NBIP: National Bridge Inspection Program Aligning Scour into Data Driven, Risk Based Approaches



April 2011 presentation to

SEBPP

by Joe Krolak Principal Hydraulic Engineer FHWA Office of Bridge Technology



Tom Everett

Joe Krolak

Purpose & Objectives

- Describe New NBIP oversight process
- Discuss application to scour metric
- Address your questions



New NBIP Process Why?

- FHWA saw need
- Bridge failure high-risk
- States' concern about FHWA consistency
- I-35 W and OIG audits
- Congress said to improve our oversight





New NBIP Process Pre-2011 Oversight Approach



- Recommended scope of annual reviews
 - Review of files, procedures and documentation
 - Site visits
 - NBI data checks
 - Interviews
- High degree of variability
- Annual summary reports

New NBIP Process What's Different?

- Consistency across the Nation
- Use of statistical samples
- Application of risk considerations
- Compliance status monitored quarterly
- Final compliance report on December 31st

New NBIP Process Specific Aspects

- 23 Individual <u>Metrics</u>
 - Relate to specific requirements of the NBIS
- 3 Assessment Levels
 - Defines specific review criteria and data sources
- 4 Levels of Compliance
 - Defines specific compliance thresholds
- <u>Risk</u> Consideration
 - Structurally deficient, fracture critical, scour critical bridges = higher risk and lower tolerance
- Clearer <u>Reporting</u> & <u>Oversight</u>
 - Less burdensome

New NBIP Process Specific Aspects: Metrics

Generic Definition

Quantified NBIS requirement by which one can make an assessment of compliance

 Specific Metric (#18)
 650.313 (e) (3) - Bridges that are scour critical Has a plan of action (POA) been prepared to monitor known and potential deficiencies and to address critical findings? Have bridges that are scour critical been monitored in accordance with the plan?

New NBIP Process Specific Aspects: Metrics

- Organization
- Program Manager qualifications
- Team leader qualifications
- Load Rater qualifications
- Underwater diver qualifications
- Routine inspection frequency
- Extended inspection frequency
- Underwater frequency
- Extended underwater frequency
- Fracture critical frequency
- Damage, in-depth, special frequency

- Inspection procedures
- Load rating procedures
- Posting procedures
- Bridge files
- Fracture critical procedures
- Underwater procedures
- Scour critical POAs
- Complex bridge procedures
- QC/QA procedures
- Critical findings procedures
- Inventory upkeep
- Timeliness of data updates

New NBIP Process Specific Aspects: Assessment Levels

• <u>Minimum</u>

- General knowledge and awareness of the state's program in relation to the metric
- Analysis of NBI data

• <u>In-depth</u>

- Larger sample sizes
- More interviews
- Research of records and/or history

Intermediate

- Sampling of inspection records or files
- Analysis of NBI data
- Visits to bridges
- Interviews
- Documentation of qualifications

New NBIP Process Specific Aspects: Compliance Levels

Compliance

Adhering to NBIS regulation.

Substantial Compliance

 Adhering to NBIS regulation with minor deficiencies. Deficiencies to be corrected within 12 months or less, unless deficiencies are related to issues that would most efficiently be corrected during next inspection.

Non-Compliance

 Not adhering to NBIS regulation. Identified deficiencies may adversely affect the program. Failure to adhere to an approved plan of corrective action is also considered non-compliance.

Conditional Compliance

Taking corrective action in conformance with FHWA approved plan of corrective action (PCA) to achieve compliance with NBIS

New NBIP Process Specific Aspects: Non-Compliance

- Plan of Corrective Actions (PCA)
 - Documented agreement with State
 - Process and schedule to correct deficiencies
 - Periodic reporting to monitor status



New NBIP Process Specific Aspects: Risk-Based

• What Do We Mean By Risk?

Strategy of Prioritizing the Vulnerable Bridges using concepts of Bridge Importance, Consequences of Failure, & Suitability of Approach to develop an acceptable plan of action or plan of corrective action

New NBIP Process Specific Aspects: *Risk-Based PCA/POA*

- Vulnerability: Bridge metrics of sufficient importance so that compliance is imperative
- Prioritization: Measure of the ranking of or sequence for taking an action at bridges
 - Bridge Importance: Focus on bridges of more significance relative to other bridges
 - Consequence of Failure: Measure of how loss of a bridge impacts public safety, disrupts transportation, & incurs economic costs for correction or replacement
 - Suitability of Approach: Relative appropriateness of a type of remedial approach (e.g., scour countermeasure) given Bridge Importance & Consequence of Failure

New NBIP Process Specific Aspects: *Risk & Vulnerability* Metric 18: Scour at Bridges

- SCOUR CRITICAL
 - Compliance (C): Yes.
 - Substantial Compliance (SC): NA.
 - Non-Compliance (NC): Less than 100%.
 - **Conditional Compliance** (CC): Adhering to approved **plan of corrective action**.

