



RESEARCH NEED STATEMENT

Call for Projects 2015

Project Research Title: Acceptable Chloride Ion Limit in Concrete

TDOT Sponsor Director: Brian Egan/Wayne Seger

List TDOT Research Team Lead: Jamie Waller

List TDOT Research Team Members: Jason Mellons, Amanda Neighbors, Houston Walker

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

Excessive amounts of chlorides in concrete can lead to the corrosion of prestressing strands and reinforcing steel thus leading to failure of the concrete structure. ACI (American Concrete Institute) as well as other concrete organizations (e.g. PCI) state an acceptable chloride ion percent by mass of cement limit in concrete. These limits are stated for acid soluble, water soluble, and the Soxhlet method. After further researching these test methods, we realize that these limits do not necessarily take into account all of the chlorides present in all constituent materials. The objective of this research would be to determine if a chloride limit other than the ACI specified limit is needed for prestressed concrete applications.

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.

Provide guidance/recommendations on the acceptable and as well as reasonable chloride limits for prestressed concrete to include into TDOT Specifications.

Identification of a test method(s) to easily and accurately measure chloride levels.

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

2 years.

5. List the anticipated tasks for this research.

Literature Review on acceptable chloride levels and test methods and other state requirements

Test various constituent materials of concrete for chloride percentages

Test these constituent materials in a concrete mix design with uncoated reinforcing steel and strands (including the artificial addition of chlorides)

Test the hardened concrete mix to determine the total amount of chlorides per mass of cement.

Study the various methods (acid soluble, water soluble, Soxhlet Method (ASTM C1524) or other methods) and determine what percentage of chlorides is actually released from the total mix or the aggregate materials alone.

6. Describe how the project results will be implemented?

Supplemental specifications would be added and/or adjusted in the structural concrete section 604 and/or prestress concrete Section 615 based off the research results.

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:

There is the possibility that some lab equipment for performing the different methods for determining the chloride percentage will be required.

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:

Chlorides can be detrimental to the reinforcement of our concrete. If the reinforcement begins to corrode, this could lead to a failure of the structure. Therefore this research supports operational goals for long term investment and safety for those reasons.

For additional information, please contact:

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