Hanli Wu, Ph.D.

Co-advisors: Drs. Jenny Liu and Xiong Zhang

Research Associate & Lecturer, Department of Civil, Architectural and Environmental Engineering,

Missouri University of Science and Technology (S&T), Rolla MO 65409

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EDUCATION

Ph.D.	Geotechnical and Pavement Engineering, Missouri S&T	Jul. 2022
M.S.	Bridge and Tunnel Engineering, Hunan University	Jun. 2019
B.S.	Civil Engineering, Hunan University	Jun. 2014

WORK EXPERIENCE

Instructor, Missouri S&T	Jan. 2023-Present
Research Associate, Missouri S&T	Aug. 2022-Present
Structural Engineer, Tianhe Construction and Installation Co., Ltd.	Jun. 2014-Jun. 2015

PROFESSIONAL AFFILIATIONS

- Friend, Transportation Research Board (TRB) AKG30 Standing Committee on Geo-Environmental and Climatic Impacts on Geomaterials.
- Friend, TRB AKT50 Standing Committee on Bridge & Structures Management
- Member, Council of Graduate Students (CGS) of Missouri S&T
- Member, Chi Epsilon (XE) The International Civil Engineering Honor Society
- Member, Deep Foundations Institute (DFI)
- Member, American Society of Civil Engineers (ASCE)
- Member, American Society for Testing Materials (ASTM) International
- Member, American Concrete Institute (ACI)
- Member, International Association of Chinese Infrastructure Professionals (IACIP)
- Member, International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII)

HONORS & AWARDS

•	IACIP Best Poster Award Second Prize, the 13th IACIP Annual Meeting, IACIP.	2023
٠	IACIP Outstanding Graduate Student Award, the 12th IACIP Annual Meeting, IACIP.	2022
•	IACIP Best Poster Award First Prize, the 12 th IACIP Annual Meeting, IACIP.	2022
٠	Graduate Student Travel Fund (GSTF), Office of Graduate Studies, Missouri S&T.	2021
٠	Outstanding and Engaged Graduate Student Award, CGS - Missouri S&T.	2021
٠	IACIP Best Poster Award Third Prize, the 11 th IACIP Annual Meeting, IACIP.	2021
٠	Waheed Uddin Outstanding Graduate Student Award First Place, the National Center for	
	Transportation Infrastructure Durability and Life-Extension (TriDurLE).	2020
٠	Chi Epsilon Outstanding Presentation Award, Missouri S&T Chapter of Chi Epsilon.	2020
٠	Ron Eckelkamap Memorial Fellowship, Missouri S&T.	2020
•	IACIP Best Poster Award Second Prize, the 10 th IACIP Annual Meeting, IACIP.	2020
•	Graduate Student Travel Award, Missouri S&T.	2020
٠	First Place Outstanding Undergraduate Thesis (Top 5 out of 569 students in the College of Civil	
	Engineering, Hunan University), Hunan University.	2014
٠	First Place Scholarship, Hunan University.	2011

PROFESSIONAL SERVICE

- **Paper Reviewer**, Transportation Research Record.
- **Paper Reviewer**, ASCE Journal of Cold Regions Engineering.
- **Paper Reviewer**, ASCE Journal of Transportation Engineering, Part B: Pavements.
- **Paper Reviewer**, ASCE International Conference on Transportation & Development (ICTD 2022).
- **Paper Reviewer**, Suranaree Journal of Science and Technology.
- Faculty Judges & Oral Session Chair, 2023 Graduate Research Showcase, Missouri S&T. 2023

