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2.1 Organizational Charts

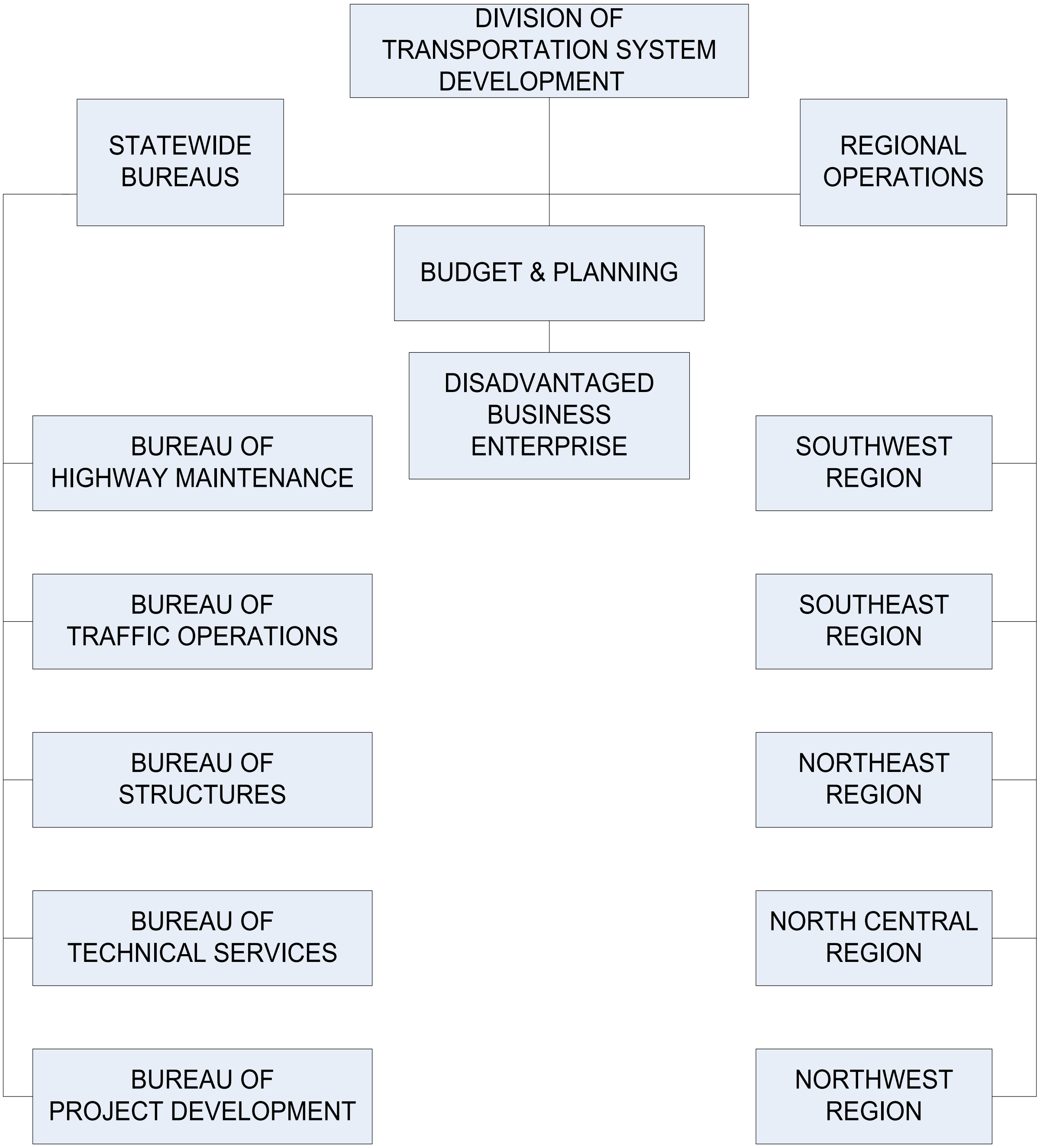


Figure 2.1-1
