

# Scour Requirements for Bridge Rehabilitations

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# 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.**



# 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 and 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 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.**



# Questions?

