ACEC – INDOT
BRIDGE INSPECTION COMMITTEE

MEETING NO. 3 MINUTES

May 5, 2009

The meeting was called to order at 9:10 a.m. by Mike Cox. Those in attendance were:

Drew Storey	INDOT, Seymour District
Jim Mickler	INDOT, Greenfield District
Bill Dittrich	INDOT, Planning and Production Division
Brian Harvey	INDOT, Planning and Production Division
Gerald Nieman	INDOT, Planning and Production Division
Jodi Coblentz	INDOT, Local Public Assistance
Keith Hoernschemeyer	Federal Highway Administration
Bill Williams	Monroe County Highway Director/Engineer
Michael Cox	Beam, Longest and Neff, L.L.C.
Mike Obergfell	USI Consultants, Inc.
Erich Hart	RQAW Corporation
Mike Garlich	Collins Engineers, Inc.
Adam Post	United Consulting Engineers & Architects
Kurt Fowerbaugh	Shrewsberry & Associates
Jon Sera	Butler, Fairman and Seufert, Inc.

A meeting agenda had previously been distributed and the following items were discussed:

1. Mike Cox started off the meeting with a brief overview of the agenda.

2. The minutes of the previous meeting were approved as written and will be posted on INDOT's website.

3. Bill Dittrich distributed two FHWA memorandums to the group (see attachments). The memos provided guidance on Plans of Action for Scour Critical bridges and elimination of bridges coded as unknown foundations. A list displaying the number of bridge coded with unknown foundations per each county was also distributed to the group (see attachment). Bill stated that a plan of action will be required for the 669 scour critical bridges and the 1120 bridges with unknown foundations displayed on the list. The plan of action will be a specific plan of procedure for a bridge before, during, and after a flood event. The FHWA deadline for plan of action development for all bridges that are scour critical is November of 2009 with the implementation date by April 2010. All unknown foundation codes should have a target date for elimination by November of 2010 according to the FHWA memo distributed to the group. The reduction in the number of bridges coded with a "U" for unknown foundations has already begun and is now down to approximately 800. Keith Hoernschemeyer stated that it is important for a record to be kept explaining the reason for the changes. Bill Dittrich and Gerald Nieman recommended that a new table be added to the current access database to track the changes in the unknown foundation codes as well as the information required for the scour critical plans of action. The group agreed that a separate table for recording this data would have less of an impact on the consultants' current procedures than adding more data to existing tables. Keith Hoernschemeyer noted that the plan of action will have to be

followed by the bridge owner to be considered implemented. Drew Storey questioned how the FHWA could determine if the plan of action has been implemented. Keith stated that implementation involves making counties aware of all of their scour critical bridges and what duties need to be performed in a flood event. The group agreed that three steps need to be performed to meet the FHWA deadline of November 2009. First, a screening process for bridges with unknown foundations must be distributed to all of the consultants right away. Second, as many as possible bridges coded with unknown foundations should be changed. Third, plans of action for the remaining unknown foundation that are scour critical bridges must be included into the database. A plan of action form from the FHWA's website is attached to these minutes. Bill Williams suggested that a memo be distributed to all of the counties outlining the procedures required to request supplemental funds for implementation of the plans of action into the database and unknown foundation changes. Mike Garlich noted that most plans of action would be very similar for each bridge. Mike Obergfell recommended that an item be included in the standard bridge inspection contract for implementation of the plans of action. This would provide a funding source following a flood event. Bill Dittrich will send out guidance on this subject matter to the counties and consultants in the near future. Mike Obergfell also recommended that a reminder be sent out 90 days prior to the FHWA due date.

4. Drew Storey passed around a handout that contained the recommended data fields required for collection in county bridge inventories with the new bridge inspection software (see attachments). Keith Hoernschemeyer discussed the reasons for the tabs included. Data fields included in the list were based on coding requirements and items covered under regulations. Mike Obergfell pointed out that the subgroup that developed the list looked at what items they felt that the counties would really want to be collected. Jodi Coblentz stated that the counties don't want to have to do anything beyond federal requirements. Keith explained that a bridge management system is necessary for the federal government to allow funding for maintenance projects. Jodi questioned if there would be enough funds available for maintenance projects when there doesn't seem to be enough to replace the eligible bridges right now. She questioned if the additional data input was worth the extra effort and cost. Mike pointed out that the subgroup has really scaled back the amount of data fields required for county bridges as compared to the amount required on INDOT's bridges. The INDOT inspection software currently requires data input for 1700 fields. Mike felt there would need to be a large level of effort required to build bridge files. Jodi is worried about the increase in inspection cost and consultants raising their fees based on anticipated extra work. Mike Obergfell will ask Inspect Tech to allow access for everyone in the group to be able to view the software and recommended county fields online. Gerald Nieman noted that the new database will give the inspectors a place to record info that they are already looking at. Bill Dittrich stated that the earliest software implementation on the county level would take place is late fall of this year. INDOT has had several problems converting the data from the new software to the federal submittal. There are still server issues as well.

5. Bill Dittrich discussed a new procedure policy for coding bridges that have been replaced. The old county bridge number will remain the same. A new field will be added for a letter which describes if the bridge has been replaced. An example would be: if Bridge No. 50 is replaced, it would then be Bridge No. A 50. A new NBI number will be required for replaced bridges.

