Washington State
Department of Transportation

TECHNICAL MANUAL

Washington State Bridge Inspection Manual

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Foreword

The Washington State *Bridge Inspection Manual* is the result of a team effort by the Bridge Inspection Committee, a team represented by WSDOT Bridge and TransAid, the cities and counties of Washington, and FHWA. This manual is the second edition written to guide inspectors through inspection and inventory coding of bridges. It replaces the Local Agency Bridge Inspection Manual.

This manual represents several years of effort to bring consistency to our bridge condition inspection techniques and to reporting the results of those inspections. Washington State has always been a leader in the condition inspection of bridges and management of bridge replacement/ rehabilitation programs.

This manual will assist us in improving our management of bridges by defining elements requiring maintenance, repair, rehabilitation, or replacement. This will help place our resources into programs that can extend the life of our bridges until replacement is dictated by economics. This is the goral of a good bridge management system and is the direction Washington State wants to proceed.

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Contents

Foreword i

Bridge Inspection Committee Members ii

Comment Request Form iii

Introduction xi

History xi

Purpose xiii

Revisions xiii

Chapter 1 Bridge Inspection Program Requirements 1-1

1.01 General 1-1

A. Definitions 1-1

B. Bridge Program Responsibilities 1-2

1.02 Bridge Inspection Organization 1-2

A. Program Manager 1-2

B. Team Leader 1-3

C. Assistant Inspector 1-3

1.03 Bridge Inventory 1-3

1.04 Inspection Frequency 1-4

1.05 Inspection Types 1-4

A. Inventory Inspection 1-5

B. Routine Inspection 1-5

C. Fracture Critical Member Inspection 1-5

D. Underwater Inspection 1-5

E. Special Feature Inspection of Complex Bridges 1-5

F. Other Inspections 1-6

1.07 Load Rating 1-6

1.08 Scour Evaluation 1-7

1.09 Bridge Records 1-7

1.10 Quality Assurance 1-8

A. FHWA's Role 1-8

B. WSDOT's Role for State Inspected Bridges 1-8

C. WSDOT's Role for Bridges Inspected by a Local Agency 1-8

Chapter 2 Bridge Inventory Coding Guide 2-1

2.01 General 2-1

2.02 WSBIS Inventory Report 2-2
- A. Control Fields 2-2
- B. Card Indicator Boxes 2-3
- C. Data Display Fields 2-3
- D. Error Reporting 2-3

2.03 Coding Procedures 2-3
- A. Establishing/Reestablishing the Inventory Record 2-4
- B. Updating the Inventory 2-6
- C. Deleting/Transferring the Inventory Record 2-7
- D. Type of Records 2-8

2.04 Inventory Coding Fields 2-8

2.05 Edit Process 2-127
- A. Valid Range Edits 2-127
- B. Fatal Field Edits 2-127
- C. Dependency Edits 2-127
- D. Logical Edits 2-128

2.06 Error Codes 2-128

Appendix
- 2-A Half Bridges 2-A-1

Forms
- WSBIS Inventory Coding Form
- Washington State Legislative Districts Map

Chapter 3 Inspections and Reports 3-1

3.01 General 3-1

3.02 Office Planning and Preparations 3-2

3.03 Inspection Equipment and Tools 3-2

3.04 Bridge Inspections 3-2

3.05 Types of Inspections and Reporting 3-5
- A. Inventory 3-5
- B. Routine 3-6
- C. Fracture Critical 3-11
- D. Underwater Inspections 3-20
- E. Special Features 3-23
- F. Other Inspections 3-25

3.06 Appendixes 3-30

3.07 Forms 3-30

Appendix
3.06-A WSDOT Bridge Preservation Inspection Guidelines 3.06-A-1
3.06-B UBIT Owners 3.06-B-1
3.06-C Example Underwater Inspection Report 3.06-C-1
3.06-D Example Fracture Critical Report & Procedures 3.06-D-1
3.07 WSDOT FORMS 3.07-1

Forms
Bridge Inspection Report
Inspection Report (Supplemental Form)
WSBIS Inventory Record
Inventory Report
Scour Field Evaluation
Underwater Inspection Report
Daily Site Dive Log
Fracture Critical Inspection Report
Prestressed Concrete Damage Report and Steel Damage Report
Fall Protection Plan
Emergency Action Plan
Lead Exposure Control Work Plan
Respirator Record
Confined Space Entry and Hot Work Permit

Chapter 4 Bridge Management System 4-1
4.0 Bridge Management System Introduction 4-1
4.1 Bridge Decks 4-5
4.2 Superstructure 4-11
4.3 Substructure 4-34
4.4 Culverts 4-46
4.5 Tunnels 4-48
4.6 Sidewalk and Supports 4-49
4.7 Bearings 4-51
4.8 Bridge Rail 4-54
4.9 Pedestrian Rail 4-55
4.10 Smart Flags 4-56
4.11 Seismic Restrainers 4-59
4.12 Expansion Joint BMS 4-61
4.13 Movable Bridges 4-70
4.14 Other Bridge Elements 4-70
4.15 Bridge Deck Overlays 4-73
4.16 Protective Coatings 4-73

Chapter 5 Bridge Analysis 5-1
5.01 General 5-1
5.02 Bridge Load Rating Revision Criteria 5-3
5.03 Scour Evaluation 5-5
A. Determining Susceptibility to Scour 5-5
B. Action Plans for Scour Critical Bridges 5-5
C. Recording Bridge Scour Information 5-7
5.06 Bridge Sufficiency Rating 5-9

Chapter 6 Special Reports — Damage and Repairs 6-1
6.01 General 6-1
6.02 Critical Damage - Bridge Repair Report 6-1
6.03 Routine Bridge Repairs 6-5
6.04 Maintenance - Bridge Repair Report 6-8
Forms
Critical Damage - Bridge Repair Report
Maintenance - Bridge Repair Report
Local Agency – Sample Bridge Repair Form

Chapter 7 Short Span Bridges 7-1
7.01 General 7-1
7.02 Criteria 7-1
A. Short Span Bridges Inspected 7-2
B. Short Span Bridges Not Inspected 7-2
7.03 Inspections 7-2
7.04 Bridge Files 7-3
7.05 Reporting 7-3
Appendix
7-A Bridge with Fill on Deck 7-A-1
7-B Bridge with No Fill on Deck 7-B-1
7-C Culvert with Fill on Deck 7-C-1

History

On December 15, 1967, as holiday and rush hour traffic streamed across the Silver Bridge between Ohio and West Virginia, it collapsed and sent 46 people tumbling to their deaths in the freezing Ohio River. This tragic loss of so many lives focused national attention on the condition of the nation's bridges. In response to that tragedy, the Federal Highway Administration (FHWA) issued the National Bridge Inspection Standards (NBIS).

The NBIS, published April 27, 1971, established a program for regular, comprehensive inspection of all federal highway system bridges. Minimum qualifications were set forth for bridge inspectors, specific types and frequencies for bridge inspection were established, and the reporting of certain standard information about each bridge was required. In 1978, these requirements were extended to all public bridges carrying vehicular traffic.

A national bridge inspection program has been in place ever since, and state and local agencies have performed bridge inspections in accordance with these guidelines. Because these guidelines remained constant for many years with only minor changes, the bridge inspectors in many states became accustomed to certain methods and procedures and developed a certain complacency. In l987, when the Office of the Inspector General (OIG) conducted a review of the national bridge inspection programs in six states, a number of shortcomings were found. A report, issued in January 1988, summarized the findings as follows:

- Inadequate or nonexistent underwater inspections were being performed.
- Inadequate supervision was being provided for bridge inspectors.
- Written inspection procedures were often not available or were not followed.
- Bridge inspection teams were not periodically reviewed to monitor their compliance with bridge inspection procedures.
- Bridge inventory files were incomplete, lacking such things as photos, completed reports, or history of maintenance activities.
- Proper equipment was not being used to perform bridge inspections so that some bridge elements were not completely inspected.
- Action was not always taken to correct problems or deficiencies identified during an inspection.
- Load rating calculations were not made for all bridges.
- Bridge inspectors did not always meet NBIS requirements.

These findings brought to light a need to improve and enhance the bridge inspection programs in each state. As a result, in August 1988, FHWA issued revisions to the NBIS.

The principal areas changed are listed below.

- An alternate means for bridge inspectors to meet the minimum education and experience requirement was added.
- A means to petition for approval of inspection intervals of up to once every four years was included for certain bridges.
- A requirement to inspect the underwater portions of a bridge which cannot be visually inspected at low water was added. In addition, a requirement to conduct a scour evaluation of bridge piers founded on erodible soils was included.
- A requirement was added to identify and inspect the fracture critical members on a bridge (those members whose failure could cause a portion of or the entire bridge to collapse).
- A requirement was added to inspect all unique elements of a bridge warranting special attention or requiring special equipment to be inspected (i.e., Under Bridge Inspection Truck (UBIT)).
- A requirement was added to develop a master list containing information on each bridge having underwater elements, fracture critical members, or requiring special equipment or procedures to be inspected.
- A requirement was added that load ratings must be determined (in accordance with AASHTO guidelines) for **all** bridges and those bridges not meeting minimum load requirements must be posted.
- The depth and scope of inventory information that must be maintained about each bridge was expanded. In addition, prompt reporting, of any changes in the inventory information, to FHWA is required.
- A requirement to submit formal recommendations for major bridge repair and to ensure that such repairs are accomplished was added.

The effect of these additional requirements on state and local bridge inspection programs was significant, changing the way inspections are performed:

- in the level of information gathered about each bridge,
- in the degree of expertise needed to perform each inspection,
- in the types of tools and equipment required,
- procedures for conducting entirely new types of inspections.

Purpose

The *Local Agency Bridge Inspection Manual* is superceded by this manual.

The *Washington State Bridge Inspection Manual* has been developed to provide guidance, offer needed technical details, and serve as an information source. Bridge inspectors may also refer to the most current editions of the following:

- *Bridge Inspector's Training Manual 90*
- *Culvert Inspection Manual*
- *Inspection of Fracture Critical Bridge Members*
- *AASHTO Manual for Condition Evaluation of Bridges*
- *Evaluating Scour at Bridges, Hydraulic Engineering Circular (HEC) No. 18*
- *Code of Federal Regulations (23CFR) 650, Subpart C*
- *FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*
- *AASHTO Guide Specifications for Strength Evaluation of Existing Steel and Concrete Bridges*
- *Detail Manual for Certification in the Field of Transportation Engineering Technology - Subfield of Bridge Safety Inspection*, contains the requirements for NICET certification. Contact the National Institute for Certification in Engineering Technologies
- M 23-11, *Transportation Structures Preservation Manual*

Revisions

The *Washington State Bridge Inspection Manual* is not a static document. It will be updated to incorporate periodic revisions based on the practices outlined by FHWA and the state. We encourage the user to submit to the Bridge Inspection Committee any revisions or new material, by using the form provided at the front of this manual.

In the event of conflicting information or requirements between the *Washington State Bridge Inspection Manual* and NBIS, the NBIS will govern. Agencies are not relieved from the responsibility of complying with the NBIS even when a conflict exists. If a conflict is discovered, notify the Washington State Department of Transportation Regional Bridge Inspection Engineer or the Bridge Engineer for Local Agencies at once.

Chapter 1 Bridge Inspection Program Requirements

1.01 General

The National Bridge Inspection Standards (NBIS) are published in the Code of Federal Regulations, 23 CFR 650, subpart C. The NBIS sets the national standard for the proper safety inspection and evaluation of bridges and apply to all structures defined as highway bridges located on all public roads. The Washington State Bridge Inspection Manual details Washington State's policies and procedures for the condition inspection of bridges.

The complete text of the NBIS can be found at http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM.

A. Definitions

Some definitions for use with this manual are as follows:

Bridge: A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Bridge Condition Inspection Training (BCIT): A comprehensive bridge inspector training course offered by WSDOT.

Bridge Inspection: The condition inspection and evaluation of in-service bridges

Inventory Record: Defines how a bridge relates to a route and identifies whether the bridge carries the route or crosses over the route.

Local Agency: Generally refers to City or County Bridge Owners but also includes bridge owners other than state and federal.

National Bridge Inventory (NBI) Bridges: All structures defined as highway bridges located on all public roads that are subject to the NBIS. This definition refers to On-records. Under- records can be any bridge structure over a highway such as pedestrian, railroad, or utility bridge. This record is required regardless of service carried by the structure. See Chapter 2, Section 2.01.

Small City: A city with a population of less than 5000

The State: The Washington State Department of Transportation (WSDOT)

Additional NBIS bridge program definitions can be found Appendix 1A.

B. Bridge Program Responsibilities

The NBIS require that each state have the following:

1. A bridge inspection organization composed of individuals who satisfy the NBIS qualifications for bridge program personnel.
2. A bridge inventory containing a record for each State and local agency owned bridge.
3. Master lists with a schedule for the regular inspection of all bridges at inspection frequencies required by the NBIS.
4. An official bridge file for each structure in the bridge inventory.

A general overview of bridge inspection program requirements is provided in the following sections. A comprehensive explanation of each requirement is provided in subsequent chapters.

1.02 Bridge Inspection Organization

The NBIS require each State transportation department to inspect, or cause to be inspected, all highway bridges located on public roads that are fully or partially located within the State's boundaries, except for bridges that are owned by Federal agencies.

Each State transportation department must include a bridge inspection organization that is responsible for the following:

1. Statewide bridge inspection policies and procedures, quality assurance and quality control, and preparation and maintenance of a bridge inventory.
2. Bridge inspections, reports, load ratings, scour evaluations, and other requirements of the NBIS.
3. The functions noted above may be delegated, but such delegation does not relieve the State transportation department of the underlying responsibility.
4. The State transportation department must have a program manager with the qualifications listed under Section 1.02A of this manual.

A. Program Manager

The program manager is the individual in charge of the bridge program that has been assigned or delegated the responsibilities for bridge inspection, reporting, and inventory. The program manager provides overall leadership and is available to inspection team leaders to provide guidance. The State may delegate program manager status to qualified local agency bridge owners.

See http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM for a flowchart of program manager qualifications

B. Team Leader

The team leader is the individual in charge of an inspection team responsible for planning, preparing, and performing the field inspection of bridges.

A certified team leader is required on site for the inspection of all NBI Bridges. The State verifies the qualifications of all team leaders and assigns an inspector identification number to certify those qualifications. An individual must have a bridge inspector identification number in order to submit inspection data to the State bridge inventory.

See http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM for a flowchart of team leader qualifications.

C. Assistant Inspector

The assistant inspector accompanies the Team Leader during on site bridge inspections. Typical duties include helping to organize bridge inspection trips, taking measurements, compiling notes, and taking photographs. Serving as an assistant inspector allows a bridge inspector-in-training to accrue the necessary experience to become a certified team leader. Assistant inspectors learn to assess the condition of bridge components and elements, determine condition and appraisal codes, and assist in report writing and other inspection documentation. Scheduling inspection teams of two or more is also considered a good safety practice.

The NBIS does not set specific training or educational requirements for assistant inspectors. However, bridge inspector training is available to all assistant bridge inspectors through WSDOT and constitutes a good foundation for beginning inspectors as well as being a requirement for advancement to Team Leader.

1.03 Bridge Inventory

The NBIS require each State bridge inspection organization to prepare and maintain an inventory of all bridges for which they are responsible. The bridge inventory for Washington State is called the Washington State Bridge Inventory System (WSBIS).

The bridge inventory provides certain standard information about each bridge and how it relates to the route it serves. The bridge inventory information is evaluated and updated throughout the bridge's service life. In Washington State, the bridge owner establishes and maintains the record for each NBI bridge.

There are two distinct types of bridge inventory records depending on whether a route is carried on the bridge or the bridge crosses over a route. In addition, these records are handled by the WSBIS computer inventory system by two distinct methods. The record type is either an "On-record" or an "Under-record" and the method is either a Main Listing or a Secondary Listing.

All bridges that carry or cross a public highway will have a Main Listing record entered in the database. When a bridge carries a highway on its deck, the listing for that route will be the Main Listing and is called the "On" record. Therefore that record is known as the "Main Listing On Record".

For a bridge that carries a public highway on its deck over another public highway a Secondary Listing for the route under the bridge will be entered in the database. This record is known as the "Secondary Listing Under Record". Regardless of the Service Level of either highway the listing for the route on the bridge will be the Main Listing and the listing for the route under the bridge will be the Secondary Listing.

