Brent M. Phares

PE, PhD

Senior Managing Consultant

With more than three decades of experience, Dr. Phares is an internationally recognized expert in forensic engineering, specializing in the investigation of all types of bridges and other transportation structures. His work spans bridge testing and evaluation, structural monitoring, and detailed inspection practices, including advanced nondestructive evaluation methods. His technical expertise also extends to wind-structure interaction and the complex behavior of soil, foundations, and structural systems, allowing him to assess performance and identify opportunities for improvement with precision.

Dr. Phares has a strong track record of supporting both horizontal and vertical construction projects through expert testimony and litigation services, bringing clarity and authority to complex engineering disputes. In addition to his technical capabilities, he demonstrates notable strength in business development, maintaining an extensive professional network and working effectively with public, private, and governmental clients across more than 35 states.

His experience in structural analysis and repair design is particularly significant, incorporating both conventional techniques and innovative materials to develop durable, efficient solutions. This combination of deep technical knowledge, practical field experience, and strategic client engagement positions him as a trusted leader in the field of structural and bridge engineering.

Education

PhD, Structural Engineering (Summa Cum Laude). Iowa State University. 1998

MS, Structural Engineering (Summa Cum Laude). Iowa State University. 1996

BS, Civil Engineering (Summa Cum Laude). Iowa State University. 1994

Licenses & Certifications

- State of Iowa P.E.

Contact Information

bphares@engsys.com

(515) 509-2920

ESi Ames

2321 North Loop Drive, Suite 201
Ames, IA 50010

Areas of Specialization

- Bridge engineering
- Bridge Testing & Evaluation
- Bridge materials: concrete, steel, timber
- Structural Health Monitoring
- Inspection practices and advanced non-destructive evaluation (NDE) methods
- Soil–structure interaction, foundations, and geotechnical-structural systems
- Engineering support for horizontal and vertical construction projects
- Structural analysis and load behavior of complex systems
- Wind–structure interaction and aerodynamic behavior of structures
- Construction induced damage
- Repair of damaged infrastructure
- Construction quality conflict resolution

Positions Held

Engineering Systems Inc., Ames, Iowa

- Senior Managing Consultant, 2026 – Present

Advanced Structural, LLC., Ames, Iowa

- President and Chief Engineer, 2014 – 2026

Iowa State University, Ames, Iowa

- Director, Bridge Engineering Center and Institute for Transportation, 2001 – 2026

Material Technologies, Inc., Los Angeles, California

- Chief Engineer, 2008 – 2010

Bridge Testing Concepts, Inc., Ames, Iowa

- President and CEO, 2007 – 2007

Phares Enterprises, Ames, Iowa

- President and CEO, 2006 – 2007

MGPS, Inc., Ames, Iowa

- Principal, President and CEO, 2001 – 2006

Wiss, Janney, Elstner Associates, Inc., McLean, VA

- Engineer III, 1998 – 2001

Project Experience

Select Bridge Engineering Projects

- ***Evaluation of the Need for Longitudinal Median Joints in Bridge Decks on Dual Structures*** The primary objective of this project was to determine the effect of bridge width on deck cracking in bridges. Other parameters, such as bridge skew, girder spacing and type, abutment type, pier type, and number of bridge spans, were also studied. To achieve the objective, one bridge was selected for live-load and long-term testing. The data obtained from both field tests were used to calibrate a three-dimensional (3D) finite element model (FEM). Three different types of loading (live loading, thermal loading, and shrinkage loading) were applied. The predicted crack pattern from the FEM was compared to the crack pattern from bridge inspection results. A parametric study was conducted using the calibrated FEM.
- ***Evaluation, Laboratory Testing, Construction Documentation, and Field Testing/Monitoring of the US 52 Overflow Bridge over the Mississippi River*** The objectives of this project were to validate design assumptions and evaluate the performance of the structural components and construction approaches provided in the design documents for a pretensioned, prestressed concrete beam-supported partial-depth precast deck system with cantilever precast overhang panels. To achieve the objectives, laboratory tests

were conducted on two small-scale specimens with horizontal loading on the barrier and vertical loading at various locations of the deck panels. The deck of each specimen generally consisted of two precast, cantilever overhangs; two precast, prestressed interior panels; and a portion of the cast-in-place concrete deck.

- ***Context Sensitive Design: Testing of Multi-performance Level Box Beam Standards*** The goal of this project was to develop a new box beam bridge joint design for use between adjacent concrete box beams, with particular interest in its applicability for use by counties. For this project, an innovative wide joint was designed with a roughened interface surface, shrinkage-compensating concrete, and reinforcement steel. The researchers built and tested a specimen that consisted of two box beams and one innovative intermediate joint under early-age thermal loading and cyclic live loading in the laboratory. During these tests, no cracking was found in the joint, and no trend of increasing differential displacement was found between the two beams over the course of millions of live load cycles and thermal cycles.
- ***Implementation of Negative Moment Reinforcing Detail Recommendations*** The main objective of this project was to evaluate the effect of different amounts of b2 bar on resisting the negative moment over the pier on a continuous prestressed concrete girder bridge when it is subject to the live load-generated moment and secondary moment. To achieve this objective, a live load field test was performed on a bridge designed with different amounts of b2 bars to allow for comparison of the varying levels of negative moment reinforcement present. A full-scale finite element model was developed and validated against the field-collected data to study b2 bar performance subjected to live loads. An evaluation was performed utilizing an analytical approach by calculating the time-dependent secondary moment using mRESTRAINT and loading the beam-line finite element model with the maximum negative moment.
- ***Implementation of Recommendations for Eliminating Longitudinal Median Joints in Wide Bridges*** The objective of this project was to follow and document the design, construction, and performance of a bridge in Black Hawk County with a specific focus on the success of the deck crack mitigation efforts. One of the primary conclusions from the previous Phase I project was that the development of cracking in bridge decks appears to be less dependent on the total width of the deck and more dependent on restraint of the abutment to temperature changes and, in particular, temperature gradients. Based on the results of that research, a 115 ft long, 228 ft wide bridge in Black Hawk County, Iowa, was selected and designed to incorporate a thermal isolation barrier. A nearly two-year-long monitoring period enhanced by multiple bridge inspections was conducted on this bridge. In addition, an analytical study was conducted to investigate the efficacy of the isolation barrier in resisting cracking at the end of the deck for an integral abutment bridge.
- ***Field Demonstration of an Innovative Box Beam Connection*** Previous research included conducting multiple levels of laboratory tests and analytical studies, as well as designing an innovative joint to resist joint cracking on the longitudinal joint between box girders. The joint design was 6.5 in. wide, filled with shrinkage-compensating concrete, and reinforced with transverse steel bars. Although the previous laboratory test and analytical simulation results indicated that the joint showed superior performance when resisting the joint early-age cracking and maintained the integrity of the bridge superstructure, its performance on a real on-site bridge was not evaluated. This project documented the field evaluation of this new design on a single-span box beam bridge. A bridge in Washington County, Iowa, was selected to

