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2.1 Organizational Charts

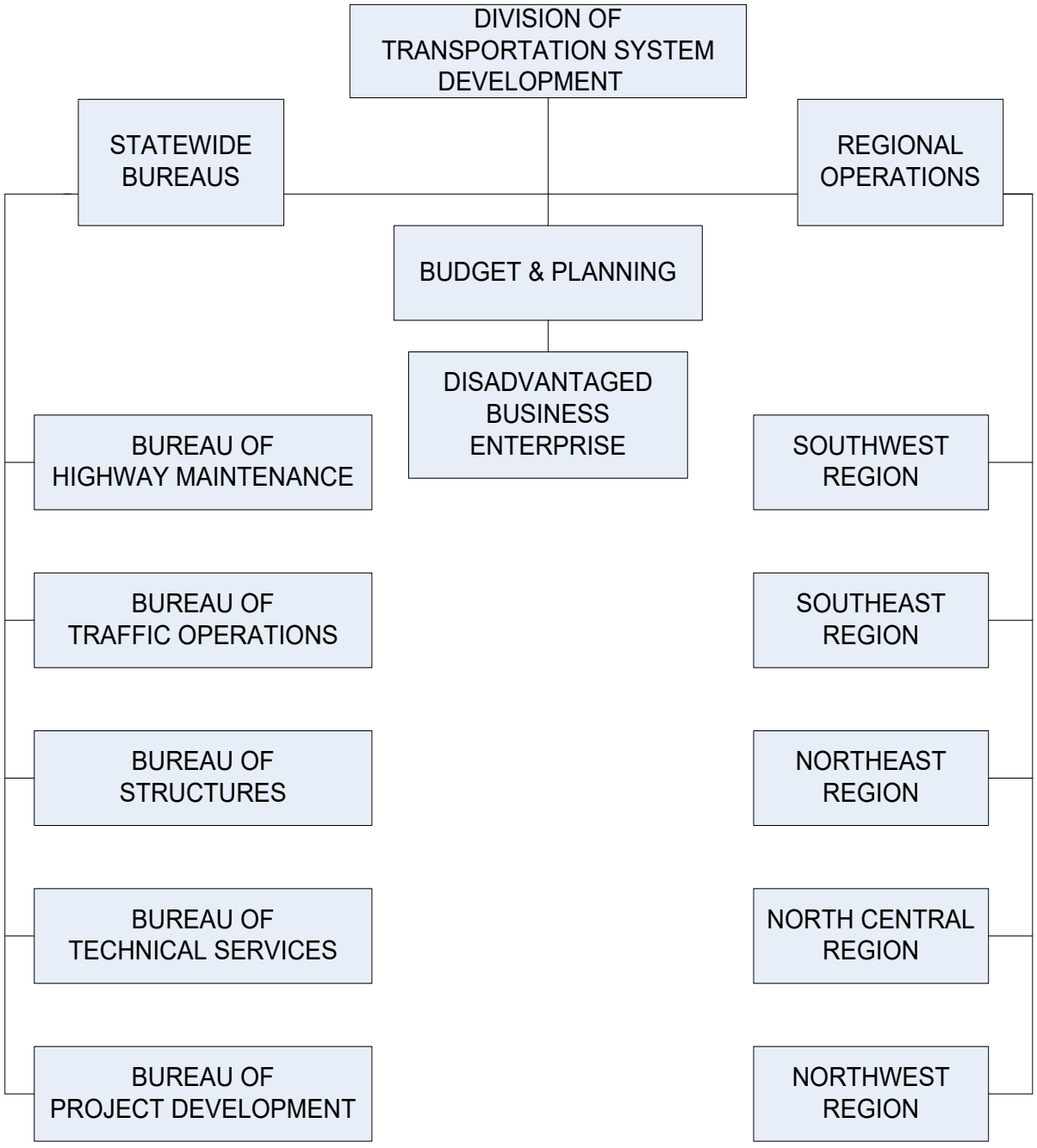


Figure 2.1-1
Division of Transportation System Development

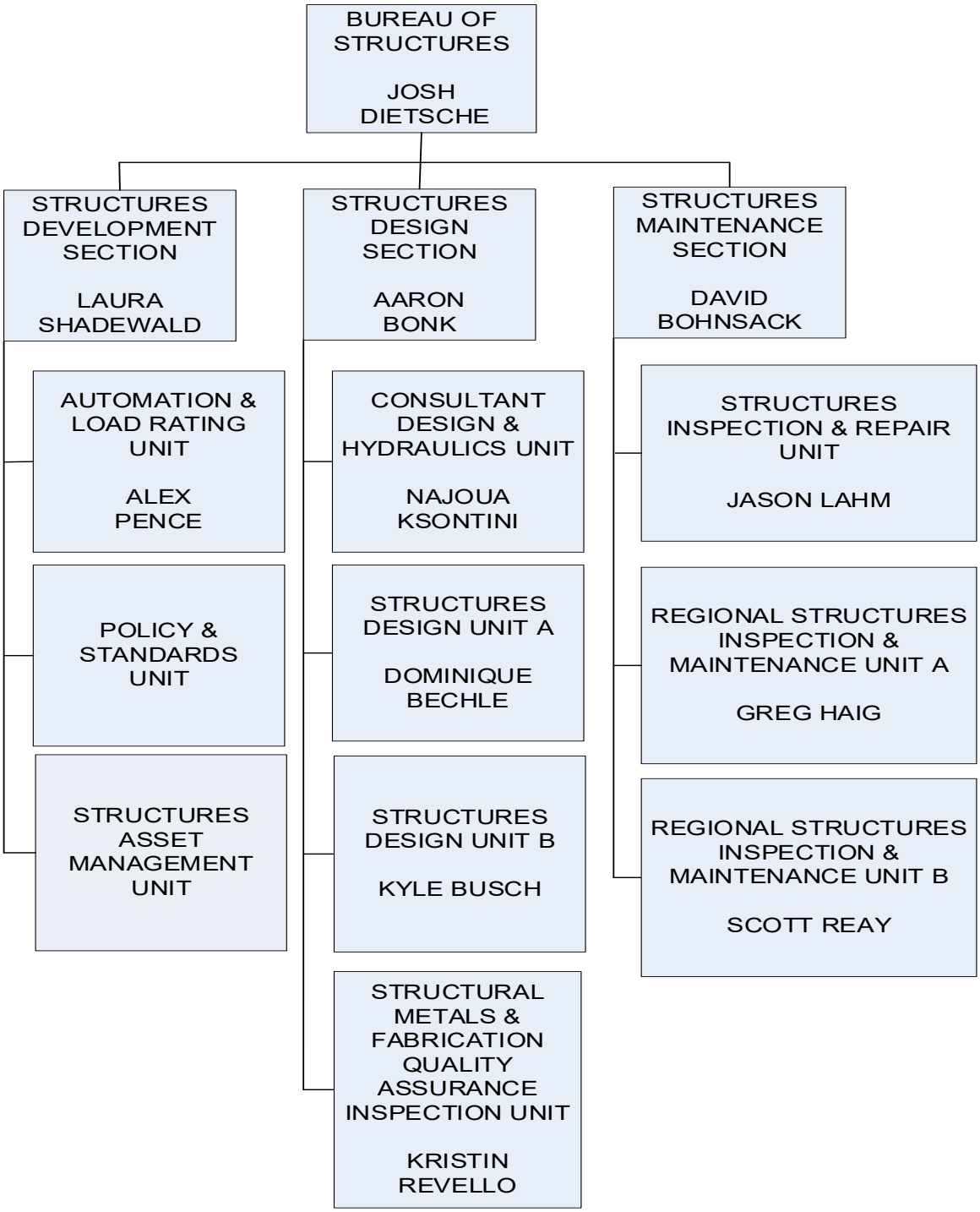


Figure 2.1-2
Bureau of Structures

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

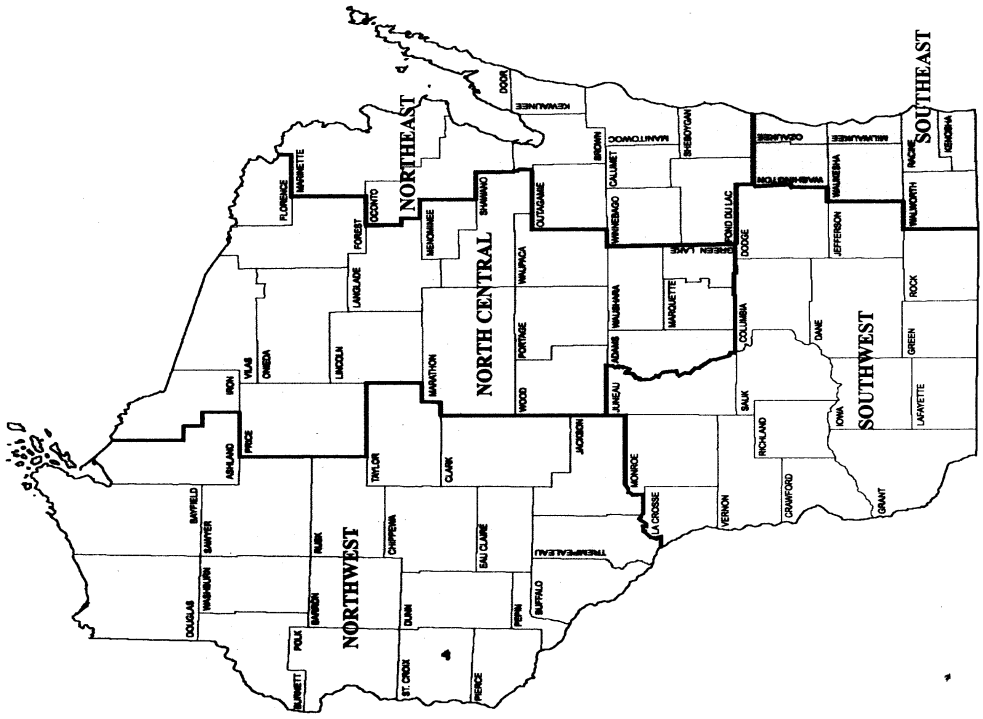


Figure 2.1-3
Region Map

2.2 Incident Management

The procedures to be followed in Incident Management are:

2.2.1 Bridge Incidents

For Bridge Incidents such as vehicle hits on girders, column or railing that are not likely to cause a bridge failure, incident management will be handled by the Regional Office and after consultation of the Regional Duty Officer (RDO) the structures technical expert. Assistance will be provided by the Structures Design Section if rehabilitation plans are required. Refer to the contacts list below for names and telephone numbers.

WisDOT policy item:

The Bureau of Structures has an on call technical expert number that is to be activated with the consultation of the RDO for bridge incidents. The number is: (608) -206 -1280.

2.2.2 Major Bridge Failures

A bridge failure requires emergency action on the part of the DOT to protect the safety of other drivers and to prevent additional crashes, to establish appropriate traffic detours, to assess the damage, to determine its cause, to plan and implement its repair. Examples include a bridge that collapses as the result of flooding, being struck by a motor vehicle, or the weakening of its members. The Bureau of Structures follows all responsibilities and actions established in the Departments Emergency Operations Plan (ETO).

To organize and execute an effective and efficient response to a major bridge failure, DOT will follow the principles of National Incident Management System (NIMS) and incident command system (ICS). NIMS and ICS are being used nationwide as an organizational tool for command, control and coordination of responses to an array of incidents – large and small, natural and man-made, spontaneous or planned.

NIMS and ICS provide a common organizational structure and terminology within a unified command under the direction of an incident commander. A large-scale incident may require the establishment of a unified command to coordinate the activities of multiple jurisdictions.

When an incident takes place, law enforcement will generally be the first responders and will take steps to close the highway to traffic. County highway officials will erect barricades and begin detouring traffic.

The State Patrol or other law enforcement will contact the Regional Office and RDO who in turn should contact the Bureau of Structures technical expert. While the Regional Office will probably retain general oversight of the incident, a Bureau of Structures representative should be given shared responsibility.

The ICS structure recognizes the importance of public information and media relations during a high-profile incident. As part of the command staff, the public information officer (PIO) reports

