Companion Guide to Video

May 2015

U.S.Department of Transportation
Federal Highway Administration

Check out the video

Federal-aid Program Overview
FHWA Bridge Scour Program
Developing a Risk-Based Scour Program

www.fhwa.dot.gov/federal-aidessentials

Implementing an action plan for scour-critical structures

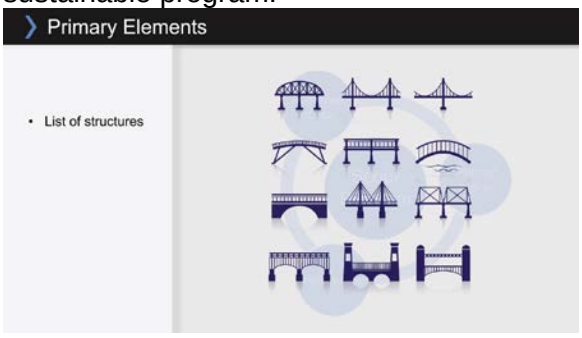
Federal-aid Essentials for Local Public Agencies
Federal-aid Simplified.

Did you know that scour, the erosion around a bridge's foundation caused by flooding, is the single greatest cause of bridge failures? In fact, following several dramatic bridge failures, the U.S. Congress required the Federal Highway Administration, or FHWA, to apply an improved approach to the agency's scour program to responsibly manage the risk of scour-related challenges with our Nation's highway bridges. This approach is based on gathering accurate data and then using that data to assess the risk to the public.

Every bridge or culvert in an agency's inventory with a span of 20 feet or greater must be appraised for risk of scour. Structures determined to be vulnerable to scour need a plan of action for mitigating the risk and associated resources for carrying out the plan.

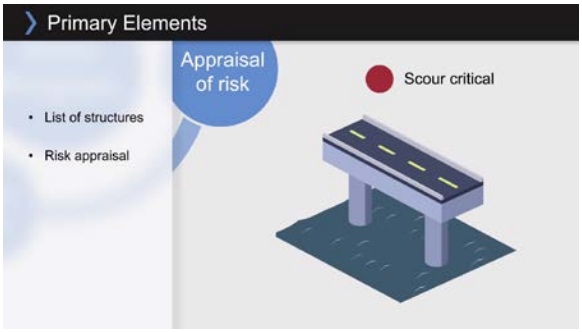
Is your agency tasked with managing a scour program for structures in its inventory? If so, how will your agency develop plans of action that are appropriate for level of risk and achievable within its budgetary constraints?

Let's begin by exploring the primary elements of a risk-based scour program. Then we'll illustrate how a local public agency, or LPA, might develop a sustainable program.

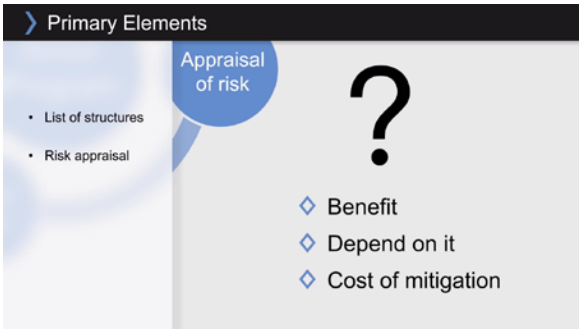


To develop a risk-based scour program, a multi-disciplinary team, consisting of engineers, engineering managers, and even public safety professionals, starts with a list

of structures that are both publically owned and 20-feet long or greater.

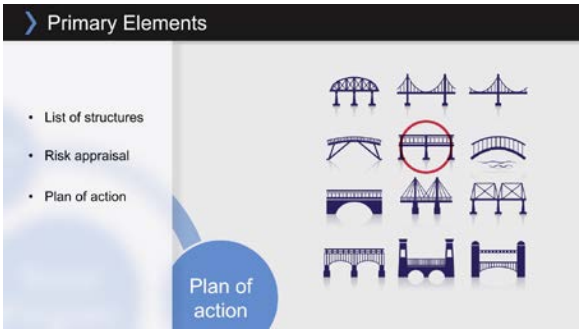


For each structure on the list, the team develops a risk appraisal. Using bridge inspection data or engineering assessment, the scour potential of a bridge is determined. For example, a bridge that doesn't cross a waterway would be identified as having no potential for scour, whereas a bridge subject to failure during the appraised flood event would be identified as scour critical.



Risk appraisal considers the consequence of failure by asking such questions as:

- What is the benefit of the bridge to the community?
- Do commuters, emergency services, and commerce depend on it every day?
- What is the cost of mitigating the risk of scour?

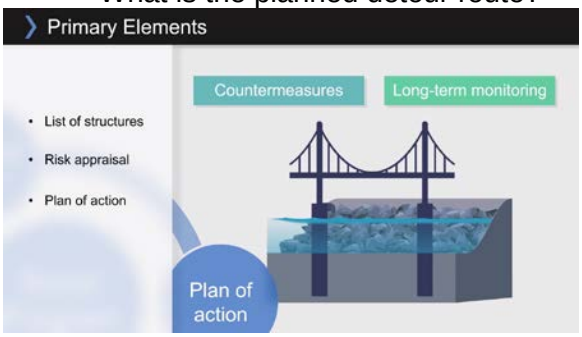


For each structure identified in the risk appraisal as scour critical, the agency team develops a plan of action, which specifies the management and public safety strategy.

For some structures, the plan of action will specify long-term monitoring.

