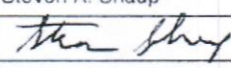
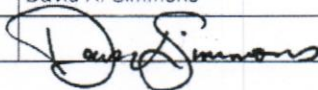


**Society for Industrial Archeology - Industrial Heritage Preservation Grant  
Grant Application Cover Sheet**

|   |   |                         |  |    |  |
|---|---|-------------------------|--|----|--|
| Date of application:  | 1. 03/01/2010   | Title of Grant:         | 2. Conserving Historic Metal Truss Bridges |    |  |
| 3. Steven A. Shaup, P.E.  | 4. 954-200-8242   |                         | 5. sashaup@transystems.com                 |    |  |
| <i>Name of Principal Researcher (Send PDF of CV with this application)</i>  |   | <i>Phone</i>            | <i>E-mail</i>                              |    |  |
| 6. Transystems, 2400 Commercial Blvd.   | 7. Ft. Lauderdale, FL 33308   |                         |  |    |  |
| <i>Address</i>  |   | <i>City, State, Zip</i> |  |    |  |
| 8. Ohio Historic Bridge Association   | 9. 614-297-2365   |                         | 10. dsimmons@ohiohistory.org               |    |  |
| <i>Name of Project Sponsor (Organization and contact name)<br/>(Send PDF of letters of sponsorship or collaboration)</i>  |   | <i>Phone</i>            | <i>E-mail</i>                              |    |  |
| 11. 800 E. 17th Avenue  | 12. Columbus, OH 43211-2474   | 13. 31-1077213          | 14. Nonprofit                              |    |  |
| <i>Address</i>  | <i>City, State, Zip</i>   | <i>Tax ID</i>           | <i>Type of Tax Status</i>                  |    |  |
| 15. Randy Bush, Morrow County Engineer  | 16. 419-947-4530  |                         | 17. mrwcoeng@rrohio.com                    |    |  |
| <i>Name of Project Co-Sponsor (s)<br/>(Send PDF of letters of sponsorship or collaboration)</i>   |   | <i>Phone</i>            | <i>E-mail</i>                              |    |  |
| 18. 50 East High Street   | 19. Mt. Gilead, OH 43338-1487   | 20.                     | 21. Governmental                           |    |  |
| <i>Address</i>  | <i>City, State, Zip</i>   | <i>Tax ID</i>           | <i>Type of Tax Status</i>                  |    |  |
| 22. Joseph W. Charles, Treasurer  | 23. 740-587-2266  |                         | 24. jdcharles@windstream.net               |    |  |
| <i>Name of person or organization receiving the check</i>   |   | <i>Phone</i>            | <i>E-mail</i>                              |    |  |
| 25. 726 Newark-Granville Road   | 26. Granville, OH 43023-1451  |                         |  |    |  |
| <i>Address</i>  |   | <i>City, State, Zip</i> |  |    |  |
| 27. Brief Description of Project (Send full project summary & application narrative in PDF)   |   |                         |  |    |  |
| The project proposes using analysis done by an experienced engineer to develop cost effective methods for conserving locally owned metal truss bridges. Many owners with limited resources for maintenance and preservation places rehabilitation of historic bridges impractical. By thoroughly inspecting and developing a preservation plan for an 1876 bridge in Morrow County, Ohio, the intent is to create a model for fair assessments and prioritized lists of work for structural improvement on similar bridges. The inspection will also be conducted as a one-day workshop to train practitioners on how to think about the cost of effective repair and conservation of ferrous metal, pin-connected bridges. |   |                         |  |    |  |
| 28. Project start date:   | 09/01/2012  | 29. Project end date:   | 12/31/2012                                 |    |  |
| 30. Is this a new proposal ?  | <input checked="" type="checkbox"/>   | Yes                     | <input type="checkbox"/>                   | No |  |
| 31. Is this a resubmitted proposal ?  | <input type="checkbox"/>  | Yes                     | <input checked="" type="checkbox"/>        | No |  |
| 32. Are you a previous SIA Grant Awardee ?  | <input type="checkbox"/>  | Yes                     | <input checked="" type="checkbox"/>        | No |  |
| 33. Is this grant your only funding source ?  | <input type="checkbox"/>  | Yes                     | <input checked="" type="checkbox"/>        | No |  |
| 34. Total dollar amount requested: (send PDF of full budget)  | \$3,000.00  |                         |  |    |  |
| 35. Total matching funds:   | \$4,311.00  |                         |  |    |  |
| 36. Total project budget:   | \$7,311.00  |                         |  |    |  |
| 37. Print Name of Principal Researcher:   | Steven A. Shaup   |                         |  |    |  |
| 38. Signature (Please fax or scan/send PDF)   |  |                         |  |    |  |
| 39. Print Name of Sponsoring Org. Official  | David A. Simmons  |                         |  |    |  |
| 40. Signature (Please fax or scan/send PDF)   |  |                         |  |    |  |



## **B. Project Summary**

While appreciation for historic metal truss bridges has increased, in many locales funding to rehabilitate them remains elusive. Competition for limited financial resources, lack of understanding about cost-effective approaches to make them adequate, and costs associated with requirements for federal local-aid projects that make it difficult for owners to perform the maintenance necessary to keep historic truss bridges from deteriorating to the point where rehabilitation is no longer prudent.

