ARDOT TRC TRANSPORTATION RESEARCH COMMITTEE

PROBLEM STATEMENT
No. 15

RESEARCH PROBLEM STATEMENT

DATE: 09/25/2020	**PROJECT AREA:** Materials

TITLE: Improving Embankment Settlement Estimates using CPT and DMT

PROBLEM STATEMENT:

The excessive settlement of embankments for highway and bridge approaches is a common issue leading to uneven roadways and the notorious bump at the end of the bridge. The estimates of settlement are typically completed using consolidation analysis using undisturbed samples or correlations with standard penetration test (SPT) data. However, these method can be time consuming and result in inaccurate estimates in some cases. The FHWA Everyday Counts A-GAME initiative offers a prefect opportunity to advance ARDOT's subsurface investigation techniques to include the ability to estimate embankment settlements using advanced in-situ methods such as the Cone Penetration Test (CPT) or Flat Dilatometer Test (DMT). Settlement estimates from CPT and DMT have several advantages over traditional consolidation (oedometer) testing including not requiring undisturbed samples, or not having to perform time consuming lab tests. Moreover, the methods provide more accurate estimates of constrained modulus for estimating settlements of sandy soils than SPT N-values.

OBJECTIVES:

1) Perform a detailed literature review of CPT and DMT practices and settlement parameters for soils similar to those found in Arkansas.
2) Perform CPT and DMT testing along side traditional methods for current projects or for projects which are not performing well.
3) Compare results from CPT and DMT with field observations and traditional methods to develop settlement design guidelines for ARDOT using the methods.

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

This project will develop guidelines and case histories for using CPT and DMT to estimate settlement of embankments and shallow foundations. The use of these methods will reduce the time and effort required to obtain settlement estimates for projects. The implementation of the research will take place during the course of the project with testing being conducted in conjunction with ARDOT. The estimates will take the place of traditional methods for settlements estimated in the standard ARDOT work flow.

Estimated Project Duration: 24 **Months**

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Standing Subcommittee Ranking	Advisory Council Ranking	Statement Combined with Statement Number(s)
4/8	22	