Division of Transportation System Development

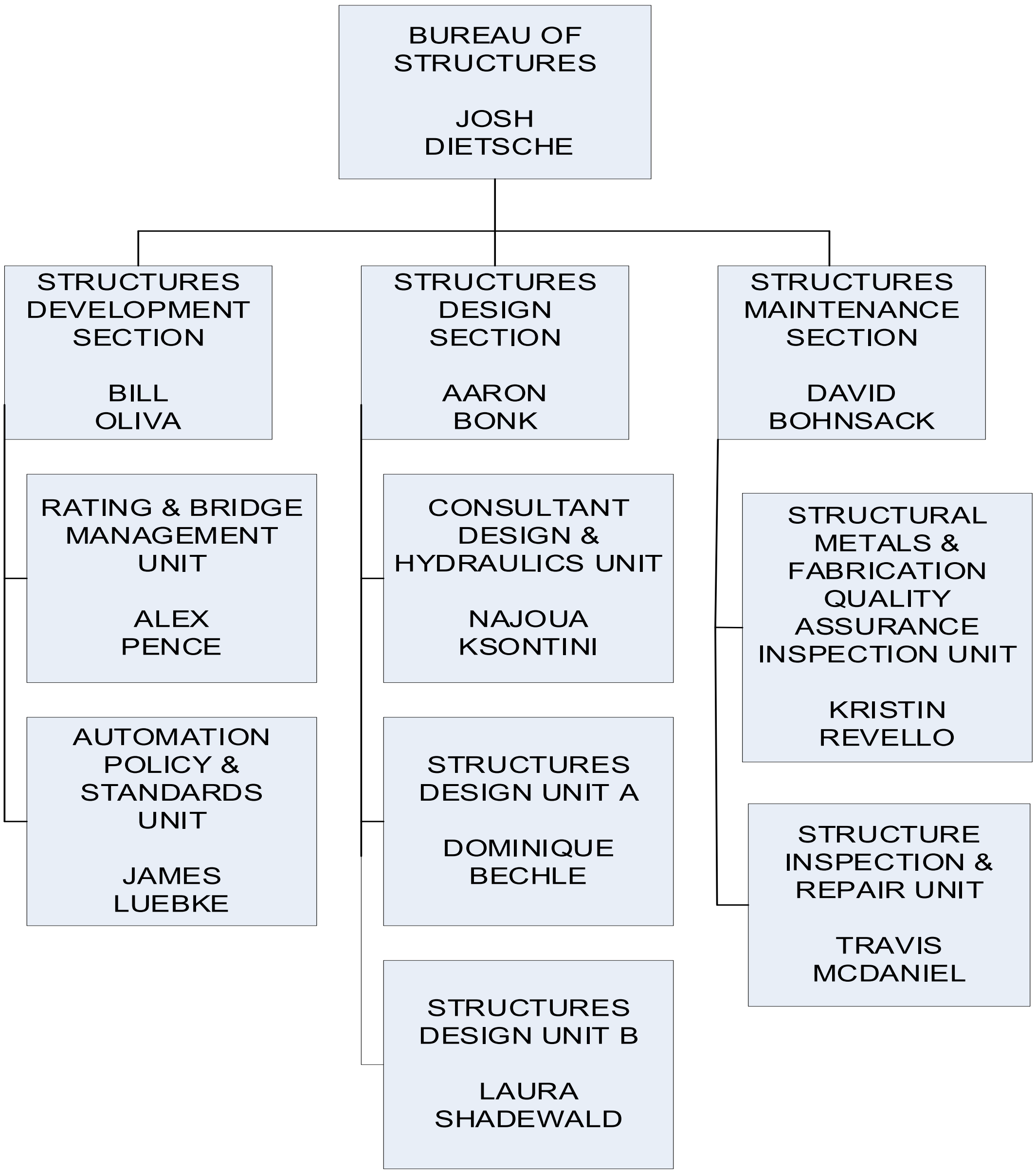
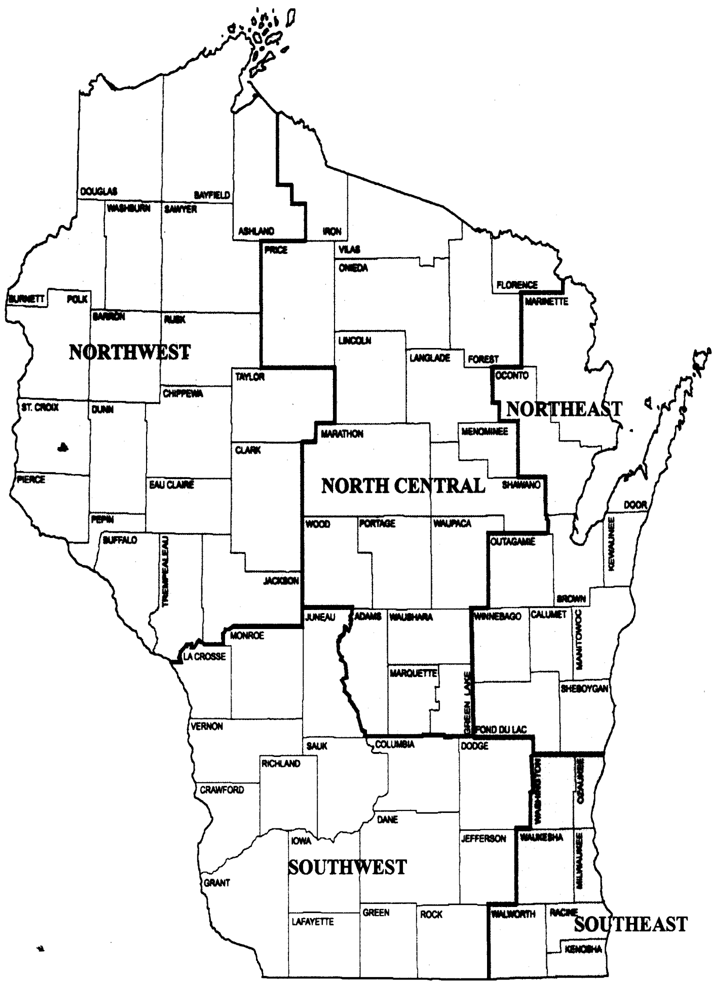