To identify effective methods for using limited funds to keep and conserve locally owned metal truss bridges, the Ohio Historic Bridge Association, in cooperation with the Morrow County Engineer, will hire professional engineers with expertise inspecting and assessing pin-connected metal truss bridges to conduct an in-depth inspection and analysis and develop a practical treatment plan for keeping a failing 1876 wrought iron bridge in Morrow County in service. It is one of ten 19<sup>th</sup> century metal truss bridges remaining in use in the county that cannot afford to repair, rehabilitate, or replace using federal or local funds. The analysis and recommendations will be compiled into a certified inspection report and given to the county at no cost to them. To increase knowledge, the hands-on inspection will be conducted in conjunction with a fee-based workshop, with participants learning from the experienced engineers and historians how to analyze ferrous metal truss bridges, practical ways to address structural and geometric deficiencies, and cost-effective treatments that balance preservation with transportation and fiscal needs. Rehabilitation *in situ* versus off-site restoration will also be discussed.

Several goals of the project extend beyond providing a detailed bridge inspection report and management plan for one historic bridge. The inspection and analysis is intended as a replicable process teaching participants how to think about cost-effective approaches to conserving truss bridges and to establish a baseline for preliminary engineering analysis that addresses rehabilitation from a conservation perspective for cost-conscious owners. Topics to be discussed will include coating systems, ways to strengthen members, deck replacement to decrease dead load, and increasing load capacity. Participants will receive materials to reinforce the day's training, including publications like Dr. James L. Cooper's *Keeping Faith with Their Maker* to a bibliography of source material available on line. It is hoped that this effort will become a nationally applicable model for all metal truss bridge owners by creating an effective approach to bridge preservation beyond the typical federally funded efforts that require enhanced local funding to address federal program requirements. Specialists, like craftsmen and ultrasound pin testers, will be encouraged to participate in the workshop to demonstrate non-destructive testing and cost-effective repair techniques.

## **C. Application Narrative**

### **1. What is the proposed project's significance to industrial heritage?**

The project will contribute to specific and general understandings of how to conserve metal truss bridges, both technically and financially. It will result in a long-term



management plan for a single historically important 1876 Wrought Iron Bridge Company bridge, but will devise a methodology applicable to the analysis and preservation of all ferrous metal truss bridges. It also represents a joint effort between industrial historians and civil engineers aimed at preserving our shared industrial heritage, long an objective of the SIA. As a publicized demonstration project, the analysis of a metal truss bridge from multiple perspectives will broaden the knowledge of all participants and provide a step towards improving the national practice. It should be possible to duplicate the process for practitioners and owners at all levels.

## **2. What research methods will you employ?**

To ensure the broadest acceptance of the findings, the inspection and resulting report will be conducted and compiled using the Federal Highway Administration's model and standards. We will investigate the cost of having the pins tested using ultrasound. Setting this study apart will be the use of engineers with specific expertise in analyzing and repairing metal truss bridges. Not all engineers who work on metal truss bridges are familiar with empirical and historical methods of analysis, have an understanding of old materials, or appreciate the low-cost opportunities for making ferric metal truss bridges adequate. This study will demonstrate the importance of using an engineer with a proven track record who is also willing to educate others on a peer-to-peer basis. The objective is to make this type of analysis commonplace, rather than being a skill set of the few, and to do it within the current bridge inspection framework.

In order for the study to have the broadest applicability, the analysis will include a load rating and prioritization of the work needed to improve its current structural condition aimed at: (1) keeping the bridge in service; and (2) ensuring its long-term preservation, which is currently in question due to the critical condition of the floor beams. As a follow through, ODOT-OES and OHBA will work with the county toward implementing specific treatment recommendations.

The inspection of the 90-foot bridge will be completed in two days with commonly used bridge inspection equipment. Engineers will complete a visual inspection of the truss bridge, including field documentation (photographs and sketches) of existing cross sections including deterioration, using ladders from the roadway and from the creek bottom. The data will be used to determine or verify the existing load capacity and the extent of work needed to rehabilitate the bridge to AASHTO HS-15 load capacity. It is assumed that there is limited existing documentation and that measurements will need to be taken in the field. Two days for field inspection have been allotted. Unless testing is donated (outstanding request with local tester to demonstrate technique and provide finding), the inspection will only include visual assessment of the pins.

The hands-on work and workshop will emphasize the analysis of the levels of deterioration and appropriate cost-effective techniques for increasing structural capacity and improving safety to an adequate level. The data will be compiled in the office with the report prepared under the supervision of the principal investigator. The workshop will be structured to first address the engineering analysis of the bridge and practical considerations for addressing deficiencies followed by the discussion of rehabilitation



and restoration treatments.

The project can be completed within six months after the budget and approach are approved. This will allow time for organizing and publicizing the workshop.

### **3. Who will be responsible for the project?**

Steven A. Shaup, P.E. will be principal investigator and will be responsible for producing the engineering report. He will supervise a junior engineer and will be the lead presenter for the technical portion of the workshop. Morrow County will provide equipment and traffic control. David Simmons (SIA) will handle overall grant administration, local coordination with the county, and coordination with ODOT. He will also serve as historian. Melinda Simmons will produce the electronic flyer for the workshop. Thomas Barrett and staff at ODOT will assist in publicizing the workshop and managing inquires. OHBA will serve as registrar for the workshop and handle all money through their treasurer. Mary McCahon (SIA) will coordinate with the engineer and ensure the engineering schedule is met, assist (on a volunteer basis) with compilation of the inspection report and its transmittal to SIA, compile handout material, and prepare publicity. She will also assist with presentation of the workshop and coordinate with David Simmons on preparing the workshop handouts.