deploy the joint. To evaluate the performance of this first implementation, a seven-day field monitoring campaign was conducted during the early age of the joint material. In addition, a live load field test and two bridge inspections at six-month intervals were performed. During the field tests and monitoring work, temperature, strain, and displacement data were collected at critical locations and analyzed to evaluate the joint functionality on cracking resistance and load distribution.

- ***Evaluation of the Use of IRI Data to Estimate Bridge Impact Factor*** The objectives of this project were to correlate international roughness index (IRI) data (which are widely collected and directly related to bridge deck roughness) to impact factors and develop a process for determining the impact factor to use for all bridges in Iowa. To achieve the project objectives, a sample of 20 bridges was selected for bridge monitoring to collect dynamic strain data. To estimate the static strain data, the locally weighted scatterplot smoothing (LOWESS) function was used to smooth the dynamic strain time history. The dynamic impact factor (DIF) value was then calculated using maximum dynamic and static strain data. IRI data were extracted from PathWeb, a web-based application provided by the Iowa DOT for all bridges considered in the field test program. Once the bridge was identified in PathWeb, the IRI data from four locations near each bridge deck approach were extracted and used to study the relationship between the IRI and DIF.
- ***Investigation of the Causes of Transverse Bridge Deck Cracking*** The goal of this research was to identify factors that consistently lead to the formation of early-age transverse cracks for mitigation in the future. To obtain a comprehensive evaluation and include as many factors as possible, this research was conducted in three stages with varying numbers of bridges and factors considered in each stage. The first stage was carried out on 2,675 bridges constructed in Iowa between 1900 and 2020. The goal of this stage was to identify the correlation between deck cracking and six parameters: deck concrete type (HPC or non-HPC), maximum span length, maximum structure length, Iowa DOT district, year built, and main structure type. The second stage was conducted to include additional bridge parameters but with a smaller number of bridges. A group of 20 bridges was selected after reviewing inspection reports for 116 bridges constructed between 2013 and 2018. Various bridge parameters in three main categories (structural, construction, and material) were investigated. The third stage was carried out based on data collected from six field visits while deck concrete was being placed. The parameters investigated in this stage included evaporation rate (lb/ft^2/h), air temperature (°F), concrete temperature (°F), relative humidity (%), and wind speed (mph).
- ***Advancing Bridge Load Rating: State of Practice and Frameworks*** Bridge load rating, posting, and overweight permitting processes evolve due to the regulatory requirements regarding the frequency of inspections and relevant changes to bridges that necessitate re-rating them. These factors include changes to the dead load, strength of members, and any maintenance or rehabilitation work. As such, states are interested in modifying their procedures to implement technology and improve means and methods to reduce the time associated with load rating. Being able to load rate bridges efficiently and accurately is a necessity, particularly in the use case of permit load routing. Based on the extensive findings during the information collection processes for this project, frameworks for future bridge load rating, posting, and overweight permitting were developed to improve productivity, efficiency, and consistency by closing process gaps and through the application of newer technologies. The newer technologies include digital twin concepts, integrating various (new) data, creating, updating, and reusing

models, integrating sensing data (bridge, traffic, weigh-in-motion), and better analysis methods. This work may help develop the state of practice.

- ***Load Rating Program Technical Support Services for Conducting Peer Exchanges*** The objective of this project was to identify the best practices for load rating, posting, and overweight load permitting among state DOTs. To achieve this goal, three primary tasks will be conducted. They include (1) the completion of a desk scan of available state information pertinent to the objective, (2) the organization and facilitation of two peer exchanges, and (3) the completion of a final report to convey the outcomes of the desk scan and peer exchanges. The final report will serve as a resource to state DOTs as they seek to meet the requirements they have with respect to bridge load rating and permit issuance. Furthermore, it is anticipated that novel methods will be derived through the compilation of existing methods or the development of new methods altogether.
- ***Development of Bridge End Deterioration Repair Strategies*** The primary objective of this project was to assist the project team in the development of means, methods, and strategies for addressing deterioration at the ends of prestressed concrete girders for the New Jersey DOT. The project has collected information on the state-of-the-practice, the selection of candidate bridges for evaluation and installation, and the development of a code-ready document. During this project, Dr. Phares developed several repair strategies for various levels of end of girder damage.
- ***Litigation Support – Damaged Steel Girders*** A fracture critical bridge was suspected of sustaining damage during a rehabilitation project. In support of this project, Dr. Phares created analytical models of the bridge during multiple construction stages to help the owner, contractor, and insurance agent in understanding the type/level of suspected damage, impact on behavior, and the development of potential remediation actions.