Figure 2.1-2
Bureau of Structures



NO.	COUNTY	REGION	NO.	COUNTY	REGION
1	ADAMS	NORTH CENTRAL	37	MARATHON	NORTH CENTRAL
2	ASHLAND	NORTHWEST	38	MARINETTE	NORTHEAST
3	BARRON	NORTHWEST	39	MARQUETTE	NORTH CENTRAL
4	BAYFIELD	NORTHWEST	40	MILWAUKEE	SOUTHEAST
5	BROWN	NORTHEAST	41	MONROE	SOUTHWEST
6	BUFFALO	NORTHWEST	42	OCONTO	NORTHEAST
7	BURNETT	NORTHWEST	43	ONEIDA	NORTH CENTRAL
8	CALUMET	NORTHEAST	44	OUTAGAMIE	NORTHEAST
9	CHIPPEWA	NORTHWEST	45	OZAUKEE	SOUTHEAST
10	CLARK	NORTHWEST	46	PEPIN	NORTHWEST
11	COLUMBIA	SOUTHWEST	47	PIERCE	NORTHWEST
12	CRAWFORD	SOUTHWEST	48	POLK	NORTHWEST
13	DANE	SOUTHWEST	49	PORTAGE	NORTH CENTRAL
14	DODGE	SOUTHWEST	50	PRICE	NORTH CENTRAL
15	DOOR	NORTHEAST	51	RACINE	SOUTHEAST
16	DOUGLAS	NORTHWEST	52	RICHLAND	SOUTHWEST
17	DUNN	NORTHWEST	53	ROCK	SOUTHWEST
18	EAU CLAIRE	NORTHWEST	54	RUSK	NORTHWEST
19	FLORENCE	NORTH CENTRAL	55	ST CROIX	NORTHWEST
20	FOND DU LAC	NORTHEAST	56	SAUK	SOUTHWEST
21	FOREST	NORTH CENTRAL	57	SAWYER	NORTHWEST
22	GRANT	SOUTHWEST	58	SHAWANO	NORTH CENTRAL
23	GREEN	SOUTHWEST	59	SHEBOYGAN	NORTHEAST
24	GREEN LAKE	NORTH CENTRAL	60	TAYLOR	NORTHWEST
25	IOWA	SOUTHWEST	61	TREMPEALEAU	NORTHWEST
26	IRON	NORTH CENTRAL	62	VERNON	SOUTHWEST
27	JACKSON	NORTHWEST	63	VILAS	NORTH CENTRAL
28	JEFFERSON	SOUTHWEST	64	WALWORTH	SOUTHEAST
29	JUNEAU	SOUTHWEST	65	WASHBURN	NORTHWEST
30	KENOSHA	SOUTHEAST	66	WASHINGTON	SOUTHEAST
31	KEWAUNEE	NORTHEAST	67	WAUKESHA	SOUTHEAST
32	LA CROSSE	SOUTHWEST	68	WAUPACA	NORTH CENTRAL
33	LAFAYETTE	SOUTHWEST	69	WAUSHARA	NORTH CENTRAL
34	LANGLADE	NORTH CENTRAL	70	WINNEBAGO	NORTHEAST
35	LINCOLN	NORTH CENTRAL	71	WOOD	NORTH CENTRAL
36	MANITOWOC	NORTHEAST	73	MENOMINEE	NORTH CENTRAL

Figure 2.1-3
Region Map

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5.1 Factors Governing Bridge Costs

Bridge costs are tabulated based on the bids received for all bridges let to contract. While these costs indicate some trends, they do not reflect all the factors that affect the final bridge cost. Each bridge has its own conditions which affect the cost at the time a contract is let. Some factors governing bridge costs are:

1. Location - rural or urban, or remote regions
2. Type of crossing
3. Type of superstructure
4. Skew of bridge
5. Bridge on horizontal curve
6. Type of foundation
7. Type and height of piers
8. Depth and velocity of water
9. Type of abutment
10. Ease of falsework erection
11. Need for special equipment
12. Need for maintaining traffic during construction
13. Limit on construction time
14. Complex forming costs and design details
15. Span arrangements, beam spacing, etc.

Figure 5.2-1 shows the economic span lengths of various type structures based on average conditions. Refer to Chapter 17 for discussion on selecting the type of superstructure.

Annual unit bridge costs are included in this chapter. The area of bridge is from back to back of abutments and out to out of the concrete superstructure. Costs are based only on the bridges let to contract during the period. In using these cost reports exercise care when a small number of bridges are reported as these costs may not be representative.

In these reports prestressed girder costs are grouped together because there is a small cost difference between girder sizes. Refer to unit costs. Concrete slab costs are also grouped together for this reason.

Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	17	30,808	3,277,766.33	106.39
CIP Facing (MSE)	3	10,611	1,683,447.67	158.65
MSE Block Walls	6	13,378	1,457,896.15	108.98
MSE Panel Walls	21	137,718	11,789,074.54	85.60
Modular Walls	3	3,643	254,004.30	69.72
Precast Panel and Wire Faced	3	17,270	2,294,507.57	132.86
Soldier Pile Walls	0	--	--	--
Steel Sheet Pile Walls	5	15,056	1,442,741.15	95.82

Table 5.4-9
Retaining Walls

Sign Structure Type		No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.
Butterfly (1-Sign)	Conc. Col.	0	--	--	--
	1-Steel Col.	4	84.5	221,728.47	2,623.01
Butterfly (2-Signs)	Conc. Col.	0	--	--	--
	1-Steel Col.	6	217.22	417,307.35	1,921.13
Cantilever	Conc. Col	0	--	--	--
Cantilever Full Span	1-Steel Col.	28	825.75	1,165,570.03	1,411.53
	2-Steel Col.	2	199	245,997.03	1,236.17
	Conc. Col.	2	185	349,166.59	1887.39
Full Span	1-Steel Col.	6	466.03	589,773.11	1265.53
	2-Steel Col.	21	1,773.5	1,789,041.14	1008.76

Table 5.4-10
Sign Structures

5.4.3 2018 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	45	276,821	40,483,970	66.45	146.25
Reinf. Conc. Slabs (Flat)	49	72,180	11,489,979	68.04	159.19
Reinf. Conc. Slabs (Haunched)	10	51,532	9,546,594	63.57	185.26
Prestressed Box Girder	1	1,864	400,675	113.39	214.95

Table 5.4-11
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	52	727,872	108,975,613	59.90	149.72
Reinf. Conc. Slabs (Haunched)	6	56,580	9,478,579	57.14	167.53
Steel Plate Girders	0	--	--	--	--
Trapezoidal Steel Box Girders	0	--	--	--	--

Table 5.4-12
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	13	1,911
Twin Cell	6	2,901
Three Cell	1	6,262

Table 5.4-13
Box Culverts

Bridge Type	Cost
Twin Pipe Culvert	2,078 Lin. Ft.