6. Jim Mickler questioned how to handle access problems to railroad over- and underpasses. He stated that the railroads require flagman and railroad reliability insurance for entering their right-of-way and the coordination to do so is quite lengthy. This is also very costly. The group agreed that as long as no special access equipment is required for the inspection, the bridge inspector should just perform the inspection without railroad coordination. Under records will be recorded in the new bridge inspection software. No condition items will be required for the under records and the inspectors will not need to go up on the railroad overpasses. Bill Dittrich will discuss the railroad coordination effort issue with Fred Hohl and Mike Riley and report his findings to the group at the next meeting. Bill felt that there was a state statute that covered this issue and he will review this before the next meeting. Bill will make sure that guidance will be included in the new design manual.

7. Mike Cox introduced Erich Hart to the group. He is the new load rating engineer for RQAW. Mike Obergfell recommended that a load rating topic be included in the upcoming Civil Engineering Professional Development Seminar at Purdue.

8. Keith Hoernschemeyer discussed the NBIS closeout. He stated that the FHWA recommended finishing up some of the items that INDOT is currently working on. Substantial progress has been made, but the FHWA would like INDOT to update their anticipated schedule for completing items such as the QC/QA program, Inspect Tech database implementation, and load ratings. Bill noted that the inspection manual being developed is very thick and will need to be split up into sections for this group to review.

9. Bill Dittrich reported to the group that the latest quarterly report will be posted soon on INDOT's website. He noted that there are several funding suspensions for counties out of compliance with the NBIS standards. The group questions the progress of report reviews at INDOT. The group felt that the wait for reports to return is overwhelming. Keith Hoernschemeyer recommended to Bill Dittrich that the backlog needs to become less or a new review procedure should be developed. Mike Cox will consider current INDOT review procedures and make suggestions to alleviate some of the review timeframe when finalizing the QA/QC procedures document. Bill also noted that he reviews applications for Bridge Inspection Team Leaders once a quarter.

The next meeting for the ACEC - INDOT Bridge Inspection Committee is scheduled for 9:00 a.m. Tuesday, August 4th, 2009, at the INDOT Indianapolis Subdistrict building.

Individuals are invited to comment on items presented in these minutes and/or submit additional topics for discussion at the next meeting. Please E-mail comments to Jon Sera at jsera@bfsengr.com.

This meeting was adjourned at 1:00 p.m.

Prepared by,

BUTLER, FAIRMAN and SEUFERT, INC.

c: Attendees

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **ACTION**: National Bridge Inspection Standards – Scour Evaluations and Plans of Action for Scour Critical Bridges
(Reply Due: February 29, 2008)
/s/ Original Signed by

Date: January 4, 2008

In Reply Refer To: HIBT-20

From: King W. Gee
Associate Administrator for Infrastructure

To: Associate Administrator for RD&T
Directors of Field Services
Resource Center Director
Division Administrators

The purpose of this memorandum is to request your assistance towards ensuring that State and local agencies (referenced herein as bridge owners) complete the scour evaluation of their bridges over waterways (riverine and tidal). Also, we request your assistance towards ensuring that bridge owners develop and implement a Plan of Action (POA) for each bridge identified as scour critical to meet the requirement set forth in the National Bridge Inspection Standards (NBIS) regulation, 23 CFR 650.313(e)(3).

Status of Bridge Scour Evaluations and POAs for Scour Critical Bridges:

Bridge owners have been working for several years towards the evaluation of their bridges over waterways to determine foundation vulnerability against stream instability and scour. To date, about 93 percent of these bridges have been evaluated. We must, however, make sure that all bridges over waterways are evaluated for their vulnerability to stream instability and scour. As of August 2007, bridge owners reported on their National Bridge Inventory (NBI) data submission a total of 34,900 bridges over waterways that still remain to be evaluated as for their scour vulnerability. These are bridges that have been coded 6, T, or Null for Item 113 of the NBI. The FHWA established a target date of January 1997 for completing all scour evaluations by memorandum dated July 15, 1991; however, as the NBI data shows, we still have work to do to complete this important component of the NBIS. Table 1 presents the number of bridges over waterways on the National Highway System (NHS) and the non-NHS that still need a scour evaluation. Another 67,039 bridges over waterways identified by bridge owners as having unknown foundations remain to be evaluated for their scour vulnerability as of August 2007. We will address the subject of unknown foundations, including a process developed by the FHWA's Office of Bridge Technology to identify bridge foundations characteristics under a separate memorandum.

Table 1 – Number of Bridges over Waterways Needing a Scour Evaluation			
Item 113 Code	NHS	Non-NHS	Total
6	3,311	30,589	33,900*
T	339	661	1,000
Total	3,650**	31,250***	34,900

* Includes 6,606 bridges not coded for Item 113.
** Includes 3,480 State-owned bridges; 162 local-owned bridges; and 8 other-owner bridges.
*** Includes 10,614 State-owned bridges; 20,546 local-owned bridges; and 90 other-owner bridges.

With regards to POA for scour critical bridges, the NBIS regulation, 23 CFR 650.313(e)(3), enacted January 13, 2005, requires that bridge owners prepare a POA to monitor both known and potential deficiencies and to address critical findings for bridges identified to be scour critical. The FHWA's Office of Bridge Technology issued a memorandum dated March 29, 2005, which advised FHWA's field offices of the January 13, 2006, target date for implementing the requirements of the NBIS regulation. In a follow-up memorandum dated March 23, 2006, the Office of Bridge Technology requested the FHWA's field offices to report by May 5, 2006, on their corresponding bridge owners' implementation plan, which should have included a schedule for developing a POA. To date, we have received only a few responses.