Select Timber Engineering Projects

- ***Analytical and Testing Methods for Rating Longitudinal Laminated Timber Slab Bridges*** The Wisconsin Department of Transportation recognizes the importance of accurately assessing the timber deck slab bridge inventory within the state. Of the 571 timber bridges in Wisconsin, 450 bridges are timber slab bridges. Current methods of load rating employ equations first developed in the late 1980s and early 1990s for determining the equivalent strip width. These equations often produce results that unnecessarily penalize the bridge by requiring a posted weight limit. Through a program of bridge live load tests and analytical modeling, Dr. Phares both measured and modeled the bridge behavior with more accuracy and have shown the current equivalent strip width calculation methodologies to be conservative, as was originally speculated. Ten unique bridges were tested as part of this study. Three of them were tested twice, once before and once after bridge strengthening measures were employed. An equation to calculate the equivalent strip width was developed with numerous variables in mind.
- ***Litigation Support – Timber Substructure Maintenance*** A movable railroad bridge with a heavy timber substructure was at the center of a boat crash that resulted in the death of one person. Dr. Phares was asked to review the case file, inspect the subject bridge, and to offer testimony regarding the condition and state of maintenance of the bridge. Dr. Phares' forensic analysis revealed the cause of the incident.

Select Nondestructive Evaluation Projects

- ***Reliability of Visual Inspection*** The Visual Inspection method is the predominant nondestructive evaluation technique used in bridge inspections. However, since implementation of the National Bridge Inspection Standards in 1971, a complete study of the reliability of Visual Inspection as it relates to highway bridge inspections had not been undertaken. Given these facts and assuming that Visual Inspection may have limitations that affect its reliability, the Federal Highway Administration's Nondestructive Evaluation Validation Center initiated a comprehensive study to examine the reliability of the Visual Inspection method for highway bridges as it is currently practiced in the United States. The study consisted of a literature review, a survey of bridge inspection agencies, and a series of performance trials utilizing State Department of Transportation bridge inspectors. The performance trials were conducted by forty-nine State bridge inspectors who completed six Routine Inspections, two In-depth Inspections, and two inspections following their respective State procedures (i.e., State-dependent procedures). Extensive information was collected about the inspectors and the environments in which they worked. This information was then used to study their relationships with the inspection results. The study ultimately identified the limitations of visual inspection and offered recommendations on means and methods to improve the reliability. Among the recommendations was the refinement of some inspection definitions and providing guidance to inspectors on the types of NDT technology that could be of use in performing inspections.
- ***Comparison of Deck Sounding to Ground Penetrating Radar*** The Visual Inspection study described above was extended to include a study of the accuracy of sounding (chain drag plus hammer sounding) relative to ground penetrating radar. In the study 24 State DOT inspection teams were asked to independently inspect the same bridge located just south of Washington DC and to provide a map of delaminations. The results of the 24 State DOT inspections were then compared to the results of an inspection performed using two different ground penetrating radar systems (one using a single antenna at walking speed and one using an antenna array at highway speeds). The results of the study concluded that ground penetrating radar proved to the most accurate of all of the assessments. It was, however, found that if given a very long amount of time, most inspection teams could match the accuracy of ground penetrating radar (however, the influence of traffic noise could not be studied due to the bridge's relatively remote location). However, most inspection teams indicated that they could not allocate the amount of time to most deck inspections that it would require to get a high-fidelity delamination map.
- ***Evaluation of the Electrochemical Fatigue Sensor*** Using funding from a congressional mandate, the Iowa DOT purchased the Electrochemical Fatigue Sensor system. The Electrochemical Fatigue Sensor is an NDE system that is capable of detecting growing cracks in metal structures. In this project, Dr. Phares was asked to do an evaluation of the system with was to include a laboratory and field examination of the capabilities and ease of application. At the conclusion of this work, Dr. Phares prepared an implementation guide for the Iowa DOT which outlined how and when to use the system. The NDE system remains a powerful tool in the Iowa DOT NDE toolbox.
- ***Guide for the Ultrasonic Testing of Bridge Pins*** A failed hanger pin initiated the tragic collapse of one span of the Mianus River Bridge in Greenwich, CT, on June 28, 1983, resulting in the deaths of three motorists. The collapse sparked an immediate increase of interest in the inspection and condition

evaluation of bridge hanger pins. Ultrasonic inspection has become the primary method of performing detailed inspection of in-service hanger pins. The research objective of this project was to develop a document describing the fundamentals of ultrasonic hanger pin inspection that can be used by State transportation agencies that are either inspecting pins themselves or contracting for inspection services. In addition, a limited experimental program was utilized to emphasize, and more completely explain, some important aspects of ultrasonic pin inspection.

- ***Litigation Support: Void Detection Below and Underground Water Vessel*** Shortly after construction of a buried water vessel, there were reports of leakage and other suspected structural defects and failure. Dr. Phares was engaged to: Perform nondestructive evaluation of vessel floor for the purpose of identifying subsurface voids and concrete thickness, Perform nondestructive evaluation of vessel walls for the purpose of identifying subsurface voids and concrete thickness, and Perform nondestructive evaluation of embankment soil for the purpose of identifying subsurface voids and layer thickness.
- ***Health Monitoring of Bridge Structures and Components Using Smart Structure Technology*** The objective of this project was to synthesize information and provide guidance on available bridge testing technologies with a specific interest in those having smart-structure attributes. Following a comprehensive information collection campaign and a survey of State Departments of Transportation, the identified technologies (both currently in use and emerging) were carefully reviewed and summarized. This final report includes a brief summary of the history of bridge evaluation in the United States of America, current and future trends of Structural Health Monitoring, and a series of completed *SHM Technology Evaluation Forms* for each of the identified technologies. In addition, a searchable database was developed and is included with the final report that allows easy identification and review of structural health monitoring technologies. Volume I of the project report summarizes the research approach and the key findings of the work. Volume II consists of completed *SHM Technology Evaluation Forms* for the 101 synthesized technologies as well as guidance for implementation.
- ***Bridge Load Rating Through Physical Testing*** Dr. Phares has been contracted by multiple organizations to determine safe load carrying capacities of hundreds of bridges that, by typical codified rating approaches, indicate under capacity. Dr. Phares' unique method of collecting bridge performance data, calibrating an analytical model, and then using that model to determine safe load levels has been adopted as an example method by several national codes.

