

15th Statewide Local Bridge Conference
Syracuse, NY
October 21, 2008

Bridge Scour Training
4 hour session

1. Hydrology - 30 min

Flood magnitude, frequency and risk
Streamflow prediction

- Deterministic – Rational method, NRCS Curve methods (TR-55)
- Statistical – Regression equations
- Case study comparison

2. Hydraulics - 20 min.

Flow characterizations

- steady/unsteady,
- uniform/non-uniform,
- subcritical/supercritical

Open channel flow

3. Stream Processes - 40 min.

Stream mechanics

- Hydraulic geometry,
- Alluvial channels

Fluvial geomorphology

- planform, erosion,
- deposition

Applications to bridges

- scour
- lateral migration

Scour classification:

- Long term aggradation and degradation
- Lateral stream migration
- Live-bed and clear water scour
- General scour
- Local scour

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4. Scour Analysis - 60 min

Scour impact on bridges

- Examples of bridge scour failures
- Bridge scour statistics
- NYSDOT policy - scour analysis for all replacement bridges over water

Scour management:

- Data collection
- Scour analysis
- Countermeasures
- Inspection and maintenance

Contraction scour:

- Live-bed contraction scour
- Clear water contraction scour

Local scour at abutments:

- Site conditions
- Skew
- Shape
- Abutment or embankment length
- Froelich and HIRE equations

Local scour at piers:

- Variables
- CSU pier scour equation
- Correction factors
- Correction factor for very wide piers
- Scour for complex foundations
- Multiple columns
- Pressure flow scour
- Top width of scour hole

Example problems from HEC- 18

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5. Measurement of Scour at Selected Bridges in New York - Jerry Butch, USGS - 30 min

- Estimating Bridge Scour from Historical USGS streamflow measurements
- Relation of Local Scour to Hydraulic Properties at Bridges
- Effects of Flow Duration on Local Scour at Bridge Piers
- Evaluation of Selected Instruments for Monitoring Scour at Bridges
- Scour-hole Dimensions at Bridge Piers
- Evaluating Selected Scour Equations at Bridge Piers in Coarse Streambeds in New York
- Scour studies in other States

6. Scour Countermeasures - 60 min

Overview

- Scour evaluation - existing bridges
- Plan of action
- Group 1 – hydraulic countermeasures
- Group 2 – structural countermeasures
- Group 3 – monitoring
- Countermeasures for new bridges

Countermeasures for:

- Meander migration
- Channel braiding and anabranching
- Channel degradation and aggradation
- Bridges – contraction and local scour
- Culverts

Countermeasure design:

- Design approach
- Riprap for channel bed
- Riprap for bank protection
- Bendway weirs
- Guide banks
- Rock vanes
- Check dams and profile retainers
- Riprap at piers and abutments
- Repair of undermined piers and abutments
- Pile foundations and structural redundancy
- Cut-off walls at culverts
- Stone aprons at culverts

List of references (to be provided via Internet links):

- HEC-18 Evaluating Scour at Bridges
- HEC-23 Bridge scour and Stream Instability Countermeasures
- NYSDOT Excel spread sheet for HEC-18 scour equations