For bridge structures that do not carry a public highway but that cross a public highway there will be a "Main Listing Under Record" recorded for the route under the bridge. This is the case for pedestrian bridges, railroad bridges, and utility bridges.

For a detailed explanation, see Chapter 2, WB74 - 32.

Since the NBI contains all the nation's bridges, it is used as a source for assigning federal dollars and establishing national needs and priorities.

1.04 Inspection Frequency

The responsibility for establishing criteria for determining appropriate bridge inspection frequencies lies with the bridge Program Manager. The NBIS specifies frequency requirements for various inspection types. However, factors such as age, condition, and bridge design may dictate reduced frequencies. Detailed information on frequency can be found in Section 1.05, Inspection Types, and in NBIS flowcharts that are available at http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM under bridge information.

1.05 Inspection Types

Each NBI bridge shall be inspected in accordance with the NBIS. There are five main inspection types:

- Inventory (Initial) Inspection
- Routine Inspection
- Fracture Critical Member Inspection
- Underwater Inspection
- Special Features Inspection for Complex Bridges

Other inspection types include damage, scour, and in-depth inspections. Specialized inspection procedures must be prepared for fracture critical, underwater and special feature inspections. Scour critical bridges require special inspection and monitoring in accordance with specific plans of action unique to the bridge. The type of inspection depends on the design and construction of the bridge. Also consider age, condition, and any other factors that can affect the serviceability of the bridge.

See Chapter 3 for further information.

A. Inventory Inspection

An inventory inspection is the initial inspection of a bridge as it becomes part of the bridge inventory or after a major rebuild when the year rebuilt is coded greater than zero. Inventory inspections provide structure inventory and appraisal (SI&A) data along with bridge element information and baseline structural condition. Inventory inspections usually begin in the office with the construction plans and route information then proceed to the field for verification of the as-built conditions.

B. Routine Inspection

A routine inspection is performed at regular intervals not to exceed twenty-four months. Inspection intervals of greater than twenty-four months, not to exceed forty-eight months, may be approved when past inspection findings and analysis justify increased inspection intervals. Written FHWA approval is required when increasing inspection intervals to greater than twenty-four months.

The routine inspection identifies the current structural and hydraulic adequacy and condition of the bridge. Included in the routine inspection report are repair recommendations and recommendations for further analysis or investigation.

C. Fracture Critical Member Inspection

A fracture critical inspection is an in depth evaluation of critical bridge components performed in accordance with procedures developed for that structure. These inspection procedures identify the location of fracture critical members and describe the inspection requirements. A fracture critical member is defined as a steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse. Inspect fracture critical members at intervals not to exceed twenty-four months.

D. Underwater Inspection

An underwater inspection is performed on bridges with structural elements that are not accessible for inspection otherwise. Underwater inspection procedures shall be developed to identify, locate, and describe underwater elements for each bridge requiring an underwater inspection. Inspect underwater structural elements at regular intervals not to exceed sixty months.

E. Special Feature Inspection of Complex Bridges

A special inspection is required on complex bridges that have unique or special features requiring additional attention. Inspection procedures shall be developed that identify specialized inspection requirements and additional inspector training and experience necessary to inspect complex brides. Complex bridges include:

- Movable Bridges
- Floating Bridges
- Suspension Bridges
- Redundant Pin and Hanger Bridges
- Precast Segmental Bridges
- Ferry Terminal Structures
- High Strength steel Bridges
- Cable-stayed Bridges

The need for special access equipment such as a Under Bridge Inspection Truck (UBIT) is **not** considered a special features inspection.

F. Other Inspections

A variety of other inspections may be required on a bridge during its service life. The types of inspections can include but are not limited to damage inspections, in-depth inspection, and interim inspections. These other inspections are not usually performed on a set frequency but are performed as needed. They provide added information and detail to the routine bridge inspection. Findings from "Other inspection" should be included in the routine inspection report.

An inspection report must be completed for every bridge inspection performed. This report is essential as it provides specific details about the inspection and about the bridge itself. Standard report forms have been developed for most inspection types. These forms provide a means for recording standard information pertinent to all bridges and special information unique to the particular bridge. Photographs, sketches, and detailed measurements should be included to quantify any problem areas found. A detailed sketch of the entire bridge may be needed in order to number and identify particular bridge elements.

1.07 Load Rating

Load rating calculations shall be performed on all NBI bridges to determine live load carrying capacity. An updated load rating calculation is required whenever the capacity of the bridge changes due to the condition of the structure, impact on the bridge due to approach roadway or deck deterioration, or if the dead load of the bridge has been increased.

A bridge must be load posted whenever the legal load exceeds the bridge capacity. Load posting consists of signs indicating the load limit in advance of the applicable section of highway or structure at points where prohibited vehicles can detour or turn around. The *Manual on Uniform Traffic Control Devices* (MUTCD), Section 6F.10, provides guidance on signs for bridge load posting.

1.08 Scour Evaluation

A scour evaluation is required for bridges over water. The purpose of a scour evaluation is to determine susceptibility of the bridge's foundation to the erosive actions of flowing water removing material from the bridge's foundation. A bridge is considered scour critical if its foundation is determined to be unstable for observed or calculated scour conditions. The NBIS require plans of action for scour critical bridges. The plan of action details the procedures for monitoring known and potential deficiencies and for addressing critical findings.

See http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM for scour evaluation and scour plan of action guidance.

1.09 Bridge Records

Comprehensive bridge records must be maintained on each bridge. These files must be kept up to date and must include the following:

- The most current WSBIS Inventory Report
- The most Current and all previous bridge inspection reports signed and dated by the team leader responsible for the inspection
- A copy of any Critical Damage Bridge Repair Reports
- Photographs or sketches of the bridge with descriptions including date and orientation.
- Bridge plans or detailed drawings
- Scour analysis for all bridges over water and a plan of action and plotted soundings for Scour Critical Bridges
- Load rating calculations stamped, signed and dated by the professional engineer responsible
- Maintenance records with repair recommendations and other maintenance activities
- General correspondence
- Established inspection procedures for fracture critical members, underwater elements, or other special features
- Other relevant information

Other general information that an agency is required to maintain includes:

- A master list of all bridges within the agency's jurisdiction that have fracture critical members, require underwater inspection, and/or warrant special attention because of their design, location, or strategic importance
- The experience and training records for all bridge program personnel. These records are used for verification of program manager and team leader status as well as to determine minimum qualifications for certification of assistant inspectors.

For more detail, see http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM. under bridge information for a link to the Local Agency Guidelines (LAG), Chapter 34.

1.10 Quality Assurance

Quality Assurance, Q/A, is the sampling and other measures to assure the adequacy of quality control, Q/C, procedures in order to verify or measure the quality level of the entire bridge inspection program. Q/A differs from Q/C in that the Q/A is conducted independent of the bridge inspection production program.

A. FHWA's Role

FHWA conducts an annual review of the State bridge inspection organization. The purpose of this review is to assure compliance with the NBIS. A specific geographical area of the state is targeted each year to review both state and local agency bridge programs. The review will focus on bridge records and is intended to identify and correct any weaknesses while building upon existing strengths. In addition, site reviews of bridge inspections and interviews of inspection personnel are conducted.

B. WSDOT's Role for State Inspected Bridges

NBIS 650.307 (c)(1) stipulates that "each State agency is responsible for a quality assurance and quality control program." The NBIS leaves the definition of this program to each agency. The NBIS 650.313 (g) adds "each agency is to assure systematic Q/C and Q/A procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, periodic bridge inspection refresher training for program managers and team leaders, and independent review of inspection reports and computations."

NBIS 650.307 (d) further stipulates "the functions of this section may be delegated, but such delegation does not relieve the State transportation department of its responsibilities."

For local agency bridges inspected by WSDOT, letters with attached inspection reports and recommended repairs with priorities are sent to each applicable local agency and small city. Follow-ups to the local agency repairs are completed at the time of the next scheduled bridge inspection or with the Bridge Engineer for Local Agencies.

C. WSDOT's Role for Bridges Inspected by a Local Agency

The WSDOT Local Agency Bridge Engineer conducts quality assurance reviews of select local agency bridge programs annually. Each bridge program is evaluated at least once every three years. The Local Agency Bridge Engineer visits the agency and interviews bridge program personnel, Reviews Bridge files, and conducts field reviews of bridge inspections with team leaders. The purpose of the review is to identify bridge program strengths as well as possible weaknesses. If deficiencies are found, the agency is provided the guidance and assistance necessary to correct the problem. Elements of the review include the following:

- The evaluation of bridge program personnel qualifications
- The review of Bridge files
- The review of bridge master lists
- The review of bridge inspection procedures
- The review of scour evaluations and plans of action
- The review of load ratings and bridge postings
- The review of critical finding procedures
- A field review of bridge inspection reports

A close-out conference is held between agency personnel and the reviewer to discuss the findings of the quality assurance review. A final report is prepared and sent to the agency and a comprehensive report of the year's reviews is sent to FHWA annually.

See http://www.wsdot.wa.gov/TA/Operations/BRIDGE/BRIDGEHP.HTM under bridge information for a link to the LAG, Chapter 34, for additional local agency bridge program information.

Chapter 2 Bridge Inventory Coding Guide

2.01 General

This chapter describes how to create a Washington State Bridge Inventory System (WSBIS) record (Inventory Record). It also describes the procedures which must be followed in order to add, update, and/or delete this inventory information.

The National Bridge Inspection Standards (NBIS) require that a bridge inventory record be established and maintained for each bridge in the state meeting certain qualifications.

1. An inventory record must be kept for all bridges greater than 20 feet in length and located on public roads which carry vehicular traffic. This is regardless of whether or not the bridge is on the Federal Aid System. Bridges less than 20 feet in length may be inventoried when they meet the qualifications enumerated in Chapter 7. However these records will not be reported to the FHWA.

2. An inventory record must also be kept for all bridges over a federal aid route, Strategic Highway Corridor Network (STRAHNET) route, or any otherwise important route. This can include a pedestrian bridge, a tunnel or even a pipeline. An Agency may also choose to maintain a record for bridges over public routes not listed above.

   Bridges that do not intersect a public road must be carefully coded to avoid submittal to the FHWA.

In Washington, to facilitate the collection and storage of such a volume of information, a computer database called WSBIS has been developed. This computer system allows the bridge inventory records for every bridge in the state to be stored in a single computer database. This system was developed by the Washington State Department of Transportation (WSDOT) so that all public bridge information in the state could be coded and stored in a standard, consistent, and accessible format. From this central database, information can easily be gathered into reports or transferred to the national database called the National Bridge Inventory (NBI).

Bridge information stored in WSBIS is the responsibility of the owner agency. Maintaining the inventory records for bridges throughout the state is the responsibility of the WSDOT Bridge Preservation Office.

In some instances, a local agency will contract with WSDOT or a consultant to inspect and update the inventory for a local agency bridge (i.e., when the local agency does not have the equipment or resources needed). However, the owner agency is still responsible for the accuracy of all of their data.

The first part of this chapter describes the procedures which must be followed to add, update, and delete an individual bridge inventory record.

The second part provides a field-by-field description of the WSBIS Inventory Report, defining each field and giving the acceptable coding values which may be entered.

The last part describes the computer editing process performed by the WSBIS system to check the values entered on the report as the inventory record is added or updated.

2.02 WSBIS Inventory Report

A WSBIS Inventory Report is produced for every bridge record that has been established in the WSBIS database. This report is your hard copy record of an individual bridges' inventory information and should be reviewed for accuracy whenever updates to the record have been made.

The format of this report is a hold over from a time when coding was submitted on paper forms for entry into the database. To make information easier to enter and retrieve, the form was arranged into four distinct sections: Control Fields, card indicator boxes, data entry fields, and a space for error notifications. While data is no longer collected on a paper form an understanding of the reports' layout is useful.

The first three sections are composed of boxes called fields. Each field is uniquely named. Each has numbered tic marks denoting columns, which indicates the number of characters each field is allowed. The white space to the right of the top set of boxes is where you will find any error codes that may have been generated by the quality control program.

A. Control Fields

Along the top of the Report (columns 1 to 27) are six fields known as Control Fields. They uniquely identify the individual bridge record in the following manner. First a unique alphanumeric number is assigned to the record. This number, called the Structure Identification serves as a Primary Key for the WSBIS database system. The Bridge Number uniquely identifies the bridge within each agency's system. The Owner Code, County Code and City Code uniquely identify the political subdivision which has control over that bridge. The Update Code is no longer used.

Instead the following logic is used. If the Structure Identification number exists the record is updated. If the Structure Identification number does not exist a new record is created. Instructions are given in 2.03C below to delete a record.

There is one other control field that is made up of several fields from the Report. This field is called the crossing key. It is a 14 character field that combines the owner code, route, and milepost to create a unique address for Main and Secondary Listing records (see WB74 - 32).

B. Card Indicator Boxes

Along the left-hand side of the Report (columns 28 to 31) are eight boxes numbered from WB71 to WB78. These numbered boxes identify information on the Report as belonging to the WSBIS Inventory. These box numbers (WB71, etc.) are duplicated on the forms (Tabs) in the Bridge Inspection Software where the data is entered. They are also used in field call-outs.

C. Data Display Fields

The data display fields are stacked directly beneath the Control Fields. This has been done so that all the information can be contained on a single page. The data display fields are where the coding information specific to the given bridge is displayed. They are a reflection of the data entered in the Bridge Inspection Software on the forms indicated by that Card Indicator Box. The middle row of each field displays the data as it is recorded in WSBIS. The bottom row will display any updates recently made when the report is printed from the application. The bottom row will be blank after all corrections have been updated to the WSBIS on the report returned to you from Bridge Preservation.

D. Error Reporting

As noted above, error codes, If any, will be found in the white space to the right of the top row of fields. If an error code is reported the record should be reviewed and the error(s) corrected when the next submittal is made. In the rare case where an error code is incorrectly reported it can be ignored.

An example of such a case would be the recording of a side hill viaduct (half bridge). The quality control program will return the error code E489, Curb to Curb Width is greater than Out to Out Deck Width. However since the correct coding of the Curb to Curb Width is the roadway width and the Out to Out is the actual deck width the coding is not in error. The quality control program simply cannot recognize this record as a half bridge which has unique coding requirements.

2.03 Coding Procedures

To establish and maintain the bridge inventory information, the inspector must enter the information into a computer with a PC-based WSBIS compatible system. Currently the two versions of Bridge Inspection Software used in Washington State are laptop98 (Local Agencies) and Mobil Bridge Inspection (WSDOT). This Section provides instructions for proper preparation of an Inventory Report.

The Inventory Report is a valuable reference of the bridges' recorded inventory information. It is also useful for determining the number of characters each field is allowed. And it provides a method of locating the named field on the report in a call out as well as the forms in the Bridge

Inspection Software. The method combines the boxes on the left with the beginning column number of the field being referenced. So in a call out Bridge Name would be referenced as WB71 – 32, Bridge Name and would be found in the application on form WB71. ADT Year would be referenced as WB74 – 53, ADT Year and found on form WB74.

Usually, numeric coded values will be right-justified and zeroes used to fill in any leading blank spaces. Alpha coded entries will be left-justified, upper case, with blanks following. **Unless otherwise noted, all fields must be completely filled in.**

Examples:

1. For ROUTE NUMBER, the value 101 shall be entered as 00101.

   For certain fields (noted in the field descriptions), the coded value must be left justified and any trailing columns to the right are to be left blank.

2. For BRIDGE NAME, the name Tule Creek Bridge would be left justified. It has 17 characters so there would be 7 trailing spaces (it is not required to enter trailing spaces).

Special characters from a keyboard should be limited (i.e., the slash (/), the apostrophe (‘), or the ampersand (&) are allowable but others should be avoided). Abbreviations may also be used where space is limited, but the abbreviations must be kept meaningful.

Refer to the descriptions of each field to determine the proper code to enter. Each description should be read carefully as a code having a particular meaning in one field may mean something else entirely in another field. For example, when information does not apply, in some instances a nine will be entered in the field, in other instances a zero will be entered, and in other instances, the field will need to be left blank. The field description will explain the proper procedure to follow.