Select Railroad Bridge Projects

- ***Evaluation of the Union Pacific Railroad Kate Shelley High Bridge*** At over 100 years old, the Kate Shelley High Bridge over the Des Moines River has safely carried train traffic across the country. Questions regarding the condition of the bridge had resulted in required speed reductions and limitations of dual trains on the bridge. Evern more, questions regarding the available remaining life of the bridge had been raised. Dr. Phares was asked to instrument and evaluate the historic bridge and to provide operational recommendations related to the bridge. With the strategic placement of an array of sensors, Dr. Phares was able to provide guidance to the Union Pacific Railroad on the short-term continued operation.

- ***Evaluation of the Impact of Rolling Stock on Bridge Behavior and Life*** As part of a multi-faceted evaluation, Dr. Phares instrumented two side-by-side railroad bridges to collect data on the impact that rolling stock condition (weight, wheel condition, etc.) had on bridge behavior and remaining life. The collected data and resulting analysis helped railroad bridge engineers better understand how rolling stock was impacting the fixed bridge assets.

Select Building Projects

- ***Litigation Support - Evaluation and Repair Recommendations for Adjacent Construction Induced Damage*** A building on the national register for historic places sustained damage to the original brick façade while the adjacent roadway was being reconstructed. Dr. Phares, at the request of the owner's attorney, conducted an investigation and evaluation of the historic building to determine the extent of damage and the required repairs. Dr. Phares' report resulted in the repair of all damage in historically appropriate ways.
- ***Litigation Support – Cracking of Water Treatment Facility*** Shortly after construction, multiple structures (groundwater storage tank, potable water tank, etc.) developed cracking in various reinforced concrete elements. Dr. Phares was retained by the owner's representative to do a review of all design and construction related activities. Dr. Phares inspected the site and documented the condition. He then constructed a non-linear analytical model of the critical component that demonstrated that numerous design errors were made. Dr. Phares then reviewed proposed repair strategies and provide support as the parties settled the matter.

Select Civil Engineering Projects

- ***Litigation Support – Asphalt Road Construction*** Following a months long dispute over the quality of construction of a road in a private housing subdivision, Dr. Phares was asked to review all matter information and to provide an opinion related to: (1) condition of the roadway and (2) source of any quality issues. Dr. Phares determined that the principal cause of the construction issues was related to the fact that the home owner's association withheld an engineer's report that documented the site conditions and the fact that the home owner's association requested construction that did not meet the engineer's design requirements.
- ***Litigation Support – Failure of Open Mouth Intake Cover*** A member of the public stepped on a cover for an open mouth intake cover which subsequently failed under the weight of the individual. The person sustained life impacting injuries and Dr. Phares was retained to review the site conditions and the design of the intake. Dr. Phares determined that the intake cover did not meet the code provisions which governed the design of such facilities.
- ***Litigation Support – Wind Turbine Failure*** Following the collapse of a small wind turbine, Dr. Phares was retained to determine the cause of the failure. Through forensic evaluation of the wind turbine and available design and construction documentation, Dr. Phares determined that the wind turbine bolts had not been properly installed and that the design did not accommodate anything less than a perfect installation.
- ***Litigation Support - Crash on Class B Roadway*** Following a single vehicle crash, Dr. Phares was retained to review the Class B roadway conditions and to offer an opinion regarding any negligence. Dr.

Phares determined that the roadway owner did not provide the required signage required for Class B roadways.

Select Ancillary Transportation Structures Projects

- ***Fatigue Evaluation of U-bolts Used in Dynamic Message Signs*** U-bolts are commonly used in many structures in ways in which they were not originally intended. One such use is in connection details used to support transportation dynamic message signs which extend over roadways. Dr. Phares was asked to test and provide design recommendations for these u-bolts. To accomplish this, Dr. Phares conducted field data collection, analytical modelling, long-term fatigue testing, and developed design recommendations.
- ***Wind Loading on Dynamic Message Signs*** Using a combination of field strain data plus aerodynamic data from wind tunnel testing, Dr. Phares studied the loads on dynamic message signs which are becoming common on the U.S. transportation system. The project revealed that dynamic message signs are subject to a specific type of aerodynamic coupling from vortex shedding that can cause rapid accumulation of stress cycles that exceed current design levels. The situation can be more extreme when the sign is positioned asymmetrically and when it has a high degree of eccentricity relative to the supporting truss.
- ***Loading on High Mast Light Towers*** High mast light towers and commonly used at the intersection between interstates and other major state highways. These structures place a high output light element very high which then broadcasts lighting across a large area. Several of these high-mast light towers have experienced premature fatigue cracking in known high wind areas. Dr. Phares instrumented and monitored several poles to determine the cause of the premature failures. Dr. Phares was able to determined that the geometry of the towers was such the cause of the failures was an aerodynamic coupling of the towers at wind speeds between 10 and 15 mph. The source of the coupling was the development of vortex shedding induced behaviors which causes the poles to vibrate very fast (and at 90 degrees to the wind) while the wind blows.

Publications

Yosef, T., Faller, R., Shafei, B., Bielenberg, B., Rosenbaugh, S., Saini, S., Sritharan, S., **Phares, B**., Rasmussen, J., Vakili, A., Steelman, J., and Loken, A. (2024) Investigation and evaluation of a MASH TL-4 precast concrete bridge railing, 2nd International Roadside Safety Conference and Peer Exchange, June 23-26, Orlando, FL.

