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43.1 Overview

This chapter is one part of a larger structures asset management program.

Chapter 42 – Bridge Preservation: Establishes program-level goals, objectives, measures, and strategies for the preservation and maintenance of bridges in Wisconsin and serves as the policy foundation for this chapter. Work actions and strategies detailed in Chapter 42 are incorporated in both Chapter 41 and 43.

Chapter 41 – Structures Asset Management: Focuses on implementing the philosophy outlined in Chapter 42. More specifically, Chapter 41 details the process to deliver preservation, rehabilitation, and replacement projects through the improvement program.

Chapter 43 – Structures Asset Management; Maintenance Work: Similar to Chapter 41, as this chapter also focuses on implementing the philosophy outlined in Chapter 42. However, the chapter provides the policy, procedure, and workflow for those bridge preservation and bridge maintenance actions most often performed through the annual Highway Maintenance Work Plan (HMWP). These actions complement work performed through the improvement program.

Work identified in this chapter is critical to a fully-functioning bridge asset management program. A given bridge will not achieve its maximum potential lifespan without the type of work detailed in this chapter. This is illustrated in [Figure 43.1-1](#).

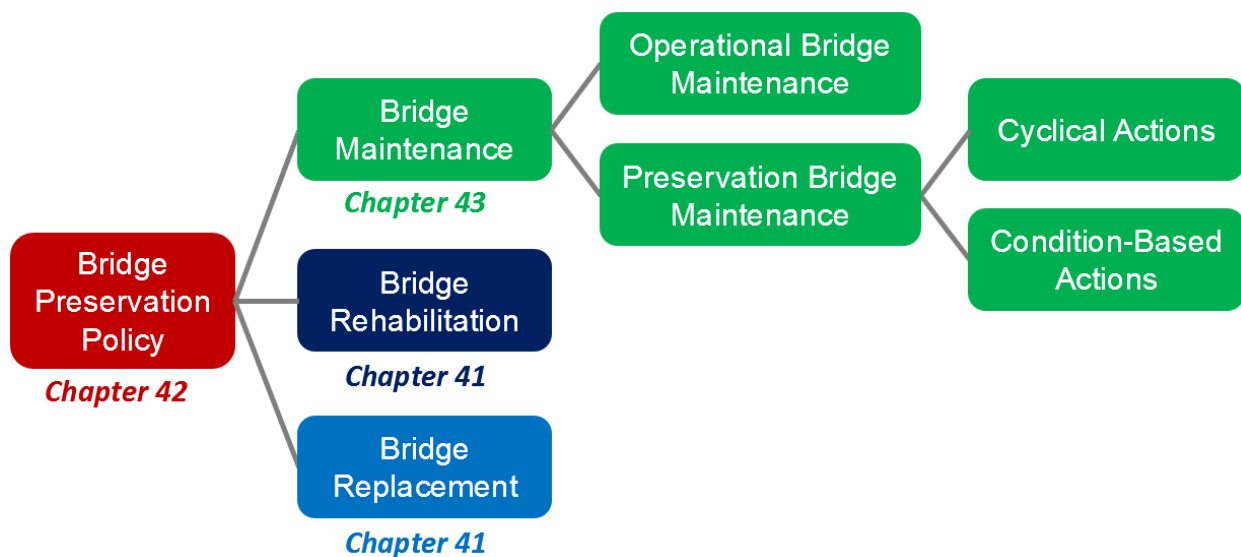


Figure 43.1-1
Bridge Asset Management Work Activities

43.1.1 Highway and Bridge Maintenance Work Plan

The Highway Maintenance Work Plan is coordinated by the Bureau of Highway Maintenance (BHM) and incorporates many different activities and subject areas. The Bridge Maintenance Work Plan is one piece of the overall Highway Maintenance Work Plan, as shown in [Figure 43.1-2](#). The Bureau of Structures is responsible for the technical direction associated with the Bridge Maintenance Work Plan.