New NBIP Process Specific Aspects: *Risk & Prioritization* Metric 18: Scour at Bridges

- How to Prioritize?
 Make Data Driven
- What Data?
 - NBI Data
 - Functional Classification
 - Average Daily Traffic
 - Detour Length
 - Deck Length/Area
 - Other (Owner)

Oklahoma - Scour Critical Using Deck Area (ft²)





New NBIP Process Specific Aspects: *Risk & Consequences* Metric 18: Scour at Bridges

- Consequence of Failure
 - Low
 - Low ADT
 - Non-NHS Bridge
 - Medium
 - State Bridge
 - High
 - Interstate
 - School Bus Route







New NBIP Process Specific Aspects: *Risk & Suitability* Metric 18: Scour at Bridges

- Suitability of Approach
 - 1. Interstate
 - Consequence = High_c
 - Life = Long
 CM Type: Structural or Hydraulic
 - 2. Low ADT Bridge
 - Consequence = Low_c
 - Life = Immaterial CM Type: Monitoring
 - 3. NHS Bridge, Long Detour
 - Consequence = Mid_c to $High_c$
 - a. Life = Long
 - CM Type: Structural or Hydraulic
 - b. Life = **Short**
 - CM Type: Monitoring



New NBIP Process Specific Aspects: *Reporting* Assessment Reporting Tool (ART)