Table 2 shows that bridge owners reported 2,671 bridges over waterways as scour critical based on the observed scour condition at one or more of the bridge foundations (code 0, 1, or 2 for Item 113). Also, Table 2 shows that bridge owners reported 18,233 bridges over waterways as scour critical based on the assessed or calculated scour depths that, if developed, would make one or more of the bridge foundations unstable (code 3 for Item 113). A State-by-State breakdown for NBI Item 113 by NHS and non-NHS is presented in Attachment A. Please note that Attachment A includes tables titled "NHS Other-Owner Bridges" and "Non-NHS Other-Owner Bridges." The data shown on the latter tables represent owner codes identified as private, railroad, unknown and records with the owner code missing.

Table 2 – Number of Scour Critical Bridges				
Scour Condition	**Item 113 Code**	**NHS**	**Non-NHS**	**Total**
Observed	0	2	111	113
	1-2	119	2,439	2,558
Total Observed		121	2,550	2,671
Total Assessed or Calculated	3	2,889	15,344	18,233
Total Scour Critical Bridges		3,010*	17,894**	20,904

* Includes 2,972 State-owned bridges; and 38 local-owned bridges.
** Includes 7,769 State-owned bridges; 10,117 local-owned bridges; and 8 other-owner bridges.

The FHWA's role and responsibility is to ensure that bridge owners complete the scour evaluation of all their remaining bridges over waterways, and that they develop, implement and maintain a POA for each of their bridges over waterways identified as scour critical to comply with the NBIS regulation.

Actions Requested:

After consulting with the FHWA Office of Chief Counsel and conducting a thorough review of the NBI database, there are several bridges that appear to not be in compliance with the NBIS regulation regarding scour. Since State departments of transportation (DOT) are responsible for overall NBIS compliance, we solicit your assistance to obtain the following information:

1. Verify with your corresponding bridge owner manager official that they still have bridges that are vulnerable to scour.

   If bridge owners confirm that they still have bridges that are vulnerable to scour (code 6, T, or Null), we request that you notify them that their jurisdiction is not in compliance with 23 CFR 650.313(e). Noncompliance could lead to suspension of Federal-aid highway funds. Bridge owners that confirm having bridges that are vulnerable to scour must provide the following schedule to avoid possible suspension of Federal-aid highway funds:

   - Schedule for completing the evaluation of all remaining scour vulnerable bridges within your State, local and other-owner jurisdiction. We recommend a target date of November 2008 for completing the scour evaluation of these bridges.

2. Verify with your corresponding bridge owner manager official the number of scour critical bridges (code 0, 1, 2, or 3 for Item 113) reported in the NBI database.

   If bridge owners confirm that they have scour critical bridges, we will appreciate it if your corresponding staff can make sure that bridge owners have developed and implemented POAs for each of their scour critical bridges. If bridge owners have not developed and implemented a POA for each of their scour critical bridges, we request that you notify them that their jurisdiction is not in compliance with 23 CFR 650.313(e)(3). As we have already stated, noncompliance could lead to the suspension of Federal-aid highway funds. These bridge owners must provide the following schedules to avoid possible suspension of Federal-aid funds:

   - Schedule for completing the development of all POAs for bridges identified as scour critical. We recommend a target date of November 2008 for bridges under State jurisdiction, and November 2009 for bridges under local and other-owner jurisdictions.

- Schedule for completing the implementation of all POAs for bridges identified as scour critical. We recommend a target date of April 2009 for bridges under State jurisdiction, and April 2010 for bridges under local and other-owner jurisdictions.

In addition, we request that bridge owners submit a status report to the FHWA Office of Bridge Technology every April and November on their progress made towards developing and implementing POAs. The status report should also include the following information:

- Percent of scour critical bridges with POAs developed by State, local, and other-owner jurisdiction, and
- Percent of scour critical bridges with POAs implemented by State, local and other-owner jurisdiction.

Bridge owners must continue to submit their status report until all bridges identified as scour critical in their corresponding jurisdiction have POAs developed and implemented.

We ask for your assistance in obtaining the information requested on these action items from all bridge owners through your corresponding State DOT manager official since the ultimate responsibility for complying with the NBIS requirement is at the State level. When a bridge owner code is missing or coded unknown, we ask that you work with the State DOT manager official to assign a proper owner code to the bridge record.

Please report the information requested herein regarding any actions taken by your division office to verify that bridges owners have reviewed their NBI data as for the number of bridges needing a scour evaluation (code 6, T, or Null for Item 113), and for the number of scour critical bridges within their jurisdiction (code 0, 1, 2, or 3 for Item 113). Also, please provide the schedules for completing scour evaluations, and for developing and implementing POAs for scour critical bridges. We request that you submit this information to the FHWA Office of Bridge Technology by February 29, 2008.

We are providing additional guidance to assist you in compiling the information requested herein in the document titled "Guidance for Reporting Schedule for Completing Bridge Scour Evaluations and Plans of Action for Scour Critical Bridges" (see Attachment B).

Also, we request that you report progress on these actions using a Web-based template, which can be accessed online at: http://staffnet.fhwa.dot.gov/bridge/attachmentc/. Once all fields are completed on this Web-based template, a summary table similar to that presented in Attachment C will be automatically generated on the Web.

If you have any questions please do not hesitate to contact Mr. Jorge E. Pagán-Ortiz, Principal Bridge Engineer – Hydraulics at (202) 366-4604, (jorge.pagan@dot.gov).