•	Session Moderator, 2021 Transportation Research Congress (TRC), Hangzhou (online). Session Moderator, the 5 th International Conference on Transportation Infrastr Materials (TIM 2021) Changsha Hunan China (online)	a, ZheJiang, China 2021 ucture and 2021		
•	Session Moderator, the 10 th IACIP Annual Meeting, Washington, D. C.	2021		
•	Student Organization Committee, the 10th IACIP Annual Meeting, Washington	on, D. C. 2020		
• Session Moderator, the 9 th International Conference on Structural Health Monitoring of Intelligent				
	Infrastructure (SHMII-9), St. Louis, MO.	2019		
TEACHING EXPERIENCE				
Lecturer, Missouri S&T				
•	CE3715 Fundamental of Geotechnical Engineering	Spring 2023		
Graduate Teaching Assistant, Missouri S&T				
•	CE6716 Soil Stabilization	Fall 2022		
•	CE6001 Soil Mechanics for Unsaturated Soils	Spring 2022		
•	CE5156 Pavement Design, Lecturer for LTPP InfoPave	Spring 2022		
•	CE3116 Construction Materials Properties and Testing, Lab instructor	Fall 2021		
Graduate Teaching Assistant, Hunan University				
•	Theory of Concrete Bridge Structures Concrete Bridge (I, II)	Spring 2016 Fall 2015		

Research Experience

Research Associate

Conducting research, preparing, and contributing to technical reports/publications and presentations, and managing the research group and the lab under Dr. Jenny Liu.

Proposal Preparing:

- Development of Field Test to Determine Actual Percent Embedment of Chip Seal Aggregate. National Cooperative Highway Research Program (NCHRP), \$400,000.
- *Center for Transformative Research in Infrastructure Durability (CTRID).* University Transportation Center (UTC) Program, U.S. Department of Transportation (USDOT), \$10 Million for 5 years.
- *Center for Environmentally Sustainable Transportation (CEST).* UTC, USDOT, \$10 Million for 5 years.

Technical Report Revising and Editing:

- Automated Detection and Characterization of Cracks on Concrete Using Laser Scanning. Project ID: 2020-MST-06. (TriDurLE)
- Numerical Simulation of Pavement Installed with Wicking Geotextile in Responses to Climatic Conditions. (TriDurLE)
- *Performance Of Wicking Geotextile (H2ri) To Mitigate Pavement Pumping.* (TriDurLE)
- *Quantifying and Incorporating the Benefits of Wicking Geotextile into Pavement Design.* (TriDurLE)

Graduate Research Assistant, Missouri S&T

- **P1.** "Navigating the New Arctic Track 1: Collaborative Research: Sociodemographic, Cultural, and Infrastructure Resilience and Adaptation under the Effects of Permafrost Degradation and Coastal Erosion," National Science Foundation, 2019-2024, Total \$3,000,000 and S&T \$350,000.
- **P2.** "Durability of Transverse Sawcut Joints in Mid-Western Jointed Concrete Pavements" (Yrs 1 and 2), USDOT TriDurLE, 2019-2022, \$146,257.
- **P3.** "UAV-Enabled Structure-From-Motion Photogrammetry for Bridge Crack Detection and Characterization", USDOT TriDurLE, 2020-2022, \$92,402.
- **P4.** "A Multiple-Camera System to Determine the Absolute Volume of Soil Specimen during Dynamic Triaxial Testing", USDOT TriDurLE, 2020-2022, \$99,478.
- **P5.** "National Center for Transportation Infrastructure & Life-Extension (TriDurLE) S&T Program," USDOT, 2019-2024, Total \$7,500,000 and S&T \$1,649,700.

- **P6.** "Novel fire-resistant MPC siding for buildings," Rock Mechanics and Explosives Research Center (RMERC) Seed Fund, January 2019 May 2019, \$4,800 (internal).
- **P7.** "Use of cellular concrete for air convection embankment to protect permafrost foundations in cold regions: feasibility study," UAF and CESTiCC, 2017-2019, \$219,972.