A. Establishing/Reestablishing the Inventory Record

The original inventory record needs to be established only once. This is required:

- When a new bridge has been built (usually before it is placed in service).
- When an existing bridge has been replaced with a new bridge **(it is required that the existing record be deleted before a new record for the bridge is created)**.
- When a detour bridge has been built and remains in service for more than three years or beyond the life of the contract under which it was built.
- When an existing bridge not previously inventoried is added to the statewide inventory.

A bridge’s original inventory record can be established by following the steps listed below.

1. In the Bridge Inspection Software select the command to add a new record (Add Short Span or Bridge, in laptop98) on the start up form. a new window will pop up with nine data entry fields. Enter valid data in all of the fields. Assign a temporary Structure Identifier in the following manner. (The actual Structure Identifier will not be assigned until the original inventory record is processed.)

   Use the first three letters of your agency's name, then the first and last initials of the lead inspectors' name. The last three characters are used as a sequencer for the creation of more than one record in the same dataset.

   For example: Jane E. Doe, a lead inspector for the city of Yakima is coding new records for two bridges. For the first record, she would assign the Structure Identifier "YAKJD001," for the second "YAKJD002," etc.

   After completing all fields close the window and then select the record you just created in the record selection boxes on the start up form.

2. Enter appropriate values in the data entry fields on the application forms. The following conditions will apply:

   - Information must be entered in all Fatal Fields. These fields are edited during the update process for values that are within a predetermined range. If a Fatal Field is blank or out of range, the record cannot be created.
   - Required Fields should be completed If the information is known. These fields are cross-referenced by the program for relational logic and valid range entries. If the information for one of these fields is unknown, it should be left blank until the correct information can be determined.

     The Sufficiency Rating generator uses a number of the Fatal and Required fields to generate the Adequacy Appraisals, Sufficiency Rating and Status. Therefore for accurate ratings these fields must be entered.
   - Other information can then be entered in the Optional Fields Information entered here is not edited so these fields can be coded or not at the agency's discretion. (See the field descriptions on the following pages for an explanation of what information can be entered in these Optional Fields.)

3. A copy of this Inventory Report shall be kept in the bridge file.

Reestablishing the Inventory Record

If an Inventory record for a bridge has been mistakenly deleted (as sometimes happens when a bridge has changed ownership), it can be recovered in the following manner:

1. Obtain the latest copy of the Inventory Report or recover the data from a data backup. If an Inventory Report is not available, or the data cannot be recovered, it will have to be reentered in the application.
2. Verify that all Control Fields are correct. Correct them If necessary. The Inventory record's original Structure Identifier shall be used.
3. A cover letter shall be included with the submittal to alert the WSBIS Inventory Engineer that this record is a recovery and not a mistake in coding.
4. Verify and correct any information for the rest of the data.
5. Submit the data in the manner described for updating the inventory.

B. Updating the Inventory

The original bridge inventory record needs to be updated whenever new data must be added or whenever changes must be made to the existing record.

Updates to the original inventory data may be required as a result of damage to the bridge, new conditions noted during an inspection, safety improvements or rehabilitation, when new computations or measurements are made, or when the bridge changes ownership. Changes to the bridge inventory record must be reported to the Bridge Engineer for Local Agencies, or the WSDOT Inventory Engineer within 90 days.

To complete an update, this procedure will be followed.

1. Review the data displayed in the Bridge Coding Software's forms and a current Inventory Report.
2. Enter new coding values in each Data Entry Field that must be updated. Make sure your entry is complete.
   - If you are entering new data, simply enter the appropriate values in the field.
   - If you are making a change to existing data, the entire field must be re coded. For example, If the name shown in WB72 - 32, Features Intersected, has been misspelled, the entire name must be reentered, not just one or two letters corrected.
   - If you want to blank out an entire field, place an asterisk (*) in the left-most column of the field. If the field is not a fatal field, the existing data contained in that field will be erased and the field will be blank after the record is processed. Fatal Fields can only be updated.
4. When all updates are complete save the records to the Updates.mdb file.
5. Send the Updates.mdb file to the Bridge Engineer for Local Agencies The updated information will be edited as the information is processed.

- If any errors are found, they will be noted at the top of the Inventory Report when it is returned to your agency. These errors should be corrected when the record is submitted with future updates.

6. This copy of the current Inventory Record shall be kept in your local agency bridge file.

C. Deleting/Transferring the Inventory Record

When an inventory record becomes obsolete, it needs to be deleted from the WSBIS database. The reasons a record may become obsolete include:

- A bridge has been bypassed and is no longer in use, or
- A bridge has been demolished, or
- A bridge has been permanently closed to traffic.

If a new bridge is built on the site of an old bridge, the agency should first delete the old record before establishing a new inventory record. (This will ensure that each new bridge is assigned a unique Structure Identifier.)

To delete the inventory record:

1. An e-mail or a signed letter shall be sent to the Bridge Engineer for Local Agencies. This communication shall include the Structure Identification Number and Bridge Name along with instructions that the record is to be deleted. The communication will be forwarded to the WSDOT Inventory Engineer for processing.

   If the jurisdiction of a bridge is being transferred from one agency to another, **the bridge record shall not be deleted**.

   Instead, the Owner Code, Custodian Code and If necessary the City Code shall be updated by the Transferor prior to sending the bridge records to the Transferee. For example:

   The city of Selah has expanded its boundaries and annexed a bridge from Yakima County.

   Yakima County would update the Owner Code from 02 to 04, the Custodian Code the same If appropriate, and the City Code from 0000 to 1155 prior to the data being submitted for update. Selah would then be responsible to correct the Bridge Number and all other data for the Inventory record.

   This will ensure that a given bridge retains its unique Structure Identifier throughout the life of the bridge.

   A sample of the entire WSBIS Inventory Report is shown in the forms section.

D. Type of Records

Before entering information for a new record, a determination must be made as to whether the record applies to a route "on" the bridge or a route "under" the bridge. There is a distinct difference between the two, and the coding requirements are not the same (see WB74 - 32).

An "on" record is the information about the highway on the bridge. This is the most common record type. For those sites in which a bridge carries a public highway, all the fields in the Bridge Coding Software's coding forms need to be evaluated and coded If applicable.

However, when the bridge does not carry a public highway on the bridge, but instead crosses over a public highway, an "under" record will be coded. This would be the case for a pedestrian or railroad undercrossing. In these cases, not all fields in the Bridge Coding Software forms need to be coded (see WB74 - 32 for a list of the fields required for "under" records).

The key to the coding is how the route relates to the bridge site. No matter whether WB74 - 32 is coded as an "on" or an "under" record, it is an indication of the relationship of the route to the bridge.

With that in mind, the following is a field-by-field description of the WSBIS Inventory Report.

2.04 Inventory Coding Fields

The following describes the valid codes that may be used and the purpose of each field. It also defines the control fields, fatal fields, required fields, and optional fields.

structure_id **Structure Identifier** *(Fatal)*
Control Field
FHWA Item 8A

This is a unique, eight-character code assigned by the WSDOT Inventory Engineer when the original bridge inventory record is processed. The Structure Identifier is a Primary Key which ties all tables with related information for that bridge together in the WSBIS database. It will not change throughout the life of the bridge.

structure_id **Structure Identifier** *(Fatal)*
Control Field
FHWA Item 8A

This is a unique, eight-character code assigned by the WSDOT Inventory Engineer when the original bridge inventory record is processed. The Structure Identifier is a Primary Key which ties all tables with related information for that bridge together in the WSBIS database. It will not change throughout the life of the bridge.

bridge_no
Control Field

Bridge Number *(Fatal)*

This is a unique (to the owner agency) alphanumeric code assigned by the owner of the bridge. This field does not require all spaces to be filled; however, the field cannot be left blank.

For local agencies, the bridge number should conform to their agency's numbering system.

The inspector should be aware that special characters can cause undesirable results; therefore, the bridge number should be limited to an alpha-numeric code as much as possible. However, the characters '/' and '-' are acceptable.

Owner Code
Control Field
FHWA Item 022

Owner Code *(Fatal)*

This code identifies the agency of record which owns the bridge. Jointly-owned bridges must be reported by only one of the owner agencies.

There will need to be an agreement between the owner agencies as to which agency will be reporting the bridge to WSBIS. This will prevent both agencies from reporting the same bridge under a different Structure Identifier.

Use one of the following codes.

01 State Highway Agency
02 County Highway Agency
03 Town or Township Highway Agency
04 City or Municipal Highway Agency
11 State Park, Forest, or Reservation Agency
12 County Park, Forest, or Reservation Agency
13 City/Other Park, Forest, or Reservation Agency
21 Other State Agencies
24 Other County Agencies
25 Other City or Local Agencies
26 Private (Ports and non-Railroad)
27 Railroad
31 State Toll Authority
32 County Toll Authority
33 City or Other Toll Authority
60 Other Federal Agencies (not listed below)
61 Indian Tribal Government
62 Bureau of Indian Affairs
63 Bureau of Fish and Wildlife
64 U.S. Forest Service
66 National Park Service
68 Bureau of Land Management
69 Bureau of Reclamation
70 Corps of Engineers (Civilian)
71 Corps of Engineers (Military)

72 Air Force
73 Navy/Marines
74 Army
75 NASA
76 Metropolitan Washington Airport Services
80 Unknown
91 Canada
92 Idaho
93 Oregon

county_id **County Number** *(Fatal)*
Control Field
FHWA Item 003

This is a two-digit code which identifies the county in which the bridge is located. If this is a jointly owned bridge, the county that is responsible for reporting the data to the inventory should be entered here. Use one of the following codes.

County Name	County Code	Region Code
Adams	01	EA
Asotin	02	SC
Benton	03	SC
Chelan	04	NC
Clallam	05	OL
Clark	06	SW
Columbia	07	SC
Cowlitz	08	SW
Douglas	09	NC
Ferry	10	EA
Franklin	11	SC
Garfield	12	SC
Grant	13	NC
Grays Harbor	14	OL
Island	15	NW
Jefferson	16	OL
King	17	NW
Kitsap	18	OL
Kittitas	19	SC
Klickitat	20	SW
Lewis	21	SW
Lincoln	22	EA
Mason	23	OL
Okanogan	24	NC
Pacific	25	SW
Pend Oreille	26	EA
Pierce	27	OL
San Juan	28	NW
Skagit	29	NW
Skamania	30	SW
Snohomish	31	NW
Spokane	32	EA
Stevens	33	EA
Thurston	34	OL
Wahkiakum	35	SW
Walla Walla	36	SC
Whatcom	37	NW
Whitman	38	EA
Yakima	39	SC

city_id **City Number** *(Fatal)*
Control Field

This is the city in which the bridge is located. (Codes for cities and towns are identified according to the most recent U.S. Bureau of the Census Identification Schedule.) Contact the Bridge Engineer for Local Agencies for newly incorporated municipalities.

If the bridge is outside of corporate limits or in an unincorporated city, code all zeros.

Use the following codes.

City	Code	City	Code	City	Code
UNINCORPORATED	0000	CENTRALIA	0180	ELMER CITY	0390
ABERDEEN	0005	CHEHALIS	0190	ENDICOTT	0395
AIRWAY HEIGHTS	0010	CHELAN	0195	ENTIAT	0405
BUCODA	0013	CHENEY	0200	ENUMCLAW	0410
ALBION	0015	CHEWELAH	0205	EPHRATA	0415
ALGONA	0020	CLARKSTON	0215	EVERETT	0420
ALMIRA	0025	CLE ELUM	0220	EVERSON	0425
ANACORTES	0030	CLYDE HILL	0225	FAIRFIELD	0430
ARLINGTON	0045	COLFAX	0230	FARMINGTON	0440
ASOTIN	0050	COLLEGE PLACE	0235	FEDERAL WAY	0443
AUBURN	0055	COLTON	0240	FERNDALE	0445
BAINBRIDGE ISLAND	0058	COLVILLE	0250	FIFE	0450
BATTLE GROUND	0060	CONCONULLY	0255	FIRCREST	0455
BEAUX ARTS VILLAGE	0070	CONCRETE	0260	FORKS	0465
BELLEVUE	0075	CONNELL	0265	FRIDAY HARBOR	0470
BELLINGHAM	0080	COSMOPOLIS	0270	GARFIELD	0480
BENTON CITY	0085	COULEE CITY	0275	GEORGE	0489
BINGEN	0090	COULEE DAM	0280	GIG HARBOR	0490
BLACK DIAMOND	0095	COUPEVILLE	0290	GOLD BAR	0495
BLAINE	0100	CRESTON	0295	GOLDENDALE	0500
BONNEY LAKE	0105	CUSICK	0300	GRAND COULEE	0510
BOTHEL	0110	DARRINGTON	0305	GRANDVIEW	0515
BREMERTON	0115	DAVENPORT	0310	GRANGER	0520
BREWSTER	0120	DAYTON	0315	GRANITE FALLS	0525
BRIDGEPORT	0125	DEER PARK	0320	HAMILTON	0535
BRIER	0127	DES MOINES	0325	HARRAH	0540
BUCKLEY	0130	DUPONT	0330	HARRINGTON	0545
BURIEN	0138	DUVAL	0335	HARTLINE	0550
BURLINGTON	0140	EAST WENATCHEE	0350	HATTON	0555
CAMAS	0145	EATONVILLE	0360	HOQUIAM	0560
CARBONADO	0150	EDGEWOOD	0364	HUNTS POINT	0570
CARNATION	0155	EDMONDS	0365	ILWACO	0575
CASHMERE	0165	ELECTRIC CITY	0375	INDEX	0580
CASTLE ROCK	0170	ELLENSBURG	0380	IONE	0585
CATHLAMET	0175	ELMA	0385	ISSAQUAH	0590

City	Code	City	Code	City	Code
KAHLOTUS	0595	MILLWOOD	0780	PORT TOWNSEND	1005
KALAMA	0600	MILTON	0785	POULSBO	1010
KELSO	0605	MONROE	0790	PRESCOTT	1015
KENMORE	0609	MONTESANO	0795	PROSSER	1020
KENNEWICK	0610	MORTON	0800	PULLMAN	1025
KENT	0615	MOSES LAKE	0805	PUYALLUP	1030
KETTLE FALLS	0620	MOSSYROCK	0810	QUINCY	1040
KIRKLAND	0625	MOUNTLAKE		RAINIER	1050
KITTITAS	0630	TERRACE	0815	RAYMOND	1055
KRUPP	0635	MOUNT VERNON	0820	REARDAN	1060
LA CENTER	0640	MOXEE CITY	0825	REDMOND	1065
LACEY	0643	MUKILTEO	0830	RENTON	1070
LA CONNER	0650	NACHES	0835	REPUBLIC	1075
LA CROSSE	0655	NAPAVINE	0840	RICHLAND	1080
LAKE FOREST PARK	0657	NESPELEM	0855	RIDGEFIELD	1085
LAKE STEVENS	0664	NEWCASTLE	0858	RITZVILLE	1090
LAKEWOOD	0665	NEWPORT	0860	RIVERSIDE	1095
LAMONT	0668	NEWCASTLE	0861	ROCKFORD	1100
LANGLEY	0670	NOOKSACK	0865	ROCK ISLAND	1105
LATAH	0675	NORMANDY PARK	0870	ROSALIA	1115
LEAVENWORTH	0680	NORTH BEND	0875	ROSLYN	1120
LIBERTY LAKE	0684	NORTH BONNEVILLE	0877	ROY	1125
LIND	0685	NORTHPORT	0885	ROYAL CITY	1127
LONG BEACH	0690	OAKESDALE	0890	RUSTON	1130
LONGVIEW	0695	OAK HARBOR	0895	ST JOHN	1135
LYMAN	0705	OAKVILLE	0900	SAMMAMISH	1136
LYNDEN	0710	OCEAN SHORES	0907	SEATAC	1139
LYNNWOOD	0715	ODESSA	0910	SEATTLE	1140
MABTON	0725	OKANOGAN	0915	SEDRO-WOOLLEY	1150
MCCLEARY	0728	OLYMPIA	0920	SELAH	1155
MALDEN	0730	OMAK	0925	SEQUIM	1160
MANSFIELD	0735	OROVILLE	0935	SHELTON	1165
MARCUS	0740	ORTING	0940	SHORELINE	1169
MARYSVILLE	0745	OHELLO	0945	SKYKOMISH	1175
MATTAWA	0750	PACIFIC	0950	SNOHOMISH	1180
MEDICAL LAKE	0755	PALOUSE	0955	SNOQUALMIE	1185
MEDINA	0760	PASCO	0960	SOAP LAKE	1190
MERCER ISLAND	0763	PATEROS	0970	SOUTH BEND	1195
MESA	0765	PE ELL	0975	SOUTH CLE ELUM	1205
METALINE	0770	POMEROY	0985	SOUTH PRAIRIE	1210
METALINE FALLS	0775	PORT ANGELES	0990	SPANGLE	1215
MILL CREEK	0778	PORT ORCHARD	1000	SPOKANE	1220

City	Code	City	Code	City	Code
SPOKANE VALLEY	1221	TUKWILA	1320	WEST RICHLAND	1425
SPRAGUE	1225	TUMWATER	1325	WHITE SALMON	1435
SPRINGDALE	1230	TWISP	1330	WILBUR	1440
STANWOOD	1235	UNION GAP	1335	WILKESON	1445
STARBUCK	1240	UNIONTOWN	1340	WILSON CREEK	1450
STEILACOOM	1245	UNIVERSITY PLACE	1343	WINLOCK	1455
STEVENSON	1250	VADER	1345	WINSLOW	1460
SULTON	1255	VANCOUVER	1350	WINTHROP	1465
SUMAS	1265	WAITSBURG	1360	WOODINVILLE	1469
SUMNER	1270	WALLA WALLA	1365	WOODLAND	1470
SUNNYSIDE	1275	WAPATO	1375	WOODWAY	1475
TACOMA	1280	WARDEN	1380	YACOLT	1480
TEKOA	1285	WASHOUGAL	1385	YAKIMA	1485
TENINO	1290	WASHTUCNA	1390	YARROW POINT	1490
TIETON	1295	WATERVILLE	1395	YELM	1495
TOLEDO	1300	WAVERLY	1400	ZILLAH	1500
TONASKET	1305	WENATCHEE	1405		
TOPPENISH	1310	WESTPORT	1420		

bridge_name
WB71 - 32

Bridge Name *(Fatal)*
This is the name of the bridge.

