

## **Rahall Transportation Institute Research Project Description Form**

**Project Number:** 211222

**Project Title:** Development of Criteria for Predicting Scour of Erodible Rock in West Virginia

**Primary Investigator Contact Information:**

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**Project Objective:** The objective of the study will be to collect geologic and hydrologic data that is site-specific to West Virginia, study relationships between site hydraulics and rock scour, and develop models that can be used to more accurately predict rock scour at bridges.

**Abstract:** Bridge foundations in West Virginia are founded in sedimentary rock, and stream scour of erodible foundational rocks creates the potential for undermining of the bridges. However, resistance of sedimentary rocks in West Virginia to scour, and the power of streams to cause scour, varies widely in the state. The study will assess the scour potential of bridges founded on rock within West Virginia by selecting 15 existing bridge locations, with a minimum of one bridge located in each of the ten WVDOH districts. The bridges under study will be selected in collaboration with WVDOH Project Monitors and with the intent to include sandstone, siltstone, claystone, shale, and limestone rock types. Determination of cumulative stream power, and rock characteristics from modified slake durability testing of collected samples, will be performed. Methodologies and test methods developed for the NCHRP Project 24-29, Scour at Bridge Foundations on Rock will be among those applied to the evaluation of rock and stream characteristics of West Virginia. A map will be developed

showing locations where scour is known to be a problem, and extrapolations (where appropriate) from the empirical data developed during this research identifying areas that are potentially scourable. Scour potential for areas where site-specific data is lacking will be based on site-specific data, existing geologic mapping, WVDOH records, and other data sources considered reliable.

**Task Descriptions:**

- Task 1: Literature Review
- Task 2: Study Site Selection
- Task 3: Field and Lab Testing
- Task 4: Data Analysis
- Task 5: Reporting

**Milestones, Dates, Schedule:**

- 1) Literature Review (3 months)
- 2) Study Site Selection (3 months)
- 3) Field and Lab Testing (10 months)
- 4) Data Analysis (8 months)
- 5) Reporting (4 months)

**Yearly and Total Budget:** \$215,000

**Student Involvement:** Two undergraduate students will be involved in the project.

**Relationship to Other Research Projects:** N/A

**Technology Transfer Activities:** The objective of the proposed project is to apply NCHRP Project 24-29 methods to evaluation of the rock and stream characteristics of West Virginia in order to develop models that can predict rock scour at bridges. The results of the research will be used to produce a set of implementable guidelines in the form of Best Management Practices (BMP) that can be incorporated into the WVDOH Bridge Design manual. A final report will also be developed.

**Potential Benefits of this Project:** A major deliverable of the proposed project will be a map indicating, to the degree that they are known, locations where significant scour potential (i.e., scourability) exists based on the interaction of rock and stream characteristics. This map will be based on:

- geologic and hydrologic data specific to the study sites selected for this project;
- results of laboratory testing for rock samples obtained from the study sites;

- WVDOH records of rock type, observed scour, and historical channel cross-section data for the study sites and other bridge sites, including WVDOH records indicating sites where scour has not occurred;
- existing geospatial datasets of rock type occurrence and distribution in West Virginia;

**TRB Keywords:** Bridges; Foundations; Erodible Rock; Scour; Scour Number.