Graduate Research Assistant, Hunan University

- P8. "Instant identification of overloaded vehicles with bridge weigh-in-motion system: theoretical research and its application," National Natural Science Foundation of China (Grant No. 51178178), ¥600,000 RMB. April 2016 December 2017
- **P9.** "The safety performance study of the innovative non-uniform continuous box-girder bridge," Science and Technology Foundation of Guangdong Provincial Department of Transportation (Grant No. 2010-02-013), ¥1,200,000 RMB. April 2016 - December 2017
- P10. "Fast identification of overloaded vehicles based on bridge weigh-in-motion (BWIM) system and early warning and rapid safety assessment of existing bridges," the Hunan Provincial Natural Science Foundation (Grant No. 13JJ2019), 2013-2016, ¥30,000 RMB. October 2015 - October 2016

BRIDGE DESIGN CONSULTATION & FIELD EXPERIENCE

Graduate Research Assistant, Hunan University

- **P1.** "102 m ultra-high-performance concrete (UHPC) bridge design consultation, in the S292 first-class highway extension line," Dazhan, Yingde, Guangdong, China. November 2016 October 2017
- **P2.** *"Construction monitoring and field tests of the Lunzhou Bridge and the Panlong Tunnel,"* Qingyuan, Guangdong, China. May 2016 December 2016
- **P3.** *"Geologic Feature Analysis of Site Condition of China-Maldives Friendship Bridge,"* Malé, Maldives. April 2016
- **P4.** "Use of bridge weigh-in-motion system on an orthotropic steel deck bridge (Fochen Bridge)," Foshan, Guangdong, China. October 2015 - March 2016
- P5. "Bridge health inspection for 5 bridges," Guilin, Guangxi, China. September 2015 October 2017
- **P6.** *"The shell-shape cable-stayed bridge design consultation of Xinzhong Road Extension Line,"* Guilin, Guangxi, China, 2013-2014

PUBLICATIONS (* Correspondence)

Journal Articles (Under Review)

- **J1.** Wu, H., Liu, J.*, Zhang, X., and Wang, Y. D. (2023). "Review of Modeling, Experiments, and Engineering Practices for Frost Damage Mitigation in Cold Regions' Pavement Infrastructure." *ASCE Journal of Cold Region Engineering*. (Under review).
- **J2.** Wu, H., Zhang, X., and Liu, J.* (2023). "Thermo-Mechanical Stability Analysis of the Novel Cellular Concrete Block Air Convection Embankments on Permafrost Foundations in Cold Regions." *Cold Regions Science and Technology.* (Under review).
- **J3.** Zhu, A., **Wu, H.**, Wang, Y. D., and Liu, J.* (2023). "Evaluation of Feasibility and Performance of Foamed Fire-Resistant Coating Materials." *Construction and Building Materials*. (Under review).

Journal Articles (Published)

- J1. Wu, H., Liu, J.*, Zhang, X., and Saboundjian, S. (2023). "Innovative Air Convection Embankment for Cold/Arctic Region Low Volume Roads." *Transportation Research Record*. 1-15. <u>https://doi.org/10.1177/03611981231155432</u>
- J2. Wu, H., Zhang, X., and Liu, J.* (2023). "Thermal Performance Analysis of Hollow Cellular Concrete Block Air Convection Embankment for Cold Regions." *Cold Regions Science and Technology*, 206, 103733. <u>https://doi.org/10.1016/j.coldregions.2022.103733</u>
- J3. Wu, H., Wang, Y. D., Zhang, X., and Liu, J.* (2022). "Impacts of Lightweight Aggregates Interlayers for Air Convection Embankment on Pavement Thermal Profile and Pavement Performance in Alaskan Permafrost Regions." *Transportation Research Record*, 2676(12), 760-774. <u>https://doi.org/10.1177/03611981221097401</u>
- J4. Zhu, A., Wu, H., and Liu, J.* (2022). "Feasibility Study on Novel Fire-Resistant Coating Materials." ASCE's Journal of Materials in Civil Engineering. 34(6), 04022080. <u>https://doi.org/10.1061/(ASCE)MT.1943-5533.0004233</u>