Alomari, Abdalla, Justin M Dahlberg, **Brent M. Phares**; Zhengyu Liu*. Investigation of the early-age behavior of lap-spliced UHPC connection used for the SIBC process. Engineering Structures.

Seyedamin Mousavi, Justin Dahlberg, **Brent M. Phares** and Zhengyu Liu*. "Evaluation of the efficiency of galvanized and painted-galvanized coatings for steel H-piles during the life time of the bridges". Journal of Materials in Civil Engineering, ASCE.

Tristan Sanderson; **Brent M. Phares**; Katelyn S. Freeseman; Zhengyu Liu*. "Evaluation of the Earth Pressure Acting on the Concrete Box Culvert". Transportation Research Record. https://journals.sagepub.com/doi/full/10.1177/03611981231198467

Seyedamin Mousavi, **Brent M. Phares** and Zhengyu Liu*. "Experimental study of full-scale bridge steel h-piles' buckling with concrete encasement. Journal of Bridge Engineering. https://ascelibrary.org/doi/full/10.1061/JBENF2.BEENG-6249

Justin M Dahlberg, **Brent M. Phares**, and Zhengyu Liu*, "Evaluation of the load distribution of timber slab bridge and the efficiency of the retrofit methods." Engineering Structures 291 (2023): 116502.https://www.sciencedirect.com/science/article/pii/S0141029623009173

Sameera Tharanga Jayathilaka, **Brent M. Phares** and Zhengyu Liu*. "Estimation of Load Rating Factor Utilizing the Monte Carlo Simulation Method". Journal of Bridge Engineering. https://ascelibrary.org/doi/full/10.1061/JBENF2.BEENG-6250

Zhengyu Liu*, **Brent M. Phares** and Seyedamin Mousavi. " Experimental Investigation on Precast Bridge Deck Panel System". Structural Journal, ACI. 2022 https://www.proquest.com/openview/b45c92216d642ff4cd7fd1eb10eed790/1?cbl=36963&pq-origsite=gscholar&parentSessionId=%2F4lwqj3uOtUnWYhO%2BH1%2B%2BZg7gNoDxhiGPv9LmF%2BaNW8%3D

Dahlberg, J., **Phares, B. M**., & Liu, Z. (2023). Evaluation of the Performance of Expanded Polystyrene Block on the Reduction of the Deck Cracking in Wide Integral Abutment Bridge. Transportation Research Record, 03611981231160160. https://journals.sagepub.com/doi/full/10.1177/03611981231160160

Justin Dahlberg; Zhengyu Liu*; **Brent M. Phares**; Katelyn S. Freeseman. "Investigation on the Pier Response during the Lateral Slide of Multi-Span Bridges". Transportation Research Record, 2023.https://journals.sagepub.com/doi/full/10.1177/03611981231155431

Zachary Dietrich, **Brent M. Phares** and Zhengyu Liu*. "Development of the Guidance on the Tightening of Large Anchor Bolts of Support Structures for Sign and Luminaires". *Transportation Research Record, 2023*. https://journals.sagepub.com/doi/full/10.1177/03611981231152470

Liu, Zhengyu*, and **Brent M. Phares**. "Field Demonstration of an Innovative Box Beam Connection." Journal of Bridge Engineering 28, no. 1 (2023): 04022135.https://ascelibrary.org/doi/full/10.1061/JBENF2.BEENG-5676

Jayathilaka, Sameera Tharanga, **Brent M. Phares**, and Zhengyu Liu*. "Implementation of a Mathematical Model for the Prediction of the Future Condition Rating for Bridge Components." Transportation Research Record (2023): 03611981221127003.https://journals.sagepub.com/doi/full/10.1177/03611981221127003

Zhengyu Liu*, **Brent M. Phares**, Zachary Dietrich, and Shafei, B. (2022). Structural behavior of large anchor bolts used for sign-support structures. Journal of Constructional Steel Research, 190, 107144.https://www.sciencedirect.com/science/article/abs/pii/S0143974X22000165

Sanderson, Tristan B*, Katelyn S. Freeseman, **Brent M. Phares**, Zhengyu Liu. "Concrete bridge deck overlay assessment using ultrasonic tomography". *Case Studies in Construction Materials*, Elsevier.2022. https://www.sciencedirect.com/science/article/pii/S2214509522000109

Zhengyu Liu, Ali Semendary* and **Brent Phares**, "Numerical Investigation on Early Age Performance of UHPC Shear Keys between an Adjacent Prestressed Concrete Box Beams". *Advances in Structural Engineering*, 2022.https://doi.org/10.1177/13694332211056111

Zhengyu Liu, **Brent M. Phares**, Zachary Dietrich, and Shafei, B. (2022). Structural behavior of large anchor bolts used for sign-support structures. Journal of Constructional Steel Research, 190, 107144. https://www.sciencedirect.com/science/article/abs/pii/S0143974X22000165

Shurbert-Hetzel, C., Shafei, B., and **Phares, B**. (2021) Performance of steel dynamic message sign-support structures in extreme wind events, Journal of Engineering Structures, 237, 112086, pp. 1-15.

Shi, W., Shafei, B., and **Phares, B**. (2021) Structural capacity and fatigue performance of ASTM A709 Grade 50CR steel, Journal of Construction and Building Materials, 270, 121379, pp. 1-11.