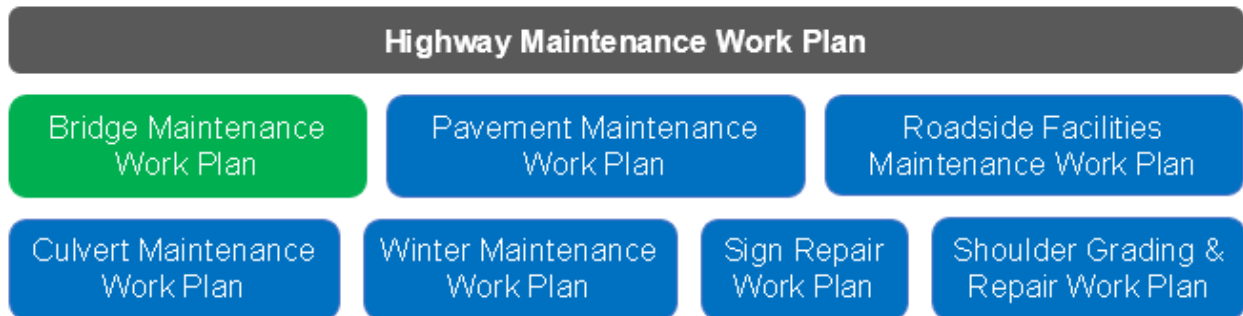


Figure 43.1-2
Components of the Highway Maintenance Work Plan

43.1.2 WisDOT Roles and Responsibilities for Bridge Maintenance

A well-defined bridge asset management program helps the Department to direct its available types of funding in the most optimal ways to achieve maximum bridge life. Bridge maintenance actions (including bridge preservation actions) are critical to maximizing the effectiveness of the Department’s bridge asset management program, and thus it is critical that roles and responsibilities in bridge maintenance are clearly defined and optimally applied.

Bureau of Structures

The Bureau of Structures (BOS) maintains and updates the comprehensive preservation policy for structures (Chapter 42 – Bridge Preservation). BOS develops and maintains the Highway Structures Information System (HSIS), a database of structures information, including condition information (inspection reports). BOS also develops and maintains the Wisconsin Structures Asset Management System (WiSAMS -see 41.2.1), a software tool used to forecast needed structures work. Together, these tools facilitate identification of structure work for both the improvement program and the highway maintenance work plan.

For bridge preservation, cyclical actions along with some limited condition-based actions are the work types that have traditionally fallen within the funding authority and workforce ability of the WisDOT highway maintenance work plan.

Bureau of Highway Maintenance

The Bureau of Highway Maintenance (BHM) is the lead for allocating available funding across program and asset types, including bridge maintenance work. After Region allocations are



determined, BHM is responsible for ensuring that each region is setting up a workplan that is in alignment with those allocations and Department priorities.

Regional Bridge Maintenance

Regional Bridge Maintenance engineers are the primary contact between WisDOT and the county service providers that perform the actions detailed in the Highway Maintenance Work Plan. Regional Bridge Maintenance works with BOS to develop and prioritize the work plan. Regional Bridge Maintenance engineers are also the primary contact for documentation of work performed by the county service providers.

Regional Programing

Regional Programing engineers work with BOS and Regional Bridge Maintenance engineers to pull bridge maintenance work into the let improvement program as appropriate.

Local Service Providers

Local service providers (primarily county work crews) are the labor force that performs the work detailed in the Highway Maintenance Work Plan. They are responsible for completing work and providing proper documentation to WisDOT after it is complete.



43.2 Bridge Maintenance Actions for Asset Management

Through strategic use of structure inventory data (stored in HSIS), well-documented preservation policies (see Chapter 42), and WisSAMS asset management algorithms, WisDOT has the ability to optimally align bridge work activities with the appropriate maintenance and improvement programs to coordinate appropriate treatment actions throughout the lifecycle of a structure.

43.2.1 Operational Bridge Maintenance Actions

Operational bridge maintenance actions are those actions necessary for the regular operation of a bridge. These actions are expected and are necessary to maintain a bridge in serviceable condition. Bridge preservation activities such as those described in Chapter 42 may lessen the amount or frequency of operational maintenance, but it will not be eliminated. Examples include:

- Cutting brush
- Patching/filling spalls
- Hot-rubbering end joints
- Joint gland replacements
- Channel debris removal
- Washout/erosion repair
- Retrofitting fatigue cracks

These actions are performed on an “as-needed” basis; some may require immediate or near-immediate action to maintain a safe and serviceable structure. That being the case, operational bridge maintenance items may take priority over all other maintenance in terms of timing and funding. These items are most often captured in the “maintenance items” recorded by the bridge inspector in the inspection report. These items are collected and stored in HSIS.