Table 5.4-14
Miscellaneous Bridges

Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	0	--	--	--
CIP Facing (MSE)	0	--	--	--
MSE Block Walls	3	4,693	567,547	120.93
MSE Panel Walls	49	378,371	44,841,726	118.51
Modular Walls	3	2,402	204,002	84.93
Precast Panel and Wire Faced	1	5,945	948,347	159.53
Soldier Pile Walls	4	8,531	1,570,107	184.05
Steel Sheet Pile Walls	2	16,620	1,639,380	98.64

Table 5.4-15
Retaining Walls

Sign Structure Type		No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.
Butterfly (1-Sign)	Conc. Col.	6	118	273,756	2,319.97
	1-Steel Col.	0	--	--	--
Butterfly (2-Signs)	Conc. Col.	5	88	277,787	3,156.67
	1-Steel Col.	4	73	326,652	4,474.68
Cantilever	Conc. Col	8	234	588,676	2,515.71
	1-Steel Col	32	850.83	1,380,710	1,622.78
Cantilever Full Span	Conc. Col.	16	1267	2,909,973	2,296.74
	1-Steel Col.	2	184.2	279,115	1,515.28
	2-Steel Col.	17	1469	2,236,464	1,522.44
Full Span	1-Steel Col.	10	675.5	513,623	760.36
	2-Steel Col.	0	--	--	--

Table 5.4-16
Sign Structures

5.4.4 2019 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	23	120,327	17,518,289	67.10	145.59
Reinf. Conc. Slabs (Flat)	44	69,664	11,879,548	70.13	170.53
Reinf. Conc. Slabs (Haunched)	10	43,057	6,148,879	100.04	142.81
Prestressed Box Girder	1	1,253	268,037	101.17	213.92

Table 5.4-17
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	19	170,986	27,970,532	75.00	163.58
Reinf. Conc. Slabs (Haunched)	3	18,772	3,060,054	63.04	163.01
Steel Beams	1	7,964	1,522,389	95.77	191.16
Steel Plate Girders	3	130,986	30,430,624	144.97	232.32

Table 5.4-18
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	8	2,496
Twin Cell	5	3,392
Three Cell	1	3,283

Table 5.4-19
Box Culverts

Bridge Type	Cost
(none)	--

Table 5.4-20
Miscellaneous Bridges

Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	0	--	--	--
CIP Facing (MSE)	0	--	--	--
MSE Block Walls	7	17,195	2,490,957	144.87
MSE Panel Walls	27	85,496	10,517,536	123.02
Modular Walls	0	--	--	-
Precast Panel and Wire Faced	0	--	--	--
Soldier Pile Walls	3	6,290	1,378,911	219.22
Steel Sheet Pile Walls	1	1,940	92,512	47.69

Table 5.4-21
Retaining Walls

Sign Structure Type		No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.
Butterfly (1-Sign)	Conc. Col.	0	--	--	--
	1-Steel Col.	0	--	--	--
Butterfly (2-Signs)	Conc. Col.	0	--	--	--
	1-Steel Col.	0	--	--	--
Cantilever	Conc. Col	0	--	--	--
	1-Steel Col	2	56	42,520	1,518
Cantilever Full Span	Conc. Col.	--	--	--	--
	1-Steel Col.	--	--	--	--
	2-Steel Col.	10	735.5	126,495	1,719.86
Full Span	1-Steel Col.	3	187	45,069	723.04
	2-Steel Col.	0	--	--	--

Table 5.4-22
Sign Structures

5.4.5 2020 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	28	236,564	35,597,272	70.46	150.48
Reinf. Conc. Slabs (Flat)	35	57,402	10,783,692	72.40	187.86
Reinf. Conc. Slabs (Haunched)	7	53,236	6,866,154	65.48	128.98
Prestressed Box Girder	2	9,050	2,694,672	157.15	297.75
Steel Plate Girders	1	19,076	5,258,732	120.51	275.67

Table 5.4-23
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	22	211,991	34,051,252	71.64	160.63
Reinf. Conc. Slabs (Flat)	1	2,179	379,028	62.35	173.95
Reinf. Conc. Slabs (Haunched)	1	5,563	870,732	43.94	156.52

Table 5.4-24
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	17	1,708
Twin Cell	1	2,073
Three Cell	0	--

Table 5.4-25
Box Culverts

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	the Federal Highway Administration for approval.
	Review Regional Office comments and other agency comments, modify preliminary plans as necessary.
	Review and record project for final structural plan preparation.
Structures Design Units (BOS)	Prior to starting project, Designer contacts Regional Office to verify preliminary structure geometry, alignment, width and the presence of utilities.
	Prepare and complete plans, specs and estimates for the specified structure.
	Give completed job to the Supervisor of Structures Design Unit.
Supervisor, Structures Design Unit (BOS)	Review plans, specs and estimates.
	Send copies of final structural plans and special provisions to Regional Offices.
	Sign lead structural plan sheet.
	Deliver final structural plans and special provisions to the Bureau of Project Development.
Bur. of Project Development	Prepare final approved structural plans for pre-contract administration.

See Facilities Development Manual (FDM) Section 20-50-5 for information on determining whether a bridge crossing falls under the Coast Guard's jurisdiction.

6.2 Preliminary Plans

6.2.1 Structure Survey Report

The Structure Survey Report is prepared by Regional Office or consultant personnel to request a structure improvement project. The following forms in word format are used and are available at: https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/survey.aspx

Under the “Survey Reports” heading:

DT1694	Separation Structure Survey Report
DT1696	Rehabilitation Structure Survey Report
DT1698	Stream Crossing Structure Survey Report (use for Culverts also)

The front of the form lists the supplemental information to be included with the report.

