In Service Performance Evaluation of Erosion Prevention and Sediment Control (EPSC) Devices

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Synopsis of the Research Problem

Currently, the Tennessee Department of Transportation (TDOT) spends millions of dollars annually on erosion prevention and sediment control (EPSC) applications for roadway construction projects. However, there is a lack of feedback from the TDOT construction supervisors and field inspectors, and consultant engineering and inspection (CEI) staff assessing the effectiveness and general constructability of these practices. Recent investigations and communications among different TDOT divisions have revealed that the current stormwater and erosion control practices need to be reconciled between EPSC standard drawing designs and Storm Water Pollution Prevention Plans (SWPPP) at construction sites. TDOT Drainage Manual (Chapter X, 10) describes 40 EPSC applications including flow and sediment control measures that can be applied to a SWPPP, although some EPSCs are utilized more than others. In addition, the rationale for how design decisions are made in the SWPPP remains undocumented. During construction, EPSC devices may be modified because of unforeseen on-site conditions requiring adjustments to the original design, but that information does not get documented and cycled back to designers for consideration in future plans. There is a need for the Drainage Manual to be consistent with observed field implementation protocols. Another needed improvement includes EPSC quantities listed on the roadway plans and estimated costs for these practices may be outdated. This research is supported by the EPSC Policies Committee.

Project Objectives

The objectives of this research project are to: 1) set up questionnaire and evaluate the performance of the current EPSC devices, 2) field investigate per reconnaissance how often EPSC devices are being modified during the construction under the Storm Water Pollution Prevention Plan (SWPPP), and 3) determine if the quantities listed on the roadway plans are correct and cost of implementation reflects the estimated costs.

Project Description and Current Outcomes

The first phase of this research is to meet with TDOT professional staff to survey in-service performance of EPSC devices, including construction supervisors; professionals from Standards & Guidelines, QA, Training Office; the Environmental Compliance Office; and others within the agency that can provide useful assessment information on current EPSC practices and inform subsequent tasks. Based on these initial interviews, a questionnaire (survey) will be developed and sent to relevant TDOT staff across the state to generate the necessary information of EPSC device performance. The surveys have been implemented and about 15-20 responses have been compiled. Additional surveys may be conducted after a preliminary assessment of results.

To support and validate interview and survey observations, approximately five to eight field investigations will be conduct with TDOT construction supervisors to better document on-site conditions and performance issues. Survey information will be complied and general descriptive statistics will be applied to summarize the information in report to TDOT. Recommendations on changes for Chapter 10 of the Roadway Design Division Drainage Manual will be included in the final report. A second phase, if warranted after the completion of the first phase will include field monitoring of selected EPSC devices. Based on field monitoring results, changes to the Drainage Manual will be recommended to the TDOT Standards & Guidelines, QA, Training Office.

Four site surveys have been completed with Mr. Ali Hangul and graduate student Payton Smith discussing EPSC installation and performance. The four sites included two on August 23, 2016 at US129 Alcoa and the SR33 Maynardville Highway projects; and two on November 8, 2016 .at the US431 and SR109/I-65 Interchange projects. . Various EPSC measures were inspected during the field visits, and qualitative information was collected with valuable input for the TDOT CEI personnel and contractor supervisors in-charge of installing and maintaining EPSC devices. A few of the EPSC measures inspected during field trip are show below, including culvert protection, catch basin filter assemblies, and rock sediment dams.



Photos from US431 project site, US129 Alcoa Highway site, and SR33 Project site

Project Status

The project is on-going at present. Survey data will be compile4d during spring 210-7. Additional field inspections of EPSC devices will also be conducted during spring 2017.