It should also be noted that time-critical repairs (deck patching, bridge hit response) are also considered operational bridge maintenance actions. Because of their nature, they are not identified in advance, but rather addressed immediately as the need arises.

Operational bridge maintenance actions are identified by the bridge inspector, except for time-critical repairs.

Operational bridge maintenance actions are most typically funded via Routine Maintenance Agreements (RMA).

43.2.2 Preservation Bridge Maintenance Actions

Preservation bridge maintenance actions are those aimed at extending the usable life of the given bridge. This work generally falls into two categories; cyclical and condition-based work actions.



43.2.2.1 Cyclical Work Actions

Cyclical maintenance occurs on a regular schedule and thus are a regular component of the annual Bridge Maintenance Work Plan. Cyclical work actions are performed as a preventative measure to attempt to slow deterioration and extend structure life. One example of a cyclical work action is deck washing; the intent is to remove chlorides (salts) from the deck, which accelerate deck deterioration. See Chapter 42 for more information.

Cyclical work actions are identified by BOS and verified/modified by Regional Bridge Maintenance.

Cyclical work actions are most typically funded via RMA.

43.2.2.2 Condition-Based Work Actions

Condition-based maintenance occurs irregularly based on the specific condition of an individual structure. The work action is only performed when a specific need is identified, and the work is performed to address the deficiency. One example of a condition-based work action is crack sealing.

Condition-based work actions are most commonly identified based on specific condition data (inspection reports). The work is typically identified by BOS and included in the unconstrained needs list (see 43.3.2). See Chapter 42 for more information.

Though not as common, condition-based work actions can be identified by the bridge inspector. In general, BOS and Region Bridge Maintenance engineers collaborate to determine the appropriate condition-based actions.

Condition-based work actions are funded by either Routine Maintenance Agreements (RMA), Discretionary Maintenance Agreements (DMA), and Performance-Based Maintenance (PBM); RMA is most typical.

43.2.3 Delivery Mechanisms for Bridge Maintenance Work

The general delivery mechanism for the overall structures program is shown in [Figure 43.2-1](#).