3 Attachments

Attachment B

Guidance for Reporting Schedule for Completing Bridge Scour Evaluations and Plans of Action for Scour (POAs) Critical Bridges

- Schedule for completing the evaluation of all remaining scour vulnerable bridges (code 6, T, or Null for Item 113 of the NBI) within your State, local, and other owner jurisdiction.

  1. This must be a firm target date for completing the scour evaluations.
     a) A target date of November 28, 2008, is recommended (e.g., The evaluation of all remaining scour vulnerable bridges within the State, local and other-owner jurisdiction will be completed by November 28, 2008).
     b) Please make sure that bridges with a missing code (null code) on Attachment A are assigned a proper code for Item 113 after a scour evaluation is completed.
  2. Each FHWA division office must review the proposed target date by State, local and other-owner jurisdiction and notify the FHWA Office of Bridge Technology of any action taken such as concurring or nonconcurring with the target date.
     a) Bridge owners must consult with their corresponding FHWA division office in the event that a previously concurred target date must be changed. The FHWA division office must review any information provided in support of the change and notify the FHWA Office of Bridge Technology of any further action(s) taken.
  3. Please continue to report on the progress made by bridge owners towards completing scour evaluations to the FHWA Office of Bridge Technology after your February 29, 2008, report. Bridge owners with less than 90 percent of their scour evaluations completed must report biannually in Calendar Year 2008 (April 30 and November 28), and owners with more than 90 percent of their scour evaluations completed must report by the November 28, 2008, target date.

- Schedule for completing the development of all POAs for bridges identified as scour critical.

  1. This must be a firm target date for completing the development of all POAs.
     a) A target date of November 28, 2008, is recommended for bridges under your State jurisdiction, and November 27, 2009, for bridges under local and other-owner jurisdictions (e.g., POAs for State-owned bridges identified as scour critical will be developed by November 28, 2008; POAs for local-owned and other-owner bridges identified as scour critical will be developed by November 27, 2009).
  2. Each FHWA division office must review the proposed target date by their State, local and other-owner jurisdiction and notify the FHWA Office of Bridge Technology of any action taken such as concurring or nonconcurring with the target date.
     a) Bridge owners must consult with their corresponding FHWA division office in the event that a previously concurred target date must be changed. The FHWA division office must review any information provided in support of the change

and notify the FHWA Office of Bridge Technology of any further action(s) taken.

3. The development of a POA means that bridge owners have held meetings involving the appropriate personnel from internal units within their corresponding agency (design, construction, inspection and maintenance, districts and others as applicable) and with external entities (local authorities such as a commissioner, police department, fire department and others as needed) to identify and document:
   a) General information about the bridge, responsibility for POA, scour vulnerability, recommended countermeasure(s) or alternatives, NBI coding information, countermeasure selection(s) including priority ranking and cost, bridge closure plan, detour route and any other supportive information.
4. Guidance for developing POAs for scour critical bridges is presented in the FHWA's POA training seminar, which was distributed on a CD-ROM to our field offices by memorandum dated May 22, 2007, (see copy of this memorandum at http://www.fhwa.dot.gov/engineering/hydraulics/bridgehyd/20070522.cfm). Copies of this CD-ROM can be obtained from NHI at the following Web site: http://www.nhi.fhwa.dot.gov/training/NHIStoreSearchResults.aspx?get=&COURSE_NO=135085&KEYWORD=&TITLE=. In addition, the POA training seminar is available online at no cost at http://fhwa.acrobat.com/n135085seminar.

- Schedule for completing the implementation of all POAs for bridges identified as scour critical.

1. This must be a firm target date for completing the implementation of all POAs.
   a) A target date of April 29, 2009, is recommended for bridges under your State jurisdiction, and April 29, 2010, for bridges under local and other-owner jurisdictions (e.g., POAs developed for State-owned bridges identified as scour critical will be implemented by April 29, 2009; POAs developed for local-owned and other-owner bridges identified as scour critical will be implemented by April 29, 2010).
2. Each FHWA division office must review the proposed target date by State, local and other-owner jurisdiction and notify the FHWA Office of Bridge Technology of any action taken such as concurring or nonconcurring with the date.
   a) Bridge owners must consult with their corresponding FHWA division office in the event that a previously concurred target date must be changed. The FHWA division office must review any information provided in support of the change and notify the FHWA Office of Bridge Technology of any further action(s) taken.
3. The implementation of a POA means that bridge owners have completed disseminating POAs to the appropriate personnel within their internal offices/units and external entities and have met with these offices/units and with external entities to communicate:
   a) General information and instructions contained in each POA (e.g., individuals responsible for the POA implementation, detour routes, when to close/open a bridge, countermeasure selection, and design and installation schedules).
      1. Bridge owners should make sure that responsible parties identified in the POA understand their roles and responsibilities and that they are provided with periodic training on the implementation of selected components of a POA such as bridge closure/opening procedures.

b) Frequency to conduct periodic reviews and updates of the information presented in a POA.

- Percent of scour critical bridges with POAs developed by State, local and other-owner jurisdiction.

1. Please report the percent of scour critical bridges that have been developed for Item 113 code 0-2, and for Item 113 code 3.
2. Please continue to report progress after your February 29, 2008, report on a biannual basis (April and November) to the FHWA Office of Bridge Technology until POAs have been developed for each scour critical bridges.
3. We encourage bridge owners to prioritize the development of POAs for bridges coded 1 or 2 for Item 113 that are critical to the transportation system of a locality or region such as Interstate bridges and other NHS bridges on arterial and primary routes.