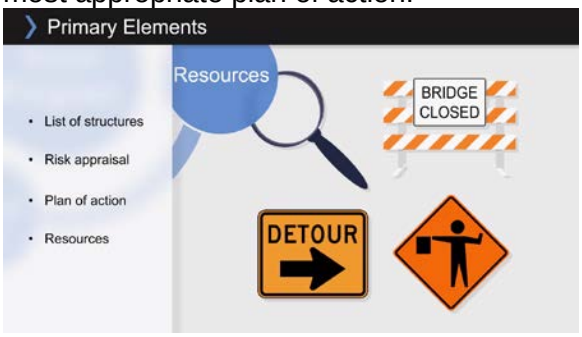
For example:

- When will the structure be monitored?
- What is the indication of failure?
- Under what conditions will it be closed and reopened?
- What is the planned detour route?



For other structures, however, the plan of action will specify countermeasures to mitigate scour. For example, an agency might plan a structure retrofit with deeper

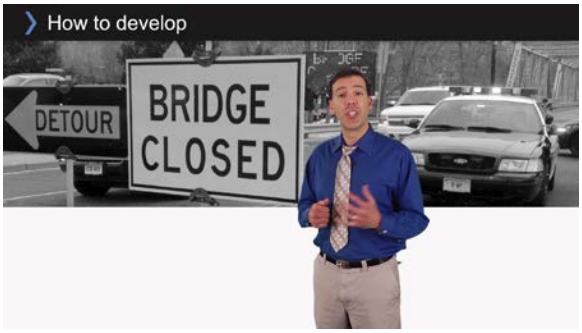
pile foundations or its banks reinforced with rip-rap. Typically, agencies use cost-benefit analyses to determine if long-term monitoring or countermeasures are the most appropriate plan of action.



Monitoring floods, closing and opening bridges, detouring traffic, and installing countermeasures require a commitment of agency resources. For this reason, the scour program identifies the resources so that agency management can consider the cost of the scour plan of action as it balances priorities.

Let's see how a LPA develops its risk assessment and scour plan of action for one scour-critical bridge.

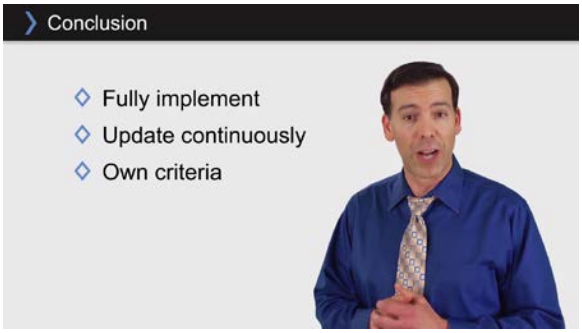
A county bridge inspector reports that the footing of a bridge has been undermined, making the bridge scour-critical. The scour program management team, including the public works director, the head of streets and maintenance, the fire chief, and the sheriff, discuss the importance of the bridge. The safety and service of the bridge are vital because it carries several school buses and provides the only access to a subdivision for emergency services.



Until the scour problem can be addressed, the team agrees that the county bridge inspectors will monitor the bridge during floods and provide direction to the sheriff when the bridge needs to be closed and allowed to be reopened to traffic.

When the team meets again, it learns that in order to keep the bridge in service, the county will install rip-rap. The $70,000 cost of the rip-rap and the short-term monitoring of the bridge are budgeted. Once the rip-rap is installed, the public works director will remove the bridge from the list of scour-critical bridges and revise the cost of scour program monitoring.

Scour is the single most common cause of bridge failure. Your agency's best defense against scour is a thoughtfully managed program. However, to be effective the program must be fully implemented. As illustrated by our example, agencies need to update their scour programs when management priorities change, bridge conditions change, or as countermeasures are implemented.



While the FHWA encourages agencies to use a risk-based approach when developing a scour program, each agency develops its own criteria for establishing priorities. When developing or updating your scour program, contact your State department of transportation. It can provide its scour program policy, guidance on how to proceed with the process, and may even offer document templates.

Additional Resources

- FHWA library of technical guidance and policy memos for Bridge Scour issues
  http://www.fhwa.dot.gov/engineering/hydraulics/policymemos.cfm

- FHWA Hydraulic Program office website with links to technical information on scour
  http://www.fhwa.dot.gov/engineering/hydraulics/scourtech/scour.cfm

- This online training provides guidance on developing a Plan of Action (POA) for scour critical bridges. Available through the NHI.
  http://www.nhi.fhwa.dot.gov/training/course_search.aspx?sf=0&course_no=135085

- This FHWA memorandum provides guidance on applying risk concepts and data utilization; collectively, these activities are referred to as the FHWA Scour Program
  http://www.fhwa.dot.gov/engineering/hydraulics/scourtech/scour.cfm

- HEC-18 presents the state of knowledge and practice for the design, evaluation and inspection of bridges for scour
  http://www.fhwa.dot.gov/engineering/hydraulics/scourtech/scour.cfm

- HEC-23 is a two-volume document set that identifies and provides design guidelines for bridge scour and stream instability countermeasures
  http://www.fhwa.dot.gov/engineering/hydraulics/scourtech/counter.cfm

The content of this document is not a substitute for information obtained from State departments of transportation, appropriate FHWA Division Offices, and applicable laws. Scenarios have been simplified for emphasis and do not necessarily reflect the actual range of requirements applicable to the scenario or this topic. This document was created under contract number DTFH61-14-P-00163 by the Federal Highway Administration, U.S. Department of Transportation, and is offered to the public to heighten and focus awareness of Federal-aid requirements within the local public agencies community and reinforces the importance of these necessary policies, procedures, and practices.

This Companion Resource is the script content for the video production of the same name.