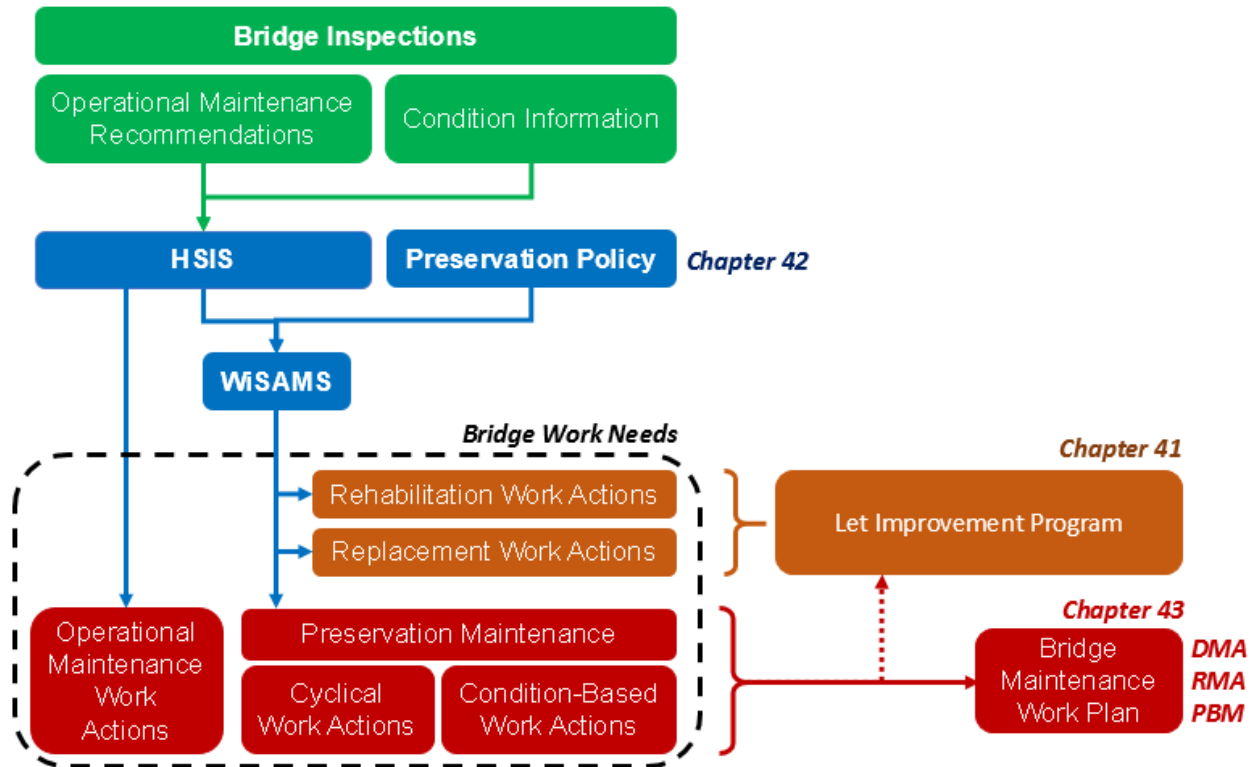


Figure 43.2-1
Overall Structures Program Delivery

Highway maintenance program funding and work force resources represent the bottom (red) portion of this diagram. The focus is on bridge maintenance, including both preservation and operational maintenance actions. Funding for bridge maintenance work comes from three primary sources; Routine Maintenance Agreements (RMA), Discretionary Maintenance Agreements (DMA), and Performance-Based Maintenance (PBM). This is illustrated in [Figure 43.2-2](#).

Federal and state rules prohibit use of federal funding on certain preservation and maintenance activities and use of state maintenance funding on certain activities. The direction for eligibility of federal funds is outlined in FDM 3-5 Exhibit 5.2 - *Agreement for the Use of Federal Funds for Preventive Maintenance of Structures*.

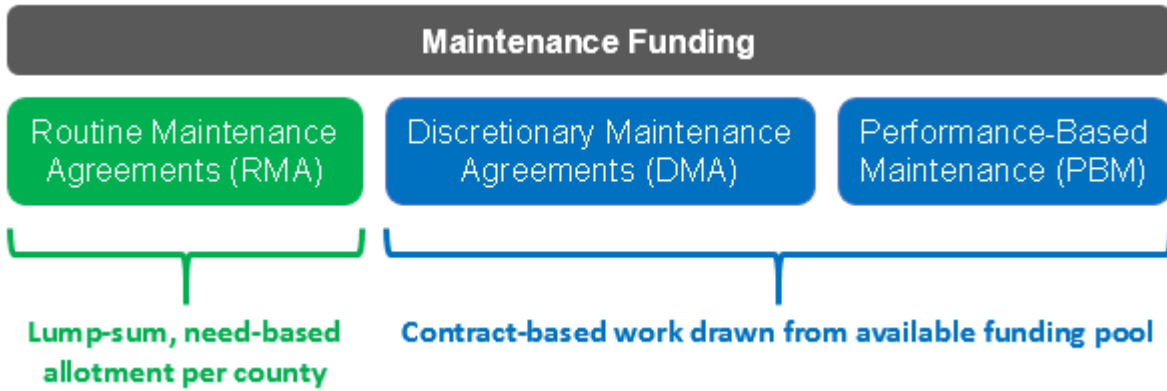


Figure 43.2-2
Maintenance Funding Mechanisms



43.3 Bridge Maintenance Work Plan Development

This section details how the Bridge Maintenance Work Plan is developed, including the parties involved and interim milestone deadlines. It's important to note that the process described here is based on the calendar year (CY), not fiscal year (FY).

