



Fiscal Year  
2015  
Research  
Program

Ohio's Research Initiative for Locals  
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In cooperation with the  
Ohio Department of Transportation, Office of Statewide Planning and Research, Research Section  
Ohio Department of Transportation, Ohio Local Technical Assistance Program and the  
U.S. Department of Transportation, Ohio Division of the Federal Highway Administration



**Ohio’s Research Initiative for Locals (ORIL)** is a program designed to provide practice-ready solutions to real-world issues faced on Ohio’s local transportation system through research. A collaborative effort between the Ohio Department of Transportation, the Ohio Township Association, the County Engineers Association of Ohio, the Ohio Municipal League, and Ohio’s institutions of higher education, ORIL is overseen by a Board consisting of 15 voting members and 3 support members

**ORIL Mission:**

*ORIL develops, funds, and oversees transportation research projects to meet the needs of local agencies for the safety and economic well-being of the traveling public.*

**ORIL Vision:**

*ORIL with self-sustaining funding, identifies, manages, and facilitates strategic research that solves local transportation challenges with implementable and cost-effective solutions.*

**ORIL Board:**

Organization Represented	Members
<b><i>Voting Board Members</i></b>	
County Engineers Association of Ohio	Bill Lozier, Licking County Steve Luebbe, Fayette County Edward Meixner, Ashland County Warren Schlatter, Defiance County
Ohio Municipal League	Terry Lively, City of Marion Paul Schmelzer, City of Findlay Leo Shanayda, City of Springfield Hassan Zahran, City of Columbus
Ohio Township Association	Greg Butcher, Violet Township
Ohio Department of Transportation	Mitch Blackford, District 6 Anna Kuzmich, District 11 John MacAdam, Office of Traffic Engineering Jack Noble, District 4
Academia/Researchers	Robert Liang, University of Akron Eric Steinberg, Ohio University
<b><i>Support Board Members</i></b>	
FHWA Ohio Division Office Ohio LTAP Center ODOT Research Program	Frank Burkett Mike Fitch Vicky Fout



## **2015 Strategic Research Focus Areas:**

### Safety

Ensuring the safety of those utilizing and maintaining our transportation system is a priority for all transportation agencies. The traveling public expects the system to meet their individual needs in a manner that is safe, convenient, economic, and efficient with minimal disruption to their daily routines. In addition, protection for roadway crews working on-location is a prominent concern. Identifying, developing, and implementing corrective strategies before hazardous events occur is key to advancing a safe and reliable transportation system. For local agencies the identification of cost appropriate, yet effective, safety measures can often be a challenge.

### Renewal/Infrastructure

Without meeting basic maintenance needs, pavements, bridges, signs, guardrail, pavement markings and other roadway features would degrade to the point of being hazardous. The major challenge is to sustain these conditions in a time of declining resources. As our infrastructure ages, it is important to find ways to preserve existing facilities, especially pavements and bridges, while improving design and construction methods which produce reliable, long-lasting facilities.

### Operations & Business Practices

Local transportation agencies face a variety of challenges based on their geography, traffic, population density, funding, equipment, staffing, local expectations, governmental structure and history. The identification and evaluation of best practices can be difficult, given the uniqueness of individual organizations. The ability to be aware of existing research and its local applicability can be a challenge for local agencies.

## **Program Funding:**

Funding for ORIL research projects is provided through the Ohio Department of Transportation's (ODOT's) State Planning and Research Part 2 (SP&R2) program. A total of \$1 million was initially budgeted in ODOT's SP&R2 program to support ORIL projects during fiscal year (FY) 2015. All FY2015 ORIL funding is at a ratio of 80% federal SP&R2 funds with the mandatory 20% matching funds provided by ODOT utilizing state funds. ODOT's Research Section provides oversight of all federal and state funds utilized by ORIL. In addition, ODOT's Research Section acts as the contracting agent for ORIL and provides administrative support.

In support of research projects that incorporate aspects of both the state and local transportation systems, ODOT's Research Section has collaborated with ORIL to initiate more comprehensive studies. In these instances, ODOT's Research Section has provided financial contributions to the projects through its traditional SP&R2 program at a funding ratio of 80% federal funds and 20% state funds. The program overview (page 3) denotes the difference between the ORIL (i.e.: local focused) and ODOT (i.e.: state focused) budgets/programs. A total budget is provided to highlight the overall value of ORIL, the local research program.