- Percent of scour critical bridges with POAs implemented by State, local and other-owner jurisdiction.

1. Please report the percent of scour critical bridges that have been implemented for Item 113 code 0-2, and for Item 113 code 3.
2. Please continue to report progress after your February 29, 2008, report on a biannual basis (April and November) until POAs have been implemented for each scour critical bridge.
3. We encourage bridge owners to prioritize the implementation of POAs for bridges coded 1 or 2 for Item 113 that are critical for the transportation system of a locality or region such as Interstate bridges and other NHS bridges on arterial and primary routes.

Attachment C: Action Items for Scour Evaluations of Bridges over Waterways and POAs for Scour Critical Bridges								
					Percent of Scour Critical Bridges with POAs Developed		Percent of Scour Critical Bridges with POAs Implemented	
Agency	**System**	**Schedule for Completing all Bridge Scour Evaluations**	**Schedule for Completing the Development of All POAs**	**Schedule for Completing the Implementation of All POAs**	**Codes 0-2**	**Code 3**	**Codes 0-2**	**Code 3**
State DOT	NHS							
	Non-NHS							
Local	NHS							
	Non-NHS							
Other Owner	NHS							
	Non-NHS							
Reporting State:	**Name and Title of Individual Updating Action Items:**			**Telephone Number:**			**Report Date:**	

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: ACTION: Technical Guidance for Bridges over Waterways with Unknown Foundations
/s/ Original Signed by
From: King W. Gee
Associate Administrator for Infrastructure

Date: January 9, 2008

In Reply Refer To: HIBT-20

To: Associate Administrator for RD&T
Associate Administrator for
Federal Lands Highway Program
Directors of Field Services
Resource Center Director
Division Administrators

The purpose of this memorandum is to provide technical guidance on a process that should be considered by Federal, State and local agencies (referenced herein as bridge owners) to identify foundation characteristics such as width, depth and length for bridge foundations identified as unknown. The goal of this process is to reduce or eliminate the population of bridges over waterways identified as having unknown foundations, which in turn would allow bridge owners to evaluate these bridges for their scour vulnerability.

Background:

The term "unknown foundations" has been traditionally associated with examining the population of existing bridges over waterways (riverine and tidal) where foundation details are unknown and therefore, foundations could not be evaluated against the hydraulic hazards related to scour. Most of the bridges having unknown foundations were identified by owners while screening their bridges over waterways (riverine and tidal) for their scour vulnerability. These bridges received a Code U for Item 113 of the FHWA's Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Coding Guide).

The FHWA exempted this population of bridges from being evaluated for their scour vulnerability due to the lack of a process and guidance that would have allowed bridge owners to determine their foundation characteristics and therefore, evaluate these bridges. This exemption did not apply to bridges on Interstate designated routes for which FHWA recommended bridge owners to consider technology available to determine their foundation characteristics and evaluate their scour vulnerability. The use of geophysics technology such as non-destructive testing (NDT) has been available for quite some time; however, cost and reliability of results may be the leading reason for their limited use for determining foundation characteristics.

The National Bridge Inspection Standards (NBIS) regulation, 23 CFR 650.313.e.3, requires that bridge owners develop a plan of action (POA) for bridges identified as scour critical bridges. We are concerned that some bridges within the unknown foundation population may be scour critical and as such need to have a POA as required by the NBIS regulation.

An additional growing concern, primarily related to our aging bridge population and increasing load and performance demand on all bridges, is our limited "body of knowledge" to assess the structural and geotechnical load capacity and deterioration mechanisms of foundation elements in both the short and long-term. When examining the "body of knowledge" from a broader view point, a more global definition of unknown foundations appears to be appropriate as we have to consider the potential of having another population of unknown foundations on land bridges currently reported in the Coding Guide. In general, the topic of unknown foundations presents a broad based challenge to bridge owners, which warrants FHWA's attention.

Status of Bridges with Unknown Foundations:

As of September 2007, the National Bridge Inventory (NBI) data showed that bridge owners reported 67,240 bridges over waterways as having unknown foundations. Table 1 presents the number of bridges over waterways on the National Highway System (NHS) and the non-NHS with unknown foundations by Federal, State and local agencies. It is important to highlight that the NHS population of unknown foundation bridges presented in Table 1 includes 144 bridges with Interstate designation. The number of bridges over waterways having unknown foundations is presented by bridge owner in Attachment A.

Table 1 – Number of Bridges over Waterways Coded U (Unknown Foundations) for Item 113 of the NBI

Agency	NHS	Non-NHS	Total
Federal	0	238	238
State	1,155*	12,864	14,019
Local	324	52,577	52,901
Other Bridge Owners	2	80	82
Total	1,481	65,759	67,240

* Includes 144 bridges with Interstate designation

Guidance on Process for Reducing the Number of Bridges with Unknown Foundations:

The following steps outline a process developed by the FHWA Office of Bridge Technology's Hydraulics and Geotechnical Team that bridge owners may consider to reduce or eliminate the population of bridges over waterways identify as having unknown foundations:

1. Screen all bridges coded U to ensure that they are correctly coded as having unknown foundations. In addition, bridges with unknown foundations that may have been coded 6 for

Item 113 should be recoded as U and undergo a screening as well. Bridge owners that assigned a Code 6 to Interstate bridges with unknown foundations based on the current definition of Code U should keep these bridges with a Code 6 and follow the guidance presented in this process. Direct and specific communication between bridge inspection and bridge design and construction units should expedite and improve the results of this activity.