6.2.1.1 BOS-Designed Structures

When preparing the Structure Survey Report, the region or consultant roadway designers will make their best estimate of structure type and location of substructure units. The completed Structure Survey Report with the locations of the substructure units and all required attachments and supporting information will then be submitted to the Bureau of Structures via e-submit (as “BOS Design”) and also to the Geotechnical Section, through the Regional Soils Engineer. This submittal will take place a minimum of 18 months in advance of the earliest PS&E due date shown on the Structure Survey Report. The Geotechnical Section is responsible for scheduling and conducting the necessary soil borings. The Bureau of Structures and the Geotechnical Section will coordinate activities to deliver the completed structure plans on schedule.

When a geotechnical consultant is performing the subsurface exploration, the work typically proceeds after the preliminary plans have been assembled by the Bureau of Structures. Under some circumstances, it may be expected that the geotechnical information gathered will be included in the Structure Survey Report in advance of the development of the preliminary plans. In the case of the Geotechnical Section performing the subsurface exploration, the geotechnical work will proceed after the preliminary plans have been assembled by the Bureau of Structures.

The Project Manager may request information on structure type and substructure locations from the Bureau of Structures if such information is necessary to expedite the environmental process.

Under this process, the scheduling of geotechnical work is coordinated with the Bureau of Structures toward completion of the bridge plans by the final plan due date. If other geotechnical work is required for the project, the Project Manager should coordinate with the

11. Title Block

    Fill in all data for the Title Block except the signature. The title of this sheet is "General Plan". Use the line below the structure number to describe the type of crossing. (Example: STH 15 SB OVER FOX RIVER). See 6.3.2.1 for guidance regarding sheet border selection.

12. Professional Seal

    All final bridge plans prepared by Consultants or Governmental Agencies shall be professionally sealed, signed, and dated on the general plan sheet. If the list of drawings is not on the general plan sheet, the sheet which has the list of drawings shall also be professionally sealed, signed, and dated. This is not required for WisDOT prepared plans, as they are covered elsewhere.

6.3.2.1.1 Plan Notes for New Bridge Construction

1. Drawings shall not be scaled. Bar Steel Reinforcement shall be embedded 2" clear unless otherwise shown or noted.

2. All field connections shall be made with 3/4" diameter friction type high-tensile strength bolts unless shown or noted otherwise.

3. Slab falsework shall be supported on piles or the substructure unless an alternate method is approved by the Engineer.

4. The first or first two digits of the bar mark signifies the bar size.

5. The slope of the fill in front of the abutments shall be covered with heavy riprap and geotextile fabric Type 'HR' to the extent shown on sheet 1 and in the abutment details.

6. The slope of the fill in front of the abutments shall be covered with slope paving material to the extent shown on sheet 1 and in the abutment details.

7. The stream bed in front of the abutment shall be covered with riprap as shown on this sheet and in the abutment details.

8. The existing stream bed shall be used as the upper limits of excavation at the piers.

9. The existing ground line shall be used as the upper limits of excavation at the piers.

10. Within the length of the box all spaces excavated and not occupied by the new structure shall be backfilled with Structure Backfill to the elevation and section existing prior to excavation within the length of the culvert.

11. At the backface of abutment all volume which cannot be placed before abutment construction and is not occupied by the new structure shall be backfilled with structure backfill.

12. Concrete inserts to be furnished by the utility company and placed by the contractor. Cost of placing inserts shall be included in the bid price for concrete masonry.

13. Prestressed Girder Bridges - The haunch concrete quantity is based on the average haunch shown on the Prestressed Girder Details sheet.

6.3.2.1.2 Plan Notes for Bridge Rehabilitation

WisDOT policy item:

The note "Dimensions shown are based on the original structure plans" is acceptable. However, any note stating that the contractor shall field verify dimensions is not allowed.

It is the responsibility of the design engineer to use original structure plans, as-built structure plans, shop drawings, field surveys and structure inspection reports as appropriate when producing rehabilitation structure plans of any type (bridges, retaining walls, box culverts, sign structures, etc.). **Note:** Older Milwaukee bridge plans used a baseline datum of 100.00. Add 580.60 to elevations using this datum. If uncertainty persists after reviewing available documentation, a field visit may be necessary by the design engineer.

1. Dimensions shown are based on the original structure plans.

2. All concrete removal not covered with a concrete overlay shall be defined by a 1 inch deep saw cut, unless specified otherwise.

3. Utilize existing bar steel reinforcement where shown and extend 24 bar diameters into new work, unless specified otherwise.

4. Concrete expansion bolts and inserts to be furnished and placed by the contractor under the bid price for concrete masonry.

5. At "Curb Repair" remove concrete to sound concrete or at least 1" behind existing reinforcing steel.

6. Existing floor drains to remain in place. Remove top of deck in drain area as directed by the Field Engineer to allow placing and sloping of 1 1/2" concrete overlay.

7. Clean and fill existing longitudinal and transverse cracks with penetrating epoxy as directed by the Field Engineer.

8. Variations to the new grade line over 1/4" must be submitted by the Field Engineer to the Structures Design Section for review.

9. The contractor shall supply a new name plate in accordance with Section 502.3.11 of the *Standard Specifications* and the standard detail drawings. Name plate to show original construction year.

10. Care shall be taken to avoid damage to the existing girder, including shear stirrups. Sawcutting of the existing shear stirrups is not allowed.

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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.