All projects listed in this program book are also included in ODOT's FY2015 Research, Development and Technology Transfer program book, which was approved by the Ohio Division of the Federal Highway Administration on June 30, 2014.



## FY 2015 Program Overview

RFP #	Project Title	Project Duration (months)	ORIL Budget (estimated)	ODOT Budget (estimated)	Total Budget (estimated)
2015-ORIL1	Evaluation and Design of a TL-3 Bridge Guardrail System Mounted to Steel Fascia Beams Agency: RoadSafe, LLC                      PI: Chuck Plaxico	28	\$291,875.67	\$0.00	\$291,875.67
2015-ORIL2	Waterproofing Details of Connections for Adjacent Precast Concrete Box-Beam Bridges Agency: University of Akron                      PI: Anil Patnaik	24	\$60,446.00	\$210,000.00	\$270,446.00
2015-ORIL3	Investigation of In-Situ Strength of Various Construction/Widening Methods Utilized on Local Roads Agency: Ohio University                      PI: Shad Sargand	18	\$147,948.11	\$0.00	\$147,948.11
2015-ORIL4	Analysis of Ground Tire Rubber (GTR) in Mix Design on Local Roadways in Ohio Agency: Ohio University                      PI: Munir Nazzal	24	\$176,822.66	\$0.00	\$176,822.66
2015-ORIL5	Assessment of IRP Truck Licensing for Ohio Counties Agency: University of Kentucky                      PI: Andrew Martin	16	\$80,519.28	\$0.00	\$80,519.28
2015-ORIL6	Inspection, Repair, Retrofit Procedures, and Design Recommendations for Non-Redundant Steel Structures Agency: University of Cincinnati                      PI: James Swanson	12	\$87,534.19	\$0.00	\$87,534.19
2015-ORIL7	Stormwater Best Management Practices for Local Roadways Agency: GS&P/OH Inc.                      PI: Mark McCabe	12	\$179,690.45	\$0.00	\$179,690.45
2015-01	Evaluation and Analysis of Liquid Deicers for Winter Maintenance Agency: University of Akron                      PI: Bill Schneider	16	\$0.00	\$189,546.00	\$189,546.00
SOL1373	Practical Design Guidelines for Replacement of Deficient Bridges with Low-Water Stream Crossing in the Rural Mid-West Agency: Kansas DOT                      PI: Susan Barker	18	\$0.00	\$30,000.00	\$30,000.00
SOL1378	11 <sup>th</sup> International Conference on Low Volume Roads and Peer Exchange Agency: Iowa DOT                      PI: Vanessa Goetz	12	\$8,000.00	\$0.00	\$8,000.00

**TOTAL ESTIMATED BUDGET FOR FY 2015:**

**\$1,032,836.36**

**\$429,546.00**

**\$1,462,382.36**



**Project Title:** Evaluation and Design of a TL-3 Bridge Guardrail System Mounted to Steel Fascia Beams

**ORIL RFP#:** 2015-ORIL1

**State Job #:** TBD

**PID:** 98644

**Agreement #:** 26602

**FY 2015 Funding:** \$291,875.67

**Funding Source:** ORIL - SP&R2

**Start Date:** TBD

**End Date:** TBD

**Research Agency:** RoadSafe, LLC

**Researchers** Chuck Plaxico  
Malcolm Ray

**ORIL TAC:** Brett Boothe, Gallia County  
Scott Coleman, Logan County  
Dennis Gonano, US Bridge  
Sean Meddles, ODOT Structural Engineering  
Edward Meixner, Ashland County  
Eric Steinberg, Ohio University

#### **Project Summary:**

For structures with concrete bridge decks, the railing system is typically connected to the deck. However, for bridges on Ohio's local road system, non-concrete bridge decks (e.g. timber, asphalt filled steel stay-in-place forms, fiber reinforced composite, etc.) are very common and require the railing connection to be located on the fascia beam. Although this fascia mounted system is performing well on the local system, a crash tested version is not available and it is ineligible for use on federal aid projects. Research is needed to evaluate and, if necessary, improve the design of a bridge guardrailing system with steel bridge posts mounted to steel fascia beams.