### **4. Anticipated tangible products**

A signed and sealed report of findings will be prepared and submitted. It will include recommendations with estimates of probable costs for the locale, and the recommendations will be prioritized in order of importance as determined by engineering judgment. In addition to report, we anticipate a broadened understanding—through the workshop, promotion of the project through engineering and preservation conferences, and the SIA newsletter—of the level of engineering effort and cost needed to keep a historic bridge in service. The content of the engineering report will hopefully provide a baseline informing similar studies and analysis of other metal truss bridges in Morrow County and elsewhere. Cost is often cited as a reason against keeping metal truss bridges in service, and this study will demonstrate a practical and real-world case study on that topic. The report will be a public document and available for posting and downloading. Two paper copies of the report will be submitted to SIA along with an electronic version and summary synopsis of the study.

### **D. Budget**

**Total Cost = \$7,311. 00** (see attached staff hours & cost proposal)

#### **Local Cost Share**

The Ohio Historic Bridge Association (OHBA) will oversee providing the match. It will include both hard funds and “soft match” items in the form of donated professional time associated with logistics, researching the bridge’s history, conducting the field inspection and workshop, and preparation of the engineering report.

### **Donated Match**

- \$53. donated use of 26' extension ladder (based on local rental fee for 2 days) (Morrow County).
- \$50. donated 500 Xerox copies for handouts @ .10 sheet. (TranSystems)
- \$774. 18 hours donated time for workshop presentation and prepare report assistance @ \$43. Hour (Mary McCahon)
- \$330. 10 hours for historical research, report preparation, workshop presentation and for creation of electronic workshop flyer @ \$30/hour (David Simmons, Bridge Historian; Melinda Simmons, Graphics Specialist).
- \$500. 15 hours for sending flyers and managing responses from participants @ 33. (Tom Barrett Cultural Resources Specialist with ODOT-OES)
- \$31 airport transportation for engineer (2 trips @ 50 miles each = 100 miles).

### **Cash**

We anticipate raising \$1,400 from 20 participants paying a fee of \$70 each. Direct costs from that total include \$250 for bag lunches and refreshments, \$160 for a portable toilet on site, and \$125 for 25 copies of booklet on repairing ferric metal truss bridges. This should leave a net profit of \$ 800 to apply to the match.

\$2,000 Funds in Hand Dedicated to Study

### **E. Supporting Materials**

- Budget
- Resumes
- Morrow County Letter of Commitment
- TranSystems Letter of Commitment
- Ohio Department of Transportation Letter

**ESTIMATE OF STAFFHOURS AND COST PROPOSAL  
Morrow County SIA Grant**

Date: 02/29/2012

| ESTIMATE OF STAFFHOURS | Engineer |            | Project Manager |            | Total Hrs | TOTAL       |
|------------------------|----------|------------|-----------------|------------|-----------|-------------|
|                        | Hrs      | \$         | Hrs             | \$         |           |             |
| Field Inspection       | 16.0     | \$576.00   | 16.0            | \$1,040.00 | 32.0      | \$ 1,616.00 |
| Structural Analysis    | 16.0     | \$576.00   | 4.0             | \$260.00   | 20.0      | \$ 836.00   |
| Report Preparation     | 16.0     | \$576.00   | 4.0             | \$260.00   | 20.0      | \$ 836.00   |
|                        |          | \$0.00     |                 | \$0.00     | 0.0       | \$ -        |
|                        | 48.0     | \$1,728.00 | 24.0            | \$1,560.00 | 72.0      | \$ 3,288.00 |

Total Salary Cost: \$ 3,288.00  
 Overhead and Profit: \$ 3,288.00  
 Expenses: \$ 735.00  
 Total Cost: \$ 7,311.00

**EXPENSES**

|                       |    |            |
|-----------------------|----|------------|
| Airfare FLL-CLB       | \$ | 400        |
| Per Diem 2 x 2@25     | \$ | 100        |
| Hotel 2 x 1@\$55/nite | \$ | 110        |
| Handouts              | \$ | 75         |
| Insp Incidentals      | \$ | 50         |
|                       | \$ | <u>735</u> |



## Steven A. Shaup, P.E.

### Registrations

Professional Engineer (Civil): FL, 1997  
Professional Engineer (Civil): GA, 2009  
Professional Engineer (Civil): MS, 2010  
Professional Engineer (Civil): TX, 2012

### Education

B.S., Civil Engineering  
University of California, Irvine, 1992  
M.S., Engineering (Civil)  
University of California, Irvine, 1993

### Affiliations & Memberships

American Society of Civil Engineers  
American Institute of Steel Construction  
Heavy Movable Structures

Years of Experience 18

Years with Firm 18

### Professional Experience

Mr. Shaup has served as a project manager, project engineer, structural engineer and senior inspector for numerous bridge inspection, load rating, rehabilitation, new design and miscellaneous services projects, many including complex and movable bridges, including historic bridges like the Bridge of Lions at St. Augustine, FL, the Center Street truss swing bridge in Cleveland and the Poinsett Bridge in South Carolina. Using his strong background in inspection, analysis and rehabilitation of historical bridge types, in 2007 he co-authored AASHTO's "Guidelines for Historic Bridge Rehabilitation and Replacement." He has also served as senior engineer for statewide historic bridge surveys and historic bridge management plan in Georgia, Tennessee, and Ohio. He has also co-authored the HAER documentation for the Bridge of Lions.

