



RESEARCH NEED STATEMENT

Call for Projects 2015

Project Research Title: Alkali Silica Reactivity (ASR) Risk Assessment

TDOT Sponsor Director: Brian Egan

List TDOT Research Team Lead: Jamie Waller

List TDOT Research Team Members: Heather Hall, Jason Mellons

1. Define the problem or research requested. What is the goal/objective of the research?

Multiple aggregate sources across the southeastern states use aggregates for bases, concrete, and asphalt materials. Many aggregates used in Tennessee have a relatively high siliceous content (e.g. gravels, some limestones, granites). Higher levels of reactive silica in aggregates can be detrimental to concrete if it reacts with the alkaline cement paste. TDOT is unaware of the alkali-silica reactions (ASR) risk of our aggregates that are used in concrete specifically. The objective of this research would be to perform a study to test the aggregates used throughout the state to determine if there are any potential risks or concerns for our structures and pavement lifecycle. Since the new, 2015 Standard Specifications now require "polish resistant aggregate" in concrete pavements and bridge decks on interstate/high volume roadways, the use of high silica aggregates in concrete will be greater. It is important to know the long term risks so proper decisions can be made now.

2. Is this research a continuation of a past or present project?

☒ No ☐ Yes

If yes, provide current research project title, RES # and reason for the project continuation.

3. Describe anticipated benefits/expected deliverables.

Benefits to this research would be to obtain a statewide aggregate information database that would include at a minimum the potential risk factors for the different aggregates. Suggested changes to the standard specifications for concrete mix designs, cement types, use of ASR inhibitors, etc.. would be expected as well.

4. What is your timeline for completion of the research?

Timeline for completion would be approximately 18 months.

5. List the anticipated tasks for this research.

Tasks include the following:

Literature Review of ASR issues in southeastern United States and certain aggregate formations

Retrieve aggregates that are already approved TDOT sources as well as surrounding areas not yet approved
Perform the specified ASTM (C1260) test methods for ASR, and/or other latest indicative test for ASR potential
Develop a database of the results and guide (range) for aggregates that at higher risk and those with a lower risk for TDOT projects based off application.

6. Describe how the project results will be implemented?

The aggregate sources would be analyzed to determine the general use within TDOT projects. Specifically if used within concrete structures, the aggregates with higher ASR potential would be flagged to not be used or for limited use or only with some supplementary cementitious material in the mix. This would mitigate any of the potentially detrimental effects of the ASR.

7. Will this study produce software, web page or other technology that will involve the Information Technology Division?

☒ No ☐ Yes, please describe:

8. Will training be provided to employees as a result of this research?

☒ No ☐ Yes, please describe:

9. Will this research involve equipment or materials purchase?

☐ No ☒ Yes, please describe:

The researcher may have to purchase the aggregates for testing or test new equipment.

10. Research must support the Long Range Transportation Plan Policy Recommendations **and/or** TDOT Operational Goals and/or Strategic Initiative. (*See attachments for additional information*)

Please indicate which categories the research will support:

Transportation Long Range Plan Policy Recommendations

☐ (A) Accessibility

☐ (B) Safety, Security, and Transportation Resilience

☐ (C) Coordination, Cooperation, and Consultation

☐ (D) Demographic and Employment Changes and Trends

☐ (E) Freight Logistics and Planning

☐ (F) Financial

☐ (G) Mobility

☐ (H) Travel Trends and System Performance

TDOT Operational Goals and/or Strategic Initiative

☐ (A) Deliver transportation projects on schedule and within budget

☒ (B) Maintain the state transportation system to protect the long term investment in our infrastructure assets

☒ (C) Operate and manage Tennessee's transportation system to provide a high level of safety and service to our customers and workers

☐ (D) Expanding mobility choices to maximize access

☐ (E) Dramatically change the paradigm for delivery of transportation products and service to improve the efficiency and effectiveness of Tennessee's transportation network

11. Please explain how the research supports the Long Range Transportation Plan Policy Recommendations **and/or** TDOT Operational Goals and/or Strategic Initiative selected above:

TDOT strives to develop and maintain a safe transportation system for the motoring public. ASR issues could potentially cause a strength loss, spalling, and cracking of our concrete structures that could lead to a failure. The public expects that when they travel on the transportation system that all avenues for potential failures have been assessed, resolved, and that are that the roadways are safe to travel. This research would benefit the motoring public in terms of safety, but also for the overall long term investment of the structures that we build.

For additional information, please contact:

Stephanie Vincent

TDOT Research Program Administrator

Telephone: (615) 741-2203

Email: Stephanie.Vincent@tn.gov