- J5. Wu, H., Liu, J., and Zhang, X.* (2020). "Feasibility Study on Use of Cellular Concrete for Air Convection Embankment on Permafrost Foundations in Fairbanks, Alaska." *Transportation Geotechnics*, 22, 100317: 1-16. <u>https://doi.org/10.1016/j.trgeo.2020.100317</u>
- J6. Wu, H., Zhao, H.*, Liu, J., and Hu, Z. (2020). "A Filtering-Based Bridge Weigh-In-Motion System on A Continuous Multi-Girder Bridge Considering the Influence Lines of Different Lanes." *Frontiers of Structural and Civil Engineering*, 14(5), 1232-1246. <u>https://doi.org/10.1007/s11709-020-0653-0</u>
- J7. Wu, H., Zhao, H.*, An, J., and Zhang, B. (2021). "Field Tests of BWIM System on A Long-Span Concrete Box-Girder Bridge." *Journal of China & Foreign Highway*, 41(1): 294-330. http://www.cnki.com.cn/Article/CJFDTOTAL-GWGL202101059.htm
- J8. Zhao, H.*, Wu, H., Hu, Z., and An, J. (2020). "In Situ Experimental Study of the Bridge Weigh-In-Motion System on A Rigid-Continuous Box Girder Bridge." *Journal of Highway Engineering*, 45(5): 21-29. <u>http://www.cnki.com.cn/Article/CJFDTOTAL-ZNGL202005004.htm</u>
- J9. Hu, Z., Wu, H., Hu, J., Gong, H., Li, J., and Zhao, H.* (2019). "Field Tests of Bridge Weigh-In-Motion System on A Continuous Small Box-Girder Bridge." *Journal of Highway Engineering*, 44(5): 87-92, 168. <u>http://www.cnki.com.cn/Article/CJFDTotal-ZNGL201905018.htm</u>
- J10. Zhang, A., Wu, H., Ma, P., Dong, Y., and Zhao, H.* (2017). "The Global Effect of the Application of BWIM System to Orthotropic Steel Decks." *Journal of Highway Engineering*, 42(6): 261-267. <u>http://www.cnki.com.cn/Article/CJFDTotal-ZNGL201706048.htm</u>
- J11. Geng, H., Ma, P., Wu, H., Dong, Y., Zhang, W., Zhu, P., and Zhao, H.* (2017). "The Application of Bridge Weigh-In-Motion System on Slab Bridge." *Journal of Highway Engineering*, 42(6): 24-30, 35. <u>http://www.cnki.com.cn/Article/CJFDTotal-ZNGL201706006.htm</u>
- J12. Qiao, D., Li, Z., Wu, H., and Zhao, H.* (2017). "Vehicle-Bridge Vibration Analysis of Simply Supported Slab Bridge Using Coupling Method With LS-DYNA." *Journal of Highway Engineering*, 42(2): 116-121, 144. <u>http://www.cnki.com.cn/Article/CJFDTotal-</u> ZNGL201702024.htm
- J13. Qin, J.*, Wan, R., Liu, J., Wang, F., and Wu, H. (2016). "Slopes Stability Analysis of the Foundation Site of the Male-Hulhule Bridge in the Gaadhoo Koa Strait." *Journal of Highway and Transportation Research and Development*, 137(5): 241-243. http://www.enki.com.en/Article/CJFDTotal-GLJJ201605095.htm