If the bridge name is more than one word, separate words with a blank space. If the name of the bridge is too long to fit in the field, use abbreviations to shorten it. Left-justify the entry and leave following columns blank. This field does not require a complete entry, but must **not** be left blank.

location
WB71 - 56
FHWA Item 009

Location *(Fatal)*

This field gives a narrative description of the physical location of the bridge with respect to the route being inventoried. The location should be keyed to a permanent, distinguishable feature, such as a road junction or a county line. Descriptions should be oriented ahead on station whenever possible. Do not use city limits, as these boundaries may move.

Left-justify this description and do not enter zeroes in remaining blank spaces (otherwise, the zeroes will be considered part of the location description). This field does not require a complete entry, but must **not** be left blank.

section
WB71 - 81

Section *(Fatal)*
This is the number of the section in which the bridge is located. Enter a numeric code from ‘01’ to ‘36’.

Section, township, and range numbers are location markers established by survey mapping.

If the bridge runs along a section, township, or range line, use the smaller of the two numbers. If a bridge crosses any line, use the number at the beginning of the bridge.

township
WB71 - 83

Township *(Fatal)*
This is the number of the township in which the bridge is located. Enter a numeric code from ‘01’ to ‘41’.

Township designations carry a directional suffix (north or south); however, since all townships in Washington are north, this directional indicator need not be entered.

range
WB71 - 85

Range *(Fatal)*

This field contains the number of the range in which this bridge is located.

There are two parts to this field. In the first two columns, enter the number of the range in which the bridge is located. Valid ranges are:

01 through 47	If the third column is E
01 through 16	If the third column is W

In the third column, enter the directional suffix which indicates the position of the range in relation to the Willamette Meridian. Enter one of the following codes:

E	East
W	West

latitude
WB71 - 88
FHWA Item 016

Latitude *(Fatal)*

This field contains the degrees of latitude at the centerline of the bridge at its beginning milepost. Latitude is designated in degrees, minutes, and seconds to the hundredth of a second. Since all of Washington is located in northern latitudes, the directional suffix (N) need not be entered. It is recommended this field be coded using GPS or an accurate digital mapping program.

longitude
WB71 - 96
FHWA Item 017

Longitude *(Fatal)*

This field contains the degrees of longitude at the centerline of the bridge at its beginning milepost. Longitude is indicated in degrees, minutes, and seconds to the hundredth of a second. Since all of Washington is located in western longitudes, the directional suffix (W) need not be entered. It is recommended this field be coded using GPS or an accurate digital mapping program.

feature_intersected **Features Intersected** *(Fatal)*
WB72 - 32
FHWA Item 006A This is the name or names of the features intersected by the bridge, i.e., the features under the bridge. If full names will not fit in the field, abbreviations may be used where necessary but an effort shall be made to keep them meaningful. Left-justify the name or names entered without using trailing zeroes. This field does not require a complete entry, but must not be left blank.

If one of the features intersected is another roadway, indicate the signed route number or name of the highway (i.e., SR 99).

If there is an alternate name for a feature, enclose this second identifier in parentheses. For example a signed number route that is also a named memorial route (i.e., SR 99 (Aurora Avenue)).

If more than one feature is intersected, give both names, signed route first separated by a comma (i.e., SR 99, Blue R, UPR).

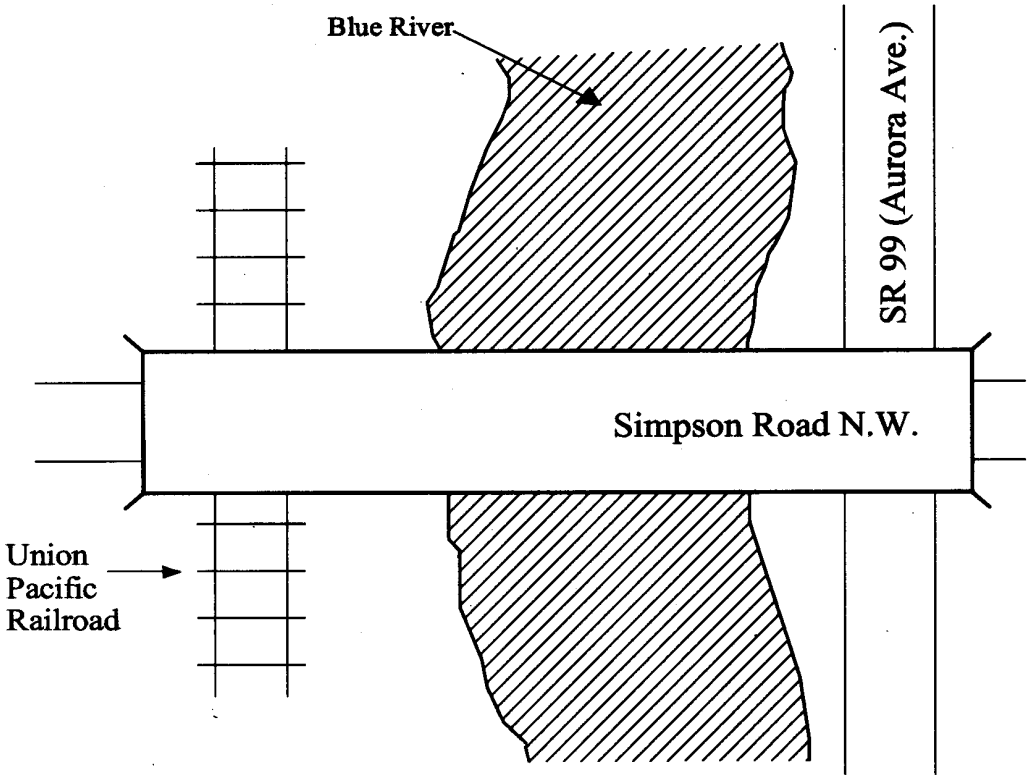


Figure WB72 - 32

facilities_carried **Facilities Carried** *(Fatal)*
WB72 - 56
FHWA Item 007

This is the name (or names) of the facility carried by the bridge. In all situations this describes the use "on" the bridge.

Left-justify the roadway name or names (use abbreviations If necessary) and do not enter trailing zeroes.

If there is an alternate name for a feature, enclose this second identifier in parentheses. For example a signed number route that is also a named memorial route (i.e., SR 99 (Aurora Avenue)).

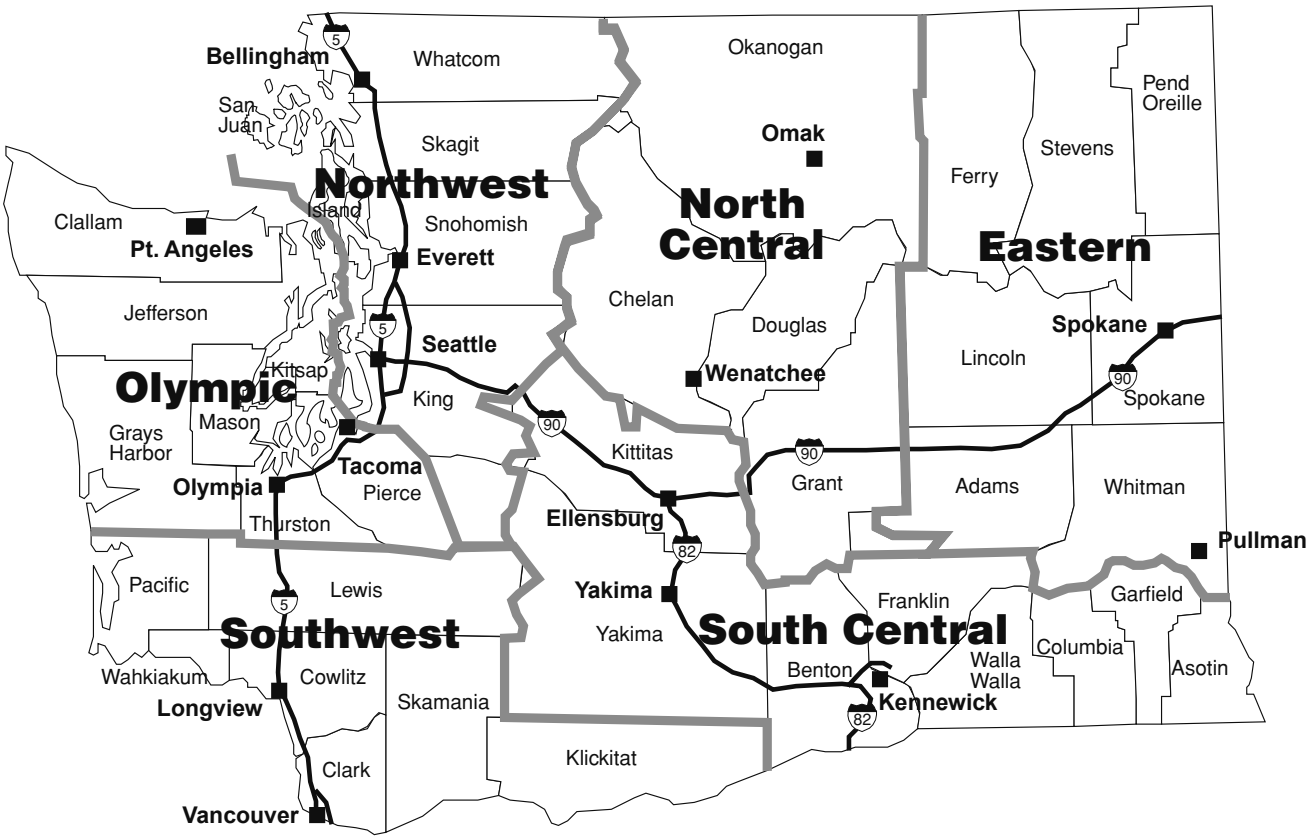
This field does not require a complete entry, but must not be left blank.

region_code **WSDOT Region** *(Fatal)*
WB72 - 74
FHWA Item 002

This is the WSDOT region in which the bridge is located. Use the following codes. Some counties may be shared by more than one region. Local Agencies should use the regions assigned below.

Region Names (Code)	County Names
Eastern Region (EA)	Adams
	Ferry
	Lincoln
	Pend Oreille
	Spokane
	Stevens
	Whitman
North Central Region (NC)	Chelan
	Douglas
	Grant
	Okanogan
Northwest Region (NW)	Island
	King
	San Juan
	Skagit
	Snohomish
	Whatcom
Olympic Region (OL)	Clallam
	Grays Harbor
	Jefferson
	Kitsap
	Mason
	Pierce
	Thurston

South Central Region (SC)	Asotin
	Benton
	Columbia
	Franklin
	Garfield
	Kittitas
	Walla Walla
	Yakima
Southwest Region (SW)	Clark
	Cowlitz
	Klickitat
	Lewis
	Pacific
	Skamania
	Wahkiakum



fips_code
WB72 - 76
FHWA Item 004

Fips Place Code *(Required)*

This field identifies the census-designated place in which the bridge is located using the Federal Information Processing Standards (FIPS 55) code, given in the current version of the Census of Population and Housing - Geographic Identification Code Scheme.

These codes can be located on the Internet at the following web address: http:/www.itl.nist.gov/fipspubs/55new/nav-top-fr.htm

If no code is applicable, enter all zeroes.

leg_dist_code_1
WB72 - 81

Legislative District Number (1) *(Required)*
This field identifies the first or only State Legislative District in which the bridge is located (see Section 2.08, Forms).

If the legislative district number is followed by a letter (District 19A, for example), disregard the letter and enter the two-digit number only.

Washington State Legislative District Maps can be found in Chapter 2 error codes.

leg_dist_code_2
WB72 - 83

Legislative District Number (2) *(Required)*
For bridges which span a State Legislative District dividing line, use this field to identify the second State Legislative District number.

Use both this and the Legislative District Number (1) field to enter the two separate State Legislative District numbers. If no code is applicable, enter all zeroes.

toll_code
WB72 - 85
FHWA Item 020

Toll *(Fatal)*

This code indicates If a toll is required for use of the bridge. One of the following codes will apply.

1. Toll bridge — a toll must be paid specifically to use the bridge.
2. On toll road — a toll must be paid to use the roadway carried by thevbridge.
3. Non-toll bridge — no tolls are paid to use the bridge or the roadway carried by the bridge.
4. On interstate toll segment under secretarial agreement. Bridge functions as a part of the toll segment.
5. Toll bridge is a segment under secretarial agreement. Bridge is separate agreement from highway segment.

custodian_id **Custodian** *(Fatal)*
WB72 - 86
FHWA Item 021

This code describes the type of agency that has primary responsibility for maintaining the bridge (may not be the same as the owner). Acceptable values to enter in this field are as follows:

01 State Highway Agency
02 County Highway Agency
03 Town or Township Highway Agency
04 City or Municipal Highway Agency
11 State Park, Forest, or Reservation Agency
12 County Park, Forest, or Reservation Agency
13 City/Other Park, Forest, or Reservation Agency
21 Other State Agencies
24 Other County Agencies
25 Other City or Local Agencies
26 Private (other than Railroad)
27 Railroad
31 State Toll Authority
32 County Toll Authority
33 City or Other Toll Authority
60 Other Federal Agencies (not listed below)
62 Bureau of Indian Affairs
63 Bureau of Fish and Wildlife
64 U.S. Forest Service
66 National Park Service
68 Bureau of Land Management
69 Bureau of Reclamation
70 Corps of Engineers (Civilian)
71 Corps of Engineers (Military)
72 Air Force
73 Navy/Marines
74 Army
75 NASA
76 Metropolitan Washington Airport Services
80 Unknown
91 Canada
92 Idaho
93 Oregon

parallel_structure_ **Parallel Structure** *(Fatal)*
WB72 - 88
FHWA Item 101

This field contains a code to identify situations in which separate bridges carry the same inventory route in opposite directions of travel over the same feature. The lateral distance between bridges has no bearing on the coding of this field.

Right and left are determined by facing in the direction of increasing mileposts or, in the absence of milepost markers, by facing north or east.

R To indicate the right-hand bridge of the pair
L To indicate the left-hand bridge of the pair
N To indicate the bridge is not a parallel bridge

temporary_structure_ **Temporary Structure** *(Required)*
WB72 - 89
FHWA Item 103

This code indicates If a temporary bridge has been built or temporary measures have been taken on an existing bridge to maintain a flow of traffic. Temporary bridges or temporary repair measures may be required during the modification or replacement of a bridge found to be deficient.

