Scour Requirements for Bridge Rehabilitations

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March 11, 2014
Agenda

- Policy background and timeline
- Requirements for bridge rehab scour evaluations
- Requirements for scour critical and 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.
1997: INDOT Scour Committee divides all bridges into high, medium, and low risk categories.


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 sent 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
- Flow line & 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.