Conference Papers

- **C1. Wu, H.**, Zhang, X., and Liu, J.* (2023). "Investigation on Thermo-Mechanical Stability of Hollow Cellular Concrete Block Air Convection Embankment for Cold Regions." In: *Proceedings of the 13th International Symposium on Cold Regions Development (ISCORD 2023)*, July 14-16, 2023, Harbin, China. (under review)
- C2. Wu, H., Zhang, X., and Liu, J.* (2023). "Reasonable Height of Cellular Concrete Aggregate Interlayer for Air Convection Embankment in Alaskan Permafrost Regions." In: *Proceedings of the Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA 2023)*, August 16-19, 2023, Honolulu, Hawaii, USA. (under review)
- C3. Ge, Y., Wu, H., Liu, J., and Zhang, X.* (2023). "Crack Detection and Characterization in the Bridge using UAV Photogrammetry and Deep Learning Methods." In: *Proceedings of the Second International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities (MAIREINFRA 2023)*, August 16-19, 2023, Honolulu, Hawaii, USA. (under review)
- C4. Zhu, A., Wu, H., and Liu., J.* (2021). "Feasibility Study on Foamed Fire-Resistant Coating Materials." In: *TRB 101st Annual Meeting*, Washington D.C., 2022: 22-04825.
- **C5.** Zhu, A., **Wu, H.**, and Liu., J.* (2020). "Feasibility Study on Novel Fire-Resistant Coating Materials." In: *TRB100th Annual Meeting*, Washington D.C., 2021: 21-04100.
- C6. Liu, J.*, and Wu, H. (2019). "Improved Ground Penetrating Radar Data Processing Method for Railroad Ballast Inspection." In: *Proceedings of the SHMII-9*, August 4-7, 2019, St. Louis, USA, (2)1236-1241.
- C7. Wu, H., Zhao, H., and Liu, J.* (2019). "In Situ Experimental Study of FFT-Based Bridge Weigh-In-Motion System on A Continuous Box Girder Bridge." In: *Proceedings of the SHMII-9*, August 4-7, 2019, St. Louis, USA, (2)1329-1334.
- C8. Wu, H., Zhao, H.*, and Liu, J. (2019). "Field Assessment of FFT-Based Bridge Weigh-In-Motion System on A Continuous Box Girder Bridge." In: *TRB 98th Annual Meeting*, Washington D.C., 2019: 19-04326.

- **C9.** Zhao, H.*, **Wu, H.**, Tan, C., Qiao, D., and Shao, X. (2015). "BWIM Technology: A Review of Application to Orthotropic Steel Decks." In: *Proceedings of the 4th International Orthotropic Bridge Conference (40BC)*, Sep 21-24, Tianjin, China, 183-192.
- C10. Zhao, H.*, Zhang, L., Wu, H., Tan, C., and Shao, X. (2015). "Fatigue Performance at Cutouts of An Orthotropic Lightweight Steel - UHPC Composite Deck." In: *Proceedings of the 40BC*, Sep 21-24, 2015, Tianjin, China, 495-501.

Technical Reports

- R1. Liu, J., and Wu, H. (2019). "Use of Cellular Concrete for Air Convection Embankment to Protect Permafrost Foundations in Cold Regions: Feasibility Study." INE/CESTICC 19.22 Report, Missouri S&T, MO, USA. <u>https://scholarworks.alaska.edu/handle/11122/10673</u>
- **R2.** Qingyuan Traffic and Transportation Bureau. (2019). "The Safety Study of the Innovative Non-Uniform Continuous Box-Girder Bridge." Section 8: Field Study of Bridge Weigh-In-Motion System on the Non-Uniform Continuous Bridge, Hunan University, Changsha, Hunan, China.

Thesis & Dissertation

- Wu, H. (2022). "Use of Cellular Concrete for Air Convection Embankment to Protect Permafrost Foundation in Cold Regions." Ph.D. dissertation, Missouri S&T, Rolla, MO, USA.
- Wu, H. (2019). "Theoretical and Experimental Study of Bridge Weigh-In-Motion System on Long-Span Continuous Bridges." Master thesis, Hunan University, Changsha, Hunan, China. DOI: 10.27135/d.cnki.ghudu.2019.004438