### Relevant Projects

#### **Ohio Historic Bridge Management Plans, Ohio Department of Transportation**

Senior Engineer for study. Tasks included compiling data for all pre-1961 bridges into one, searchable database with supported eligibility recommendations as the first step in managing the state's population of historic bridges. The purpose was to identify their level of historic significance and to then prepare management plans for those with high and exceptional significance. Bridge-specific management plans were completed teaming experienced historians and engineers. Each addressed the engineering adequacy for remaining in service or an alternative use. All evaluations were founded on balancing sound engineering with preservation of features that make the bridge significant. 4(f) considerations and NEPA issues were addressed. Plans serve as a model for analysis of preservation potential for same types of bridges. General maintenance guidance was compiled into a "resource manual" of best practices. It received a 2011 achievement award from Ohio SHPO.

#### **Guidelines for Historic Bridge Rehabilitation and Replacement, NCHRP Project 25-25 Task 19**

TranSystems authored this report requested by AASHTO. The report includes a literature search, findings of a survey on the current state of historic bridge rehabilitation or replacement decision making, and nationally applicable decision making guidelines for historic bridges. The guidelines are intended to be used as the protocol for defining when rehabilitation is prudent and feasible based on engineering and environmental data and judgments. Prior to this report, no such nationally applicable decision making guidelines existed. Mr. Shaup was Project Engineer responsible for inclusion of engineering topics and preparation of the final report.

#### **Bridge Preservation Summaries, Tennessee DOT**

Project engineer. TranSystems is preparing bridge-specific summaries of potential treatments to preserve or conserve selected old bridges throughout the state. The summaries are intended to serve as a starting point for owners and interested parties to consider preservation options. Each includes an explanation of the current condition and the work needed to upgrade it for long term preservation. Recommendations balance sound engineering and preserving what makes the bridges historically and culturally important. Studies done by teaming historian and engineer. Deliverables include a training course on old bridges analysis and rehabilitation and a website.



### **Georgia Historic Bridge Survey Update, Georgia DOT**

Mr. Shaup served as project manager and senior engineer for the study. Tasks included inventory of 1956-1967 bridges that are not subject to interstate administrative exemption and preparing historic contexts, as well as setting up an inclusive database to for inventory and historic bridge management plans. Historic bridges were field inspected and available data sets used to support the prudence of rehabilitation and the work needed to make it adequate for continued highway use. That data was then compiled into bridge specific management plans.

### **Bridge of Lions Rehabilitation, St. Augustine, Florida DOT District 2**

Senior structural engineer for the design of the new movable span superstructure and existing piers rehabilitation/strengthening. Work also included design of a temporary movable span and piers to be used during construction at the permanent bridge. TranSystems was also responsible for the historic evaluation of the National Register listed bridge and worked closely with DOT and SHPO to avoid adverse effects. Responsibilities included design and backchecking of structural calculations, plans preparation and detailing for numerous bridge components, including the bascule span superstructure and design of repairs/restoration of the historic bascule piers, and preparation of HAER-level historic documentation.

### **Poinsett Bridge Structural Assessment, Greenville County, South Carolina Department of Natural Resources**

Project engineer for the rehabilitation study for the National Register listed 1820 stone masonry Gothic arch bridge. Work included an in-depth inspection and analysis using conventional and finite element analysis methods. The bridge was surveyed to determine its geometry, and ground-penetrating radar was used to determine wall and arch ring thicknesses required for the analysis. The study included recommendations and cost estimates for preserving the bridge as well an adjacent section of the old road between Asheville, NC and Greenville, SC.

### **Trail Creek Bridge, Athens, GA**

Mr. Shaup was project manager for the analysis of an abandoned timber rail trestle bridge through a park to determine the prudence and feasibility of adapting it for use on a rails-to-trails project. The Georgia Railroad dates to the mid 19<sup>th</sup> century; several spans at the south end of the trestle had long been demolished. As part of the analysis, the history of the rail line and the significance of the bridge were researched. Three-dimensional analysis of the bridge was performed, and a report was prepared summarizing the results, documenting required work to make the structure adequate for adaptive use, and evaluating the prudence of such adaptation based on current rehabilitation and future maintenance costs versus bridge replacement costs.

### **ELECTED PRESENTATIONS AND ARTICLES**

"Prudent and Feasible: A Workshop on Historic Bridge Rehabilitation Feasibility Analysis," by Mary McCahon and Steven Shaup, The Statewide Conference on Heritage, Harrisburg, PA, May 2011.

"Maintenance of Historic Metal Bridges," by Steven Shaup, Iron & Steel Preservation Conference, Lansing, MI, March 2011.

"Historic Rehabilitation of the Bridge of Lions," by Steven Shaup, Heavy Movable Structures Inc. Thirteenth Biennial Symposium, Orlando, FL, October 2010.

### **PUBLICATIONS**

Harshbarger, J.P., McCahon, M.E., Pullaro, J.J. and Shaup, S.A., "Guidelines for Historic Bridge Rehabilitation and Replacement," NCHRP Project 25-25 Task 19, National Cooperative Highway Research Program, March 2007.

McCahon, M.E. and Shaup, S.A., "Historical Narrative and 2004-2006 Rehabilitation Methodology for the Bridge of Lions St. Augustine, Florida," Florida Department of Transportation, July 2004.