Any one of the following conditions will require that a code of "T" be entered in this field:

- The bridge has been shored up or additional temporary supports have been installed.
- Temporary repairs have been made to keep the bridge open.
- A temporary bridge has been built to provide an interim bypass.
- Other temporary measures have been taken, such as barricaded traffic lanes, to keep the bridge open to traffic.

If none of these conditions exist, leave the field blank.

Any repaired bridge or replacement bridge expected to remain in service without further project activity (other than maintenance) for a significant period of time shall not be considered temporary. Under such conditions, that bridge, regardless of its type, shall be considered the minimum adequate to remain in place and shall be evaluated accordingly.

If this item is coded T, then all data recorded for the bridge shall be for the condition of the bridge without temporary measures, except for the following items which shall be coded for the temporary bridge:

WB72 - 93 Structure Open, Posted, or Closed to Traffic

WB73 - 70 Minimum Vertical Clearance Over Bridge Deck

WB73 - 74 Minimum Vertical Clearances Under Bridge

WB73 - 79 Minimum Lateral Underclearance Right

WB73 - 83 Minimum Lateral Underclearance Left

WB74 - 91 Horizontal Clearance Route Direction

WB74 - 95 Horizontal Clearance Reverse Direction

WB76 - 60 Operating Level

critical_facility
WB72 - 90
FHWA Item 6B

Critical Facility *(Required)*

No longer coded, leave blank.

median_code
WB72 - 91
FHWA Item 033

Median *(Fatal)*

This code indicates If there is a median on the bridge. By definition, a bridge median can only exist on divided highways.

A divided highway can be identified by the use of traffic control devices separating the route and reverse route directions of travel. Devices such as a concrete barrier, or yellow crosshatching between solid double yellow lines 18 inches or more apart, or others, such that vehicles are restricted to the right-hand lanes unless directed or permitted in the left-hand lanes by a police officer, or other official traffic control devices.

If a structure has been divided into a left and a right bridge so that the median is between the two structures then no median is considered to be on the bridge. Culverts will often have a median similar to the diagram for Code 1.

Use the following diagrams to identify the median device on the bridge.

0 No median (undivided roadway).
1 Open median.
2 Closed median — painted (Traffic lanes are separated only by painted median).
3 Closed median — mountable curb or center island.
4 Closed median — flex or thrie beam guardrail.
5 Closed median — box beam guardrail.
6 Closed median — Concrete (i.e., NJB, Type F barrier, etc.).
7 Open median — with safety modifications (i.e., a net has been installed).
9 Other type of median.

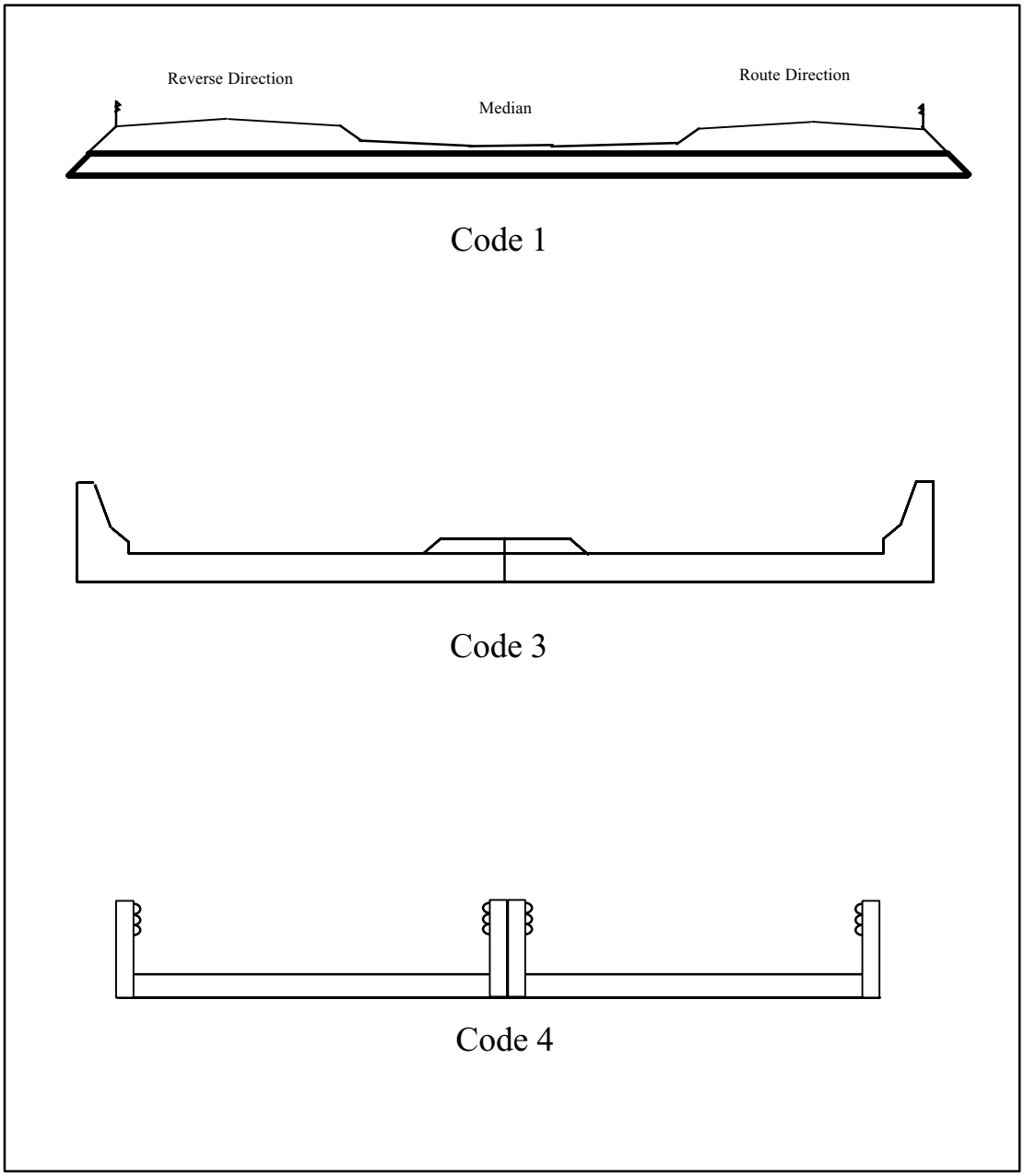


Figure WB72 - 91

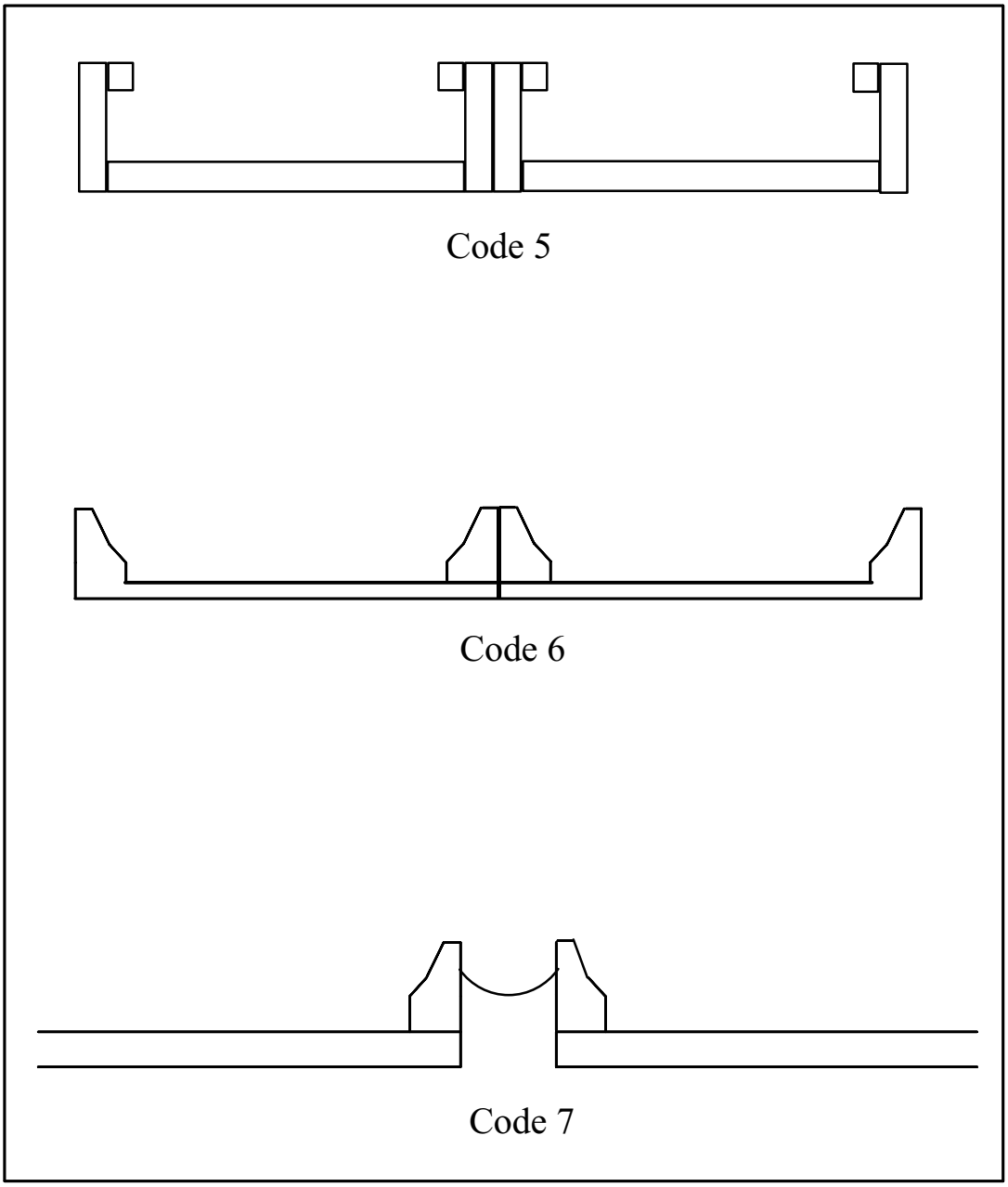


Figure WB72 - 91

hist_signif **Historical Significance** *(Fatal)*
WB72 - 92
FHWA Item 037

A bridge may be considered historically significant If it is a particularly unique example of the history of engineering, the crossing itself is historically significant, the bridge is associated with historical property, or the bridge was involved in events of historical significance.

If the bridge is only on the National Register of Historic Places (NRHP) list, use the numeric code. If the bridge is only on the Historical American Engineering Record (HAER) list, use the alpha code. If the bridge is on both NRHP and HAER lists, use the numeric code. For questions, contact the Office of Archeology and Historic Preservation at (360) 586-3065. Their web address is www.oahp.wa.gov.

1 or A Bridge is on the NRHP or HAER.

2 or B Bridge is eligible for the NRHP or HAER.

3 or C Bridge is possibly eligible for the NRHP or HAER. (Further investigation is required before a determination can be made.)

4 Bridge's historical significance has not been determined at this time. (This code should be used If the bridge is less than 50 years old.)

5 Bridge has been reviewed by the State Office of Archaeology and Historic Preservation and is not eligible for the NRHP, HAER.

6 Bridge has been reviewed and a determination has been made that this bridge has no historical significance.

open_closed
WB72 - 93
FHWA Item 041

Open, Closed, or Posted *(Fatal)*

This field provides information about the actual weight capacity status of a bridge. The field review could show that a structure is posted, but WB76 - 60 Operating Level may indicate that posting is not required. This is possible and acceptable coding since WB76 - 60 is based on the operating stress level and the governing agency's posting procedures may specify posting at some stress level less than the operating rating. One of the following codes shall be used:

- A Bridge is open with no restrictions.
- B Bridge is open. Posting has been recommended but but has not been legally implemented (all signs are not in place).
- D Bridge is open. It would be posted or closed except that temporary shoring, etc., has been used to allow for unrestricted traffic flow. If this code is used, WB72 - 89 shall be coded T.
- E Bridge is open, but it is a temporary bridge carrying traffic while the original bridge is being replaced or rehabilitated. If this code is used, WB72 - 89 shall be coded T.
- G Bridge is new and not yet open to traffic.
- K Bridge is closed to traffic.
- P Bridge is posted for weight restrictions.
- R Bridge is posted for other load-capacity restrictions such as speed or limiting the number of vehicles allowed on the bridge at one time.

program_year
WB72 - 94

Program Year *(Required)*

If the bridge has been included in an approved six-year construction program, this field contains the year that work is to start on the project, including preliminary engineering.

Work to be performed on the bridge must be major construction or reconstruction. If the bridge is not included in a six-year program, code zeroes in this field.

built_year
WB73 -32
FHWA Item 027

Year Built *(Fatal)*

This is the year that original construction of the bridge was completed.

If the year the bridge was built is not known, enter an estimate of that date. If the bridge was built during or before the year 1900, enter 1900 in the field.

There are cases where a careful evaluation of the year built and year rebuilt must be made. The first is when an existing bridge has been moved to a new site. The second is when parts of a dismantled bridge from another site are used at a new site. And the third is when parts of the old bridge are used at the same site.

Excluding engineering and safety considerations, an evaluation of the impact on future funding is a factor. The year built and year rebuilt are key fields used to determine If a bridge is eligible for federal funding. Another consideration would be the percentage of used material in relation to new material. The greater the percentage of new material used in the bridge the less need there is of capturing the original date of construction in the inventory.

Since every occasion of these instances will be unique in its' application guidance should be sought from your Program Manager when there is question as to the proper year to use.

Address farther definition of this topic when old parts are used

rebuilt_year
WB73 - 36
FHWA Item 106

Year Rebuilt (*Fatal)*

This is the year in which the last major rehabilitation of the existing bridge was completed.

Record and code the year of most recent reconstruction of the structure. Code all four digits of the latest year in which reconstruction of the structure was completed. If there has been no reconstruction, code 0000.

For a bridge to be defined as rebuilt, the type of work performed, whether or not it meets current minimum standards must have been eligible for funding under any of the federal aid funding categories. The eligibility criteria would apply to the work performed regardless of whether all state or local funds or federal aid funds were used.

Some types of eligible work not to be considered as rebuilt are listed:

- Safety feature replacement or upgrading (for example, bridge rail, approach guardrail, or impact attenuators).
- Painting of structural steel.
- Overlay of bridge deck as part of a larger highway surfacing project (for example, overlay carried across bridge deck for surface uniformity without additional bridge work).

- Utility work.
- Emergency repair to restore structural integrity to the previous status following an accident.
- Retrofitting to correct a deficiency which does not substantially alter physical geometry or increase the load-carrying capacity.
- Work performed to keep a bridge operational while plans for complete rehabilitation or replacement are under preparation (for example, adding a substructure element or extra girder).

Example	**Code**
Rebuild completed 1970	1970

structure_length
WB73 - 40
FHWA Item 49

Bridge Length *(Fatal)*

This is the measurement for the length of roadway supported by the bridge. This measurement is taken along the center of the roadway from the back of the backwall of each abutment or from the back of paving notch (seat) to paving notch (seat). Culvert lengths are measured along the centerline of the roadway from inside face to inside face of the exterior walls, or from spring line to spring line, regardless of depth below grade. When the culvert is not perpendicular to the roadway, the centerline length must be calculated. Code this measurement to the nearest foot.

The bridge length entered in this field is considered the length when determining eligibility for federal funding, except when the bridge length is near 20 feet. If that is the case, the length of the bridge as entered in NBIS Length will be used. See Figure WB73 - 40A and Figure WB73 - 40B.

nbi_length
WB73 - 46
FHWA Item 112

NBIS Length *(Fatal, If WB 73 - 40 is between 19 and 23 feet)*

The NBIS bridge length is a measurement along the center of the roadway between undercopings of abutments, spring lines of arches, or the extreme ends of openings for multiple boxes.