PRESENTATIONS

- 1. Thermal Performance Analysis of Hollow Cellular Concrete Block Air Convection Embankment for Cold Regions. *ASCE Geo-Institute Case Histories Seminar with Student Projects*, April 11, 2023, St. Louis, MO. (podium and poster presentation)
- 2. Thermal Performance Analysis of Hollow Cellular Concrete Block Air Convection Embankment for Cold Regions. *The 13th IACIP Annual Meeting*, January 14-15, 2023. (poster presentation)
- Feasibility Study on Use of Cellular Concrete for Air Convection Embankment on Permafrost Foundations. ASCE Geo-Institute St. Louis 2022 Case History Night, April 26, 2022, St. Louis, MO. (poster presentation)
- 4. Impacts of Lightweight Aggregates Interlayers for Air Convection Embankment on Pavement Thermal Profile and Pavement Performance in Alaskan Permafrost Regions. *The TRB 101st Annual Meeting*, January 9-13, 2022, Washington, D. C. (podium presentation)
- 5. Feasibility Study on Foamed Fire-Resistant Coating Materials. *The TRB 101st Annual Meeting*, January 9-13, 2022, Washington, D. C. (poster presentation)
- 6. Impacts of Lightweight Aggregate ACEs on Pavement Performance in Alaskan Permafrost Regions. *The 12th IACIP Annual Meeting*, January 9, 2022. (poster presentation)
- 7. Impacts of Lightweight Aggregates Interlayers for Air Convection Embankment on Pavement Thermal Profile and Pavement Performance in Alaskan Permafrost Regions. 2021 TriDurLE Symposium, December 6-7, 2021, TriDurLE, USA. (poster presentation)
- 8. Impacts of Lightweight Aggregate ACEs on Pavement Performance in Alaskan Permafrost Regions. *The 2021 CGS Poster Competition, the Council of Graduate Students and the Office of Graduate Studies at Missouri S&T*, November 17-18, 2021. (poster presentation)
- 9. Impacts of Lightweight Aggregates Interlayers for Air Convection Embankment on Pavement Thermal Profile and Pavement Performance in Alaskan Permafrost Regions. 2021 Midwest Numerical Analysis Day (MWNADay), October 29-30, 2021, Rolla, MO. (podium presentation)
- 10. Comparison of the Cooling Effects of Different Cellular Concrete Air Convection Embankments on Protecting Permafrost Foundations from Thawing. *The 11th IACIP Annual Meeting*, January 10, 2021. (poster presentation)
- 11. Feasibility Study on Novel Fire-Resistant Coating Materials. *The TRB 100th Annual Meeting*, January 5-29, 2021. (poster presentation)
- 12. Feasibility Study on Use of Cellular Concrete for Air Convection Embankment on Permafrost Foundations. *The 10th IACIP Annual Meeting*, January 12, 2020, Washington, D. C. (poster presentation)
- 13. Improved Ground Penetrating Radar Data Processing Method for Railroad Ballast Inspection. *The SHMII-9 International Conference*, August 4-7, 2019, St. Louis, MO. (podium presentation)

- 14. In Situ Experimental Study of FFT-Based Bridge Weigh-in-Motion System on a Continuous Box Girder Bridge. *The SHMII-9 International Conference*, August 4-7, 2019, St. Louis, MO. (podium presentation)
- 15. FFT-Based Portable Bridge Weigh-in-Motion System for Highway Transportation Management. *The SHMII-9 International Conference*, August 4-7, 2019, St. Louis, MO. (poster presentation)
- 16. FFT-Based Bridge Weigh-in-Motion System for Highway Transportation Management. *The 7th Transportation Infrastructure Conference*, April 27, 2019, MST, Rolla, MO, USA. (poster presentation)
- 17. FFT-Based Bridge Weigh-in-Motion System for Highway Transportation Management. *The TRB* 98th Annual Meeting, January 12-16, 2019, Washington, D. C. (poster presentation)

SKILLS

- Multiphysics modeling of climate-soil-structure interaction, fluid-thermal-structure coupling, highperformance computing, and frozen ground engineering.
- Structural health monitoring, bridge inspection and reinforcement, bridge construction monitoring.
- Finite Element Software: Midas Civil, ANSYS Mechanical, ANSYS Fluent, COMSOL Multiphysics.
- Road Engineering Software and Database Application: *HintCAD*, *AASHTOWare Pavement ME Design*, *LTPP InfoPave*, *TEMPS*, *AKFPD*
- Others: AutoCAD, Autodesk Revit, SolidWorks, MATLAB, Maple, OriginLab, Microsoft Visio, SAS, JMP, Minitab.