Phares, B.M., Y. Lee, T. Hosteng, and J. Nelson "Investigation of Grouted Coupler Connection Details for Accelerated Bridge Construction" Transportation Research Record, Volume 2675, Issue 8, 2021 https://journals.sagepub.com/doi/10.1177/0361198121999393

Liu, Z. , & **Phares, B**. M. (2020). Determination of U-bolt connection load capacities in overhead sign support structures. Journal of Constructional Steel Research, 170, 106096. https://www.sciencedirect.com/science/article/pii/S0141029619353921

Shi, W., Shafei, B., Liu, Z. , & **Phares, B**. (2020). Longitudinal box-beam bridge joints under monotonic and cyclic loads. Engineering Structures, 220, 110976. https://www.sciencedirect.com/science/article/pii/S0141029619353921

Zhengyu Liu , **Brent M. Phares**, Behrouz Shafei, Weizhuo Shi. "Full-Scale Evaluation of the Innovative Joint Design between Adjacent Box Beams." Transportation Research Record, 2020. https://journals.sagepub.com/doi/full/10.1177/0361198120902695

Zhengyu Liu , Katelyn Freeseman and **Brent M. Phares**. "Evaluation of the Need for Negative Moment Reinforcing in Prestressed Concrete Bridge", Engineering Structures, Elsevier. 2020. https://www.sciencedirect.com/science/article/pii/S0141029619322655

Liu, Z. , **Brent M. Phares**. "Use of Shrinkage Compensated Concrete in the Joint between Adjacent Box Beams." Materials in Civil Engineering, ASCE, 2020. https://ascelibrary.org/doi/pdf/10.1061/%28ASCE%29BE.1943-5592.0000925

Liu, Z. and **B.M. Phares** "Material Selection for the Joint between Adjacent Box Beams" Journal of Materials in Civil Engineering, ASCE, 10.1061/ASCE MT.1943-5533.0003085

Dopko, M., Najimi, M., Shafei, B., Wang, X., Taylor, P., and **Phares, B**., "Carbon Microfiber Reinforced Concrete with Binary Chemical Admixtures", ACI Materials Journal, 2019.

Liu, Z. and **Phares, B.M**., "Small Scale Investigation on Wide Longitudinal Joints Filled with shrinkage Compensated Concrete for Adjacent Box Beam Bridges", Journal of Bridge Engineering, ASCE, 2019, 24 (12): 04019114.

Liu, Z. and **Phares B.M**., "Use of Shrinkage Compensated Concrete in the Joint between Adjacent Box Beams." Materials in Civil Engineering ASCE, 2019.

Shi, W., Shafei, B. and **Phares, B.M**., "Early-Age Performance of Longitudinal Bridge Joints Made with Shrinkage-Compensating Cement Concrete" Engineering Structures, 197, 109391, pp1-11, 2019.

Shi, W., Shafei, B., Liu, Z., and **Phares, B**., "Early-Age of Longitudinal Bridge Joints made with Shrinkage-Compensating Cement Concrete", Journal of Engineering Structures, pp. 1-10, DOI: 10.1016/j.engstruct.,109391, 2019.

Arabi, S., Shafei, B., and **Phares, B**., "Investigation of Fatigue in Steel Sign-support Structures under Diurnal Temperature Changes", Journal of Constructional Steel Research, 153, pp. 286-297, 10.1016, 2019.

Shi, W., Shafei, B., and **Phares, B**., "Laboratory Investigation of Structural Performance of A1010 Steel for Bridge Applications", Transportation Research Board Annual Meeting, January 13-17, Washington, DC, [Full Length], 2019.

Dopko, M., Najimi, M., Shafei, B., Wang, X., Taylor, P., and **Phares, B**., "Assessment of Strength and Restrained Shrinkage Behaviors on Micro-Carbon Fiber Reinforced Concrete with Binary Chemical Admixtures", Transportation Research Board Annual Meeting, January 7-11, Washington, DC [Full Length], 2018.

Arabi, S., Shafei, B., and **Phares, B**., "Fatigue Analysis of Sign-Support Structures During Transportation Under Road-Induced Excitations", Journal of Engineering Structures, 164, pp. 305-315, 2018.

Dopko, M., Najimi, M., Shafei, B., Wang, X., Taylor, P., and **Phares, B**., "Flexural Performance Evaluation of Fiber Reinforced Concrete Incorporating Multiple Macro-Synthetic Fibers", Transportation Research Record: Journal of the Transportation Research Board, 2672(27), pp. 1-12, 2018.

Iekel, P, **Phares, B.M**., and Nop, M. "Performance Investigation and Design of Pile-to-Pile Cap Connections subject to Uplift", Transportation Research Record: Journal of the Transportation Research Board, Volume 2672, volume 2672, 2018.

Bektas, B., Hans, Z., **Phares, B.M.**, Nketah, E., Carey, J. Solberg, M, and McPeek, K. "Most Likely Bridges as Roosting Habitat for Bats: Study for Iowa", Transportation Research Record, Volume 2672, Issue 24, 2018.

Arabi, S., Shafei, B., and **Phares, B.**, "Vulnerability Assessment of Sign Support Structures During Transportation", Transportation Research Board Annual Meeting, January 8-12, Washington, DC, 2017.

Hajilar, S., Dopko, M., Shafei, B., **Phares, B.**, and Bierwagen, D., "Feasibility Assessment of Use of Link Slabs in a Case Study Bridge in Iowa", Transportation Research Board Annual Meeting, January 8-12, Washington, DC, [Full Length], 2017.

Deng, Y, **B.M. Phares**, and P. Lu, "Lateral Live-Load Distribution of Dual-Lane Vehicles with Non-Standard Axle Configurations", ASCE Journal of Bridge Engineering/Volume 22 Issue 4 – April 2017.

Seo, J, C. Kilaru, **B.M. Phares**, and P. Lu "Agricultural Vehicle Load Distribution for Timber Bridges", Journal of Bridge Engineering, Volume 22, Issue 11, November 2017.

Deng, Y., **Phares, B.M**., Putz, A.J., and Carter, C., "Performance Evaluation of Transverse High-Performance Concrete Closure Pour Connection for Use in Modular Bridge Construction", Transportation Research Record 2642 (1): 55-67, January 2017 DOI: 10.3141/2642-07.

