ARDOT TRC TRANSPORTATION RESEARCH COMMITTEE

**PROBLEM STATEMENT**
**No.** 2

## RESEARCH PROBLEM STATEMENT

| **DATE:** 09/07/2018 | **PROJECT AREA:** Construction |
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**TITLE:** Maturity Method for Concrete Elements

**PROBLEM STATEMENT:**

Concrete strength is generally a function of time and temperature. If the time-temperature history of a concrete mixture is known, the in-place strength of the concrete can be estimated accurately. This technique is known as the concrete "maturity method." Compared to field cured concrete cylinders, this method allows the in-place strength to be monitored continuously and can provide an accurate picture of variations in strength throughout a concrete placement. With the ubiquity of smart phones and inexpensive wireless sensors, the maturity method can easily be applied in a distributed manner for concrete bridge decks, pavements, and other concrete structures.

The maturity method can be applied to speed up construction practices for Arkansas bridges. The critical path in a bridge project schedule often includes time spent waiting for concrete to gain adequate strength before saw cutting, formwork removal, placement of construction equipment, or opening to traffic. With the maturity method, these construction practices can be carried out as soon as the in-place concrete strength is adequate, without waiting for cylinder breaks. This saves time, and money.

**OBJECTIVES:**

This project will develop a standard practice for the use of the maturity method in Arkansas. This project will also test commercially available wireless maturity sensors to make recommendations on the most valuable features for use in Arkansas. Several mixtures will be tested, using materials available throughout the state. This will validate the technique and uncover any unforeseen difficulties in applying the method in Arkansas. The culmination of the project will be a field trial to serve as a proof of concept on a real Arkansas bridge deck or pavement. This will serve to determine how much time and cost can be saved by using the method.

**FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:**

A standard practice for the maturity method will provide contractors with an official route to the use of the maturity method for bridge construction. This method will allow faster bridge construction without any sacrifice to safety or strength. A case study in Arkansas will provide proof of concept and will help build confidence in the method among practitioners. Shortening bridge construction schedules will save the state money and reduce disruptions to normal traffic as bridges are being constructed. It is also expected that this information on in-place conditions of concrete mixtures will improve the finished product.

**Estimated Project Duration:** 24 **Months**

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| Standing Subcommittee Ranking | Advisory Council Ranking | Statement Combined with Statement Number(s) |
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| 2/2 | 28/37 | |