### **PROFESSIONAL TRAINING**

FHWA-NHI-130078 - Fracture Critical Inspection Techniques for Steel Bridges, June 2011

NHI Bridge Inspection Refresher Training, 2006

Load & Resistance Factor Rating of Highway Bridges, 2004 (1 day)



**DAVID A. SIMMONS**

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PO Box 356  
Galena, OH 43021  
(740) 965-4023

TIMELINE  
800 17th Ave.  
Columbus, OH 43211  
(614) 297-2365

**EDUCATION:**

**Miami University, Oxford, Ohio**

M.A. in American History. Thesis on "Fort Hamilton, 1791-1797: Its Life and Architecture." December 1975

**ADDITIONAL TRAINING:**

**Ohio Department of Transportation**

Bridge Inspection Workshop, April 1993

**WORK EXPERIENCE:**

**Editor, TIMELINE, Ohio Historical Society.** August 2004 to present.  
Negotiate with authors, edit manuscripts, and oversee production of 56-page quarterly, popular history journal.

**Associate Editor, TIMELINE, Ohio Historical Society.** September 1986 to August 2004. Conduct illustration research and write captions.

**Inventory and Registration Department, Historic Preservation Division, Ohio Historical Society.** Jan. 1976-September 1986. Oversaw state inventories and process for listing sites on the National Register of Historic Places. Conducted Section 106 reviews for federally funded bridge projects. Advisor and contributing writer for three statewide historic highway bridge inventories, including evaluation and preservation plans, prepared by the Ohio Department of Transportation since 1981. Served on ODOT's review committee for ISTEA grants.

**PUBLICATIONS:**

*The Ohio Historic Bridge Inventory, Evaluation and Preservation Plan.*  
Columbus: Ohio Department of Transportation, 1983.

"The Risk of Innovation: Ohio Bridge Patents in the 19th Century."  
*Proceedings of the Historic Bridges Conference.* Columbus: Ohio State University and Ohio Historical Society, 1985.

“Ohio Bridges from 1850 to 1950: Reflections of Society.” *The Old Northwest*, Vol. 12, NO. 1 (Spring 1986).

“Building a Concrete Y: Zanesville, Ohio’s Historic Concrete Bridge.” *Concrete International*, Vol. 14, No. 6 (June 1992).

“Bridges and Boilers: Americans Discover the Wrought-Iron Tubular Bowstring Bridge.” *IA*, Vol. 19, No. 2 (1993).

*The Concrete Arch Supplement to the Ohio Historic Bridge Inventory, Evaluation and Preservation Plan*. Columbus: Ohio Department of Transportation, 1994.

“American Truss Bridge Connections in the 19th Century.” With Dario Gasparini. *Journal of Performance of Constructed Facilities*, Vol. 11, no. 3 (August 1997).

“The Continuous Clatter: Practical Field Riveting.” *IA*, Vol. 23, No. 2 (1997).

“Light, Aerial Structures of Modern Engineering: Early Suspension Bridges in the Ohio Valley.” *Proceedings of an International Conference on Historic Bridges to Celebrate the 150<sup>th</sup> Anniversary of the Wheeling Suspension Bridge* (Morgantown, WV: West Virginia University Press, 1999).

*Covered Bridges: Ohio, Kentucky, West Virginia*. Co-author with Miriam F. Wood. Photography by B. Miller. Wooster, OH: The Wooster Book Company, 2007.

“Cabin John Bridge: Role of Alfred L. Rives, C.E.” With Dario Gasparini. *Journal of Performance of Constructed Facilities*. Vol. 24, No. 2 (March/April 2010).

#### **ADDITIONAL ACTIVITIES:**

Director, Society for Industrial Archeology, 1989-1991; 1996-1999.

Past chairman, Advisory Committee to the Institute for the History of Technology and Industrial Archaeology, WVU, Morgantown, WV.

President, Ohio Historic Bridge Association. Prepared plans and specifications for a covered bridge restoration and oversaw project.



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## Mary E. McCahon - Architectural Historian

### Education

M.A. Architectural History  
University of Virginia, 1975  
B.A., History of Art/American History  
Boston University, 1969

### Affiliations

Transportation Research Board (AFF10 & ADC50)  
Society for Industrial Archeology

Years of Experience: 31  
Years with Firm: 17

### Professional Experience

Ms. McCahon meets the Secretary of the Interior's professional qualification standards in architectural history and American history and works almost exclusively with transportation projects for state DOTs that are advanced under Section 106 of NHPA (amended) and Section 4(f) of the US DOT Act of 1966. She is experienced with and interpreting The Secretary of the Interior's Standards & Treatments for bridges and buildings. Her responsibilities with the firm have included directing and reviewing all historical research and assisting engineers with studies concerning historic bridge rehabilitation and upgrading. She has served as the project manager and principal researcher for eight statewide bridge surveys/updates and historic bridge management plans and has extensive experience in the analysis and documentation of a wide variety of historic structures, including buildings, bridges, industrial sites, districts, and historic contexts. She also prepares HAER documentation for transportation resources. She is the principal author on publications and a guideline related to historic bridge analysis and preservation and has lectured extensively at national conferences about historic bridges and highways and rehabilitation. She is a member of TRB ADC50 Committee on Historic Archaeology Preservation in Transportation and AFF10 General Structures.