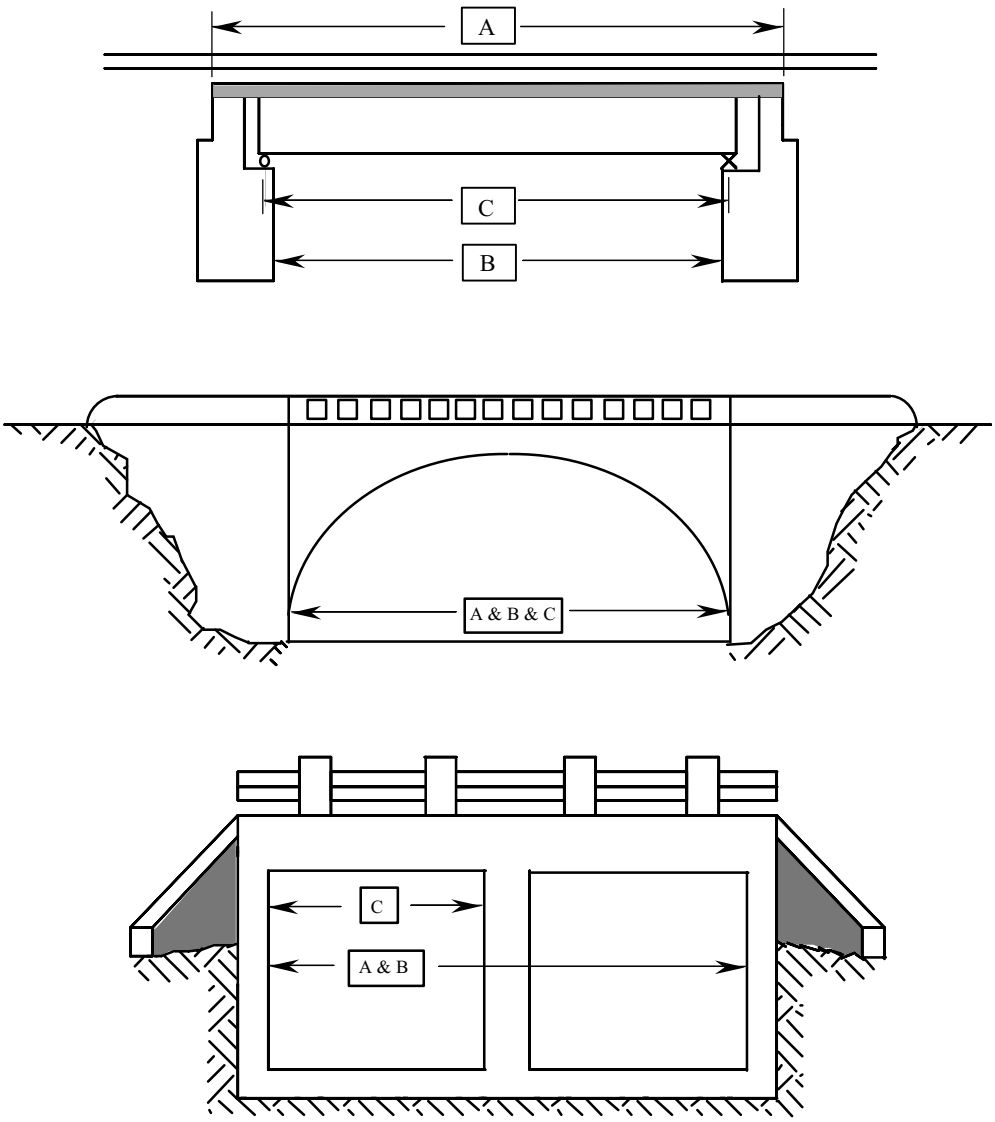
This measurement is coded to the nearest lesser foot and may be different from the measurement entered in Bridge Length.

If the measurement as entered in Bridge Length is between 19 and 23 feet, a measurement of the NBIS length shall be coded in this field.

If the measurement as entered in Structure Length is greater than 23 feet, this field should be left blank. See Figure WB73 - 40A and Figure WB73 - 40B.

max_span_length **Maximum Span Length** *(Fatal)*
WB73 - 48
FHWA Item 048

This is the number of feet which the bridge spans at its maximum opening. This length is measured along the centerline of the bridge. The span length is measured either as the center-to-center distance between bearings or the clear distance between piers, bents, or abutments. The preferred measurement to enter is the center-to-center distance between bearings. The span may be either a main span or approach span. See Figure WB73 - 40A and Figure WB73 - 40B.



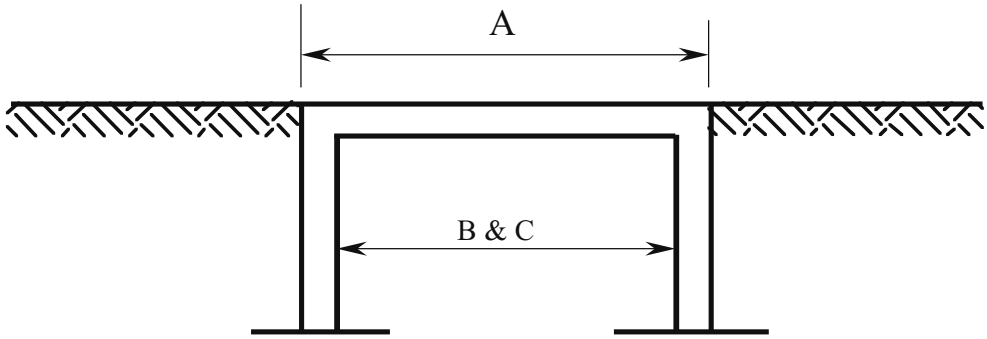
A = Structure Length (WB73-40)

B = NBIS Length (WB 73-46)

C = Maximum Span Length (WB73-48)

For a culvert, it doesn't matter if the roadway is on the slab or on ballast, "A" will remain unchanged.

Figure WB73 – 40A



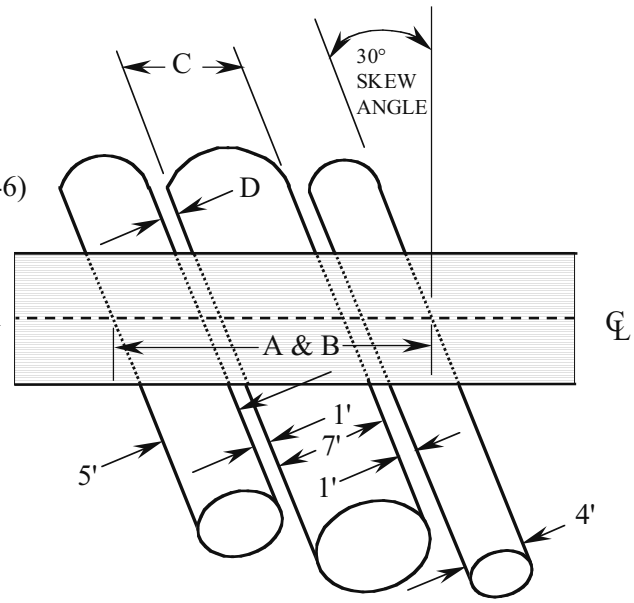
For a structure with ballast (where the ballast is > A/2) such that the live load is not transferred into the deck, "A" will be inside the face of the exterior walls.

A = Structure length

B = NBIS Length (WB73 – 46)

C = Maximum span length

D = the distance between consecutive pipes, which must be = or < _ the diameter of the smallest pipe in the series.



Opening Distance = 18' = 5'+ 1'+ 7'+ 1'+ 4'

$$A \text{ (normal to the pipes)} = \frac{18'}{\cos(30)} = \frac{18'}{.867} = 20.76' \quad \text{(Code: 2Ø')}$$

$$C = \frac{7}{\cos(30)} = 8.08' \quad \text{(Code: 8')}$$

Figure WB73 – 40B

lane_on **Lanes On** *(Fatal)*
WB73 - 52
FHWA Item 028A

The number of lanes of motor vehicle traffic carried by the bridge must be entered in this field. It includes all traffic lanes which are striped or otherwise marked as full-width lanes for the entire length of the ridge.

Include any full-width merge lanes or ramp lanes carried on the bridge. The number of traffic lanes is independent of the direction in which these lanes carry traffic. That is, a one-lane bridge which carries traffic in two directions is considered to have only one lane on the bridge.

It should be noted here for purposes of the Deck Geometry Evaluation any one-way bridge (excluding ramps, WB74 - 34 coded 7) which has a curb-to-curb width 16 feet or greater shall be evaluated as two lanes. Also, If the curb-to-curb is less than 16 feet and the bridge carries two way traffic, then WB73 - 52 is coded Ø1 and WB74 - 90 is coded 5. For information to code a half bridge, see Appendix 2.07A.

lane_under **Lanes Under** *(Fatal)*
WB73 - 54
FHWA Item 028B

This field contains the number of lanes of motor vehicle traffic carried by the highway or highways which pass underneath the bridge.

If the bridge carries highway traffic (WB74 - 32 is coded 1, regardless of ownership and/or maintenance responsibility), it is the total number of lanes of all inventory routes passing underneath.

If the route being inventoried is under the bridge (WB74 - 32 coded 2 or A-Z), this is the number of lanes of the inventoried route only.

There may be a separate record of some or all of the routes located under the bridge (see WB74 - 32 for routes requiring a record in the NBI).

curb_to_curb_width Curb-to-Curb Width *(Fatal)*
WB73 - 56
FHWA Item 051

The curb-to-curb width is the measurement, in feet, of the most restrictive width of the structure from curb-to-curb (or inside face of rail to inside face of rail If no curb). This is a Fatal Field.

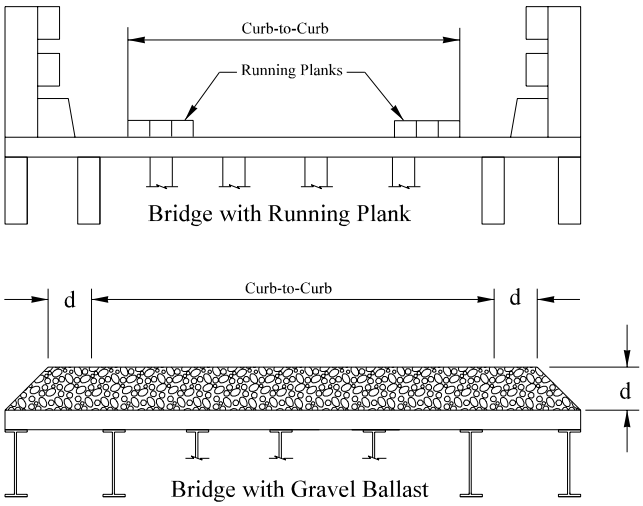
This measurement is recorded to the nearest tenth of a foot. For structures that carry lanes of traffic separated by a median barrier, the curb-to-curb width is the sum of the most restrictive minimum widths of each roadway carried on the structure. The widths of any open medians, raised or non-mountable medians, barrier-protected horse or bicycle lanes, or flared ramps should be excluded from this measurement.

When the roadway runs directly on the top slab or wearing surface of a culvert (such as a reinforced concrete box without fill), the actual roadway width from curb-to-curb or from rail-to-rail is entered in this field. This is also the case If the fill is minimal and the culvert headwalls reduce the roadway width. When there are no lateral restrictions such as curbs or rails the actual useable roadway width is recorded as the curb-to-curb measurement.

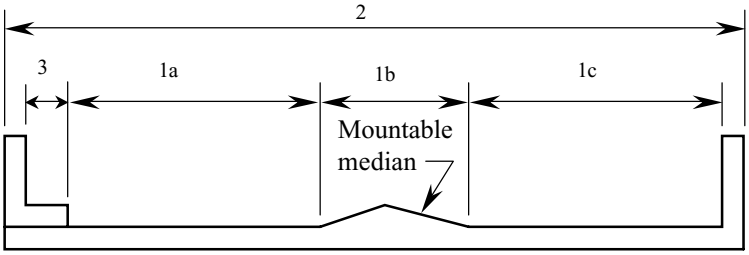
When the roadway is carried on sufficient fill covering a pipe or box culvert so that the load is not transferred into the structure, and when headwalls or parapets do not affect the flow of traffic, a value of ØØØØ should be entered in this field. The filled section over the culvert simply maintains the roadway cross-section, the structure itself is considered to have no deck and thus no curb-to-curb width.

It should be noted, however, that for purposes of Sufficiency Rating calculations the program will default to a curb-to-curb width of 36´ for the S2, D, and E calculations.

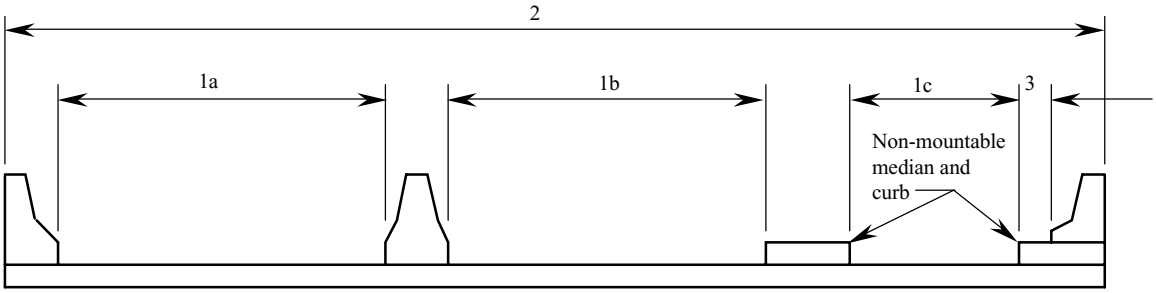
For the correct coding of a Side Hill Viaduct (Half Bridge), see Appendix 2.07A



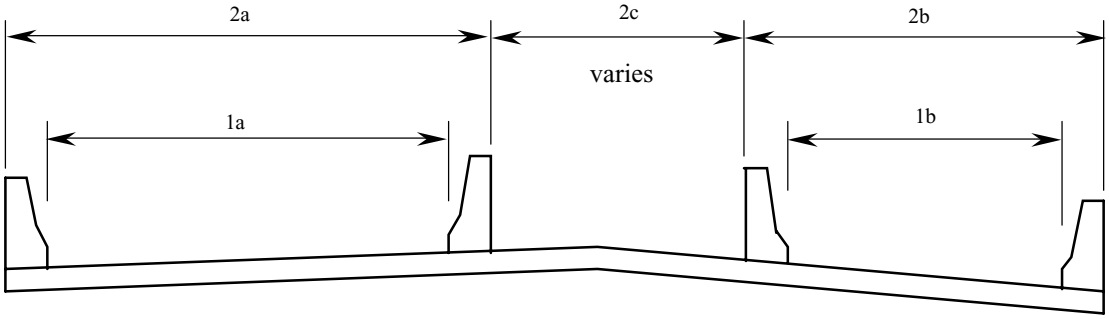
Curb-to-Curb Roadway Width
Figure WB73 - 56



1 = 1a + 1b + 1c



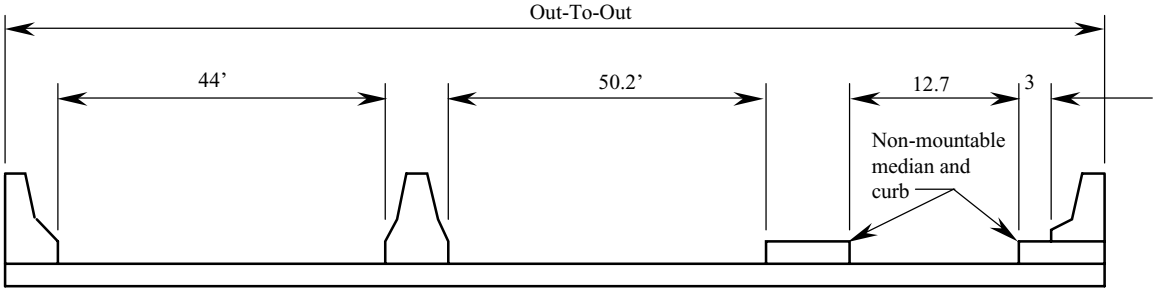
1 = 1a + 1b + 1c



1 = 1a + 1b

2 = 2a + 2b + 2c

WB73-56 (1) Bridge Roadway Width, Curb-to-Curb
WB73-60 (2) Deck Width, Out-to-Out
WB73-64 (3) Curb or Sidewalk Width



Curb-to-Curb Width = 44’+50.2’+12.7’ = 106.9’