Liu, C., Y. Gong, S. Laflamme, **B.M. Phares**, and S. Sarkar "Bridge Damage Detection using Spatiotemporal Patterns Extracted from Dense Sensor Network", Measurement Science and Technology, Volume 28, Number 1, 2016.

Liu, Z., **B.M. Phares**, and L. Greimann "Use of Longitudinal Expansion Joints in Wide-Bridge Applications to Reduce Deck Cracking", ASCE Journal of Bridge Engineering, Volume 21 Issue 10, 10.1061/(ASCE)BE.1943-5592.0000925, October 2016.

Lee, Y., **B.M. Phares**, T. Brockman, and J. Rooney "High Strength Bolt Tightening and Verification Techniques", Journal of Civil Engineering and Architecture Research, Vol 3, No 8, pp1605-1617, 2016.

Deng, Y, **B.M. Phares**, and O. Steffens "Experimental and Numerical Evaluation of a Folded Plate Girder System for Short-Span Bridges – A Case Study", Volume 113, pages 26-40, Engineering Structures, April 2016.

Deng, Y and **B.M. Phares**, "Automated Bridge Load Rating Determination Utilizing Strain Response Due to Ambient Traffic Trucks", Journal of Engineering Structures, pp 101-117, https://doi.org/10.1016, 2016.

Cronin, M. and **B.M. Phares** "Economic Viability of Implementing Empirical Deck Design with Stainless Reinforcing Steel", International Journal of Structural and Civil Engineering Research, Volume 3, Issue 2, October 2015-March 2016.

Deng, Y., **B.M. Phares**, and J. Dahlberg, "Impact of Concrete Deck Removal on Horizontal Shear Capacity of Shear Connections", ASCE Journal of Bridge Engineering, 10.1061/(ASCE)BE.1943-5592.0000832, 04015059, January 2016.

Seo, J., T. K. Hosteng, **B.M. Phares**, and J. Wacker "Live-Load Performance Evaluation of Historic Covered Timber Bridges in the United States, Journal of Performance of Constructed Facilities, 10.1061/(ASCE)CF.1943-5509.0000852, December 2015.

Lee, Y.S., **B.M. Phares**, D. Bierwagen, and M. LaViolette, "Development and Implementation of a Precast Paving Notch System for Accelerated Bridge Repair", Volume 3, Issue 1, International Journal of Structural and Civil Engineering Research, April 2015-September 2015.

Lee, Y.S., and **B.M. Phares**, "Bond Strength and Development Length of Galvanized Reinforcing Steel", Volume 3, Issue 1, pp311-317, International Journal of Civil and Structural Engineering Research, 2015.

Deng, Y., **B.M. Phares**, L.F. Greimann, and J. Hoffman, "Behavior of Curved and Skewed Bridges with Integral Abutments", Volume 109, pp115-136, Journal of Constructional Steel Research, June 2015.

Sari, K., S. Laflamme, C. Song, D. Qiao, **B.M. Phares**, and J. Li, "Smart Sensing Skin for Detection and Localization of Fatigue Cracks", Smart Materials and Structures, Volume 24, Issue 6, June 2015.

Seo, J., **B.M. Phares**, A. Abu-Hawash, T.J. Wipf, and J. Dahlberg “A Framework for Statistical Distribution Factor Determination of Steel-Concrete Composite Bridges Under Farm Traffic”, Engineering Structures, Volume 69, pp72-82, June 2014.

Chang, B., **B.M. Phares**, and H. Zou “Thermal Analysis of a Highway Overhead Support Structure”, Number 2406, pp32-41, Transportation Research Record, 2014.

Seo, J., **B.M. Phares**, and T.J. Wipf “Lateral Live-Load Distribution Characteristics of Simply Supported Steel Girder Bridges Loaded with Implements of Husbandry”, ASCE Journal of Bridge Engineering, Volume 19, Issue 4, ISSN1084-0702, April 2014.

Hoffman, J. and **B.M. Phares** “Thermal Load Design Philosophies for Horizontally Curved Girder Bridges with Integral Abutments”, 10.1061/(ASCE)BE.1943-5592.0000573, 04014008., 2013.

Gopalakrishnan, K., M. Govindarasu, D.W. Jacobson, and **B.M. Phares** “Cyber Security for Airports”, International Journal for Traffic and Transport Engineering, Volume 3, Issue 4, pp 365-376, 2013.

Lee, Y. and **B.M. Phares** “Monitoring Corrosion Resistance in Bridge Deck Reinforcing Steel: Field Investigation”, International Journal of Advance Research in Science and Engineering, Volume No. 2, Issue No. 8, August 2013.

Phares, B.M., A. Abu-Hawash, P. Lu, and T.J. Wipf “Overview of Monitoring Applications from the Iowa DOT Point of View”, ACI Structural Journal Special Publication: SP-292 Structural Health Monitoring Technologies, pp10.1-10.20, 2013.

Lee, Y, **B.M. Phares**, T.J. Wipf, and F. Malhas “Structural Health Monitoring with an Active Data Management System for Secondary Road Bridges”, ACI Structural Journal Special Publication: SP-292 Structural Health Monitoring Technologies, pp6.1-6.14, 2013.

Seo, J., **B.M. Phares**, P. Lu, T.J. Wipf, and J. Dahlberg “Bridge Rating Protocol Using Ambient Trucks Through Structural Health Monitoring System”, Engineering Structures, Volume 46, pp569-580, January 2013.

Phares, B.M., P. Lu, T.J. Wipf, L.F. Greimann, and J. Seo “Evolution of a Bridge Damage-Detection Algorithm”, Journal of the Transportation Research Board, Number 2331, pp71-80, Washington, DC, 2013.