43.3.1 Preliminary Funding Levels

BHM is responsible for managing funding for the overall Highway Maintenance Work Plan. This includes funding for the Bridge Maintenance Work Plan, but also includes pavement work, winter maintenance, etc. BHM assembles all proposed work for the Highway Maintenance Work Plan and works with Region Bridge Maintenance to determine the appropriate funding level for the Bridge Maintenance Work Plan. The timing of these budget discussions vary by region, but most often these occur in November and December.

43.3.2 Unconstrained Needs Identification

Using data in HSIS, WiSAMS, and maintenance items identified in inspection reports, BOS will generate a list of unconstrained maintenance needs; both operational and preservation maintenance work actions, without consideration of any fiscal constraints. This will be referred to as the Unconstrained Bridge Maintenance Needs List.

- Timeline: The Unconstrained Bridge Maintenance Needs list for the upcoming calendar year is distributed to Regional Bridge Maintenance no later than January 1.

The format of the Unconstrained Bridge Maintenance Needs List will remain intact through the entire annual cycle of the Bridge Maintenance Work Plan. This list will be used to track the changing status of the work identified and provide the data to update HSIS and produce annual maintenance program reports.

43.3.3 Draft Bridge Maintenance Work Plan

Regions use the Unconstrained Bridge Maintenance Needs List as the starting point to develop the Draft Bridge Maintenance Work Plan. Region Bridge Maintenance Engineers review the list and use on-site knowledge to edit the list in the following ways:

- Add any maintenance items that are missing
- Review/update the priority for each maintenance item
 - Priority definitions for maintenance items (High, Medium, and Low) are found in the Structure Inspection Field Manual
- Select a "Status" for each maintenance item
 - Approved – item is approved for work in the upcoming year
 - Rejected – item is not valid, the work does not need to be done
 - Deferred – item is valid, but cannot be completed in the upcoming year
 - Complete – item has already been completed
- Add a Status Comment/explanation for any Rejected or Deferred items
- For all Approved maintenance items



- Select a Funding Type (RMA, PBM, etc.)
- Add/update the Estimated Amount
- Scheduled Year should already be defaulted to the upcoming year

Region Bridge Maintenance engineers should work with Region Program engineers to determine which items should be included in the Improvement Program (these can be designated with a Funding Type of “LET”).

The Draft Bridge Maintenance Work Plan is subject to approval from BOS to ensure compliance with asset management philosophies. Prioritization and evaluation for funding are primarily the responsibility of Region personnel, with input from BOS as appropriate.

- Timeline: The Draft Bridge Maintenance Work Plan is completed by February 1 of the calendar year (CY) for the work plan.

43.3.4 Final Bridge Maintenance Work Plan

BOS will work with Region Bridge Maintenance Engineers to review and approve the Draft Bridge Maintenance Work Plan, thus creating the Final Bridge Maintenance Work Plan.

- Timeline: Development of the Final Bridge Maintenance Work Plan is completed no later than March 1 of CY for the work plan.

Figure 43.3-1 shows the Bridge Maintenance Work Plan development timeline.

<u>Deliverable</u>	<u>Responsible Party</u>	<u>Timeline</u>
Unconstrained Bridge Maintenance Needs List	• Bureau of Structures	January 1
Draft Bridge Maintenance Work Plan	• Region Maintenance • Region Planning	February 1
Final Bridge Maintenance Work Plan	• Region Maintenance • Bureau of Structures	March 1

Figure 43.3-1
Bridge Maintenance Work Plan Development Timeline



43.3.5 Delivering the Bridge Maintenance Work Plan

Following prioritization, additional fields are added to the Prioritized Bridge Maintenance Work Plan for the local service providers to document work completed. This document represents the Final Maintenance Work Plan. The contracts developed with the county service providers for bridge preservation work should include the Final Bridge Maintenance Work Plan as an attachment to the “Scope of Work”. This will help ensure:

- Accuracy in specific work requests to the county.
- A mechanism to track the progress and completions of work.
- A method to support invoicing by the county for work completed.
- A method to document specific bridge maintenance work performed in HSIS.