### Relevant Experience

#### **Ohio Historic Bridge Management Plans, Ohio Department of Transportation**

Principal investigator for study. TranSystems compiled data for all pre-1961 bridges into one, searchable database with supported eligibility recommendations as the first step in managing the state's population of historic bridges. Compiling information, including current photos, on over 8,000 bridges was successfully accomplished by working with over 100 bridge owners (state, county, and municipalities). Each historic bridge was evaluated to establish its level of historic significance. Bridge-specific management plans were prepared for those with high and exceptional significance by teaming experienced historians and engineers. Each report considered the engineering adequacy needed to remain in current usage or for an alternative use, and all evaluations will be founded on balancing sound engineering with consideration of preservation of features that make the bridge significant. 4(f) considerations and NEPA issues were addressed. The plans serve as a model for analysis of preservation potential for same types of bridges. General maintenance guidance was compiled into a "resource manual" of best practices. It received a 2011 achievement award from Ohio SHPO.

#### **Ohio Department of Transportation Office of Environmental Services On-Call Cultural Resources, Statewide**

Project manager and principal investigator for on-call cultural resources assessments associated with transportation improvements. In addition to statewide bridge survey work, assignments have included assessing Amish settlement for historic district potential and effect of roadside improvements to accommodate non-traditional means of transportation and architectural survey of small market town to determine if historic district present and what resources would then contribute to potential historic district in Garrettsville. The study, done with the assistance of the local historical society, revealed how much from pre-1955 historical development of the village remained. Understanding of history informed decisions about bridge improvements.



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### **Bridge Preservation Summaries, Tennessee DOT**

Principal investigator. TranSystems is preparing bridge-specific summaries of potential treatments to preserve or conserve selected old bridges throughout the state. The summaries are intended to serve as a starting point for owners and interested parties to consider preservation options, including costs. Each includes an explanation of the current condition and the work needed to upgrade it for long term preservation as well as stabilize them. Recommendations balance sound engineering and preserving what makes the bridges historically and culturally important. Studies were completed by teaming historian and engineer. Deliverables includes training course on old bridges analysis and rehabilitated and a website.

### **Georgia Historic Bridge Management Plan, Statewide, Georgia**

Ms. McCahon was the project manager and historian for development of a management plan to identify which of the over 300 Georgia historic bridges are candidates for preservation and which are not based on Section 4(f) considerations. Baseline engineering data was gathered for all bridges and was evaluated against the ability of the structure to meet current safety standards and usage requirements. Engineering concerns are balanced against the historical and technological significance of the structure. For bridges with preservation potential, specific preservation/conservation methodologies were developed.

### **Curry Creek Bridge, Jefferson, Georgia**

Architectural historian for the alternatives study and public participation effort for the Georgia Department of Transportation to develop a mutually acceptable way to improve the level of service at the intersection of two state routes. The 1926 reinforced concrete arch bridge, which was just west of the intersection, had been determined eligible. The goal of the study, to identify and support an engineering solution to meet the geometrical and safety concerns at an intersection without adversely affecting the bridge was achieved.

### **NCHRP Historic Bridge Rehabilitation or Replacement Decision Making Guidelines, Nationwide**

Principal researcher and author of AASHTO Standing Committee on the Environment's quick response studies for national guidelines decision making whether to replace or rehabilitate a historic bridge. The study includes a multi-discipline survey of current practices and then develops a decision making matrix that will define thresholds for replacement or rehabilitation given prevailing conditions and project need. The guidelines are also intended to assist all decision makers with understanding perspectives other than their own. Report was endorsed and published by AASHTO in 2008.

### **Waldo-Hancock Bridge, Prospect-Verona, Maine**

Historian for the HAER recordation of the 1931 suspension bridge that was one of David Steinman's earliest suspension bridge commissions in the United States. It is noteworthy for the early use of prestressed twisted wire strand cables. It was determined to not be prudent and feasible to rehabilitate the bridge because of main cable problems. Some of the work was done on an emergency basis because of changes that had to be made to the main cables in order to keep the bridge open. The recordation included working with original Steinman materials and placing the landmark bridge in its proper technology context.

### **Bridge of Lions, St. Augustine, Florida**

Ms. McCahon was the project historian for the rehabilitation of the architectonic, National Register Bridge. She assisted engineers with development of rehabilitation methodologies that are acceptable to preservationists and reviewing agencies. Because of structural condition and capacity problems, the approach spans are being rebuilt in kind but at a slightly wider width. The bascule span and operating machinery are being replaced, and the bascule piers and towers are being conserved. The original railings were removed in 1971 and are being reproduced. The project was determined by Florida SHPO to have no adverse effect.





**RANDY BUSH P.E. & P.S.**

Morrow County Engineer  
50 East High St.  
Mt. Gilead, Ohio 43338

Co. Engineers Office  
419-947-4530  
Fax: 419-947-4540

Co. Garage  
419-946-4941

February 23, 2012

Mr. David A. Simmons  
Ohio Historical Bridge Association  
1982 Velma Avenue  
Columbus, Ohio 43211-2497

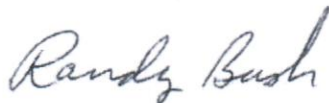
Re: MRW-CR 225-0.36  
Bridge PRU #15 (SFN: 5932394)

Dear Mr. Simmons:

Per your request stated in your 2/15/12 letter, Morrow County hereby grants the Ohio Historical Bridge Association permission to use the 1876 Wrought Iron Bridge Company truss carrying County Highway 225 over Alum Creek in Peru Township (SFN 5932394) as a demonstration project to develop a cost-effective approach to repairing and conserving such bridges.

Please keep us informed of your activities regarding this project and how we might be of assistance.