Phares, B.M., P. Lu, T.J., Wipf, L.F. Greimann, and J. Seo “Field Validation of a Statistical-Based Bridge Damage-Detection Algorithm”, ASCE Journal of Bridge Engineering, Volume 18, Number 11, pp1227-1238, 2013.

Wipf, T.J., **Phares, B.M.** and Ritter, M.A., “Literature Review and Assessment of Nanotechnology for Sensing of Timber Transportation Structures” Forest Products Laboratory, General Technical Report, FPL-GTR0-210, 2012, https://doi.org/10.2737/FPL-GTR-210.

Bigelow, J.J., Z. Hans, and **B.M. Phares** “Bridge Rail and Approach Railing for Low-Volume Roads in Iowa”, Journal of the Transportation Research Board, Number 2262, pp85-93, Washington, DC, 2011.

Chang, B., P.P. Sarkar, and **B.M. Phares** “A Time-Domain Model for Predicting Aerodynamic Loads on a Slender Support Structure for Fatigue Design” American Society of Civil Engineers, Journal of Engineering Mechanics, Vol. 136, No. 6, pp736-746, 2010.

Lu, P., **B.M. Phares**, L.F. Greimann, and T.J. Wipf “Bridge Structural Health Monitoring System Using Statistical Control Chart Analysis”, Journal of the Transportation Research Board, Number 2172, pp123-131, Washington, DC, 2010.

Chang, B., **B.M. Phares**, P.P. Sarkar, and T.J. Wipf, “Development of a Procedure for Fatigue Design of Slender Support Structures Subjected to Wind Induced Vibration”, Journal of the Transportation Research Board, No 2131, pp23-33, Washington, DC, 2010.

Phares, B.M., T.J. Wipf, F.W. Klaiber, A. Abu-Hawash, and S. Neubauer, “Implementation of Physical Testing for Typical Bridge Load and Superload Rating”, Journal of the Transportation Research Board, Transportation Research Record 11-S, pp159-167, 2005.

Bigelow, J., **B.M. Phares**, B.M., T.J. Wipf, M. Ritter, and D.L. Wood, “Dynamic Performance of Glued-Laminated Timber Bridges”, Transportation Research Record 1928, Journal of the Transportation Research Board, Washington, D.C., 2005, p. 155-164.

Wipf, T.J., **B.M. Phares**, F.W. Klaiber, A.H. Al-Saidy, and Y. Lee, “Strengthening Steel Girder Bridges with CFRP Plates”, Journal of the Transportation Research Board, Transportation Research Record 11-S, pp435-447 2005.

Hosteng, T.K., **B.M. Phares**, T.J. Wipf, M. Ritter, and D.L. Wood, “Live Load deflection of Glued-Laminated Timber Girder Bridges”, Journal of the Transportation Research Board, Transportation Research Record 1928, pp174-182, 2005.

Phares, B.M., J. Bigelow, T.J. Wipf, M. Ritter, and D.L. Wood, “Dynamic Performance of Glued-Laminated Timber Bridges”, Journal of the Transportation Research Board, Transportation Research Record 1928, pp155-164, 2005.

Lee, Y.S., T.J. Wipf, **B.M. Phares**, and F.W. Klaiber, “Evaluation of a Steel Girder Bridge Strengthened with CFRP Post-Tension Bars”, Journal of the Transportation Research Board, Transportation Research Record 1928, pp233-244, 2005.

Phares, B.M., G. A. Washer, D.D. Rolander, B.A. Graybeal, and M.E. Moore “Routine Highway Bridge Inspection Condition Documentation Accuracy and Reliability” Journal of Bridge Engineering, Vol. 9, No. 4, American Society of Civil Engineers, 2004.

Graybeal, B.A., **B.M. Phares**, D.D. Rolander, M.E. Moore, and G. A. Washer “Visual Inspection of Highway Bridges” Journal of Nondestructive Evaluation, 21(3): pp67-83, September 2002.

Phares, B.M., B.A. Graybeal, D.D. Rolander, M.E. Moore, and G.A. Washer, “Reliability and Accuracy of Routine Inspection of Highway Bridges”, Journal of the Transportation Research Board Transportation Research Record 1749, pp82-92, 2001.

Graybeal, B.A., D.D. Rolander, **B.M. Phares**, M.E. Moore, and G.A. Washer, “Reliability and Accuracy of In-depth Inspection of Highway Bridges”, Journal of the Transportation Research Board, Transportation Research Record 1749, pp93-99, 2001.

Rolander, D.D., **B.M. Phares**, B.A. Graybeal, M.E. Moore, and G.A. Washer, “Highway Bridge Inspection: State-of-the-Practice Survey”, Journal of the Transportation Research Board, Transportation Research Record 1749, pp73-81, 2001.

Phares, B.M., F.W. Klaiber, and T.J. Wipf, “A Low Volume Road Bridge Alternative”, Journal of the Transportation Research Board, Transportation Research Record 1696, pp178-186, 2000.

Fagen, M.E. and **B.M. Phares** “Life Cycle Cost Analysis of a Low Volume Road Bridge Alternative”, Journal of the Transportation Research Board, Transportation Research Record. 1696, pp8-13, 2000.

Phares, B.M., G.A. Washer, and M.E. Moore, “The FHWA’s NDE Validation Center: A National Resource”, Journal of the Transportation Research Board, Transportation Research Record 1680, pp74-76, 999.

Phares, B.M., F.W. Klaiber, and T.J. Wipf, “Laboratory Testing of a Low Volume Road Bridge Alternative”, Journal of the Transportation Research Board, Transportation Research Record 1624, pp148-159,1998.

Phares, B.M., T.J. Wipf, F.W. Klaiber, and R.A. Lohnes, “Behavior of High Density Polyethylene Pipe with Shallow Cover”, Journal of the Transportation Research Board, Transportation Research Record 1624, pp214-224,1998.