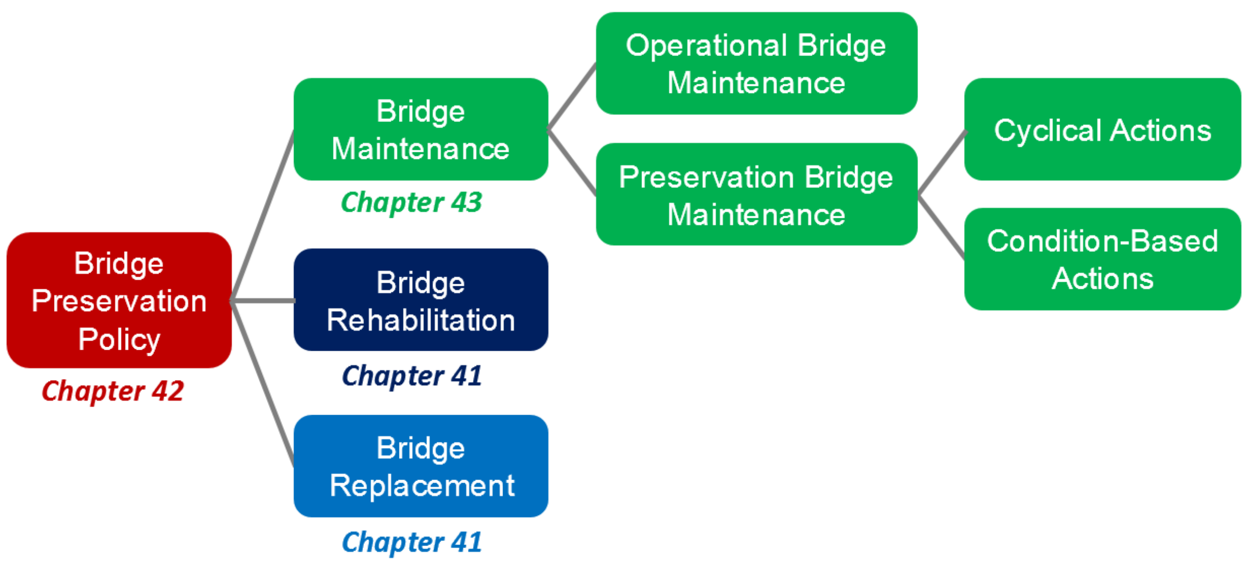

Figure 43.1-1
Bridge Asset Management Work Activities

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.

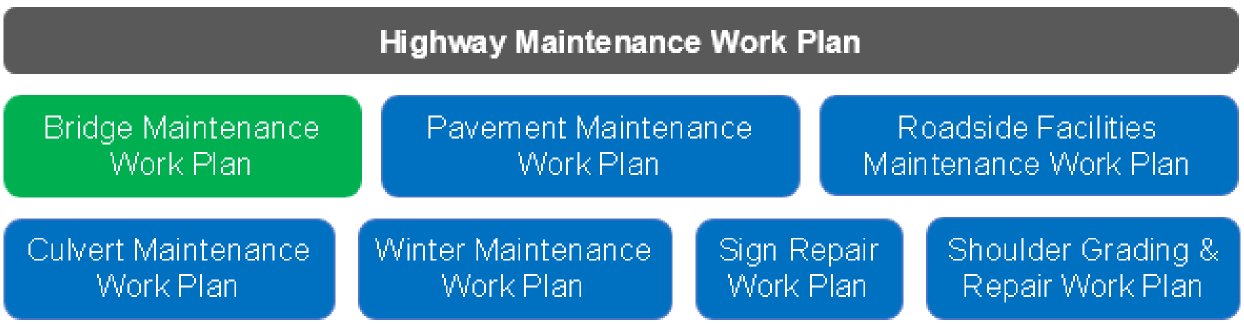

Figure 43.1-2
Components of the Highway Maintenance Work Plan

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 WiSAMS 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.