WASHINGTON DFS Medic 7 23 CER 650.311 Inspection frequency - Routine Extended Metric Definition Metric Regulation FHWA approval has been granted for extended impection 650.309 (a) (3) - Routine Impection - Extended interval provide not with A te approved interval 650.309 (a) (3) - Routine Impection - Extended interval enclance at Substantial Complance is: Not Complance interval es or	Metric View							
Year Add Another Assessment Level Immediate Year Organization The notice fragment on the the approval cities and specified inspection in the scheduled inspection in the scheduled inspection in the scheduled inspection in the scheduled inspection of the scheduled inspection interval that does not meet the approved cities. Close Form Year Add Another Assessment Level Immediate Year Year Scheduled inspected in specified in the scheduled inspection interval that does not meet the approved cities. Scheduled inspection interval that does not meet the approved cities. Scheduled inspection interval that does not meet the approved cities. Year Add Another Assessment Level Immediate Year Complexes that is a scheduled inspection interval that does not meet the approved cities. Scheduled inspection interval that does not meet the approved cities. States To Preview Statu Notice Year Complexe not meet the approved cities. Scheduled inspection interval that does not meet the app		WASHINGTON		DFS	West			
Metric Delimition Metric Regulation FHWA approval has been granted for extended inspection reveal, are holdpes being inspected in accordance with the pproved criteria? Are controls in place to ensure sustained ongenene with the approved criteria? Substantial Compliance is: Nan Compliance/sin compliance with the pproved criteria? Substantial Compliance is: Nan Compliance/sin Close Form conclare. At least 98% of all applicable bridges have been inspected in accordance with the stabilished and approved criteria. At most 2% beyond the scheduled inspection date. Other bridges have been inspected in accordance with the stabilished and approved criteria. At most 2% beyond the scheduled inspection date. View Assessment Type Descriptions Year Add Another Assessment Local Image: Compliance is: View Assessment Type Descriptions Year Add Another Assessment Local Image: Compliance Stability View Assessment Local Sample Tier 1 Year Add Another Assessment Local Image: Compliance Stability View Assessment Local Sample Tier 1 Year Add Another Assessment Local Image: Compliance Stability View Assessment Local Sample Tier 1 Year Add Another Assessment Local View Year Add Another	7 23 CFR 650.311 Inspection frequency - Routine Extended							
FHVA approval has been granted for extended inspection Extended interval ppivod orbeina? Are controls in place to ensure sustained ompliance with the approved orbeina? Are controls in place to ensure sustained ompliance with the approved orbeina? Are controls in place to ensure sustained ompliance with the stabilished and approved citeria. Close Form Control in place to ensure sustained ompliance in the stabilished and approved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished and approved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished and approved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished on daproved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished on daproved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished on daproved citeria. A most 2% of these bidges have been inspected in accordance with the stabilished on daproved citeria. View Assessment Type Descriptions View of the scheduled inspection date. Anton extended inspection interval that does not meet the approved citeria. Enter Population Sample Tite 1 If necleate is possible accordance with the stabilished inspection interval that does not meet the approved citeria. View of the scheduled inspection date. Not method accordance with the stabilished below the scheduled inspection for accordance with the approved citeria. Enter Population Sample Tite 1 If necleate is possible accordance with the approved citeria. View of the scheduled inspection for accordance with the actor accordance with the accordance with the accorda	Metric Definition Metric Regulation							
Substantial Compliance is: Non Compliance is: Non Compliance is: Close Form des or accordance with the stabilished and approved citeria. At most 2% beyond the scheduled inspection date. Less than 98% of all applicable bridges have been inspected in accordance with the stabilished and approved citeria. At most 2% beyond the scheduled inspection date. View Assessment 2% of these bridges inspection with the stabilished and approved citeria. View Assessment 2% of these bridges inspection by more than 4 months. Any bridge ionn dwind with anorthy beyond the scheduled mapection date. Any bridge ionn dwind with an onch beyond the scheduled mapection date. View Assessment 2% of these bridges inspection with scheduled inspection date. View Assessment 2% of these bridges inspection interval that * Year Add Another Year Add enother Compliance Statu: No. Option (Compliance Statu: The date Year Pace DA Notified 2/1/2011 "Push Button" Add an Parency Observation: Sample Tier 2 Attach File Sample Tier 2 Attach File Date Observation: Gompliance Smaphoc Smaphoc Smaphoc Smaphoc 576/2010 // Reviewed 2009 NBI database and queried al bridges with insection frequencies greater tha May Immediance specified in the May <	If FHWA appr interval, are b approved crite compliance w	roval has been granted for extended inspection ridges being inspected in accordance with the eria? Are controls in place to ensure sustained ith the approved criteria?	650.309 (a) (3) - Rou Extended Interval	utine Inspections -				
Adjustering Longituring Longituries Subset in Longituring Longituries is Interest 93% of all applicable bridges have been inspected in accordance with the established and approved criteria. At most 2% of these bridges have been inspected no more than 4 months Less than 93% of all applicable bridges have been inspected in accordance with the established and approved criteria. At most 2% of these bridges have been inspected no more than 4 months View Assessment 12% of these bridges inspector during a definition of these bridges have been inspected no more than 4 months View Assessment 12% of these bridges inspectors during a definition of these bridges inspectors during a definition of these bridges have been inspector during a definition of these bridges inspectors during a definition of these bridges inspectors during a definition of the established and approved criteria. View Assessment 12% of these bridges inspectors during a definition of the established and approved criteria. View Add Another Add Another Add another Add another No mpliant Push Button** Add an Enter Population Sample Tier 1 Sample Tier 2 2009 Add Another Add another Add another No mpliant Compleme Sample Tier 2 Attachment for 2009 State Observation: Complete Compleme Compliance Sample Tier 1 Sample Tier 2 Attach File State Difference Tode web page a spreadsheet to listhe values in the NB1 for the orteria specified in the	Constants	Cultatential Constitues in			lan Caratina in		Close Form	
Add Another Year Compliance Status Not mpliant Review Status Complete Date Observation: Agency S/26/2010 Reviewed 2009 NBI database and queried all bridges with inspection frequencies greater than 24 S/26/2010 Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Nation State Driveria. I used a random number generator to identify 15 records for review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review State Driveria. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review Review. I developed a spreadsheet to list the values in the NBI for the orieria specified in the May Review Review Review Revie	Yes or does not apply	At least 98% of all applicable bridges have been ins accordance with the established and approved crit of these bridges have been inspected no more than beyond the scheduled inspection date.	pected in eria. At most 2% i 4 months	Less than 98% of all applica accordance with the establ 2% of these bridges inspect inspection date. Any bridge months. Any bridge found u does not meet the approved	be bridges have been in ished and approved criter ed within 4 months beyon e delinquent for inspection with an extended inspection d criteria.	spected in ia. Greater than d the scheduled by more than 4 on interval that	View Assessment Type Descriptions	
Date Chemplance Agency Snapshot \$/26/2010 Image: Snapshot Signification Reviewed 2009 NBI database and queried all bridges with inspection frequencies greater than 24, months. 454 bridges met this ortenia. I used a random number generator to identify 15 records for review. I developed a spreadsheet to list the values in the NBI for the ortenia specified in the May	1 20	09 Year Compliance Status Review Status	Nor, Impliant Complete	2/1/2011	Report Obse	rvation	Sample Tier 2 Sample Tier 2 Sample Tier 2 Stachment for 2009	
5/26/2010 V Reviewed 2009 NBI database and queried all bridges with inspection frequencies greater than 24 months. 454 bridges met this orbitains. I used a random number generator to identify IS records for review. I developed a spreadsheet to list the values in the NBI for the criteria specified in the May View	Date Agency	Observation:			Compliance Snapshot	_		
	5/26/2010 Washington S	Reviewed 2009 NBI database and queried all bridg months. 454 bridges met this oriteria. I used a ran rate D ^r review. I developed a spreadsheet to list the value	is with inspection frequ form number generator is in the NBI for the cri	rencies greater than 24 to identify 15 records for treia specified in the May	Ren Compliant Viev			

New NBIP Process Important Takeaways

- New process to be used in 2011
- Former annual NBIS summary report discontinued after 2010
- Compliance of 23 metrics rather than single overall determination
- NBIS regulation DID NOT CHANGE!!
- Implementation assistance available from Bridge Safety Engineers
- Level of effort may be higher than the past

Questions

