FHWA Unknown Foundations Program: Policy, Guidance and Direction

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Unknown Foundations Program

Objectives:

- Develop a plan for direction
- Provide expert advice
- Assist with process/technology development and implementation

http://www.fhwa.dot.gov/unknownfoundations/
Focus Areas

Categorization and Prioritization
- Risk Determination References

Determination of Foundation
- Positive Discovery
- Inference

Determination of Scour Potential Without Determining Foundation
- Scour Assessment Processes
- Single Span Bridges

Plans of Action for Unknown Foundation Bridges
- Guidance for Developing and Implementing Plans of Action for Bridges with Unknown Foundations

References

Memos
- Additional Guidance for Assessment of Bridges Over Waterways with Unknown Foundations
- Frequently Asked Questions - Bridges Over Waterways with Unknown Foundations

Research
- NCHRP 21-05 Unknown Subsurface Bridge Foundation Testing

Publications
- GT-16 - "Determination of Unknown Subsurface Bridge Foundations." NCHRP 21-5 Interim Report Summary (pdf, 0.7 mb)
- Geophysical Methods

Workshops and Training
- 2005 Unknown Foundation Summit
  - Presentation Summaries
- Plan of Action Training
- Plan of Action Template

About Unknown Foundations

Events
- Unknown Foundations Webinar 2: Categorization, Thresholds, and Prioritization, November 13, 2009 - 10:00 am - 11:30 am

Sponsors
- Bridge Technology
- Division Offices
- National Highway Institute
- Turner Fairbank Highway Research Center

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Related Sites
- Geotech
- Hydraulics
- Transportation and Highway Related Web Sites
- State Transportation Web Sites

PDF files can be viewed with the Acrobat Reader.
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Unknown Foundations Program

FHWA team is made up of Structural, Geotechnical, and Hydraulics engineers representing:

- Office of Bridge Technology
- Office of Research, Development and Technology
- Resource Center
- Division Offices
Bridges with an Unknown Foundations

Described in Item 113 of the Coding Guide

References a bridge over waterway with foundations having insufficient details such that it can not be evaluated for vulnerability to scour

Not intended to address the vulnerability of bridge foundations to hazards not related to scour
Unknown Foundations - Background

January 2008 memorandum set requirement for *elimination* of all bridges coded “U” from the NBI

Significant confusion regarding language and intent of that memorandum

Provided clarification of intent of language and target date set forth by FHWA in June 2009 memorandum

Provided further guidance on risk-based assessments of bridges with unknown foundations in October 2009 memorandum
1/9/2008 Memorandum Key Points

Establishes November 2010 target date for elimination of bridges with unknown foundations

Suggested a process for reducing and eliminating the population

State examples of implementing an evaluation process
Presented answers to some frequently asked questions by bridge owners and division offices regarding bridges with unknown foundations.

Clarified the intent of Item 113 in the coding guide with respect to the code U.

Clarified the requirements for bridge owners to meet the November 2010 target date for addressing bridges coded U.
Presents guidance on conducting risk-based assessments for bridges with unknown foundations

The example guidance presented by FHWA is just one of many successful approaches

Several bridge owners are using other acceptable methods

FHWA guidance is not meant to supersede ongoing efforts deemed successful
Approach for Addressing Inventory

1. Develop and implement risk-based assessment procedures to determine the necessary characteristics of bridge foundations

2. Move bridges into the scour program *if* risk-based assessment is successful

3. Recode bridges accordingly after evaluation for scour vulnerability
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Goal of the program and the procedures presented is to **reduce, not eliminate** the inventory of bridges coded U in Item 113.

There will be an inventory of bridges that remain coded U in Item 113 if sufficient information can not be obtained to advise recoding.
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FHWA guidance is intended to offer a rational approach for:

a) determining enough about bridge foundations to conduct a scour evaluation, or

b) appropriately address bridges that will remain coded U
FHWA Example Procedure

Example risk-based procedure is intended to provide one method for conducting a risk-based assessment.

Purpose is to determine necessary foundation characteristics for conducting a scour evaluation.

Based on a process successfully in use for addressing bridges with unknown foundations.

Several other approaches have been implemented.
Why risk-based approach?

- Limited Resources
- Competing Demands
- Safety of Traveling Public
- Minimize negative impacts
- Rational method
Provides a method for categorizing and prioritizing bridges

Outlines minimum standards for defining risk for categories of bridges

Provides a process for selecting appropriate assessment tools that address the consequence of loss of service and ensure a reasonable level of safety
Example Risk-Based Assessment for Bridges with Unknown Foundations

**STEP 1**
Perform initial screening and assessment to group and categorize bridges for action based on risk of failure and impact to user.

**STEP 2**
Define thresholds for potential risk categories (e.g. A - High, B - Moderate, C - Low).

Define tolerable criteria for each category (e.g. For A – Positive discovery, B – Inference, C – Risk acceptable for categorical POA or remedial countermeasure).

**STEP 3**
Category A

**STEP 4**
Category B

**STEP 5**
Category C
Categorization

- Systematic way to sort, group and treat bridges with unknown foundations meeting some defined criteria

- Criteria
  - Significant distinction
  - Represents some tolerable limits
  - Threshold defined and accepted by owner
Example Categories

- Insignificant threat of scour
- Simple Span Bridges
- High Risk
- Moderate Risk
- Low Risk
- Other (e.g. Bridge Replacements, 1981-1996, by Bridge Maintenance in coastal plain...)
Additional Highlights

Methods available on the unknown foundations website for:

1) Positively discovering bridge foundations
2) Inferring foundation characteristics of bridges
3) Conducting assessments based on historical observation and performance, and stream characteristics
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For bridges that will remain coded U, FHWA recommends that a POA be developed and implemented until:

a) properly designed countermeasures can be installed to protect the bridge foundations

b) the bridge can be replaced
Plans of Action – Unknown Foundations

As noted previously, there will be an inventory of bridges coded U for which a scour evaluation cannot be completed.

For these bridges, a POA should be developed and implemented. This is currently recommended in the Bridge Coding Guide.
FHWA is suggesting two options for development of a POA for bridges remaining coded U in Item 113:

a) change to a scour critical code, and develop and implement a POA in accordance with scour critical bridges

b) develop a POA based on risk assessment and owner defined criteria that considers known information about the bridge
The FHWA Unknown Foundations Team

Policy
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Thank You!

For more information, please visit

http://www.fhwa.dot.gov/unknownfoundations/