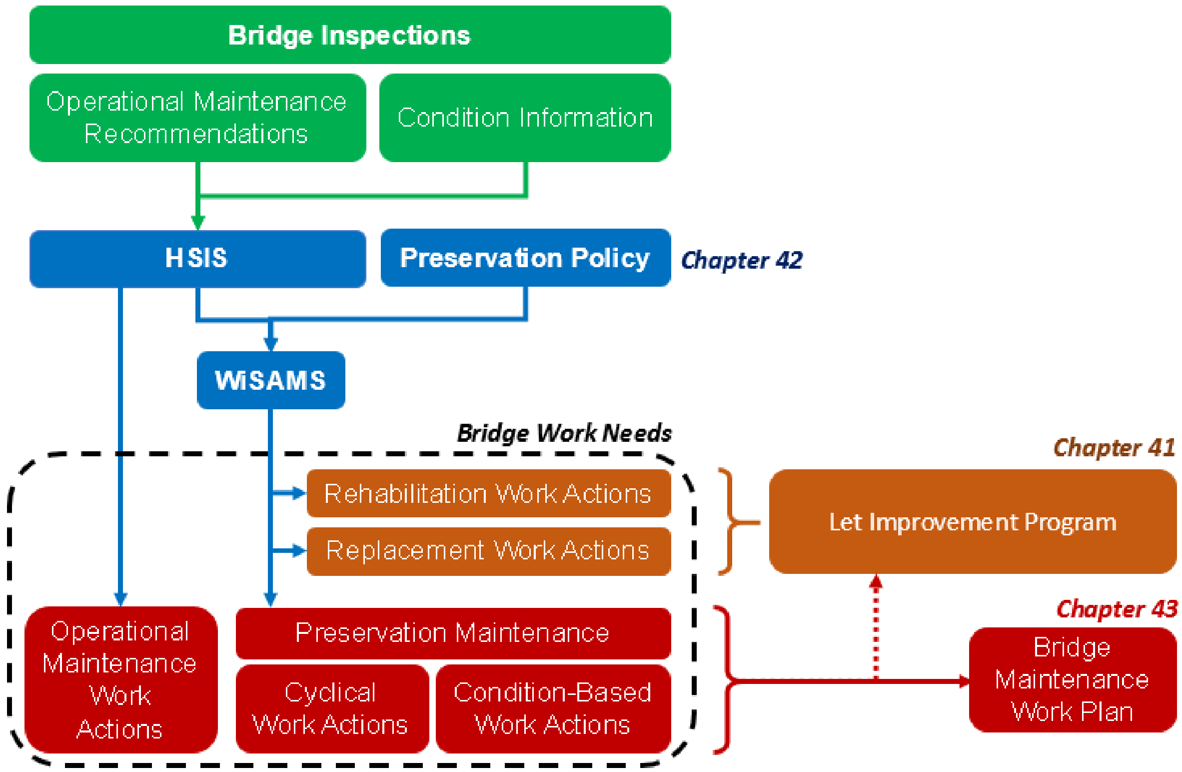

Figure 43.2-1
Overall Structures Program Delivery

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.*

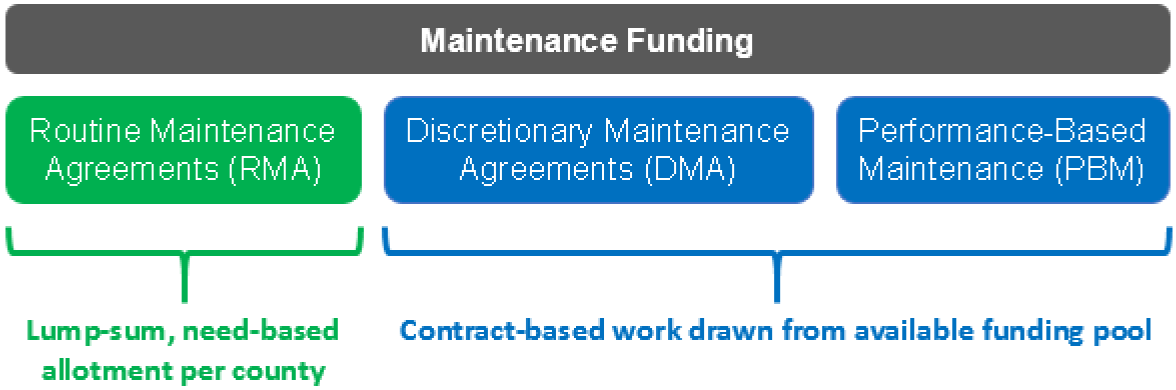

Figure 43.2-2
Maintenance Funding Mechanisms

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.

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.

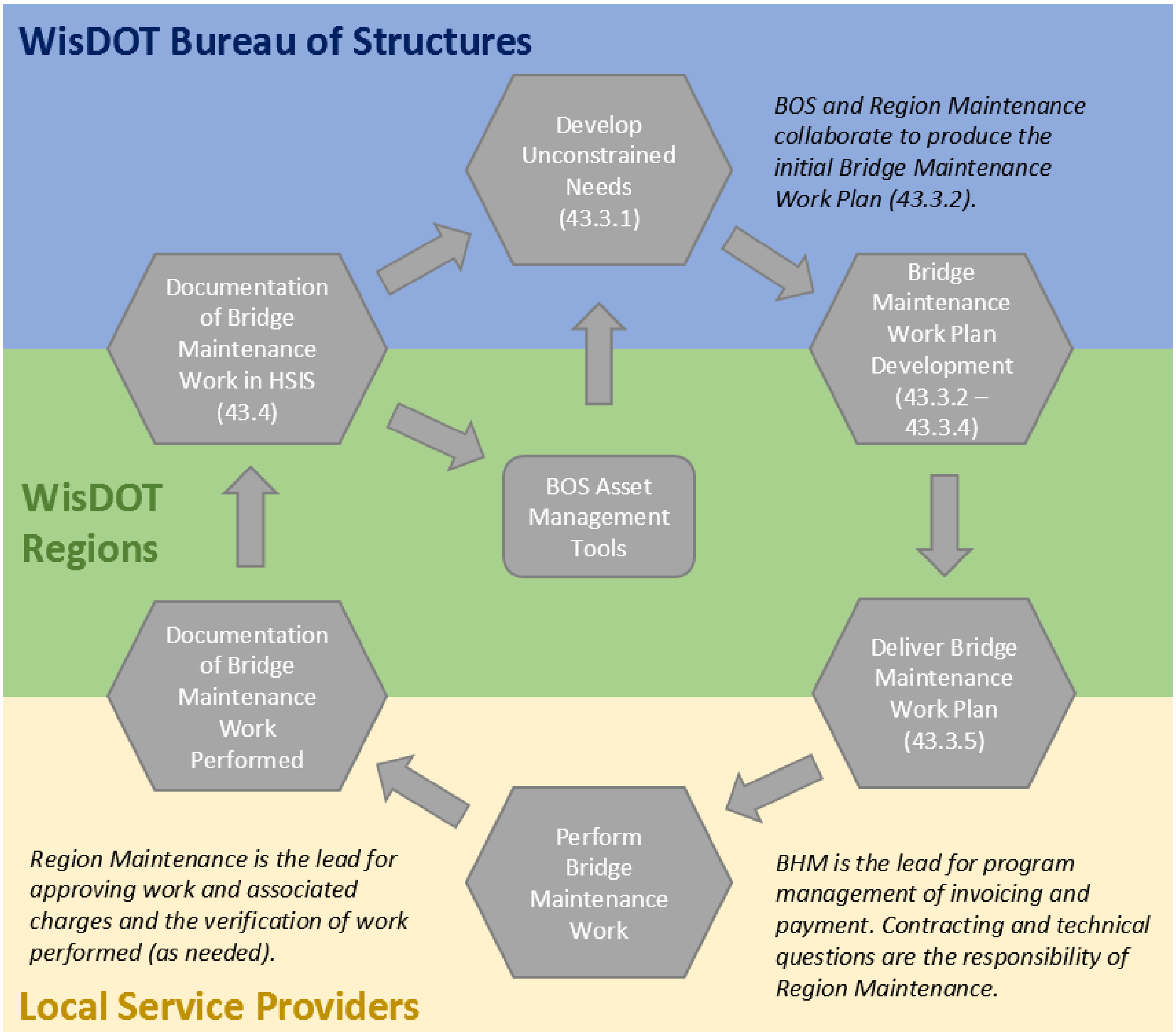

Figure 43.4-1
Bridge Maintenance Workflow and Responsibilities

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)