The Bureau of Highway Maintenance is the responsible party for program management for invoicing and payment. Region Bridge Maintenance is the lead for contracting with the local service providers and approving the actual work performed. Region Bridge Maintenance also acts as the technical lead, providing direction and feedback as required. Region Maintenance is also the point-of-contact for collecting and verifying documentation (as needed); see [43.4](#) below for more information.

- Timeline: The Bridge Maintenance Work Plan is delivered to the county service providers no later than March 15 of the CY for the work plan.



43.4 Documentation of Completed Bridge Maintenance Work

Local service providers shall submit a copy of the Final Bridge Maintenance Work Plan to Region Bridge Maintenance. The work plan includes areas to document information related to completed work items. It should be noted that the Final Bridge Maintenance Work Plan includes columns to capture cost data. This information is critical. As WisDOT refines the structures asset management program, this cost data will be a parameter in cost-benefit analysis and resource allocation decisions.

Region Bridge Maintenance is the lead for working with the local service providers to collect the completed Final Bridge Maintenance Work Plan. Region Maintenance will review and verify (as necessary) and then submit to BOS for inclusion in HSIS.

Timeline: Documentation is complete and back to Region Bridge Maintenance by November 15. Regions review, verify (as needed) and deliver documentation to BOS by December 1. Maintenance work completed after this date will need to be noted on the Draft Bridge Maintenance Work Plan or manually entered into HSIS by Region Bridge Maintenance engineers.

An overview of the entire process is shown below in [Figure 43.4-1](#).

