NJDOT Bridge Scour Program

1. General Scour Background Info for New Jersey
2. Scour Plan Of Action
3. Scour Monitoring
4. Scour Countermeasures
5. Scour Research

General Scour Background Info

- In 2005 completed Stage I & Stage II Scour Evaluation – Identified 165 State Owned Bridges as Scour Critical out of ~2600 State Owned Bridges (313 County Owned Bridges out of ~2600 County Bridges)
- At FHWA request developed two items:

1. Scour Plan Of Action (POA)
2. Scour Countermeasure Program

NJDOT Scour Plan Of Action

- Structural Evaluation monitors the USGS website for real time flood data from their flow gauges http://waterdata.usgs.gov/nj/nwis/
- E-mail Reg. Maint. Engineers alerting them to streams/rivers in flood stage, and identify bridges need to be monitored.
- Maint. staff monitor bridges every two (2) hours until told the waterway is no longer at flood stage.
- Structural Evaluation reviews each data record to determine if a follow-up field inspection is warranted.

NJDOT Scour Plan Of Action (POA)

FLOOD MONITORING PROGRAM

ROUTE _____ DATE _____

BRIDGE NO _____

			CRITICAL							NON-CRITICAL								
			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	
Time	Weather	Insp. Initials	Alignment (Y, N)	Tilt (Y, N)	Vibration (Y, N)	Approx. Freeboard (Nearest 1/2 ft.	Snagging Debris (Y, N)	Bridge Noise (Y, N)	Superstructure Distress (Y, N)	Length (Chg. Nearest 1/2 inch)	Erosion (Y, N)	Settlement (Y, N)	Cracking (Y, N)	Debris (N, L, M, H)	Impacting Debris (Y, N)	Flow Characteristic Changes (Y, N)	Stream Noise (Y, N)	Remarks (See Below)

REMARKS

Director of Roads, Bridges and Engineering (908) 788-1227 (o) (908) 996-4821 (m)

NJDOT Scour Monitoring

- Recognized some extraordinarily sensitive streams
- Recognized scour modeling tends to "over-predict"
- Countermeasures too environmentally intrusive
- Partnered with New Jersey's USGS office to monitor some bridges which are over sensitive streams & have no history of observed scour

NJDOT Scour Monitoring

- 10 Bridges began monitoring in 2008
- 8 Additional bridges began in 2010
- Post Countermeasure Stream X-sections
- Partnering with Rutgers University and their Center for Advanced Infrastructure Technology and the LTBPP team to test new scour monitoring technology proposed by Dr. Farad Ansari of UIC on three (3) bridges

NJDOT Scour Monitoring

NJDOT Scour Countermeasures

- **Initiated a Scour Countermeasure Installation Program**
- **Utilize four QBS consultants to develop individual designs & permits for bridges – Status:**

1. **25 Bridges – Scour Countermeasures Installed**
2. **25 Bridges – In the Design "pipeline"**

- **Additionally new bridges designed w/ countermeasures included (or on piles) – 5 Bridges**