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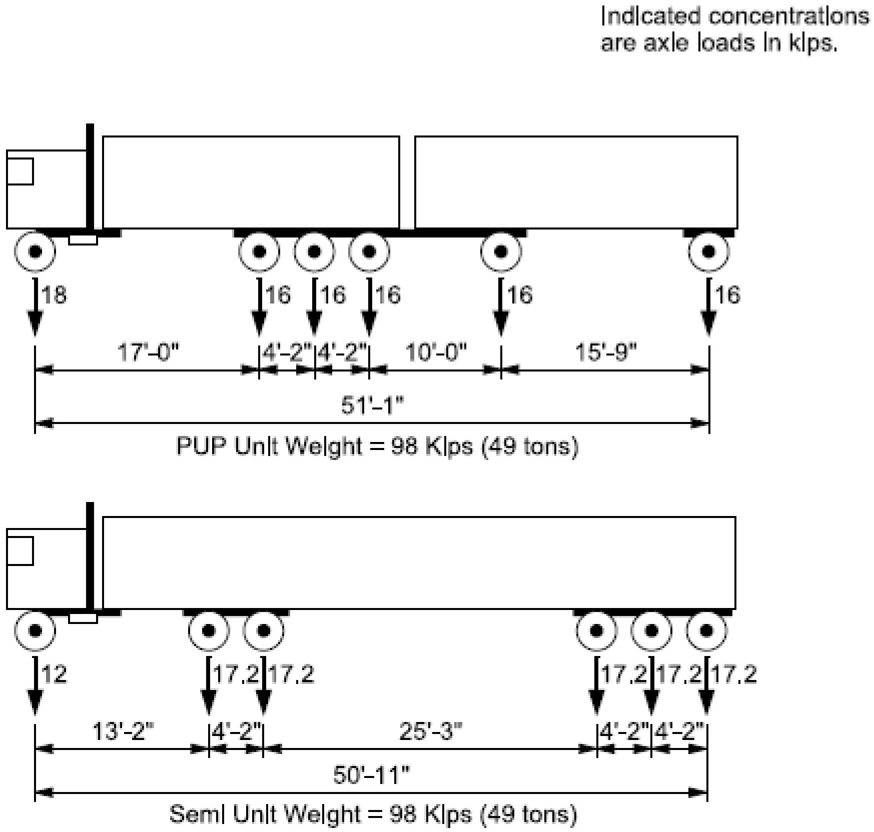
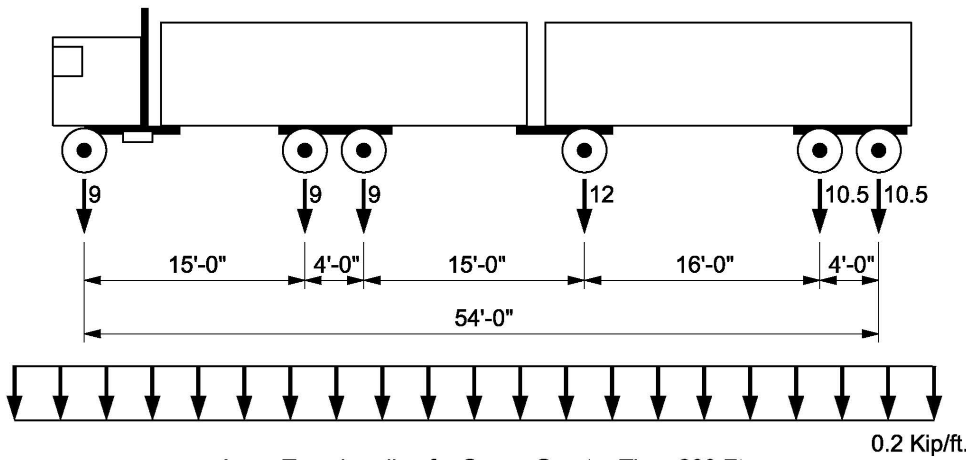
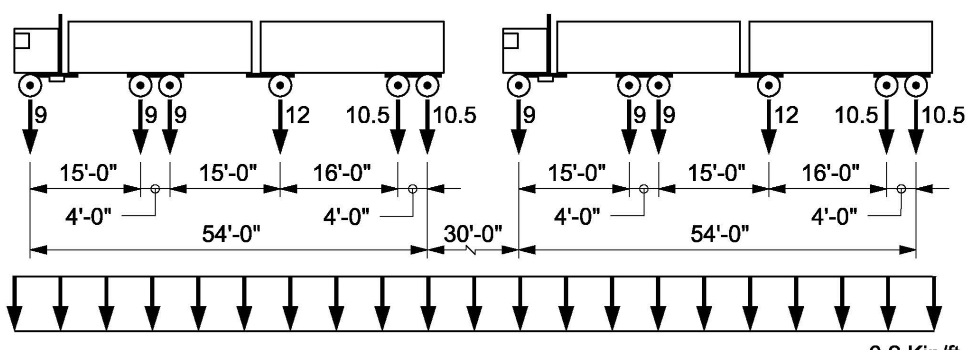


Figure 45.10-3
WisDOT Specialized Annual Permit Vehicles

Indicated concentrations are axle loads in kips (75% of type 3-3).



Lane-Type Loading for Spans Greater Than 200 Ft.



Lane-Type Loading for Negative Moment and Interior Reaction.

Figure 45.10-4
Lane Type Legal Load Models