- Most bridge owners may have some form of historical technical inventory of project plans, standard sheets, construction specifications, and design guidance. A concerted effort to "mine" this historical data by cross referencing coded U bridges construction dates should yield valuable preliminary information regarding foundation practices in that period. This information could also be coupled with knowledge on bridges with known foundations constructed in the same time period. Similar to current foundation practices, historical practices were very repetitive and rather simple in concept.

2. For bridges over waterways that are determined to be correctly identified as having unknown foundations:

- Prioritize these bridges based on their functional classification. We recommend that this prioritization be as follows: Principal Arterial – Interstate; Principal Arterial – Other Freeways or Expressways; Other Principal Arterial; Minor Arterial, Major Collector; Minor Collector.

- Consider using the following criteria for determining, with a reasonable accuracy, foundation characteristics:
  a) Collect and document historical knowledge of foundation design and construction practices for the period of original construction.
  b) Consider geologic, subsurface conditions, bridge standards, and information that may be available from nearby bridges.
  c) Consider applying "proven" surface and subsurface NDT tools to confirm foundation type and determine foundation length.
     1. NCHRP 21-05(2) "Determination of Unknown Subsurface Bridge Foundations" specifically examined NDT tools for the application. The unedited final report and accompanying guideline document can be obtained for loan by contacting NCHRP at NCHRP@nas.edu. More information on this project is available at http://www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=667.
        a) Pertinent results of this study are summarized in FHWA's Geotechnical Notebook Issuance No. 16 (GT-16) of the same title, which is available at http://www.fhwa.dot.gov/engineering/geotech/policymemo/gt-16.pdf.
        b) Since the completion of project NCHRP 21-05(2) further advancements in computer software and hardware have greatly advanced to provide improved result reliability. The current state of knowledge is such that the combined suite of surface and subsurface NDT tools has limitations based on foundation access (surface or down-hole) foundation material type and dimension and the best results require the user to consider each situation for undertaking a testing program.

- Conduct a scour evaluation based on this determination and consider recoding the bridge for Item 113 according to the outcome of the evaluation.

a) A risk-based prioritized schedule for conducting the scour evaluations of these bridges may be considered.
   1. Factors other than functional classification, such as the amount and reliability of the determined information should be considered in a risk-based prioritization schedule in order to target the scour evaluation of the bridges most in need of attention.
   2. It is likely that only partial foundation information may be determined on some bridges and that some information may be qualitative rather than quantitative resulting in some uncertainty in the scour evaluations for that population.
   3. Several projects funded by the NCHRP have addressed the topic of unknown foundations and produced valuable though limited information and guidance. The concept of a risk based approach was addressed in the NCHRP project 24-25, Risk-based Management Guidelines for Scour at Bridges with Unknown Foundations (Web-only document 107). This project advanced a template for a risk-based approach and computer software. While this project might not meet the needs of all bridge owners, it provides a protocol of how a risk-based approach could be structured to manage bridges with unknown foundations. We encourage bridge owners to consider this product as a beginning draft to develop their own risk based approach. The Web-only document 107 could be downloaded at: http://www.trb.org/news/blurb_detail.asp?id=8000.

3. For bridges that were previously coded as U for Item 113 of the NBI and whose foundations are completely and accurately identified after completing the screening:

- Conduct scour evaluations following the guidance presented in the FHWA publication Hydraulic Engineering Circular No. 18, Evaluating Scour at Highway Bridges, Fourth Edition dated May 2001.
  a) Prioritize the scour evaluation of these bridges based on the functional classification previously recommended.

- Code Item 113 according to the outcome of the evaluation.

We request that your appropriate staff disseminate and discuss this technical guidance with their appropriate Federal and State department of transportation management official. We plan to monitor the progress made by bridge owners towards reducing their number of bridges with unknown foundations by reviewing the NBI data every year in April. November 2010 is the target date for eliminating the number of bridges with unknown foundations from the NBI. We are contemplating amending the NBIS regulations so that any remaining bridge reported as having unknown foundations after November 2010 would be kept with a Code U for Item 113, considered scour critical and subject to the plan of action requirement of the NBIS regulation, 23 CFR 650.313(e)(3), until properly designed countermeasures are installed to protect the bridge foundations or until the bridge is replaced.

If you have any questions please do not hesitate to contact Mr. Jorge E. Pagán-Ortiz, Principal Bridge Engineer – Hydraulics at (202) 366-4604 (jorge.pagan@dot.gov), or Jerry DiMaggio, Principal Bridge Engineer – Geotechnical at (202) 366-1569 (jerome.dimaggio@dot.gov).

Attachment

Number of Bridges per County with Unknown Foundation Types.

data as of: 2/14/2009

3	CO_NAME	113a	# of Bridges in County with a "U"
01	Adams	U	1
02	Allen	U	11
04	Benton	U	6
05	Blackford	U	3
08	Carroll	U	10
10	Clark	U	83
11	Clay	U	1
13	Crawford	U	43
18	Delaware	U	28
20	Elkhart	U	2
21	Fayette	U	11
22	Floyd	U	36
23	Fountain	U	78
24	Franklin	U	9
25	Fulton	U	2
32	Hendricks	U	30
34	Howard	U	40
35	Huntington	U	25
37	Jasper	U	16
41	Johnson	U	2
44	LaGrange	U	7
45	Lake	U	11
46	LaPorte	U	42
47	Lawrence	U	22
48	Madison	U	51
49	Marion	U	192
50	Marshall	U	4
51	Martin	U	1
53	Monroe	U	17
54	Montgomery	U	18
56	Newton	U	1
57	Noble	U	42
58	Ohio	U	4
60	Owen	U	62
61	Parke	U	36
64	Porter	U	15
67	Putnam	U	4
70	Rush	U	58
71	St. Joseph	U	9
75	Starke	U	6
76	Steuben	U	4
78	Switzerland	U	14
82	Vanderburgh	U	8
85	Wabash	U	29
89	Wayne	U	25
90	Wells	U	1