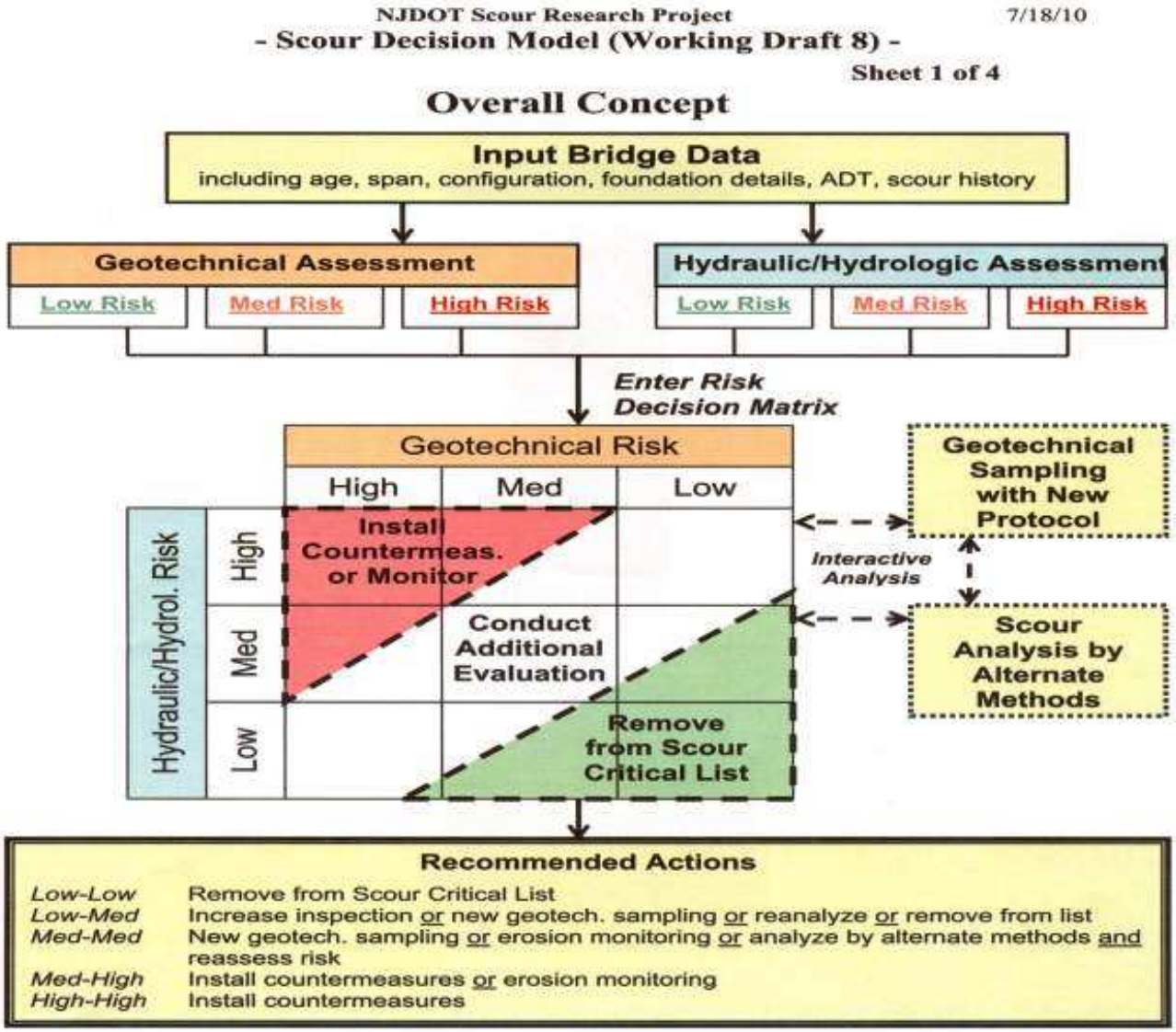
NJDOT Scour Countermeasures

NJDOT Scour Countermeasures

NJDOT Scour Research

- NJDOT entered into a scour research agreement with New Jersey Institute of Technology
- Existing Scour Models over predict based on two facts actual flows and varying stream bed materials
- Developing a New Jersey specific risk based model based on hydraulic factors & geologic factors

NJDOT Scour Research



NJDOT Scour Research

Table 1 - Summary of Erosion Classes and Scour Evaluation Procedures

Erosion Class	Predominant Texture & Description	Scour Depth Evaluation Procedure		Do HEC 18 Eqs. Apply?	Occurrence by Physio. Province
		New Bridges	Existing Bridges		
A. High Erosion Resistance					
A1. Competent Rock	Includes granite, gneiss, basalt, diabase, dolomite, limestone, slate, siltstone sandstone, and related rocks that exhibit an average RQD of 70% and recovery of 90%. Also includes mudstone and shale with an average RQD of 70% and recovery of 90%, and a Slake Durability Index (SDI) of 90.	Design scour depth shall be assumed to coincide with the top of rock elevation. Spread foundations shall be placed directly on a prepared rock surface that is free of soil or surface weathering. Blasting is NOT permitted for rock excavation for footings.	Field inspection and erosion monitoring reports for the last five years shall be reviewed (and Stage II study, if available). If the review does not indicate significant field scour issues, then scour shall be assumed to coincide with the top of rock elevation and the bridge designated as "Low Risk," regardless of age.	No	Highlands, Ridge & Valley, and parts of Piedmont
A2. Extremely Coarse Granular Soil	Includes coarse granular soil with significant cobble- and boulder-sized pieces. Must contain 30% or more particles classifying as cobble-size or larger. (>100 mm diam.).	Recommended minimum scour depth is 4 ft.	• Bridges <50 years old: Use the requirements for new bridges. • Bridges >50 years old: Review field inspection and erosion monitoring reports, and Stage II study, if available. If the review does not indicate significant field scour issues, then maximum scour shall be reduced to the depth of the existing footing, and the bridge designated as "Low Risk."	No	Highlands, Ridge & Valley, and parts of Piedmont

NJDOT Bridge Scour Program

- In Summary:
- Scour POA
- Scour Monitoring
- Scour Countermeasures
- Scour Research

Any Questions & Contact Info:

richard.dunne@dot.state.nj.us