directly to the incident commander, who has the overall responsibility and authority for the response.

Generally, the PIO is responsible for coordinating the release of information to the media, handling reporters' inquiries and advising the incident commander about communication strategies. Public information in the event of a major bridge failure or damage will be directed at assuring the public that the DOT is taking appropriate action to protect other drivers, provide adequate routes, investigate the cause and make repairs in a timely manner.

The PIO may need assistance from the Bureau of Structures or region staff to provide: 1) details of the incident, 2) acknowledgement of deaths or injuries, 3) traffic detours, 4) plans for investigation, 5) cause of the incident, 6) plans to repair or rebuild the bridge, 7) maps locating the bridge, closed highways and alternate routes, 8) background information on the bridge's design, construction and past repairs, 9) recent bridge inspection reports, and 10) policies regarding bridge inspection.

The incident commander has the final authority over the release of all information to the media and the general public. DOT employees are authorized to make only the following statement when questioned in any capacity about emergency and recovery efforts. This policy and statement applies to all agency personnel at all offices:

> "Wisconsin DOT has activated an incident command system. All inquiries for more information are being handled by the information officer at our agency command center".

Only the information officer or incident commander is authorized to provide other information.

2.2.3 Bureau of Structures Actions in Incident Response

1. Document details from Regional Office RDO at time of contact.
2. Notify Bureau Director, Division Administrator, Secretary's Office & all Bureau coworkers via PCR (Public Communication Record).
3. In the event of a structure hit that compromises the ability to carry traffic, the DMV OSOW permitting unit should be notified.
4. Respond to the bridge site if requested.
    a. Determine In-house expertise for Project team.
    b. Determine if Consultant expertise is needed.
    c. Involve all available Bureau Sections in decision making.
    d. Have bridge plans available.
    e. Establish a Bureau contact for communication from Response site.

f. Select at least one other structure person to go to the bridge site.

5. Observe all safety rules at bridge site.

6. Continue to communicate with all Bureau staff.

   a. Select at least one other structure person to go to Notify Bureau Contact Person to perform required communication.

7. Document actions taken and file for future reference. Communicate to all indicated in Item #2.

2.2.4 Public Communication Record

A "Public Communication Record": (PCR) is a form filled out by DOT employees to inform upper management and other potentially interested staff of a contact that may be of interest to the recipient. The contact is normally from the Media, Legislator, Local Official or the public concerning a topic that is or could be controversial now or in the future.