16% scour critical

Number of Bridges per County with Unknown Foundation Types.

data as of: 2/14/2009

			1120

SCOUR CRITICAL BRIDGE - PLAN OF ACTION

1. GENERAL INFORMATION

Structure number: _____	**City, County, State:** _____	**Waterway:** _____
Structure name: _____	**State highway or facility carried:** _____	**Owner:** _____

Year built: ____	**Year rebuilt:** ____	**Bridge replacement plans (if scheduled):** _____ **Anticipated opening date:** _____

Structure type: ☐ Bridge ☐ Culvert
Structure size and description: _____

Foundations: ☐ Known, type: _____ Depth: _____ ☐ Unknown

Subsurface soil information (*check all that apply*): ☐ Non-cohesive ☐ Cohesive ☐ Rock

Bridge ADT: _____	**Year/ADT:** _____	**% Trucks:** _____

Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? ____
If so, describe: _____

2. RESPONSIBILITY FOR POA

Author(s) of POA (name, title, agency/organization, telephone, pager, email):

_____

Date: _____

Concurrences on POA (name, title, agency/organization, telephone, pager, email):

_____

_____

POA updated by (name, title, agency, organization): _____ **Date of update:** ___
Items update: _____

_____

POA to be updated every _____ **months by (name, title, agency/organization):**_____

Date of next update:_____

3. SCOUR VULNERABILITY

a. Current Item 113 Code: ☐ 3 ☐ 2 ☐ 1 Other: _____

b. Source of Scour Critical Code: ☐ Observed ☐ Assessment ☐ Calculated Other: _____

c. Scour Evaluation Summary: _____

d. Scour History: _____

4. RECOMMENDED ACTION(S) (see Sections 6 and 7)

	Recommended		Implemented	
a. Increased Inspection Frequency	☐ Yes	☐ No	☐ Yes	☐ No
b. Fixed Monitoring Device(s)	☐ Yes	☐ No	☐ Yes	☐ No
c. Flood Monitoring Program	☐ Yes	☐ No	☐ Yes	☐ No
d. Hydraulic/Structural Countermeasures	☐ Yes	☐ No	☐ Yes	☐ No

5. NBI CODING INFORMATION

	Current	Previous
Inspection date		
Item 113 Scour Critical		
Item 60 Substructure		
Item 61 Channel & Channel Protection		
Item 71 Waterway Adequacy		
Comments: (drift, scour holes, etc. - depict in sketches in Section 10)		

6. MONITORING PROGRAM

☐ **Regular Inspection Program** ☐w/surveyed cross sections
Items to Watch: _____

☐ **Increased Inspection Frequency of __ mo.** ☐w/surveyed cross sections
Items to Watch: _____

☐ **Underwater Inspection Required**
Items to Watch: _____

☐ **Increased Underwater Inspection Frequency of __ mo.**
Items to Watch: _____

☐ **Fixed Monitoring Device(s)**
Type of Instrument: _____
Installation location(s): _____
Sample Interval: ☐ 30 min. ☐ 1 hr. ☐ 6 hrs. ☐ 12 hrs. ☐ Other: _____
Frequency of data download and review: ☐ Daily ☐ Weekly ☐ Monthly ☐ Other _____
Scour alert elevation(s) for each pier/abutment: _____
Scour critical elevations(s) for each pier/abutment:_____
Survey ties: _____
Criteria of termination for fixed monitoring: _____

☐ **Flood Monitoring Program**

Type: ☐ Visual inspection
☐ Instrument (*check all that apply*):
☐ Portable ☐ Geophysical ☐ Sonar ☐ Other: _____

Flood monitoring required: ☐ Yes ☐ No

Flood monitoring event defined by (*check all that apply*):
☐ Discharge _____ ☐ Stage _____
☐ Elev. measured from _____ ☐ Rainfall _____ (in/mm) per _____ (hour)
☐ Flood forecasting information: _____
☐ Flood warning system: _____

Frequency of flood monitoring: ☐1 hr. ☐3 hrs. ☐6 hrs. ☐ Other: _____

Post-flood monitoring required: ☐ No ☐Yes, within _____ days

Frequency of post-flood monitoring: ☐Daily ☐Weekly ☐Monthly ☐Other: _____

Criteria for termination of flood monitoring: _____

Criteria for termination of post-flood monitoring: _____

Scour alert elevation(s) for each pier/abutment: _____

Scour critical elevation(s) for each pier/abutment: _____

Note: Additional details for action(s) required may be included in Section 8.

Action(s) required if scour alert elevation detected (*include notification and closure procedures*): _____

Action(s) required if scour critical elevation detected (*include notification and closure procedures*): _____

Agency and department responsible for monitoring: _____

Contact person (*include name, title, telephone, pager, e-mail*): _____

7. COUNTERMEASURE RECOMMENDATIONS

Prioritize alternatives below. Include information on any hydraulic, structural or monitoring countermeasures.

