revit Architecture,
- Lpile, Shaft, Group, FB-Multipier
- Slide, Phase2, Settle3D, PSDDF
- Plaxis, GeoStudio
- Other applications: Microsoft Office, MathCAD, Matlab

Training Courses

- OSHA, Occupational Safety and Health, Dubai, UAE (2009)
- Computer Comprehensive Course (Word, Excel, PowerPoint, Access) Dubai, UAE. (2009)
- Highways Maintenance Irbid municipality, Irbid, Jordan (2003)
- Computer Aided Structural Design Using (STAAD III), Jordan Engineers Association / The Engineers Training Center, Amman, Jordan. (2002)
- Prokon, Jordan Engineers Association / The Engineers Training Center, Amman, Jordan. (2002)
- Primavera, Jordan Engineers Association / The Engineers Training Center, Amman, Jordan. (2002)
- Maintenance of Concrete Structures, Irbid municipality, Irbid, Jordan (2002)
- AutoCAD Jordan Engineers Association / The Engineers Training Center, Amman, Jordan (2001)

Societies Membership

- Jordan Engineers Association, Amman – Jordan, 2000.

Languages

- Arabic (My native language)
- English (very good Skills)
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Special Skills:

- High motivation, detail oriented, and excellent organization skills.
- Outstanding oral and written communication skills.
- Exceptional leadership and public speaking skills.