

New Jersey Department of Transportation
Bureau of Research

Technical Brief



Scour Evaluation Model Implementation Phase

This project launched the new Scour Evaluation Model (SEM) and began applying it to New Jersey bridges. The model was used to evaluate three dozen bridges across the State to help discern those that require repair from others that have low scour risk. The overall goal was to provide the State with a rational tool to manage bridges on the Scour Critical List.

Background

Beginning in the 1990s, the New Jersey Department of Transportation (NJDOT) launched a robust Plan of Action to identify scour critical bridges and to perform corrective work. In carrying out the plan, the Department decided to develop New Jersey's own modified method of scour analysis known as the Scour Evaluation Model (SEM). The model is risk-based and reflects the State's unique geology and hydrology. More information about SEM and its development is available in the report, "Design and Evaluation of Scour for Bridges Using HEC-18," FHWA-NJ-2017-011.

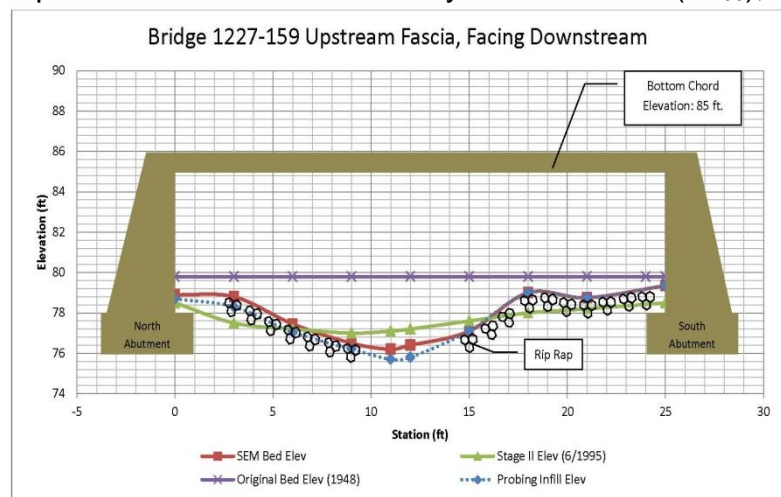
Research Objectives and Approach

This project was the "Implementation Phase" for SEM aimed at transferring the model into state-wide practice. Bridges were evaluated in all four of New Jersey's physiographic provinces, including the Coastal Plain, Piedmont, Highlands, and Valley and Ridge. The chosen bridges had a wide variety of characteristics, including age, structure type, number of spans, drainage basin size, and flooding history. Bridges were subjected to thorough geotechnical and hydrological investigations. Field measurements were also conducted using soundings and ground penetrating radar (GPR). The key findings for each bridge were the Scour Priority Level (1 thru 4) based on a risk analysis, as well as specific recommended actions. Three New Jersey consulting firms participated in the project for the purposes of technology transfer.



Findings

- The study commenced with a prescreening phase to search for high risk bridges. This allowed the Department to begin repairing scour critical bridges even while the rest of the project was underway. The prescreening phase identified 17 bridges for repair or replacement.
- During the next project task, 19 bridges were evaluated using SEM to fully demonstrate the model. The evaluations yielded a range of results, including:
 - Low risk bridges that are recommended for removal from the Scour Critical List;
 - Medium risk bridges that are recommended for minor repair or continued monitoring; and
 - High risk bridges that are recommended for priority repair or replacement.
- A new hydrologic calculation procedure was established to analyze the historic flow events at any State bridge. The procedure estimates the 100-year storm flow (Q_{100}), which is a key input parameter for SEM.
- The study investigated the use of envelope curves to assess scour at bridges founded in fine textured sediments. It was concluded that envelope curves can be an effective tool within select geologic regions of the State, when coupled with the other SEM evaluative procedures.



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A final report is available online at: <http://www.state.nj.us/transportation/refdata/research/>. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.state.nj.us.

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