Within the Bureau of Structures (BOS), the Bureau Director, Section Managers, Supervisors and Lead workers should be included in all PCRs filled out by BOS staff, along with the established list of PCR contacts found in Outlook "Global Address List" under DOT DL PCR. A copy of the PCR form (DT 33) can be found on the DOTNET at:

http://dotnet/opa/opapolicies.htm

If you are contacted by the Media, Legislator or Local Official and are not sure if you need to fill out a PCR, contact your Supervisor for their opinion. A PCR is quick and easy to do so "if in doubt fill it out" is the best approach to use.

2.3 Responsibilities of Bureau of Structures

2.3.1 Structures Design Section

- Provide guidance to Regional Offices on the preparation of various types of Structure Survey Reports.
- Assist Regional Offices making design investigation studies by providing guidance on structure costs, depths, and practical structure types for the alternate sites under consideration.
- Prepare comparative cost estimates for alternate structure types. Prepare economic studies on rehabilitation versus replacement of existing structure. Make recommendations to Regional Office or Consultant or Government Agency.
- Review and approve Consultant preliminary and final plans, evaluate hydraulic adequacy and compliance to current Standards.
- Review and approve Consultant rehabilitation proposals.
- Collect and make information available to Regional Offices for hydrology studies and new hydraulic developments by other agencies.
- Provide procedures for scour analysis of structures.
- Make field observations of the proposed site, gather additional information for hydraulic reports, and evaluate the general conditions of the site. Coordinate hydraulic impacts with DNR.
- Assemble data and prepare drawings as required by Coast Guard for permit applications to construct bridges over navigable streams. Assemble data as necessary and receive certification from the Corps of Engineers and other agencies exercising environmental control over the proposed structure improvement.
- Prepare preliminary structures plans for bridges. This includes designing, detailing, drafting, estimating, and checking as may be necessary to obtain approvals from other governmental agencies.
- Determine size and length of box culverts. Design and plot culvert plans for checking by staff.
- Distribute preliminary structure plans to Regional Offices for approval and utility contacts.
- Prepare final contract plans for bridges, box culverts and other structures which include designing, detailing, drafting, estimating and ensuring compliance with preliminary study report and Standard Specifications.

- Prepare Special Provisions for construction of bridges, box culverts, and other structures covering special items not on the contract plans or in Standard Specifications.
- Review and approve permits relating to placement of utilities on structures.
- Evaluate bridges for rehabilitation, replacement or widening and recommend the course of action. Prepare contract plans for structure rehabilitation.
- Provide design and plans for bridge damage repair, contract change orders and steel repair.
- Provide technical assistance to Regional Offices or consultants with inquiries on final plans, specifications, materials, etc. in both the design and construction phases of the project.
- Upon request review construction falsework plans for structures.
- Design and prepare plans for sign bridges, sign supports, light poles, and other sign or lighting related to structures.
- Review fabrication drawings for monotube, highmast light towers, misc. light and sign support structures as submitted by Bureau of Highway Operations (Traffic Engineering Section) or Regional Office Traffic personnel.
- Make recommendations for standard bridge details, design procedures, and new computer programs to the Structures Development Section.
- Provide design costs for structures on an as needed basis to the Regional Offices for use in negotiating consultant contracts and budgeting in-house design time on structural projects.

2.3.2 Structures Development Section

- Create and maintain plan insert sheets that detail commonly used bridge components (i.e. Parapets, Railings, Bearings, Girders and Diaphragms).
- Review and approve overweight vehicle permit requests for State Trunk Network System bridges.
- Maintain the filing system and supervise the scanning of all highway structures data.
- Maintain the Highway Structures Information System (HSIS) for transportation structures.
- Develop and maintain Bridge Management Systems.

- Evaluate, implement, and develop new transportation structures Computer Programs and maintain all computer program documentation.
- Provide technical assistance and operational procedures for Bridge Engineering Workstations, CADDS and PC applications.
- Research, evaluate, and recommend the use of new materials, design theories, and structural types. Work closely with other transportation structure agencies and manufacturers in these areas gathering relevant facts and make recommendations for improving materials or product specifications.
- Develop and maintain text and tables for the Bridge Manual and post on extranet site.
- Develop and maintain Bridge Standard details by evaluating new design and/or by revising existing procedures, materials, and specifications. Prepare design tables, graphs, or curves to assist in structures design and detail plans preparation.
- Provide structure related technical assistance to Consultants, Contractors, Counties, DOT Central Offices, and Regional Offices with an emphasis on quality improvement of materials and/or procedures.
- Initiate work plans and provide specifications for Experimental Construction Projects. Provide follow up in-service inspection and performance evaluation reporting on new materials or methods.
- Maintain the Bridge Computer Programs as they relate to analysis and design procedures, materials, and specifications.
- Maintain office facilities for computer program documentation, manual texts and technical libraries for design, research records and new products information.
- Provide technical development, guidance, or review of material specifications such as AASHTO, ACI, ASTM, AWS, etc. in areas related to transportation structures.

2.3.3 Structures Maintenance Section

- Perform complex in-depth inspection of structures
- Write in-depth inspection reports
- Perform complex emergency repairs
- Perform routine inspections with or without special equipment
- Assist in bridge repair.
- Provide bridge inspection training courses

- Manage the bridge painting program

2.4 Bridge Standards and Insert Sheets

Bridge standards are drawings which show the standard practice for details used by WisDOT. These Standards have been developed over time by input from individuals involved in design, construction and maintenance. They are applicable to most structures and should be used unless exceptions are approved by the Section Managers.

The Insert Sheets represent the Standards and are intended to be used with minimum revision for insertion in the final set of plans for construction purposes.

1. FHWA Approval of Structure Standards Process

   The following points define the working relationship between FHWA and WISDOT concerning production and adoption of Bureau of Structures (BOS) Standard Detail Drawings. These points were agreed upon at a meeting on December 17, 2002 between BOS and FHWA.

- Submittals will be sent by electronic methods in PDF format to FHWA. (For special cases with a large amount of supporting information other methods may be used as agreed to by both parties on a case by case basis).

- Generally two weeks should be sufficient to render an approval or request for additional information. (In special cases requiring input from sources outside of the Wisconsin FHWA office additional time will be requested in writing with an expected due date for a decision agreed to by both WisDOT and FHWA).

- Appropriate supporting documentation ranging from written explanations to fully detailed engineering calculations will accompany submittals. The level of support should reflect the level of review expected.

- The Structure Standards reviewed by the FHWA will be done so with respect to Federal Law, Policy and safety issues. Differing opinions on other issues will not be cause for non-approval of standards.

2.5 Structure Numbers

An official number, referred to as a structure number, is assigned to bridge structures and ancillary structures in the WisDOT right-of-way. As shown in Figure 2.5-1, structure numbers begin with a letter based on the structure type. The structure type designation is then followed by a two-digit county number, a unique four-digit structure number, and in some cases a unit number. Note: leading zeroes may be omitted from the structure number (i.e. B-5-70).