Sincerely,



Randy Bush, P.E., P.S.  
Morrow County Engineer



**TranSystems**

2400 East Commercial Blvd.  
Suite 1000  
Ft Lauderdale, FL 33308  
Tel 954-653-4700  
Fax 954-567-2511

[www.transystems.com](http://www.transystems.com)

February 27, 2012

Mr. David Simmons, President  
Ohio Historic Bridge Association  
1982 Velma Avenue  
Columbus, OH 43211-2497

RE: SIA Grant Application Commitment for MRW-CR 225-0.36 Inspection Report and Workshop

Dear Mr. Simmons:

TranSystems is committed to performing the work scoped in the grant application and the estimate of staff hours cost proposal dated 2/29/2012 that is attached to the application. We believe that this effort will be an important contribution to managing metal truss bridges, and we are pleased to be able to support it.

Thank you for your faith in the abilities of our personnel.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan Klevens", written over the typed name and title.

Alan Klevens, P.E.  
Senior Vice President





# OHIO DEPARTMENT OF TRANSPORTATION

CENTRAL OFFICE • 1980 WEST BROAD STREET • COLUMBUS, OH 43223

JOHN R. KASICH, GOVERNOR • JERRY WRAY, DIRECTOR

## Office of Environmental Services

February 28, 2012

Mr. David Simmons, President  
Ohio Historical Society  
Timeline Office  
1982 Velma Ave.  
Columbus, OH 43211-2497

Re: Proposed Morrow County historic bridge repair workshop: *A Cost Effective Approach to Conserving Historic Metal Truss Bridges: A Demonstration Study*

Dear Mr. Simmons,

ODOT's Office of Environmental Services commends the Ohio Historic Bridge Association (OHBA) for their efforts in supporting rehabilitation and preservation of historic structures throughout Ohio; and increasing awareness of the state's unique industrial heritage.

We are contacting your organization to express ODOT's support of the proposed Morrow County historic bridge workshop: *A Cost Effective Approach to Conserving Historic Metal Truss Bridges: A Demonstration Study*, sponsored by the OHBA and Society for Industrial Archeology (SIA). We feel that the project will enhance the Management Plan for the 1876 Wrought Iron Bridge Company Pratt Pin-connected thru truss (SFN: 5932394) which ODOT completed for Ohio's Historic Bridge Inventory Update in 2010 (enclosed). The field study, in-situ repairs demonstration, and inspection report on this important bridge, will provide historic bridge owners and engineers useful knowledge in economical techniques to keep their structures in service and available for future generations to learn from and appreciate.

Sincerely,

A handwritten signature in cursive script, appearing to read "Timothy M. Hill".

Timothy M. Hill  
Administrator  
Office of Environmental Services  
Ohio Department of Transportation  
1980 West Broad

[WWW.TRANSPORTATION.OHIO.GOV](http://WWW.TRANSPORTATION.OHIO.GOV)

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Section I A - D

**I. GENERAL INFORMATION**

**A. LOCATION/IDENTIFICATION**

SFN Number: 5932394                      Owner: COUNTY  
 Municipality: PERU TWP                      County: MORROW                      District: 06  
 Feature Carried: CH 225  
 Feature Under: ALUM CREEK

**B. STRUCTURAL INFORMATION**

Main Span Type: THRU TRUSS                      Design: PRATT (PINNED)  
 Material: METAL  
 Year Built: 1876                      Altered/Rehabbed: 1942  
 Total Number of Spans: 1                      Overall Length: 90

**C. CLASSIFICATION OF SERVICE**

Functional Classification: Local Road-Rural                      On National Highway System: No  
 Direction of Traffic: 2-Way Traffic                      Number of Lanes On: 2  
 ADT /Date: 150 / 1992                      Waterway Adequacy: 9: Above flood

**D. GEOMETRIC INFORMATION**

Bridge Travelway Width: 18 ft                      Deck Width, Out to Out: 18.4 ft  
 Approach Travelway Width: 22 ft                      Vertical Clearance on Bridge: 9.6 ft

Is Bridge Roadway as Wide or Wider Than Approaches?  
 No. Reportedly 4' less. In reality appears to be as wide. On VLVL.

Sidewalk Width Left/Right: 0 ft / 0 ft

Crash Data:  
 Researching.



**E. STRUCTURAL EVALUATION**

Physical Description:

One span, 90'-long and 18'-wide, wrought iron, pin-connected thru truss bridge. The verticals are built up with angles and plate instead of lacing. Non-standard upper lateral and sway bracing details. Shaped, built-up floorbeams. Beam guide rail across bridge. Located on a reportedly 22'-wide gravel road with south approach on tangent and a jog to the north. Deck placed in 2006 after bridge was temporarily closed.

Summary of Structural Deficiencies:

The floorbeams are severely deteriorated; assumed they are controlling members for low load capacity and condition rating. The approaches are considered poor because of width and alignment. Vertical clearance is limited, but this seems to be attempt to limit load. Some LC eye bars loose. Isolated section loss on verticals at original railing connection.

**II. CONFORMANCE WITH STANDARDS**

|                                   | Actual  | Required | Adequate (Y/N) |
|-----------------------------------|---------|----------|----------------|
| Load Rating Inventory (Operating) | 4* (4*) | HS-15    | No             |
| Bridge Roadway Width              | 18 ft   | VLVLR    | Yes            |
| Number of Lanes                   | 2       | 2        | Yes            |
| Alignment/Sight Distance          | -       | -        | Intolerable*** |
| Geometric Adequacy                | -       | -        | Yes**          |

Conformance Comments:

\* eng judgment; no analysis performed.

\*\* on VLVLR with no observed safety performance problems.