Curb-to-Curb Roadway Width

Figure WB73 - 56

out_to_out_width **Out-to-Out Deck Width** *(Fatal)*
WB73 - 60
FHWA Item 052

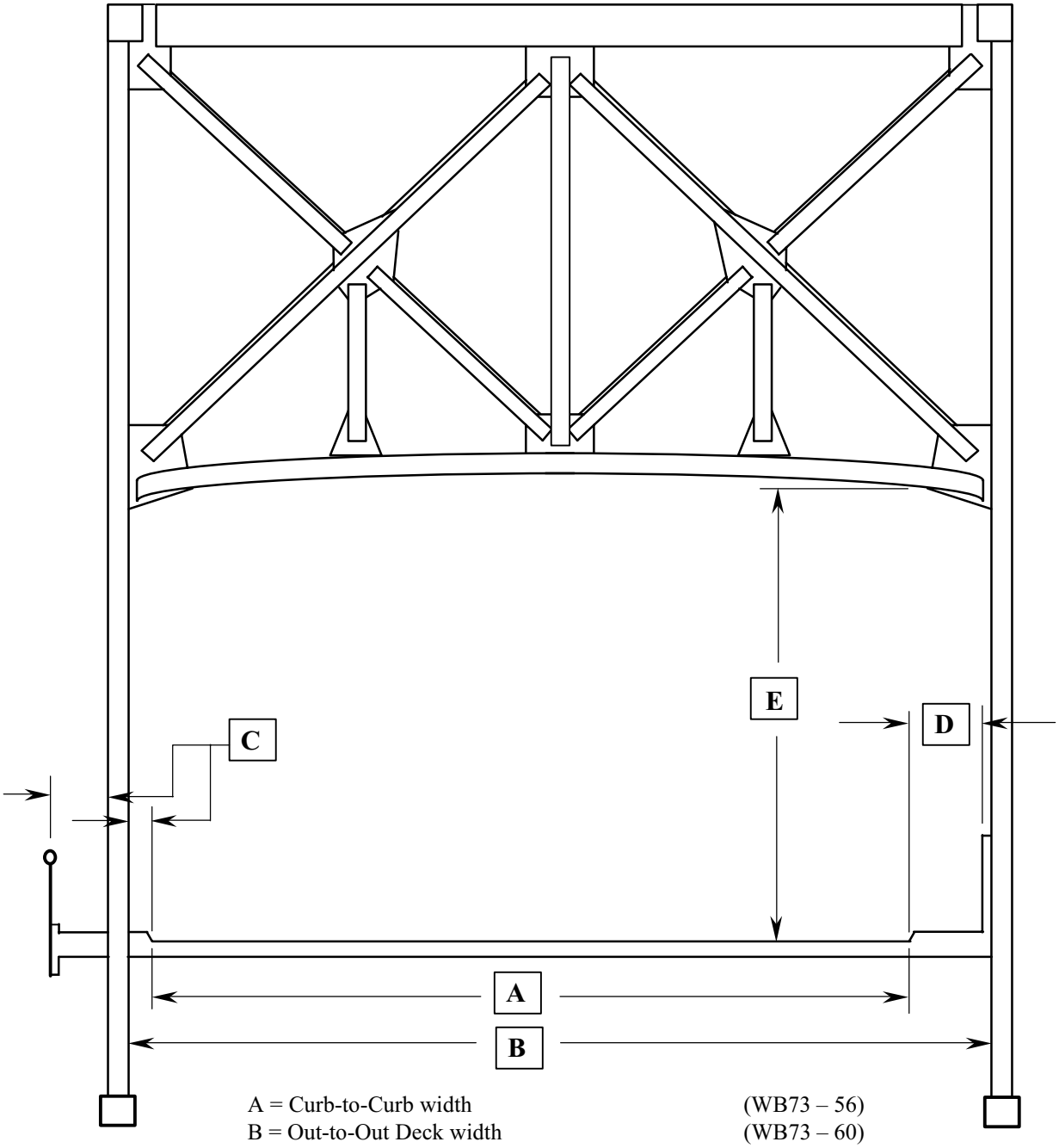
This field contains the measurement of the most representative out-to-out width on the bridge. This measurement should be taken normal to centerline from the outside edges of each side of the deck and coded to the nearest tenth of a foot. The widths of any open medians, or flared ramps should be excluded from this measurement. For through structures, the out-to-out width is a measurement of the lateral clearance between superstructure members. See Figures WB73 - 56 and WB73 - 60.

When the roadway runs directly on the culvert (as described in Curb-to-Curb Width), the width of the culvert itself, from outside edge to outside edge, should be entered in this field. When the roadway is carried on fill over a buried culvert (also described in Curb-to-Curb Width), a value of zero should be entered.

See Appendix 2.07-A for Side Hill Viaduct (Half Bridge) coding.

HORIZONTAL / VERTICAL MEASUREMENTS

(Looking Ahead on Mileposts)



A = Curb-to-Curb width	(WB73 – 56)
B = Out-to-Out Deck width	(WB73 – 60)
C = Sidewalks and Curb – Left	(WB73 – 64)
D = Sidewalks and Curb – Right	(WB73 – 67)
E = Minimum Vertical Clearance Over Bridge Deck	(WB73 – 70)

Figure WB73 -60

sdwk_curb_left **Sidewalk/Curb Width, Left** *(Required)*
WB73 - 64
FHWA Item 050A

The combined useable width of the left-hand sidewalk and curb on the bridge is entered in this field. The left-hand side of the bridge is determined by facing in the direction of increasing mileposts. If no mileposts are in use, left is determined by facing north or east. See Figure WB73 - 64.

This measurement is coded to the nearest tenth of a foot.

If the bridge has no functional sidewalks and/or curbs, code zeroes in this field. If the bridge has concrete barriers for rails and no sidewalks, also code zeroes.

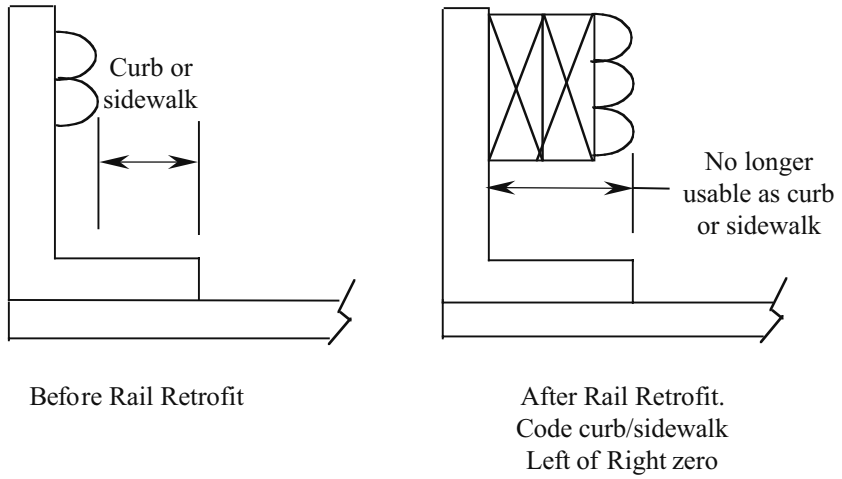


Figure WB73 - 64

sdwk_curb_right **Sidewalk/Curb Width, Right** *(Required)*
WB73 - 67
FHWA Item 050B

The combined useable width of the right-hand sidewalk and curb on the bridge is entered in this field. The right-hand side of the bridge is determined by facing in the direction of increasing mileposts. If no mileposts are in use, right is determined by facing north or east.

This measurement is coded to the nearest tenth of a foot.

If the bridge has no functional sidewalks and/or curbs, code zeroes in this field. If the bridge has concrete barriers for rails and no sidewalks, also code zeroes.

min_vert_deck **Minimum Vertical Clearance Over Deck** *(Required)*
WB73 - 70
FHWA Item 053

The minimum vertical clearance over the bridge deck is entered in this field. This measurement is coded to the nearest lesser inch and should be taken from the top of the traffic lane or shoulder to a point where the clearance is the most restrictive to include bridge mounted elements. The foot (´) and inch (↑) symbols are already marked in the field. See Figure WB73 - 60.

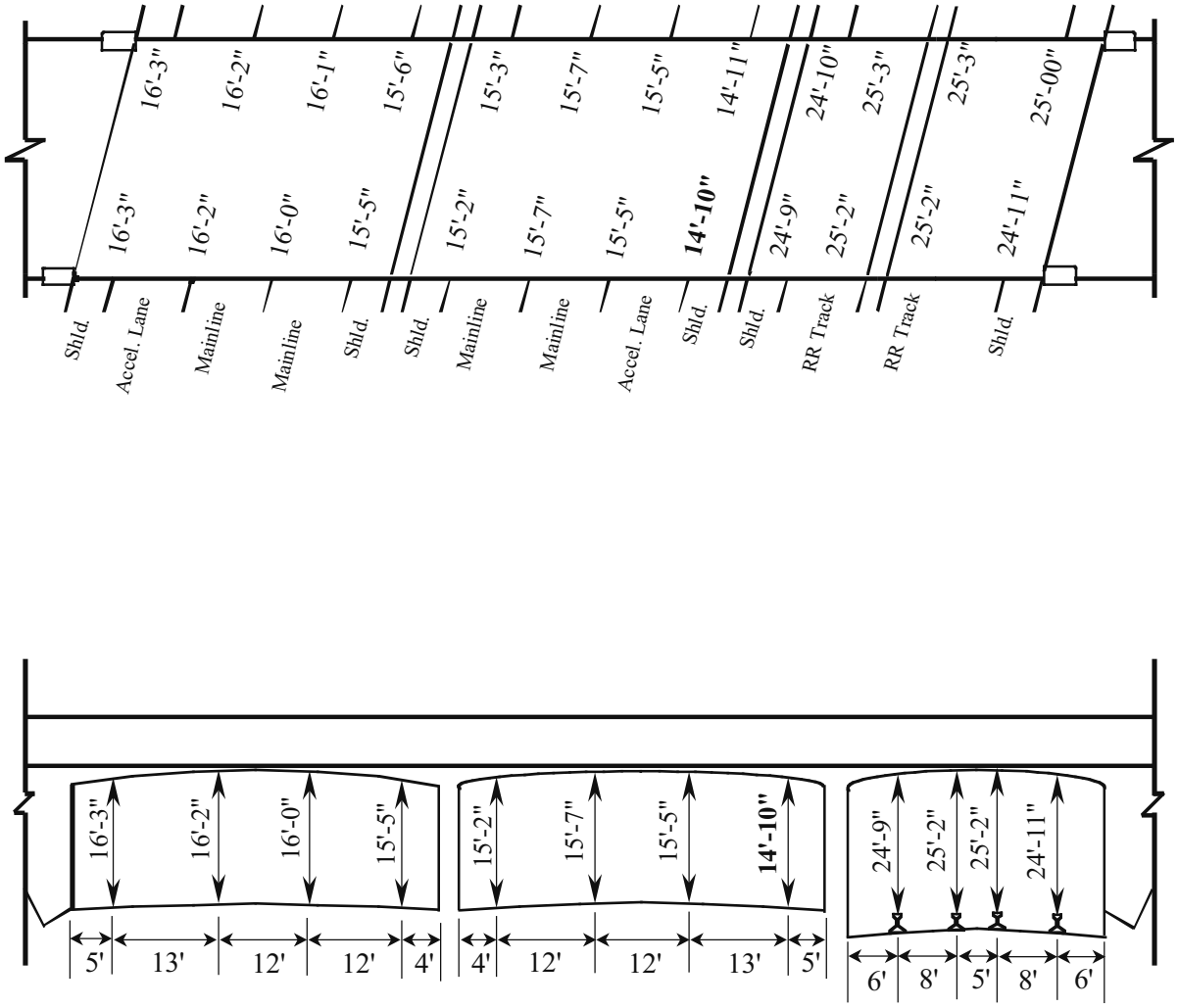
If there is no restriction, code 9999 in this field. If the minimum restriction is a distance greater than 100 feet, code 9912.

min_vert_under **Minimum Vertical Clearance Under Bridge**
WB73 - 74 *(Required)*
FHWA Item 054B

This field contains the minimum vertical clearance measured under the bridge. This is the minimum vertical clearance from the roadway (travel lanes only) or railroad track beneath the bridge to the underside of the superstructure. See Figure WB73 - 74.

The value is coded to the nearest lesser inch. The posted clearance is typically less than the measured value. The measured value should be reported in this field. WSDOT typically posts bridges with clearance less than 15´-3↑.

If the bridge does not cross a highway or a railroad, zeroes should be entered. If the bridge crosses both a highway and a railroad, code the most critical dimension and note why it is the one recorded in the inspection report (see Figure WB73 - 78).



Code the most Restrictive Clearances:
WB73 – 74 would be coded **141Ø**
WB73 – 78 would be coded **H**

Figure WB73 – 74 and WB73 - 78

vert_under **Vertical Underclearance Code** *(Required)*
WB73 - 78
FHWA Item 054A

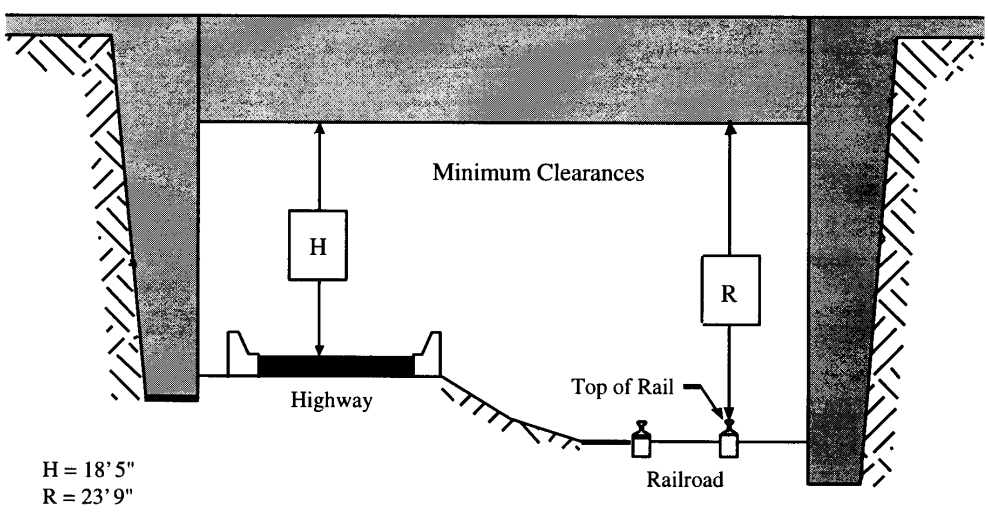
The code in this field identifies the feature from which the minimum vertical underclearance was taken. If the bridge does not cross a highway or a railroad, the letter "N" shall be entered. If the bridge crosses both a highway and a railroad, the measurement of the minimum vertical underclearance should be taken to the most critical feature. See Figure WB73 - 78.

H Highway
R Railroad
N Neither

From the WSDOT Design Manual 1120.03(5) revised December 1997, the minimum clearance over railroad is 22 feet 6 inches, and minimum clearance over a roadway is 14 feet 6 inches. Select the most restrictive measurement.

The current coding for WB73 - 74 and WB73 - 78 is as follows:

- If the bridge crosses neither a highway nor a railroad, code ØØØØN.
- If the bridge crosses a highway with a minimum vertical underclearance of 18 feet 5 inches, code 18Ø5H.
- If the bridge crosses a railroad with a minimum vertical underclearance of 23 feet 9 inches, code 23Ø9R.
- If the bridge crosses both a highway and a railroad, and the highway has a clearance greater than minimum design standards but the railroad is less than design standards, code the measurement to the railroad.



Vertical Clearances
Figure WB73 - 78

lateral_route_right **Minimum Lateral Underclearance Right** *(Required)*
WB73 - 79
FHWA Item 055B

Using a three-digit number and a one-digit code (WB73 - 82), record the minimum lateral underclearance on the right to the nearest tenth of a foot (with an assumed decimal point). When both a railroad and highway are under the bridge, code the most critical dimension. This measurement is determined while facing the direction the traffic flows.

