

Scour Requirements for Bridge Rehabilitations

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Agenda

- Policy Background and Timeline.
- Requirements for Bridge Rehab scour evaluations.
- Requirements for scour critical & non scour critical bridges.
- Hydraulic Report requirements.



Background

- Late 1980's: Scour becomes a nationwide concern after two bridge failures.
- 1988: FHWA requires all bridges to be rated on scour vulnerability under NBI
- 1991: INDOT begins designing all new bridges to resist scour.



Background

- 1997: INDOT Scour Committee divides all bridges in to High, Medium, and Low Risk Categories.
- 1997-2002: High risk bridges given priority for scour evaluation/monitoring.
- 1998: Standard Drawings for scour protection at three/four sided structures developed.



Background

- 1999: INDOT & FHWA agreement requires all bridges to be evaluated for scour when rehabbed.
- 1999: Hydraulics & Bridge Rehab send out two design memoranda detailing need for scour design during rehab.
- 1999-Present: This memo is still in effect.



Requirements

- Use 1% Annual EP only
 - Follow IDM Chapter 202 on hydrology.
- Use FEMA FIS model if available.
- Use survey from existing bridge plans.
 - Can supplement with GIS/DEM information



Requirements

- Model in HEC-RAS.
- Follow IDM 203-3.03(04), Scour – Hydraulic Modeling Using HEC-RAS.
- Determine if structure is scour critical.



Scour Critical

- Scour Critical: If scour depths are lower than the low pile/footing depths of the structure. Unknown foundations are automatically scour critical.
- Countermeasures *are required*.
- Follow IDM Figures 203-2D for riprap sizing, and 203-3B for scour countermeasures.



Not Scour Critical

- Not Scour Critical: Scour depths are higher than the known low pile/footing depths of the structure.
- Countermeasures should be provided.
 - Designer has option to use.
- No Further Countermeasures Needed is an acceptable recommendation.



Report

- Scour modeling and countermeasures are reviewed by the Hydraulics Office.
- Most submittals are occurring in conjunction with the Bridge Inspection Report.
- If coordination with DNR is needed, may take longer.



Report

- Generally an abbreviated Bridge Hydraulics report.
- Need calculations, model, and scour determination and recommendations.
- All standard Hydraulics Report requirements should be followed.



Hydraulic Data Summary

- Drainage Area
- Q100
- Q100 Elevation
- 1% Annual EP contraction scour
- 1% Annual EP total scour
- 1% Annual EP low scour elevation
- 1% Annual EP maximum velocity
- Flowline & Low foundation elevation if known



Conclusion

- A long standing policy.
- 1% Annual EP with existing survey is sufficient.
- Scour critical structures must have appropriate scour countermeasures.
- Report follows standard procedures.



Questions?