☐ **Only monitoring required (see Section 6 and Section 10 – Attachment F)**
Estimated cost $_____

☐ **Structural/hydraulic countermeasures considered (see Section 10, Attachment F):**

Priority Ranking	**Estimated cost**
(1) _____	$ _____
(2) _____	$ _____
(3) _____	$ _____
(4) _____	$ _____
(5) _____	$ _____

Basis for the selection of the preferred scour countermeasure: _____

Countermeasure implementation project type:
☐ Proposed Construction Project ☐ Maintenance Project
☐ Programmed Construction - Project Lead Agency:
☐ Bridge Bureau ☐ Road Design ☐ Other _____

Agency and department responsible for countermeasure program (if different from Section 6 contact for monitoring): _____

Contact person (*include name, title, telephone, pager, e-mail*): _____

Target design completion date: _____

Target construction completion date: _____

Countermeasures already completed: _____

8. BRIDGE CLOSURE PLAN

Scour monitoring criteria for consideration of bridge closure:

- ☐ Water surface elevation reaches _____ at _____
- ☐ Overtopping road or structure
- ☐ Scour measurement results / Monitoring device (See Section 6)
- ☐ Observed structure movement / Settlement
- ☐ Discharge: _____ cfs/cms
- ☐ Flood forecast: _____
- ☐ Other: ☐ Debris accumulation ☐ Movement of riprap/other armor protection
  ☐ Loss of road embankment

Emergency repair plans (*include source(s), contact(s), cost, installation directions*): _____

Agency and department responsible for closure: _____

Contact persons (name, title, agency/organization, telephone, pager, email): _____

Criteria for re-opening the bridge: _____

Agency and person responsible for re-opening the bridge after inspection: _____

9. DETOUR ROUTE

Detour route description (route number, from/to, distance from bridge, etc.) - Include map in Section 10, Attachment E.

Bridges on Detour Route:

Bridge Number	Waterway	Sufficiency Rating/ Load Limitations	Item 113 Code

Traffic control equipment (detour signing and barriers) and location(s): _____

Additional considerations or critical issues (susceptibility to overtopping, limited waterway adequacy, lane restrictions, etc.) : _____

News release, other public notice (include authorized person(s), information to be provided and limitations): _____

10. ATTACHMENTS

Please indicate which materials are being submitted with this POA:

☐ **Attachment A: Boring logs and/or other subsurface information**

☐ **Attachment B: Cross sections from current and previous inspection reports**

☐ **Attachment C: Bridge elevation showing existing streambed, foundation depth(s) and observed and/or calculated scour depths**

☐ **Attachment D: Plan view showing location of scour holes, debris, etc.**

☐ **Attachment E: Map showing detour route(s)**

☐ **Attachment F: Supporting documentation, calculations, estimates and conceptual designs for scour countermeasures.**

☐ **Attachment G: Photos**

☐ **Attachment H: Other information: _____**

The following are fields required for data collection of County Bridges:

1. SI&A – Main Tab
    a. SI&A All – Sub Tab – All fields
    b. Ident. – Sub Tab – All fields
    c. Struct. Data – Sub Tab – All fields
    d. Age of Service – Sub Tab – All fields
    e. Geometric – Sub Tab – All fields
    f. Navigation – Sub Tab – All fields
    g. Classif. – Sub Tab – All fields
    h. Condition – Sub Tab – All fields
        i. Inspect Tech needs to do some work to this page, add "Wearing Surface", and "Comment for Wearing Surface"
    i. Rating – Sub Tab – All fields
        i. Item 41x needs added to the Rating Sub Tab, (41x = Posted For Other)
    j. Appraisal – Sub Tab – All fields
        i. A hyperlink to Primary Forms – Foundation was recommended
        ii. Items from Foundation Sub Tab required:
            1. 113A Scour Critical Br.
            2. 113B.02 Abutment #1 type and comment field
            3. 113B.03 Abutment #2 type and comment field
            4. 113B.06A Types of Int Piers and comment field
            5. 113B.06B Types of Int Piers and comment field
            6. 113B.06C Types of Int Piers and comment field
            7. 113B.06D Types of Int Piers and comment field
            8. 113B.06E Types of Int Piers and comment field
            9. 113B.06F Types of Int Piers and comment field
        iii. If item 113A (Scour Critical Br.) is anything but "N" (No) then Scour – Office Scrning, Foundation Data, & Monitoring Data is required
        iv. If item 113A (Scour Critical Br.) is "U", "1", "2", or "3" then P.o.A – Scour P.o.A. is required
    k. Prop. Improv – Sub Tab – All fields
        i. A hyperlink to Primary Forms – Est. Rem. Life was recommended
            1. All items from Est. Rem. Life Sub Tab are required
    l. Inspection – Sub Tab – All fields
        i. If Item 92A.01 (Requires Fracture Critical Inspection?) is "Y" (Yes) then FC/UW/Spec. – 92A Data, 92A Master List, & 92A Req.
        ii. If Item 92B.01 (Requires Under Water Inspection?) is "Y" (Yes) then FC/UW/Spec. – 92B NBI Data & 92B Master List
        iii. If Item 92C.01 (Requires Special Inspection?) is "Y" (Yes) then FC/UW/Spec. – 92C Special Data, 92C Req., & 92C Master List
    m. Under Rec – Sub Tab – All fields
2. Aux. Forms – Main Tab
    a. Actions Taken (506) – See below for detail
        i. Item 506.08 (Presumed to be Critical Deficiency check box) is required if in fact a Critical Deficiency is noted during the time of the inspection
        ii. Item 506.08 comment Field is required if 506.08 check box is scored