The goal of this two-phased research project is to analyze and design a steel fascia beam mounted railing system for use on Ohio's local transportation system. The objective is to obtain MASH TL-3 approval of the designed system to allow for its use on federal aid and credit bridge projects. Since the connection would occur at the beam as opposed to the deck, the application of the system would be suitable with a myriad of bridge deck types. The ability to utilize materials other than concrete for bridge decks results in substantial cost savings for locals. Furthermore, the use of an approved railing system will enhance the overall safety of the traveling public and confidence in Ohio's local transportation system.





**Project Title:** Investigation of In-Situ Strength of Various Construction/Widening Methods Utilized on Local Roads

**ORIL RFP#:** 2015-ORIL3 **State Job #:** 134991

**PID:** 98611 **Agreement #:** 26597

**FY 2015 Funding:** \$147,948.11 **Funding Source:** ORIL - SP&R2

**Start Date:** August 11, 2014 **End Date:** February 11, 2016

**Research Agency:** Ohio University **Researchers:** Shad Sargand  
Roger Green

**ORIL TAC:** Adam Au, ODOT Pavement Engineering  
Mitch Blackford, ODOT District 6  
Anna Kuzmich, ODOT District 11  
James Wiechart, Mercer County  
Warren Schlatter, Defiance County

**Project Summary:**

A common practice among local public agencies in Ohio is to reuse materials (e.g.: asphalt, concrete, Portland cement concrete, etc.) from projects to widening existing roads or backfill at other locations. A variety of other methods may also be utilized in conjunction with the repurposed materials (e.g.: fly ash, lime, fabric, etc.). The utilization of these techniques may be driven, in part, by budgetary constraints or material availability. While it is easy for local transportation officials to compare these methods based on costs, there is a lack of information available to compare the overall effectiveness of these methods in terms of projected strength or relative load capacity. In order to provide local governments with the tools necessary to assist in system preservation decisions, research into the performance of these methods is needed.

The goal of this research is to establish a range of structural coefficients (or moduli) for various materials utilized to widen/construct roads on Ohio's local system. The objective is to provide locals with a repeatable, non-destructive methodology to characterize the strength/load capacity of materials used in road widening/construction when established values are unavailable. The results of this research will provide local officials with enhanced knowledge and understanding of the potential structural integrity of materials being considered for use in roadway maintenance, improvement and construction projects. This will lead to more efficient design and greater confidence in the load carrying capacity of rural roads. It will provide a scientific basis for material selection to complement the readily available cost data, which will aid locals in managing budgets and ensuring the fiscal integrity of local pavement preservation programs.



**Project Title:** Analysis of Ground Tire Rubber (GTR) in Mix Design on Local Roadways in Ohio

**ORIL RFP#:** 2015-ORIL4 **State Job #:** 134989

**PID:** 98609 **Agreement #:** 26595

**FY2015 Funding:** \$176,822.66 **Funding Source:** ORIL - SP&R2

**Start Date:** September 2, 2014 **End Date:** September 2, 2016

**Research Agency:** Ohio University **Researchers:** Munir Nazzal  
Sang-Soo Kim

**ORIL TAC:** JuanPablo Ascarrunz, City of Akron  
Mitch Blackford, ODOT District 6  
Michael Huber, City of Akron  
Robert Liang, University of Akron  
Perry Ricciardi, ODOT District 3  
Michael Teodecki, City of Akron  
Hassan Zahran, City of Columbus

#### **Project Summary:**

For decades, transportation agencies have considered the incorporation of crumb rubber, now referred to as ground tire rubber (GTR), in asphalt mixtures to enhance the durability and longevity of pavements. In addition to the improvements in pavements, GTR has demonstrated the potential for positive environmental impacts through its reuse of recycled tires. While the benefits of using GTR appear to be great, the initial cost to implement GTR can often render the material as being cost-prohibited. ODOT has various specifications concerning asphalt mix designs (e.g.: Nos. 446 and 448) including GTR (e.g.: No. 887). While these specifications address the utilization of materials on interstates and highways, their direct application to local roadways may not be appropriate. Factors such as variations in traffic volume and traffic patterns (e.g.: intersections) may influence the performance of GTR resulting in the ODOT specifications being either over or under designed for local roads. Furthermore, advances in technology over the years have increased the options available to transportation agencies in regards to both application methods and products. Since 2005, GTR has been used on approximately 33 local roads and 3 state highways. This presents Ohio with the opportunity to analyze the actual in-field performance of GTR, assess the pros and cons of using the material, and determine if the life-cycle cost of the materials offsets the installation costs.

The goal of this two-phased research project is to assess the true life-cycle cost of GTR mixes on local roads within Ohio and identify opportunities for GTR to be more affordable. The objective is to develop specifications and supplemental QC/QA testing and acceptance criteria for GTR additive/mixture use on municipal and local roads. The results of this research will provide local officials with enhanced knowledge and a field validated assessment of the life-cycle cost of GTR enhanced mixes on its use and performance. The development of a specification for GTR use on local roads will encourage uniformity and provide clear guidance. This information will be of assistance to local decision makers in managing budgets and the proper utilization of GTR on their respective projects.







**Project Title:** Inspection, Repair, Retrofit Procedures, and Design Recommendations for Non-Redundant Steel Structures

**ORIL RFP#:** 2015-ORIL6 **State Job #:** TBD

**PID:** 98639 **Agreement #:** 26601

**FY 2015 Funding:** \$87,534.19 **Funding Source:** ORIL - SP&R2

**Start Date:** TBD **End Date:** TBD

**Research Agency:** University of Cincinnati **Researchers:** James Swanson

**ORIL TAC:** Brett Boothe, Gallia County  
Mike Brokaw, ODOT Structural Engineering  
Scott Coleman, Logan County  
Dennis Gonano, US Bridge  
Bill Lozier, Licking County  
Eric Steinberg, Ohio University

**Project Summary:**

There are approximately 1500 structures in Ohio with the designation of fracture critical. Of these, approximately 900 pony trusses reside on the county system. As a result, counties are responsible for conducting specialized arms-length inspections on the fracture critical members (FCM) of these structures every twenty four months, in addition to the annual routine inspection. The FCM inspections are both costly and difficult to perform often due to the location of the members. While the tension zones in the steel pony members are categorized as fracture critical per FHWA's Bridge Inspection Reference Manual (BIRM), a detailed analysis may prove otherwise. Research is needed to develop a modeling standard to analyze these structures and establish protocols, consistent with provisions outlined by FHWA, in order to refine fracture-critical designations.

The goal of this research is to provide analytical evidence and protocols that allow for the reduction of the number of fracture critical members to inspect on pony trusses utilized on Ohio's local roadway system. In addition to the analytical goal, there is an objective to develop a repair/retrofit procedure to eliminate non-redundancy or fracture critical elements of pony trusses, thereby transitioning from a non-redundant to quasi-redundant designation. The results of this research will provide local engineers with enhanced knowledge and understanding of the function of this structure type. It will also aid to educate bridge inspectors as to the actual in-field performance of pony trusses. Positive findings from this research will position locals for potential savings in terms of cost and time through the elimination of excessive and onerous inspections. This would further increase the desirability of the pony truss as a viable option to own and maintain; thereby, expanding its consideration for use by local transportation officials.







**Project Title:** Practical Design Guidelines for Replacement of Deficient Bridges with Low-Water Stream Crossing in the Rural Mid-West

**ORIL RFP#:** Pooled Fund SOL:1373                      **State Job #:** N/A

**PID:** TBD    **Agreement #:** N/A

**FY 2015 Funding:** \$30,000.00                      **Funding Source:** ODOT - SP&R2

**Start Date:** TBD    **End Date:** TBD

**Research Agency:** Kansas DOT                      **Researchers** Susan Barker

**ORIL TAC:** TBD

**Project Summary:**

This is a pooled fund study being led by the Kansas Department of Transportation. The research is expected to be conducted by Dr. Bruce McEnroe of the University of Kansas and will last a total of 18 months. This research is contingent upon meeting the funding commitment level established by the Kansas DOT.

Many county-owned rural areas bridges are deficient and in need of replacement. Counties cannot afford to replace all deficient bridges and must prioritize their expenditures. In many locations the type and volume of traffic is too low to justify the expense of bridge replacement. This situation is worsening as the rural population declines. Some counties are closing low-volume roads rather than replacing deficient bridges. In some locations a low-water stream crossing might be a practical low-cost alternative to road closure.

County engineers and engineering consultants need guidelines to assess the practicality of replacing a deficient bridge with a low-water crossing and to select the best type of crossing. They also need straightforward design procedures and general design details for common types of crossings. Some general guidance on low-water crossings can be found in reports by the U.S. Forest Service (2006) and Iowa State University (2003). However, these reports do not provide some of the specific information needed for site assessment and crossing design.

This pooled fund study will produce a report that provides practical engineering guidance for the replacement of deficient bridges with low-water stream crossings in the rural Midwest. The report will address the following issues:

- 1) Site assessment and economics.
- 2) Selection of crossing type. The two basic types of low-cost low-water crossings are the unvented ford and the vented ford.
- 3) Design of roadway profile and culvert pipes.
- 4) Selection of crossing materials. Low-water crossings can be built of concrete, crushed stone, natural stone, stone reinforced with geogrid or geotextile, stone-filled gabions and other materials. We will provide guidelines for materials selection.
- 5) General design details. We will provide general design details for unvented fords and vented fords constructed of different materials. We will also provide guidance on signage of low-water crossings.



**Project Title:** 11<sup>th</sup> International Conference on Low Volume Roads and Peer Exchange

**ORIL RFP#:** Pooled Fund SOL:1378                      **State Job #:** N/A

**PID:** TBD    **Agreement #:** N/A

**FY 2015 Funding:** \$8,000.00                      **Funding Source:** ORIL - SP&R2

**Start Date:** TBD    **End Date:** TBD

**Research Agency:** Iowa DOT                      **Researchers** Vanessa Goetz

**ORIL TAC:** TBD

**Project Summary:**

This is a pooled fund study being led by the Iowa Department of Transportation. Those participating on behalf of ORIL will be expected to provide a presentation/report on the information obtained to their respective organization(s) to encourage technology transfer.

The Transportation Research Board (TRB) is hosting the 11th International Conference on Low-Volume Roads, in Pittsburgh, Pennsylvania, USA on July 12 to 15, 2015. The conference, held every four years, will feature the latest information about low-volume road management, design, construction, safety, maintenance, and many other related topics.

At this conference, those who administer, plan, design, build, or maintain low-volume roads will learn innovative ways of managing low-volume road systems. The conference is organized for practitioners worldwide in local, state, and federal agencies; universities; private firms; and international organizations. Previous conferences typically have attracted 250 to 300 transportation professional from around the world.

The focus of this pooled fund project will be to encourage states and other agency participation in the Low Volume Roads Conference. The primary activities of this pooled fund project are technology exchange, information sharing, and the facilitation of partnering relationships among state agencies, FHWA and other appropriate associations. Specifically this pooled fund will:

- 1) Provide communication and information sharing among member states. Discuss research, development and technology transfer needs in the areas of design, construction, maintenance, and safety on low volume roads and provide research ideas to TRB in connection with the 2015 11th LVR Conference.
- 2) 11th International Low Volume Roads Conference: Provide a technology and knowledge exchange forum to enhance the practical knowledge of conference participants concerning low volume road management with a focus on encouraging State DOT participation in the conference.
- 3) State DOT Meeting on Low Volume Road Issues: Provide a technology and knowledge exchange forum focused on State DOT Low Volume Road Issues during a workshop at the conference. Topics may include agency collaboration, funding, asset management, shared ROW/utilities, safety programs, emergency response, training and certifications, maintenance of traffic, federal oversight, standards and specifications, contracting methods, environmental issues, energy development, maintenance, material sources and quality, and bonding.

Deliverables will include quarterly administrative progress report updates (FHWA standard pooled fund format) and two final reports: a final summary report of the conference and a final report of the State DOT session at the conference. A follow-up webinar may be provided as funds allow.