



## RESEARCH REQUEST FOR PROPOSAL (RRFP) #19-03

### FEASIBILITY OF USING BASALT FIBER REINFORCED POLYMER (BFRP) AS INTERNAL REINFORCEMENT IN BRIDGE DECKS

**POSTED DATE: 07/18/2019; CLOSING DATE: 08/14/2019**

#### PROJECT INFORMATION

<b>Funds:</b>	\$225,000
<b>Estimated Contract Term:</b>	24 months
<b>Projected Start Date:</b>	January 1, 2020
<b>Deadline for Submitting Proposal:</b>	4:30:00 PM (local time) August 14, 2019
<b>Submit Proposal via Email to:</b>	<a href="mailto:research@getipass.com">research@getipass.com</a>

#### BACKGROUND

The basalt fiber reinforced polymer (BFRP) is a new advancement in fiber reinforced polymers (FRP) and offers many advantages. Some of those advantages include:

- Having as much as 3-times the strength of steel reinforcement
- Being non-corrosive
- Being non-conductive
- Being resistance to chemical attacks
- Being lightweight.

This research will focus on the practicality of using BFRP rebar in Tollway bridge decks and the possibility that using BFRP can extend the service life of bridge decks.

Because of its recent development, limited research has been completed and documented regarding the use of BFRP rods in bridge decks. BFRP fibers have been used as strengthening material similar to Fiber wrap.

## OBJECTIVE

The primary objectives of this proposed research effort are to investigate the performance and effectiveness of bridge decks reinforced with BFRP and develop design guidelines for potential implementation of BFRP rebar in Tollway bridge decks.

## RESEARCH TASKS AND REQUIRED DELIVERABLES

The research shall be divided into tasks, as described below:

- A. Conduct a comprehensive literature review regarding the use of BFRP rebar in various structures, with an emphasis on their use in bridge decks.

*Task deliverables: Report containing a summary of literature reviewed and findings gleaned from the current practice and experience of other agencies utilizing BFRP rebars in bridge decks. Information related to performance, characteristics, cost and availability should be included.*

- B. Conduct an experimental program focusing on the mechanical and long-term properties that may affect the performance of the structure and overall effectiveness of BFRP rebar in bridge decks. The programs should concentrate on reinforcement details and mix designs similar to the ones used by the Illinois Tollway on their bridge decks. Accelerated tests for durability (alkali resistant and freeze thawing cycles) should be included as part of the experimental program.

*Task deliverables: Experimental Program Report including: executive summary, experimental programs, testing procedures, test results, analysis and conclusions.*

- C. Using Tasks A and B, develop a design document that could be used by the Tollway to implement BFRP rebars into Tollway bridge decks.

*Task deliverables: Design document for implementing BFRP rebar in Tollway bridge decks.*

Deliverables that will be required throughout this project will include:

- Quarterly progress reports, in electronic format, containing a summary of effort performed during the quarter and expected progress for the following quarter.
- Final report, in electronic format, summarizing the results and recommendations developed as a result of this research effort as contained in the Tasks A, B and C documents described above. A draft final report shall be submitted 45 days prior to the end date of the research contract. The Tollway will review and provide comments and feedback within 15 days of receipt of the draft final report. Then, the researcher

shall have 30 days to address the comments and questions, make revisions, and resubmit the final report.

- Two hard copies and one electronic copy (pdf) of the final report shall be submitted.

## **INSTRUCTIONS FOR SUBMITTING A PROPOSAL**

The proposal shall be prepared in accordance with the guidelines presented in Appendix A. The contact name/email and due date are presented on the first page. All potential Principal Investigators (PIs) should read and understand the responsibilities of Illinois Tollway Principal Investigators, which are presented in Appendix B.

Technical questions regarding the research project or questions regarding the RFP procedures should be submitted to [research@getipass.com](mailto:research@getipass.com) by 2:00:00 p.m. (local time) on August 7, 2019. Technical questions that are received by 2:00:00 p.m. (local time) on August 7, 2019 will have the question and answers posted on the Tollway's website at least 3 days before the proposal due date.

## **SPECIAL CONDITIONS FOR REVIEWING PROPOSALS AND AWARDING ILLINOIS TOLLWAY FUNDS**

Please note that the following two conditions will be applied in reviewing all proposals received and in awarding Tollway funds:

- 1) The award of this project is contingent upon the availability of funds at the time of award.
- 2) Tollway research projects are entered into through an Intergovernmental Agreement. Therefore, the lead institution in a successful proposal is required to meet the definition of a "public agency" pursuant to Illinois' Intergovernmental Cooperation Act (5 Ill. Comp. Stat. 220) in order to enter into an Intergovernmental Agreement to complete the project.

## **APPENDIX A: GUIDELINES FOR PREPARING A PROPOSAL FOR THE ILLINOIS TOLLWAY**

Please use the following format for submitting a Tollway proposal for consideration. Please limit your total proposal to 5 pages in length (not including the Cover/Summary Page or optional Appendices), ensure file size is less than 5 MB, and use a font size no smaller than 10. We suggest Arial font with 1.5 spacing between lines.

### **1. Cover/Summary Page**

Use the cover page included in Appendix C.