Structure numbers should be assigned to structures prior to submitting information to the Bureau of Structures for the structural design process or the plan review process. For assigning structure numbers and structure unit numbers, contact the Regional Structures Program Manager for B-Structures and the Regional Ancillary Program Manager for ancillary structures. As of 2024, the practice of assigning unit numbers to bridge structures has been discontinued. Existing bridge structures assigned unit numbers will remain in place, unless directed otherwise. Refer to the WisDOT Structures Maintenance and Inspection website for additional information.

When a structure is rehabilitated, the name plate should be preserved, if possible, and reinstalled on the rehabilitated structure. If a new name plate is required, it should show the year of original construction. The original structure number applies to all rehabilitation including widening, lengthening, superstructure replacement, etc.

The following criteria should be used when assigning structure numbers to bridge (B) and ancillary structures (C, P, S, L, R, N, or M):

- B is assigned to bridge structures (B-Structures) over 20 ft. in structure length, measured along the roadway centerline between the inside faces of abutments or exterior walls. The following should be considered when assigning structure numbers to bridges:
    - A set of nested pipes may be assigned as a bridge structure if the distance between the inside diameters of the end pipes exceeds 20 ft. and the clear distance between pipe openings is less than half the diameter of the smallest pipe.
    - Refer to the Structure Inspection Manual for measurements used to define a bridge structure.
    - Bridges on state boundary lines also have a number designated by the adjacent state. Pedestrian only bridge structures are assigned a B-Structure if they are over 20 ft in structure length and are state maintained, DNR bridges reviewed by WisDOT, or cross a roadway. Pedestrian boardwalks may be assigned a B-Structure when a clear span exceeds 20 ft. Other cases may be considered on a project-to-project basis.
    - A bridge number should not change except in very rare or unusual circumstances.
    - When any portion of the existing bridge is retained for rehabilitation or partially replaced, it will retain the existing bridge number.
    - A new number is assigned for a completely new bridge (i.e. do not retain the existing bridge number).

- Assign one bridge number to any bridge with a closed median, where the area between the two roadways on the bridge is bridged over and can support traffic sharing a common substructure unit or units. Closed medians may have either mountable or non-mountable curbs or barriers. Refer to Figure 2.5-2.
- Assign two bridge numbers to separate superstructures with an open median (not meeting the closed median criteria above) sharing a common substructure unit or units. Refer to Figure 2.5-2.
- Separate bridge numbers be reported for each mainline bridge and the ramp that connects to the mainline bridge, when the ramp has at least one distinct abutment and is greater than 20 feet in length. Separate bridge numbers are to be assigned for a bridge that divides into two or more separate bridges, or two or more bridges that merge into one single bridge. In both cases, the separating point between bridges should be the closest deck joint, or substructure unit to the separating point, or other logical and reasonable location as determined by BOS.

- In general, C is assigned to small bridge structures (C-Structures) 20 ft. or less in structure length that have a unique structural design and/or a heightened inspection interest. This includes bridge-like structures (deck girders, flat slabs, etc.), concrete box culverts with a cross-sectional opening greater than, or equal to 20 square feet, rigid frames (three-sided concrete structures), and structural plate structures (pipes, pipe arches, box culverts, etc.). Structures not meeting the bridge structure or small bridge structure criteria are then typically considered a roadway culvert as described in Facilities Development Manual (FDM) 13-1. Buried structures listed in FDM 13-1 are typically not assigned a structure number, except for closely nested pipes and structural plate structures. Refer to the Structure Inspection Manual for additional information on small bridge structures.

- P designates structures for which there are no structural plans on file.

WisDOT Policy Item:

No new P numbers will be assigned as we should always request plans.

- S is assigned to overhead sign structures and signal monotubes. Unit numbers should be assigned to signal monotubes at an intersection with multiple structures. In this case, the base structure number should be the same for all signal monotubes and the unit numbers use to designate individual structures (i.e. S-13-1421-0001, S-13-1421-0002, etc.).

- L is assigned to high mast lighting structures. High mast light structures grouped at a location, such as an interchange or rest area, should be assigned unit numbers.

- R is assigned to permanent retaining walls. For a continuous wall consisting of various wall types, such as a secant pile wall followed by a soldier pile wall, unit numbers should be assigned to each wall type segment. Wall facing discontinuities (e.g.

stairwells, staged construction, tiers, or changes to external loads) do not require unique wall numbers if the leveling pad or footing is continuous between the completed wall segments. For soldier pile walls with anchored and non-anchored segments, unique wall numbers are not required for each segment.

Cast-in-place walls being utilized strictly as bridge abutment or box culvert wings do not require R numbers as they are considered part of the structure.

Retaining walls whose height exceeds the below criteria require R numbers:

- Proprietary retaining walls (e.g., modular block MSE walls)
  - MSE walls having a maximum height of less than 5.5 ft. measured from the bottom of wall or top of leveling pad to top of wall are deemed to be "minor retaining walls" and do not require an R number. Refer to FDM 11-55-5.2 for more information.
  - Modular block gravity walls having a maximum height of less than 4.0 ft. measured from the bottom of wall or top of leveling pad to top of wall are deemed to be "minor retaining walls" and do not require an R number. Refer to FDM 11-55-5.2 for more information.
- Non-proprietary walls (e.g., sheet pile walls, cast-in-place walls):

Walls having an exposed height of less than 5.5 ft. measured from the plan ground line to top of wall may require an R number based on specific project features. Designer to contact the Bureau of Structures region liaison for more information.

- N is assigned to noise barriers. Unit numbers may be assigned to long barriers or complex interchanges where it is desirable to have only one structure number for the site. Unit numbers should also be used if a continuous noise barrier is supported by different structure type (e.g. ground mounted or structure mounted).

  M is assigned to miscellaneous structures where it is desirable to have a structure plan record while not meeting the above-mentioned structure assigned criteria.

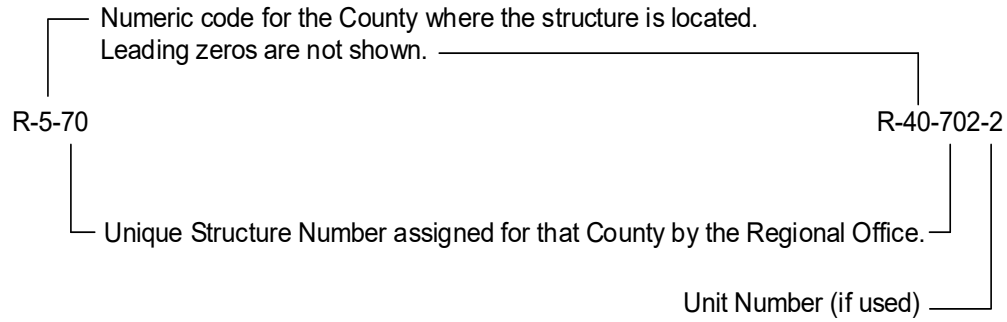
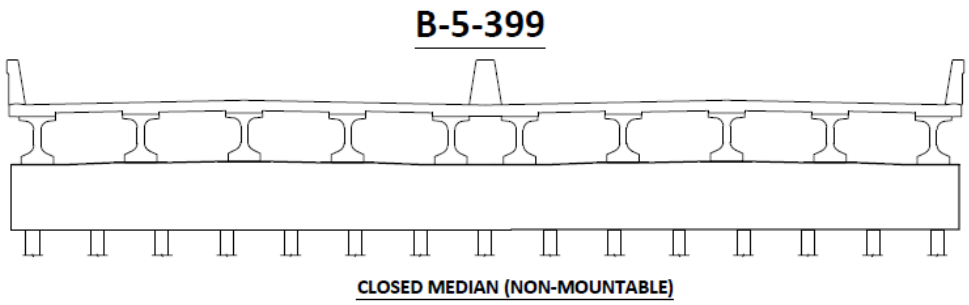
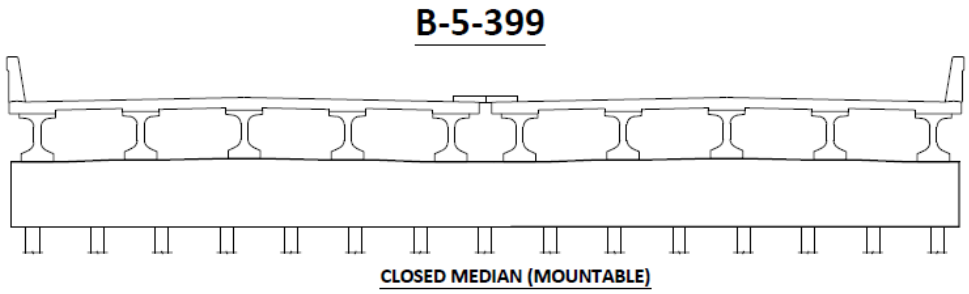


Figure 2.5-1
Structure Number Detail





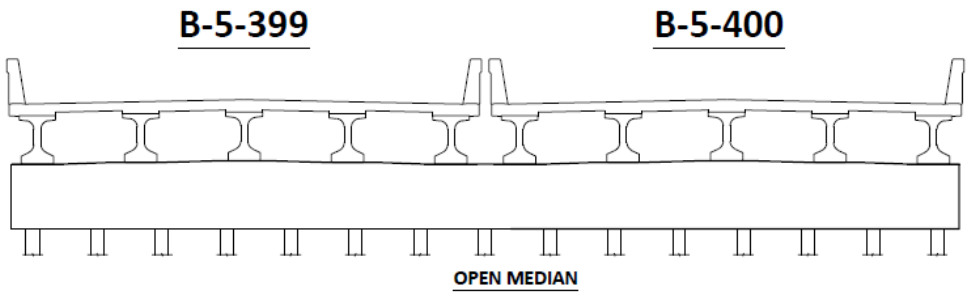


Figure 2.5-2
Structure Numbers for Closed and Open Medians

2.6 Bridge Files

Records and information useful in bridge planning and design are kept in appropriate places. Following is a brief summary of the various types of files, their contents and location. The data is arranged in alphabetical order for quick reference.

		Location	Agency
Bridge Cost Analysis		Structures Design	BOS
National Bridge Inventory Data			
	Information coded for the electronic computer file.	Structures Development	BOS
Catalogues		Structures Development	BOS
	Manufacturers' Product Files		
	Research Files and Technical Items		
Civil, Mechanical and Electrical Technical Reference Books			
Design Calculations			
	After project is completed, the design calculations are filed in a folder until they are digitized.	Bridge Files, Microfilm or in HSIS	BOS
Engineers' Estimates		----------	BPD
FHWA Program Manual		----------	BOS
Log of Test Borings		Geotechnical Section	BTS
	Records of all borings.		
	Borings for each bridge are kept in Bridge Folder or on microfilm.		
Manuals		Structures Development	BOS
Bridge Manual, Computer, Construction and Materials Manual, Design Manual, Maintenance Manual and Transportation Administrative Manual			
Maps		Structures Design	BOS
	Geological Maps, National Forests		
	Navigation Charts, Rivers-Harbors		
	State Park, Topographic, Historical		
Maps		Structures Development	BOS

	City-Village-Town (CVT) Maps showing location of bridges.		
Payment estimates to Contractors		----------	BPD
ASTM Specifications		Structures Development	BOS
Plans		----------	BOS
As built. All plans are digitized.		Structures Development	BOS
	Bridge Plans: Plans of structures designed but not yet advertised are in files.	----------	BOS
Shop Plans of Active Steel Projects		Metals Fabrication and Inspection Unit	BOS
Records (Accounting)			
	Bridge Standards: Documentation for Standards and Bridge Manual	Structures Development	BOS
	Rainfall and Runoff Data	Structures Design	BOS
	Bids on Individual Items	_____	BPD
Reports			
	Bridge Maintenance Reports	Structures Maintenance	BOS
	Federal Highway Experimental Project Reports	Structures Development	BOS
	Foundation Reports	Geotechnical Section	BTS
	Preliminary Reports: Contains Information necessary for Design of Structures.	----------	Region
	Research Reports	Structures Development	BOS
Special Provisions of Active Projects		----------	BOS
Specifications		Structures Development	BOS
	AASHTO, ACI, AWS, AREMA, AISC, CRSI, PTI, SSPC, etc.		
Survey Notes		----------	Region
Text Books on Foundations, Structures and Bridge Design		Structures Development	BOS

Bureau Legend:

BOS - Bureau of Structures

BPD - Bureau of Project Development

BTS - Bureau of Technical Services

2.7 Contracts

Contracts are administered by construction personnel in the Regional Office where the project is located. The Bureau of Project Development coordinates the activities of the Regional Offices.

The contract contains the plans, specifications, supplemental specifications where applicable and special provisions where applicable. These parts of the contract are intended to be cooperative. In the event of a discrepancy, the Standard Specifications gives the priority part to be used.

2.8 Special Provisions

Special provisions are required for some projects to give special directions or requirements that are not otherwise satisfactorily detailed or prescribed in the standard specifications. Following are some of the principal functions of the special provisions:

1. Supplement the Standard Specifications by setting forth requirements which are not adequately covered, for the proposed project, by the Standard Specifications.

2. Alter the requirements of the Standard Specifications where such requirements are not appropriate for the proposed work.

3. Supplement the plans with verbal requirements where such requirements are too lengthy to be shown on the plans.

4. Call the bidder's attention to any unusual conditions, regulations or laws affecting the work.

5. For experimental use of a new material or system such as paint systems not covered in the Standard Specifications.

When preparing the special provisions for any project, the writer must visualize the project from the standpoint of the problems that may occur during construction.

Special provisions are generally written for a specific project or structure, however several “standard” bridge special provisions are available on-line at the Structures Design Information site:

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/special-provisions.aspx

These special provisions may require modification to accurately reflect the requirements of individual projects or structures.

2.9 Terminology

AASHTO	American Association of State Highway and Transportation Officials.
ABUTMENT	Supports at the end of the bridge used to retain the approach embankment and carry the vertical and horizontal loads from the superstructure.
ACI	American Concrete Institute.
AISC	American Institute of Steel Construction.
Allowable Headwater	The maximum elevation to which water may be ponded upstream of a culvert or structure as specified by law or design.
Anchor Bolts	Bolts that are embedded in concrete which are used to attach an object to the concrete such as rail posts, bearings, etc.
ANSI	American National Standards Institute.
Apron	The paved area between wingwalls at the end of a culvert.
ASTM	American Society for Testing Materials.
ADT	Average Daily Traffic
Award	The decision to accept the proposal of the lowest responsible bidder for the specified work, subject to the execution and approval of a satisfactory contract bond and other conditions as may be specified or required by law.
AWS	American Welding Society.
Backfill	Fill materials placed between structural elements and existing embankment.
Backwater	An unnaturally high stage in a stream caused by obstruction of flow, as by a dam, a levee, or a bridge opening. Its measure is the excess of unnatural over natural stage. A back up of water due to a restriction.
Bar Chair	A device used to support horizontal reinforcing bars above the base of the form before the concrete is poured.
Bar Cutting Diagram	A diagram used in the detailing of bar steel reinforcement where the bar lengths vary as a straight line.
Base Course	The layer of specified material of designed thickness placed on a subbase or a subgrade to support a surface course.
Batter Pile	A pile that is purposely driven at an angle with vertical.
Bearings	Device to transfer girder reactions without overstressing the supports, insuring the bridge functions as intended. (See Fixed Bearings and Expansion Bearings).
Bearing Stiffener	A stiffener used at points of support on a steel beam to transmit the load from the top of the beam to the support point.
Bedrock	The solid rock underlying soils or other superficial formation.
Bench Mark	A relatively permanent object bearing a marked point whose elevation above or below an adopted datum is known.
Blocking Diagram	A diagram which shows the distance from a horizontal line to all significant points on a girder as it will be during erection.

Bridge	A structure having a span of more than 20 ft. from face to face of abutments, measured along the roadway centerline.
Bridge Approach	Includes the embankment materials and surface pavements that provide the transition between bridges and roadways.
Bushings	A lining used to reduce friction and/or insulate mating surfaces usually on steel hanger plate bearings.
Butt Splice	A splice where the ends of two adjoining pieces of metal in the same plane are fastened together by welding.
CADDS	Computer Aided Design and Drafting System.
Caisson	A watertight box of wood or steel sheeting; or a cylinder of steel and concrete, used for the purpose of making an excavation. Caissons may be either open (open to free air) or pneumatic (under compressed air).
Camber	A slight vertical curvature built into a structural member to allow for deflection and/or vertical grade.
Cathodic Protection	A method of protecting steel in concrete by impressing direct current via anodes thus making the bar steel cathodically protected.
Causeway	A raised road across wet or marshy ground or across water.
Change Order	A written order to the Contractor, signed by the Engineer, ordering a change in the work from that originally shown by the Plans and Specifications that has been found necessary. If the work is of a nature involving an adjustment or unit price, a Supplemental Agreement shall be executed. Change orders duly signed and executed by the Contractor constitute authorized modifications of the Contract.
City and Village Streets	City and Village streets are the public thoroughfares within the boundaries of incorporated municipalities. They are improved and maintained under the jurisdiction of the respective city and village authorities that constitute the local governing bodies. A few city and village streets are eligible for federal aid.
Cofferdam	A barrier built in the water so as to form an enclosure from which the water is pumped to permit free access to the area within.
Composite Section	Two sections made of the same or different materials together to act as one integral section; such as a concrete slab on a steel or prestressed girder.
Compression Seals	A preformed, compartmented, elastomeric (neoprene) device, which is capable of constantly maintaining a compressive force against the joint interfaces in which it is inserted.
Concrete Overlay	1 1/2” to 2” of concrete placed on top of the deck, used to extend the life of the deck and provide a good riding surface.
Construction Limits	The Stations at which construction begins and ends.
Contract Time	The number of calendar days shown in the proposal which is allowed for completion of the work.

Contraction Joint	A joint in concrete that does not provide for expansion but allows for contraction or shrinkage by the opening up of a crack or joint.
Coordinates	Linear or angular dimensions designating the position of a point in relation to a given reference frame. In Wisconsin it refers to the State Plane Coordinate System.
County Trunk Highway System	The County Trunk Highway System, established in 1925, which forms the secondary system of highways within the State, constitutes the interconnecting highways of the State Trunk System, and is made up mainly of highways secondary in traffic importance. It consists generally of highways of local service and is improved and maintained by the 72 county boards, which constitute the local governing authorities. Many county trunks are eligible for federal aid.
Creep	Time dependent inelastic deformation under elastic loading of concrete or steel resulting solely from the presence of stress.
Cross Bracing	Bracing used between stringers and girders to hold them in place and stiffen the structure.
Culvert	A structure not classified as a bridge having a span of 20 ft. or less spanning a watercourse or other opening on a public highway.
Curb	A vertical or sloping member along the edge of a pavement or shoulder forming part of a gutter, strengthening or protecting the edge, and clearly defining the edge of vehicle operators. The surface of the curb facing the general direction of the pavement is called the "face".
Cut-Off-Wall	A wall built at the end of a culvert apron to prevent the undermining of the apron.
Dead Load	The weight of the materials used to build the structure including parapets, utilities and future wearing surface on deck.
Deadman	A concrete mass, buried in the earth behind a structure, that is used as an anchor for a rod or cable to resist horizontal forces that act on the structure.
Deck Structure	A structure that has its floor resting on top of all the main stress carrying members.
Deflection Joint	A joint placed in the parapets of bridges to prevent cracking of the parapet due to deflection of the superstructures.
Design Volume	A volume determined for use in design representing traffic expected to use the highway. Unless otherwise stated, it is an hourly volume.
DHV	Design hourly volume.
Diaphragm	A structural member used to tie adjoining girders together and stiffen them in a lateral direction as well as distribute loads.
Dolphins	A group of piles or sheet piling driven adjacent to a pier. Their purpose is to prevent extensive damage or possible collapse of a pier from a collision with a ship or barge.

Draped Strands	Strand pattern for prestressing strands, where strands are draped at the ends of the girder to decrease the prestressing stress where the applied moments are small.
Drift Pin	A metal pin, tapered at both ends, used to draw members of a steel structure together by being driven through the corresponding bolt holes.
Drip Groove	A groove formed into the underside of a projecting sill or coping to prevent water from following around the projection and reaching the face of the wall.
Dummy Joint	A groove in the surface of a concrete structure that resembles a joint but does not go all the way through. It provides a plane of weakness, and is used to ensure that any cracks that occur will be in a straight line.
Epoxy Coated Rebar	Bar steel reinforcement coated with a powdered epoxy resin to prevent corrosion of the bar steel.
Expansion Bearings	Bearings that allow longitudinal movement of the superstructure relative to the substructure and rotation of the superstructure relative to the substructure.
Expansion Device	A device placed at expansion points in bridge superstructures to carry the vertical bridge loads without preventing longitudinal movement.
Expansion Joint	An expansion device in concrete that allows expansion due to temperature changes, thereby preventing damage to the slabs.
Filler Plate	A steel plate or shim used to filling in space between compression members.
Fixed Bearings	Bearings that do not provide for any longitudinal movement of the superstructure relative to the substructure, but allows for rotation of the superstructure relative to the substructure.
Flat Slab	A reinforced concrete superstructure that has a uniform depth throughout.
Floor Beam	A transverse structural member that extends from truss to truss or from girder to girder across the bridge.
Fracture Critical Members	Steel tension members or steel tension components of members whose failure would probably cause a portion of or the entire bridge to collapse.
Fracture Mechanics	Study of crack growth in materials.
GVW	Gross vehicle weight which is the total weight of basic truck, body and related payload.
Geotextiles	Sheets of woven or nonwoven synthetic polymers or nylon used for drainage and soil stabilization.
Girder	Main longitudinal load carrying member in a structure.
Grade Separation	A crossing of two highways, or a highway and a railroad, at different levels.
Grid Floors	Prefabricated steel grids set on girders and/or stringers provide the roadway surface, generally on moveable highway structures.

Hammerhead Pier	A pier which has only one column with a cantilever cap and is somewhat similar to the shape of a hammer.
Hanger Plate	A steel plate which connects the pins at hinge points thus transmitting the load through the hinge.
Haunch	An increase in depth of a structural member usually at points of intermediate support.
Haunched Slab	A reinforced concrete superstructure that is haunched (has an increased depth) at the intermediate supports.
Hinge	A device used to hold the ends of two adjoining girders together, but allowing for longitudinal movement of the superstructure.
Hinged Bearing	At hinge location along a girder, where forces from supported member are transferred to supporting member by a bearing (See Std. 24.8).
Hold down Device	A device used on bridge abutments to prevent girders from lifting off their bearings as a result of the passage of live load over the bridge.
Hybrid Girder	A steel plate girder with the web steel having a lower yield strength than the steel in one or both flanges.
Inlet Control	The case where the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and the entrance geometry, including barrel shape, cross sectional area, and inlet edge.
Intermediate Stiffener	A vertical transverse steel member used to stiffen the webs of plate girders between points of supports.
Jetting	Forcing water into holes in an embankment to settle or compact the earth.
Laminated Elastomeric Bearing	A bearing device constructed from elastomer layers restraining at their interfaces by integrally bonded steel or fabric reinforcement. Its purpose is to transmit loads and accommodate movements between a bridge and its supporting structure.
Lateral Bracing	Bracing placed in a horizontal plane between steel girders near the bottom and/or top flanges.
Leads	The vertical members of a pile driver that steady the hammer and pile during the driving.
Liquid Penetrant Inspection	Nondestructive testing method that reveals surface discontinuities by the bleedout of a penetrating medium against a contrasting colored background.
Live Load	For highway structures AASHTO truck or lane loadings. The weight of moving loads.
LRFD	Load Resistance Factor Design.
Longitudinal Stiffener	A longitudinal steel plate (parallel to girder flanges) used to stiffen the webs of welded plate girders.
Low Relaxation Strands	Prestressing tendons which are manufactured by subjecting the strands to heat treatment and tensioning causing a permanent elongation. This increases the strand yield strength and reduces strand relaxation under constant tensile stress.

Low Slump Concrete	Grade "E" concrete, used for concrete masonry overlays and repairs on decks.
Mag Particle Inspection	Nondestructive testing method that is used primarily to discover surface discontinuities in ferro magnetic materials by applying dry magnetic particles to a weld area or surface area that has been suitably magnetized.
Modular Exp. Joints	Multiple, watertight units placed on structures requiring expansion movements greater than 4”.
Mud Sill	A timber platform laid on earth as a support for vertical members or bridge falsework.
NCHRP	National Cooperative Highway Research Program.
Negative Moment	The moment causing tension in the top fibers and compression in the bottom fibers of a structural member.
Negative Reinforcement	Reinforcement placed in concrete to resist negative bending moments.
Non-Redundant Structure	Type of structure with single load path, where a single fracture in a member can lead to the collapse of the structure.
Oil Well Pipe Pile	High quality pipe used in oil industry drilling operations that may be used as an alternate to HP piling.
Outlet Control	The case where the discharge capacity of a culvert is controlled by the elevation of the tailwater in the outlet channel and the slope, roughness, and length of the culvert barrel, in addition to the cross sectional area and inlet geometrics.
P S & E	Literally plans, specifications, and estimates. Usually it refers to the time when the plans, specifications, and estimates on a project have been completed and referred to FHWA for approval. When the P S & E have been approved, the project goes from the preliminary engineering phase to the construction phase.
Parapet	A masonry barrier designed and placed to protect traffic from falling over the edge of a bridge, or in some cases, from crossing lanes of traffic traveling in opposite directions.
Pier	Intermediate substructure unit of a bridge.
Pile	A long, slender piece of wood, concrete, or metal to be driven or jetted into the earth or river bed to serve as a support or protection.
Pile Bent	A pier where the piles are extended to the pier cap to support the structure.
Pile Cap	A slab, usually of reinforced concrete, covering the tops of a group of piles for the purpose of tying them together and transmitting to them as a group the load of the structure which they are to carry.
Pile Foot	The lower extremity of a pile.
Pile Head	The top of a pile.
Pile Points	Metal tip fastened to the lower end of pile to protect it when the driving is hard.
Pin Plate	A steel plate attached to the web plate of girders at hinge points to strengthen the web plate of girders at the hinge locations.

Positive Moment	The moment causing compression in the top fibers and tension in the bottom fibers in a structural member.
Post-Tensioned	Method of prestressing in which the tendon is tensioned after the concrete has cured.
Prestress Camber	The deflection in prestressed girders (usually upward) due to the application of the prestressing force.
Prestressed Concrete	Concrete in which there have been introduced internal stresses of such magnitude and distribution that the stresses resulting from given external loadings are counteracted to a desired degree. In reinforced-concrete members the prestress is commonly introduced by tensioning the steel reinforcement.
Pretensioned	Any method of prestressing in which the strands are tensioned before the concrete is placed.
Radiographic Inspection	Nondestructive testing method where gamma rays or X rays pass thru the object and cast an image of the internal structure onto a sheet of film as the result of density changes.
Redundant Structure	Type of structure with multi-load paths where a single fracture in a member cannot lead to the collapse of the structure.
Reflection Crack	A crack appearing in a resurface or overlay caused by movement at joints or cracks in underlying base or surface.
Residual Camber	Camber due to the prestressing force minus the deadload deflection of the girder.
RIPRAP	A facing of stone used to prevent erosion. It is usually dumped into place, but is occasionally placed by hand.
Rolled Girder Structure	A structure which has a rolled steel beam as the main stress carrying member.
Roughometer	A wheeled instrument used for testing riding qualities or road surfaces.
S.S.P.C.	Steel Structures Painting Council.
Semi-Retaining Abutment	An abutment used for retaining part of the back-fill of the roadway as well as supporting the end of the bridge.
Semi-Through Structure	A structure that has no overhead bracing, but the main stress carrying members project above the floor level.
Shear Connector	A connector used to join cast-in-place concrete to a steel section and to resist the shear at the connection.
Sheet Pile	A pile made of flat or arched cross section to be driven into the ground and meshed or interlocked with like members to form a wall, or bulkhead.
Shoulders	The portions of the roadway between the traveled way and the inside edges of slopes of ditches or fills, exclusive of auxiliary lanes, curbs, and gutters.
Shrinkage	Contraction of concrete due to drying and chemical changes, dependent on time.
Sill Abutment	A shallow concrete masonry abutment generally about 5 feet deep.
Simple Spans	Spans with the main stress carrying members non-continuous, or broken, at the intermediate supports.

Skew or Skew Angle	The acute angle formed by the intersection of a line normal to the centerline of the roadway with a line parallel to the face of the abutments or piers, or in the case of culverts with the centerline of the culverts. Left hand forward skew indicates that, look up station, the left side of the structure is further up station than the right hand side. Right hand skew indicates that the right side of structure is further up station than the left side.
Slope	The degree of inclination to the horizontal. Usually expressed as a ratio, such as 1:25 or 1 of 25, indicating 1 unit rise in 25 units of horizontal distance.
Slope Paving	Paving placed on the slope in front of abutment under a bridge to prevent soil erosion and sliding.
Spandrel	The area between the roadway and the arch in the side view of an arch bridge.
Special Provisions	Special directions and requirements that are prepared for the project under consideration and made a part of the contract.
Specifications	The body of directions, provisions, and requirements contained herein, together with written agreements and all documents of any description, made or to be made, pertaining to the method or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract.
Spread Footing	A footing that is supported directly by soil or rock.
Spur Dike	A wall or mound built or extended out from the upstream side of an abutment used to train the stream flow to prevent erosion of stream bank. May also be used where there is no bridge, but the stream flows along the side of highway embankment.
Stainless Steel Teflon Bearings	Incorporates stainless steel and Teflon with steel to provide the necessary expansion movement.
State Plane Coordinates	The plane-rectangular coordinate system established by the United States Coast and Geodetic Survey. The plane coordinate system in Wisconsin is based on the Lambert conformal conic projection. Plane coordinates are used to locate geographic position.
State Trunk Highway Network	The system of highways heretofore selected and laid out by the Legislature and special legislative committees and by the Commission, and as revised, altered and changed by the Commission, including temporary routes designated by the Commission, the portions of the Interstate Highway System within the state, and routes adopted by the American Association of State Highway Officials as part of the U.S. Numbered Route System.
Stirrup	Vertical U-shaped or rectangular shaped bars placed in concrete beams to resist the shearing stresses in the beam.
Strip Seal Joint	Molded neoprene glands inserted and mechanically locked between armored interfaces of extruded steel sections.
Substructure	All of that part of the structure below the bridge seats or below the skewbacks of arches, or below the tops of the caps of piling or

	framed trestles, except that the wingwalls and parapets of abutments shall be considered as part of the substructure.
Superstructure	That part of the structure above the bridge seats, or above the skewbacks of arches, or above the tops of the caps of piling or framed trestles, including the flooring, but excluding wing walls and parapets of abutments (See substructures).
Supplemental Specifications	Specifications adopted subsequent to the publication of these specifications. They generally involve new construction items or substantial changes in the approved specifications. Supplemental specifications prevail over those published whenever in conflict therewith.
Surcharge	Any load that causes thrust on a retaining wall, other than backfill to the level of the top of the wall.
TRB	Transportation Research Board.
Temporary Hold down Device	A device used at the ends of steel bridges where the slab pour terminates to prevent the girders from lifting off the abutment bridge seats during the pouring of the concrete deck.
Tendon	A name for prestressed reinforcing element whether wires, bars, or strands.
Through Structure	A structure that has its floor connected to the lower portion of the main stress-carrying members, so that the bracing goes over the traffic. A structure whose main supporting members project above the deck or surface.
Tining	Used on finished concrete deck or slab surfaces to provide friction and reduce hydroplaning.
Town Road System	The town road system, or tertiary system of highways within the state, has been improved or maintained under the jurisdiction of the town boards, which are the local governing bodies. Some of the town roads are eligible for federal aid.
Transfer Stresses	In pretensioned prestressed concrete members the stresses that take place at the release of prestress from the bulkheads.
Ultrasonic Inspection	A non-destructive inspection process where by an ultra-high frequency sound wave induced into a material is picked up in reflection from any interface or boundary.
Unbonded Strands	Strands so coated as to prevent their forming a bond with surrounding concrete. Used to reduce stress at the ends of a member.
Underpinning	The adding of new permanent support to existing foundations, to provide either additional capacity or additional depth.
Uplift	A force tending to raise a structure or part of a structure and usually caused by wind and/or eccentric loads, or the passage of live-load over the structure.
Waterproofing Members	Impervious asphaltic sheets overlaid with bituminous concrete to protect decks from the infiltration of chlorides and resulting deterioration.

Wearing Surface	The top layer of a pavement designed to provide a surface resistant to traffic abrasion.
Weep Hole	A drain hole through a wall to prevent the building up of hydraulic pressure behind the wall.
Weir	A dam across a stream for diverting or measuring the flow.
Weld Inspection	Covers the process, written procedure, and welding in process. Post weld heat maintenance if required, post weld visual inspection and non-destructive testing as specified in contract and Standard Specifications.
Welded Wire Fabric	A two-way reinforcement system, fabricated from cold-drawn steel wire, having parallel longitudinal wires welded at regular intervals to parallel transverse wires and conforming to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", AASHTO.
Well-Graded	An aggregate possessing proportionate distribution of successive particle sizes.
Wingwall	A wall attached to the abutments of bridges or box culverts retaining the backfill of the roadway. The sloping retaining walls on each side of the center part of a bridge abutment.

Table 2.9-1
Terminology

2.10 WisDOT Bridge History

Prior to the early 1950's, structure types on Wisconsin State Highways were predominantly reinforced concrete slabs and steel girders or trusses with reinforced concrete decks. Also, timber structures were used at a number of county and town road sites. In 1952, the first prestressed concrete voided slab sections were cast and erected incorporating transverse post-tensioning. In 1956, the first prestressed concrete "I" girders were designed and precast. After field setting, these prestressed girders were post-tensioned and completed with an integral cast-in-place reinforced concrete deck. During the mid-1950's and early 1960's, prestressed concrete "I" and steel girder structures were made continuous and incorporated composite designs for carrying live loads.

In 1971, the first cable-stayed bridge in the United States, a three span pedestrian structure, was constructed in Menomonee Falls.

2.10.1 Unique Structures

Structure Type	Bridge Number	Year Constructed	(feet) Span Configuration
Steel Rigid Frames	B-40-48 - Milwaukee	1959	45.3, 168.5, 46.3
Steel Rigid Frames	B-56-47/48* - Mirror Lake	1961	50.6, 22.0, 49.4
Overhead Timber Truss	B-22-50* - Cassville	1962	48.0
Arch Truss	B-16-5 - Superior	1961	270.0, 600.1, 270.0
Tied Arches	B-9-87* - Cornell	1971	485.0
Tied Arches	B-12-27* - Prairie du Chien	1974	462.0
Tied Arches	B-40-400 - Milwaukee	1974	270.0, 600.0, 270.0
Tied Arches	B-5-158* - Green Bay	1980	450.1
Tied Arches	B-22-60 - Dubuque, IA	1982	670.0
Tied Arches	B-16-38* - Superior	1984	500.0
Prestressed “I” Girders with Cantilever	B-40-524* - Milwaukee	1985	112.0, 69.0, 107.8, 383.5 Spans with 25’ Cantilevers
Prestressed Strutted Arches	B-40-603 - Milwaukee	1992	8-158.0 Strutted Arch Spans
Tied Arches	B-32-202* - La Crosse	2004	475.0

Table 2.10-1
Unique Structures

* Designed in the Wisconsin Department of Transportation Bureau of Structures.