\*\*\* Lower speed to cross bridge; vertical clear restricted.

Status Notes:

Bridge is so significant that consideration should be given to working with owner to apply for and use TE funds for rehabilitation and preservation.

### III. HISTORICAL SIGNIFICANCE

Historical Rank: High

Summary of Significance:

Early & complete example of standardization thru truss design. Retains transitional details. One of two oldest WIBC thru trusses in state. Important record in evolution of design of metal truss bridges in Ohio and the nation.

### IV. SUMMARY OF PRESERVATION POTENTIAL

Is it prudent and feasible to preserve bridge for its current usage? Yes

Does the bridge have any preservation potential, including alternate use? Yes

Summary of Preservation Potential:

Based on current guidelines and available information, the bridge is adequate in substructure condition and waterway adequacy. It is located on an unpaved (gravel), very low volume local road that appears to be functioning satisfactorily (no impact damage observed), so its geometry is considered adequate. It is deficient in superstructure condition (serious condition (3)), load-carrying capacity, and safety features. There has been a cumulative deterioration of the bridge since initially evaluated in 1984, when its summary rating was 6. It was lowered to 3 in 2009. The deteriorated floorbeams are assumed to be the controlling member. It is posted for 4 tons. It is also posted for a 9'-6" vertical clearance, but that posting appears to be more a means of restricting loads rather than an actual physical restriction. The 18'-wide bridge deck is reported as being 4' narrower than the 22'-wide approaches, but in actuality the approaches approximate the bridge deck width. The approaches are tangent.

The bridge is in serious condition, and the deteriorated floorbeams, which exhibit more deterioration toward and at the center of the built-up, shaped members, are evaluated on the BR-86 as "critical." For the bridge to have any preservation potential, the floorbeams need to be replaced as soon as practical or the bridge should be closed. After that, a complete structural analysis using modern methods should be done to determine the capacity of all members. The upcoming truss bridge rating program will identify every deficient member. It is anticipated that any load analysis will indicate that in its present condition that the bridge is insufficient to carry traffic loads. Any long term preservation potential for the 135 year old bridge to remain in service is for restricted usage only; it is not prudent to upgrade the bridge to meet current load requirements. There is a less than five mile bypass with unrestricted bridges, which may support rehabilitating the bridge for limited use.

**No build:** This option is not prudent if the bridge is to be preserved. The floorbeams are severely deteriorated, and they need to be replaced for the bridge to remain in service for even light vehicles. The bridge has an overall rating of serious condition, which means that closing it until corrective action is taken may be appropriate.

**Rehab without adverse effect:** Based on field observations, it appears to be possible to rehabilitate the bridge for restricted usage with its inventory rating based on analysis. Work needed to strengthen the flooring system and potentially increasing the inventory rating can be done using traditional techniques like placement of higher strength floorbeams and stringers. In the context of Morrow County, it would be appropriate to replace the shaped built up floorbeams with rolled beams in order to make the work cost effective. Placement of a beam guide rail system to protect the trusses is a reversible and thus acceptable change, and the needed height and load-restricting barriers would be placed off the bridge. There is a less than 5 mile long bypass route with an unrestricted bridge. If it is determined to be acceptable to have a load-restricted bridge on the unimproved very low volume local road that appears to be performing adequately, then its rehabilitation to accommodate passenger vehicles and light trucks is would be more economical than replacing it with a new one. Rehabilitation should include water-blast cleaning and coating/painting of the bearing areas only until such time as funds are available to paint/coat the entire bridge.

Replacing floorbeams is expensive. It is anticipated that the bridge will need to be lifted off the abutments in order to complete the work. The cost estimate is estimated minimally at \$250,000. An adequate beam guide rail system is estimated at \$150 to \$200 a linear foot



because of the attachment details. Additionally, large vehicle restrictions need to be placed at each approach to self-enforce restricted loading. It is anticipated that rehabilitation of the bridge to as built condition would be less than full replacement. A replacement 90'-long bridge meeting current criteria is estimated at 1 million dollars.

**Bypass/historic bridge left in place:** The viability of constructing a parallel span and leaving this bridge in place would have to be evaluated determined based on the need to maintain the low traffic volume crossing. There is an adequate bypass route with an unrestricted bridge. If the bridge is taken out of service, it should still be preserved because of its historic importance within the Ohio and the national contexts of the development and standardization of the metal truss bridge.

**Other:** Based on its date of construction, details, association with a significant Ohio fabricator, and remarkable state of preservation given its over 135 years of being in service, the bridge is of seminal importance. If not preserved at this location, it should be dismantled, conserved, and re-erected in a protected setting.

#### V. PRESERVATION RECOMMENDATION

-- It is critical for the long-term preservation of the 1876 thru truss bridge that load limits be enforced. The bridge is currently posted for 4T loading, but a heavy truck was observed trying to cross the bridge. There are nearby bypass routes with unrestricted bridges. The bridge is located on a very low volume local road, and it appears to be performing adequately.

--The floorbeams are severely deteriorated and are the member controlling the load rating. Failure of one of the floorbeams has the potential to fail the entire bridge. Therefore, the floorbeams should be replaced as soon as practical. This and enforcing the load restriction are the priority actions needed to secure long-term preservation of the bridge.

-- Erect height-restriction barriers at each approach in order to limit overweight vehicle usage. Post weight restriction warning signs in advance of the bridge.

-- Place a modern beam guide rail system across the bridge to protect the truss lines.

Committee Recommendation:

Date/Committee: