



## **RESEARCH REQUEST FOR PROPOSAL (RRFP) #23-02**

### **APPLICATIONS FOR FOAMED GLASS LIGHTWEIGHT AGGREGATE**

**POSTED DATE: 4/17/2023; CLOSING DATE: 5/15/2023**

#### **PROJECT INFORMATION**

<b>Funds:</b>	\$150,000
<b>Estimated Contract Term:</b>	18 months
<b>Projected Start Date:</b>	August 21, 2023
<b>Deadline for Submitting Proposal:</b>	4:30:00 PM (local time) May 15, 2023
<b>Submit Proposal via Email to:</b>	<a href="mailto:research@getipass.com">research@getipass.com</a>

#### **BACKGROUND**

Foamed glass aggregate is a sustainable aggregate used for fill operations that require a low unit weight, for design purposes such as poor existing soils or underlying utilities. Its engineering properties and environmental benefits have been previously researched with promising results.

The lightweight properties of the foamed recycled glass coupled with its engineering and environmental benefits, particularly its high friction angle, indicate that the material is ideal for usage as a lightweight construction material in engineering applications such as non-structural fills in embankments, retaining wall backfill, select fill for mechanically stabilized earth (MSE) retaining walls, and pipe bedding.(1) The material has been used previously in Europe (2).

Each of these application types are used on the Tollway system. The Tollway currently uses lightweight cellular concrete fill, a product which requires cement. In light of recent cement shortages, and considering sustainability, alternate products are of value to the Tollway.

Foamed glass lightweight aggregate has been previously researched in the following studies and others. The current body of knowledge suggests that this material could be of benefit in Illinois Tollway applications, however an evaluation in the Tollway's climate and traffic conditions is needed.

- (1) Arulrajah *et al.* Engineering and environmental properties of foamed recycled glass as a lightweight engineering material – Journal of Cleaner Production (2015)
- (2) T. Auvinen, *et al.* Covering the Highway E12 In The Centre Of Hämeenlinna – Innovative Use of Foamed Glass As Light Weight Material of Approach Embankment - The XXVIII International Baltic Road Conference
- (3) R. Swan, *et al.* Engineering Properties of Foamed Recycled Glass as a Lightweight Fill, TRB (2016)
- (4) Research Needs Statements, TRB – Design and Construction Guidelines for Alternative Lightweight Backfill for Mechanically Stabilized Earth Walls

## **OBJECTIVE**

Foamed glass lightweight aggregate has been previously researched in the referenced studies and others. The current body of knowledge suggests that this material could be of benefit in Illinois Tollway applications, however an evaluation in the Tollway's climate and traffic conditions is needed.

## **RESEARCH TASKS AND REQUIRED DELIVERABLES**

Several steps are envisioned for completing this research project, as described below:

- A. Conduct a literature review on foamed glass lightweight aggregate for geotechnical applications.
- B. Develop and execute a testing program to address any knowledge gaps in the literature as it relates to suitability for Tollway applications.
- C. Recommend appropriate applications on the Tollway system and draft a specification for materials and construction. A region-specific analysis of the sustainability benefits, as well as the economic impact should be included.

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 including percent of remaining schedule and budget.
- Final report, in electronic format, summarizing the results and recommendations developed as a result of this research effort as contained in the Tasks A-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.

- An 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 May 1, 2023. Technical questions that are received by 2:00:00 p.m. (local time) on May 1, 2023 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 three 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.
- 3) The lead institution must perform at least 35% of the work (budgeted costs).

## **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.

**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 RRFP 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 TRP meetings 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 45 days before the end date for the project, submit the draft final report to the Tollway for review and work with the TRP chair to finalize the content of the report.
10. Re-submit the final report to the Tollway for publication. The Tollway will post the final report to the Tollway website.
11. 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.

12. 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 #23-02**

**APPLICATIONS FOR FOAMED GLASS LIGHTWEIGHT  
AGGREGATE**

**DUE: May 15, 2023**  
**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>	