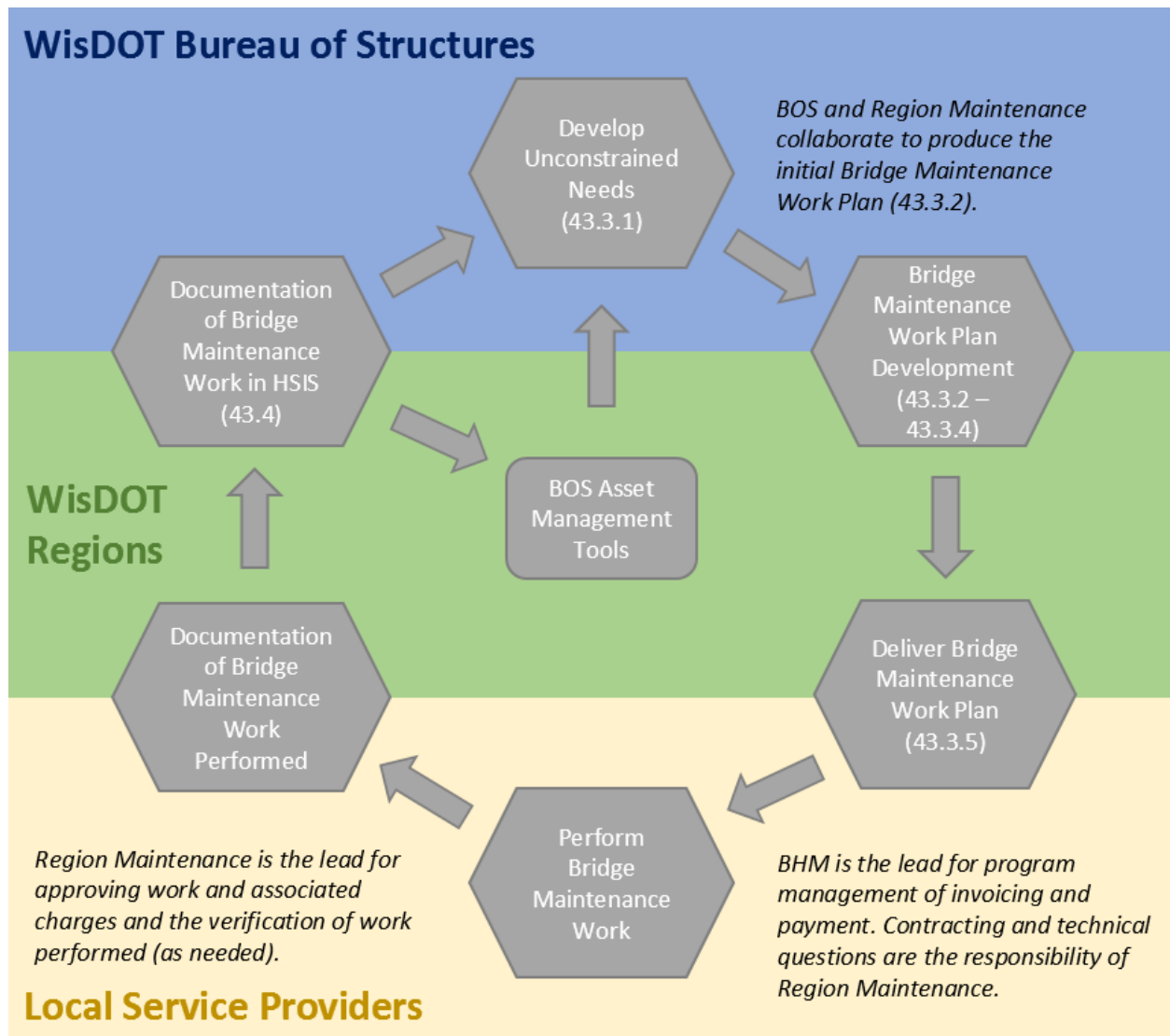


Figure 43.4-1
Bridge Maintenance Workflow and Responsibilities



43.5 Bridge Maintenance Work Reporting

Analyzing data collected from the Final Bridge Maintenance Work Plan is critical to understanding the cost-benefit of performing bridge maintenance activities. BOS will determine the appropriate program reports and share with affected stakeholders, including Region Bridge Maintenance.

It must be noted that there are no goals or target levels associated with these reports at this time. This is currently an information-gathering and analysis exercise to determine the impacts of past work to help shape the direction of future work. BOS will analyze and present the data in a manner to best inform WisDOT and DTSD management on the optimal level of funding for bridge maintenance work and how those funds might best be spent.

- Timeline: BOS will produce bridge maintenance work reports by February 1 for the previous calendar year.



43.6 Definitions

Highway Maintenance Program: The funding mechanism or collection of funding mechanisms by which WisDOT contracts with local service providers to perform maintenance work. The Highway Maintenance Program is inclusive of all transportation infrastructure maintenance including bridge maintenance, but also pavement maintenance and more.

Highway Maintenance Work Plan (HMWP): The list of specific work actions to be performed through the Highway Maintenance Program as described above. It includes work actions on bridges, but also pavements and more. See [43.1.1](#) and [Figure 43.1-2](#).

Bridge Maintenance Work Plan: This plan addresses bridge maintenance work and is appropriate work for local service providers. The Bridge Maintenance Work Plan is a subset of the larger Highway Maintenance Work Plan.

Bridge Maintenance Actions: This term encompasses both Operational and Preservation bridge maintenance actions.

Operational Bridge Maintenance Actions: Actions necessary for the regular operation of a bridge; actions necessary to maintain the bridge in a serviceable condition.

Preservation Bridge Maintenance Actions: Bridge Preservation is defined as actions or strategies that prevent, delay, or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good or fair condition and extend their service life. Preservation actions may be cyclic or condition-driven.

Highway Structures Information System: Highway Structures Information System (HSIS) is the system developed by WisDOT for managing the inventory and inspection data of all highway structures. The inspection data is collected in accordance with the NBIS and *2019 AASHTO Manual for Bridge Element Inspection*.

Wisconsin Structures Asset Management System (WiSAMS): Automated application to determine optimal work candidates for improving the condition of structures. This application serves as a programming and planning tool for structures improvements, rehabilitations, maintenance, and preservation. This application coupled with the Highways Structures Information System (HSIS) serves as a comprehensive Structures (Bridge) Management system.



43.7 References

1. FDM 3-5 Exhibit 5.2 Agreement for the Use of Federal Funds for Preventive Maintenance of Structures. (May 2016). (<https://wisconsindot.gov/rdwy/fdm/fd-03-05-e0502.pdf#fd3-5e5.2>)
2. Highway Maintenance Manual (<https://wisconsindot.gov/Pages/doing-bus/local-gov/hwy-mnt/mntc-manual/default.aspx>)