### **2. Research Plan**

The research plan should describe in a specific and straightforward manner the proposed approach for solving the problem described in the problem statement. The research plan should be subdivided into the following sections:

#### **(a) Introduction, including Research Idea Statement**

Provide an introduction to the proposal and a concise overview of the research approach. Outline the objectives of the research project and explain the questions that will be answered by the research.

#### **(b) Research Approach/Work Plan**

Include the details of how the investigator will carry out the project and accomplish the project objectives. Itemize the tasks to be completed, explaining each in sufficient detail so the reviewers understand what will be done for each task and what will be produced or completed with each task.

#### **(c) Anticipated Research Results**

Specifically state the anticipated research results and deliverables.

#### **(d) Applicability of Results to Illinois Tollway Practice**

Describe how the anticipated research results can be used to improve Tollway practices.

### **3. Qualifications and Accomplishments of the Research Team**

Identify who will perform the research and provide a brief explanation of each researcher's qualifications to perform the research. Please provide examples of similar research that the proposed individuals have performed.

**4. Other Commitments of the Research Team**

Briefly outline the other commitments of the proposed principal and co-principal investigators to demonstrate that both will be able to fulfill the commitments of the proposal.

**5. Equipment and Facilities**

Describe the facilities and equipment available to undertake the research proposal.

**6. Time Requirements**

Describe the time that will be required to complete the research proposal, including final report preparation, Tollway editing, review of the report by the Technical Review Panel (TRP), and final review/publishing of the report. Include a timeline for each task. Please plan on submitting the draft final report to the Tollway for initial editing at least three months before the end date for the project.

**7. Itemized Budget**

Provide an itemized budget for each of the Phases of the project and for the entire project, including the cost of personnel, consultants, subcontracts, equipment, materials, travel, overhead/indirect costs and cost share (match). The Illinois Tollway believes that an overhead/indirect rate of 20% is reasonable and competitive. Justification shall be provided if an indirect cost rate in excess of 20% is used. Please itemize equipment and travel requests, especially any requested out-of- state travel or planned attendance at conferences.

**8. Cooperative Features (if appropriate)**

If assistance or cooperation is required from other sectors, public or private, to complete this proposed research, describe the plans for securing this assistance.

**9. Appendices (if appropriate)**

You may include such things as statements regarding previous work on the problem or related problems, abstracts of related projects, a bibliography or list of references, or materials describing the submitting organization.

## **APPENDIX B: RESPONSIBILITIES OF ILLINOIS TOLLWAY PRINCIPAL INVESTIGATORS**

1. Prepare and submit a project work plan and multi-year line-item budget, consistent with the Tollway RRF for the newly-approved research project.
2. Meet with the Technical Review Panel (TRP) and revise the project work plan and multi-year budget, as agreed with the TRP.
3. Assist the TRP chair in preparing an Implementation Planning Worksheet and work throughout the project to identify the expected benefits of the research, e.g., construction savings, operation and maintenance savings, increased lifecycle, safety, etc.
4. Carry out the project as agreed with the TRP, or notify the TRP if any problem develops regarding the project.
5. Provide online quarterly progress reports to the TRP chair for review and approval.
6. Attend quarterly meetings of the TRP to provide project updates and answer TRP members' questions about the project.
7. Provide the TRP a synopsis of the project's implementation potential as well as implementation strategies. In conjunction with the TRP, develop Implementation activities/ tools such as draft specifications, policy guidelines, software, and training on new test/ practice/ equipment/ software and develop an implementation cost estimate, if applicable.
8. Near the completion of the research project, draft a final research report in accordance with the Tollway report format. (The timeline for the work plan must allow adequate time to prepare the report, typically three months.)
9. At least three months before the end date for the project, submit the draft final report to the Tollway for preliminary editing (prior to submission to the TRP).
10. After the Tollway returns the edited draft final report, submit the report to the TRP chair for review and work with the TRP chair to finalize the content of the report.
11. Re-submit the final report to the Tollway for publication. The Tollway will post the final report to the Tollway website and will arrange to publish the final report.
12. The publication or release of all work products, any information that is deemed confidential by the Tollway, or information which includes patentable results may not be published/ released without the Tollway's approval.

13. Include the Illinois Tollway acknowledgement statement and disclaimer statement (available on the Tollway website) in all publications and presentations regarding research sponsored partially or fully by the Tollway.





**APPENDIX C:  
PROPOSAL COVER SHEET FOR  
SOLICITATION #19-03**

**FEASIBILITY OF USING BASALT FIBER REINFORCED  
POLYMER (BFRP) BARS AS INTERNAL REINFORCEMENT IN  
BRIDGE DECKS**

**DUE: AUGUST 14, 2019**  
**TO: [research@getipass.com](mailto:research@getipass.com)**

<b>Submitted by: (Include Name and Address of Organization)</b>	
<b>Proposed Investigator(s):</b>	
<b>Corresponding Investigator Name:</b>	
<b>Corresponding Investigator Phone:</b>	
<b>Corresponding Investigator Fax:</b>	
<b>Corresponding Investigator Email:</b>	
<b>Submission Date:</b>	