The lateral clearance should be measured from the right edge of the roadway (excluding shoulders) or from the centerline (between rails) of the right hand track of a railroad to the nearest substructure unit (pier, abutment, etc.), to a rigid barrier (concrete bridge rail, etc.), or to the toe of a slope steeper than 3:1. The clearance measurements to be recorded will be the minimum after measuring the clearance in both directions of travel. In the case of a divided highway, this would mean the outside clearances of both roadways should be measured and the smaller distance recorded and coded (see Figures WB73 - 79 through WB73 - 83).

If two related features are below the bridge, measure both and record the lesser of the two. An explanation should be written on the inspection form as to what was recorded. When the clearance is 100 feet or greater, code 999.

If the feature beneath the bridge is not a railroad or highway, code ØØØN to indicate not applicable.

The presence of ramps and acceleration or turning lanes is not considered in this item; therefore, the minimum lateral clearance on the right should be measured from the right edge of the **through** roadway.

Examples	**Code**
Railroad 6.22 feet centerline to pier	062
Highway 6.16 feet edge of pavement to pier	062
Creek beneath bridge	000

lateral_route **Lateral Underclearance Code** *(Required)*
WB73 - 82
FHWA Item 055A

This code identifies the type of reference feature from which the minimum lateral underclearance measurement on the right was taken. See Figures WB73 - 79 through WB73 - 83.

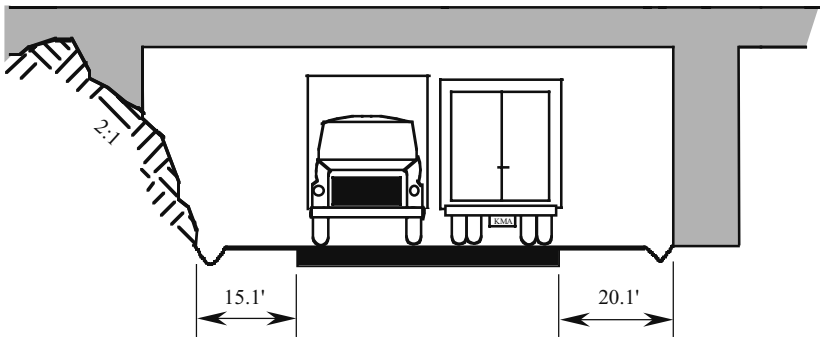
H Highway beneath bridge.
R Railroad beneath bridge.
N Feature beneath the bridge is neither a highway nor a railroad.

lateral_route_left **Minimum Lateral Underclearance Route Left**
WB73 - 83 *(Required)*
FHWA Item 056 Code only for divided highways, one way streets, and ramps. This is not applicable to railroads or two-way roads with closed medians. Using a three-digit number, record and code the minimum lateral underclearance on the left (median side for divided highways) to the nearest tenth of a foot (with an assumed decimal point). The lateral clearance should be measured from the left edge of the roadway (excluding shoulders) to the nearest substructure unit, to a rigid barrier, or to the toe of slope steeper than 1 to 3. Refer to Figures WB73 - 79 through WB73 - 83.

In the case of a divided highway, the median side clearances of both roadways should be measured and the smaller distance recorded and coded. If there is no obstruction in the **median area**, a notation of "open" should be recorded and 999 should be coded. For clearances greater than 100 feet, code 998. Code ØØØ to indicate not applicable.

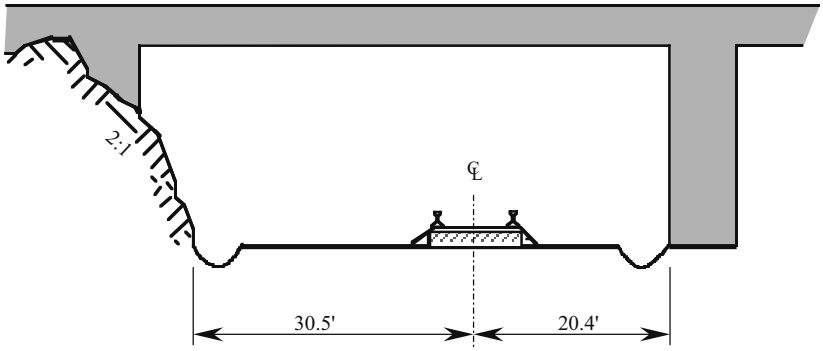
Code	Description
000	Not applicable.
998	Clearance equal to 99.8 feet or greater.
999	Divided highway with no obstructions.

UNDIVIDED HIGHWAY



For Minimum Lateral Underclearance Right, Code 15.1H
For Minimum Lateral Underclearance Left, Code ØØØ

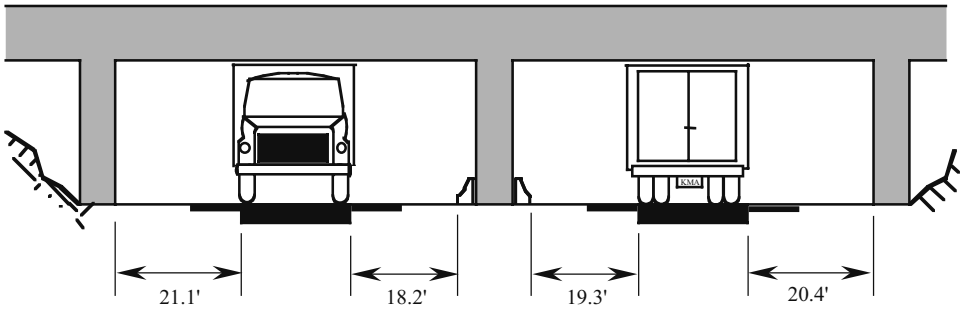
RAILROAD



For Minimum Lateral Underclearance Right, Code 2Ø.4R
For Minimum Lateral Underclearance Left, Code ØØØ

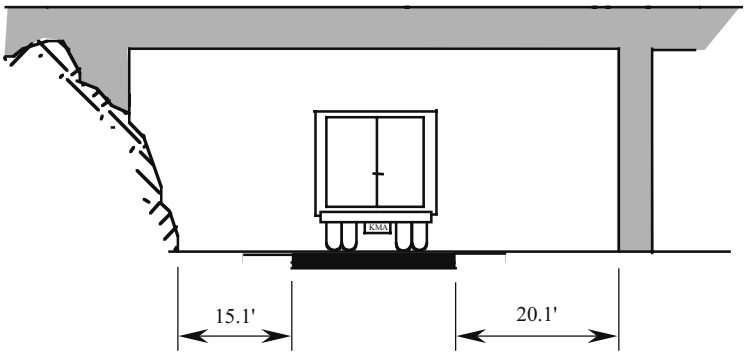
Figures WB73 – 79 through 83

DIVIDED HGHWAY



For Minimum Lateral Underclearance Right, Code 2Ø.4H
For Minimum Lateral Underclearance Left, Code 18.2

ONE - WAY ROADWAY



For Minimum Lateral Underclearance Right, Code 2Ø.1H
For Minimum Lateral Underclearance Left, Code 15.1

Figures WB73 – 79 through 83

nav_control_code **Navigation Control Code** *(Fatal)*
WB73 - 86
FHWA Item 038

This field indicates whether or not a navigation control (a bridge permit for navigation as issued by the United States Coast Guard) is required.

0 No navigation control on waterway (bridge permit does not exist).
1 Yes, navigation control on waterway (a bridge permit exists).
N Not applicable (bridge does not cross a waterway).

nav_vert_clrnc **Navigation Vertical Clearance** *(Required)*
WB73 - 87
FHWA Item 039

This field contains the minimum vertical clearance allowable for navigational purposes. If the Navigation Control code has been coded 1, this field will show the number of feet (to the nearest foot rounded down) of minimum vertical clearance imposed at the site. This is not a field measurement but is the number of feet as measured above a datum point specified on the navigation permit.

In the case of a swing or bascule bridge, the clearance should be measured with the bridge in the closed position. In the case of a vertical lift bridge, the clearance should be measured with the bridge in the raised or open position.

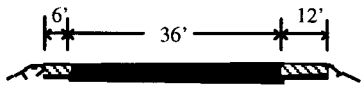
If the Navigation Control code has been coded Ø or N, enter zeros in this field to indicate there is no navigational clearance.

nav_horiz_clrnc **Navigation Horizontal Clearance** *(Required)*
WB73 - 90
FHWA Item 040

This field contains the minimum horizontal clearance allowable for navigational purposes. If the Navigation Control code has been coded 1, this field will show the number of feet (to the nearest foot rounded down) of minimum horizontal clearance between fenders (If any), or the minimum clear distance between piers or bents. This is the measurement shown on the navigation permit and may be less than the actual clearance distance measured on site.

If the Navigation Control code has been coded Ø or N, enter zeros in this field to indicate there is no navigational clearance.

UNDIVIDED HIGHWAY
(as approach roadway)

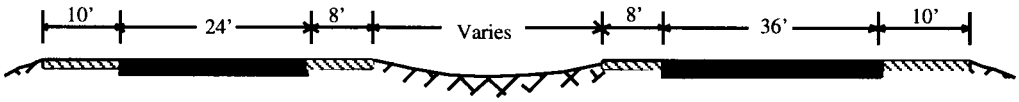


Left Shoulder	Main Roadway	Right Shoulder	Code
6.0	36.0	12.0	054

If the approach roadway is an undivided highway, measure and code the full width of the roadway, including shoulders.

Code: Ø54

DIVIDED HIGHWAY
(as approach roadway)



Left Shoulder	Left Roadway	Median Width	Right Roadway	Right Shoulder
10.0	24.0	16.0	36.0	10.0

If the approach roadway is part of a divided highway carried on parallel bridges, there will be two records. Code the width of the approach roadway for the appropriate bridge record.

Code: Ø42 - for left bridge
Code: Ø54 - for right bridge

If the approach roadway is part of a divided highway with a median (one structure record), measure and code the width of the left shoulder and roadway, the right shoulder and roadway, plus the average median width of the approach roadway.

Code: Ø96 (34' + 46' + 16')

Figure WB73 - 97

vert_lift_min_clrnc **Vertical Lift Minimum Navigation Clearance** *(Required)*
WB73 - 94
FHWA Item 116

For vertical lift bridges, this value indicates the minimum vertical clearance for navigational purposes when the bridge is in the closed position (that is, when the bridge allows vehicular traffic to cross).

If the Navigation Control code has been coded 1 and the bridge is a vertical lift bridge, this field will show the number of feet (to the nearest foot rounded down) of minimum vertical clearance imposed at the site. This is the number of feet as measured above a datum point specified on a navigation permit.

If the Navigation Control code has been coded 1, but the bridge is not a vertical lift bridge, leave the field blank.

aprch_width **Approach Roadway Width** *(Fatal)*
WB73 - 97
FHWA Item 032

This is the normal width to the nearest foot of the roadway approaching the bridge. This measurement should include the width of shoulders If the shoulders have been constructed so that they are maintained flush with the adjacent traffic lane and are structurally consistent with these traffic lanes.

This measurement should disregard localized widening. Grass or dirt adjacent to the traffic lanes but not within the maintained roadway should not be considered part of the approach roadway for this item.

For bridges with closed medians, the normal width of the median between the roadways approaching the bridge should not be included in this measurement. Where there is a variation between the approach widths at either end of the bridge, code the narrowest of the approach widths in this field. See Figure WB73 - 97.

nominal_skew_angle **Skew Angle** *(Fatal)*
WB73 - 100
FHWA Item 034

The skew angle is a measurement of the angle of intersection between the centerline of a pier and a line drawn perpendicular to the roadway centerline. This angle is coded to the nearest whole degree. See Figure WB73 - 100.

If the bridge is not skewed, enter 00 in this field. If the skew angle varies from pier to pier, enter the average skew angle, provided it is a representative figure. If it is not, code 99 in this field to indicate that a major variation exists in the skew angles measured from the separate piers supporting the bridge.

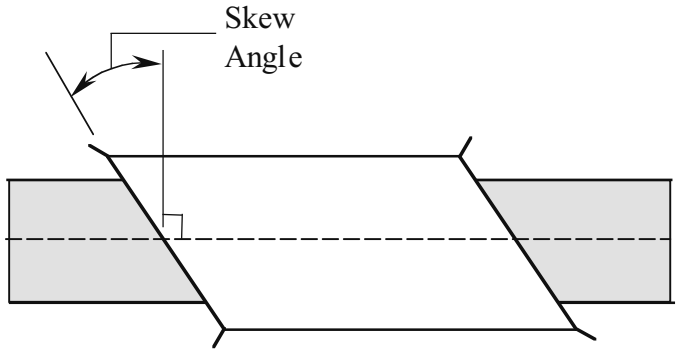


Figure WB73 - 100

flared_flag **Flared Flag** *(Fatal)*
WB73 - 102
FHWA Item 035

This code indicates whether or not the width of the bridge varies (or flares). Although there may be other causes, generally such variance is the result of ramps converging or diverging from the structure's through lanes. Minor widening at the four corners of the bridge (i.e., for aesthetic reasons) is not to be considered a flare.

N No, bridge does not flare.
Y Yes, bridge flares.

on_under_code **Inventory Route On /Under** *(Fatal)*
WB74 - 32 FHWA Item 005A This field identifies whether the route being inventoried is carried on or is under the bridge. It cannot be overemphasized that all route-oriented data must agree in the coding as to whether the route being inventoried is"on" or "under" the bridge.

For all records, there are data elements related to the structure and data elements related to the inventory route. The data elements related to the structure (structure data) will not change whether you are coding for the route on the bridge or for the route under the bridge. However, the data elements related to the inventory route (crossing data) are related to the specific route being inventoried.

These two data element types are maintained in two separate tables in the database and are related to each other by the Structure Identifier and a Crossing Key. The Crossing Key is created from the owner code, route number, and mile post to create a unique addressing code for each crossing. Therefore, each bridge will have only one structure record but may have multiple crossing records.

In order for the computer to keep multiple crossings related to their structure elements, it uses a flag known as the Main listing and Secondary listing flag. All structure records are related to the Main listing. The first or only crossing record for a route is also related to the Main listing. The same is true for under routes where no "on" record is coded, such as a tunnel.

However, where a record for a route is coded "on" a bridge and another record(s) will be coded for a route(s) under the same bridge, there must be a Secondary listing(s) created. This Inventory Coding Form was not designed to report Secondary listings. Regardless of whether the code in this field is 1 or 2, this report always displays the Main listing information.

For Secondary listings, another form must be used. If your agency has a bridge over a federal aid route that fits into this category, contact the Bridge Engineer for Local Agencies for the proper procedures.

For entering the code in this field for the Main listing, use one of the following codes:

Code	Description
1	Route being inventoried is On the bridge.
2	Route being inventoried is Under the bridge. This would be the code for a single route under the bridge, for tunnels, pedestrian, and railroad undercrossings or even a building.
A-Z	Multiple routes go Under the bridge. The code A will be used for the most important of the multiple routes on separate roadways under the bridge. Z will be for the 26th route under the bridge. The level of importance is determined by STRAHNET designation and the highway class.

If the code entered here is 2 or A-Z, only the following fields need to be entered:

Field Name	WSBIS Code	FHWA No.
Location	WB71 - 56	009
Latitude	WB71 - 88	016
Longitude	WB71 - 96	017
Features Intersected	WB72 - 32	006A
Facilities Carried	WB72 - 56	007
FIPS Place Code	WB72 - 76	004
Toll	WB72 - 85	020
Parallel Structure	WB72 - 88	101
Temporary Structure	WB72 - 89	103
Critical	WB72 - 90	06B
Year Built	WB73 - 32	027
Bridge Length	WB73 - 40	049
NBIS Length	WB73 - 46	112
Maximum Span Length	WB73 - 48	048
Lanes On	WB73 - 52	028A
Lanes Under	WB73 - 54	028B
Min Vertical Clearance Under Bridge	WB73 - 74	054B
Vertical Underclearance Code	WB73 - 78	054B
Minimum Lateral Underclearance Right	WB73 - 79	055B
Lateral Underclearance Code	WB73 - 82	055A
Minimum Lateral Underclearance Route Left	WB73 - 83	056
On/Under	WB74 - 32	005A
Highway Class	WB74 - 33	005B
Service Level	WB74 - 34	005C
Route Number	WB74 - 35	005D
Mile Post	WB74 - 40	01}
ADT On Inventory Route	WB74 - 45	029
Truck ADT PCT	WB74 - 51	109
ADT Year	WB74 - 53	030
National Highway System	WB74 - 83	104
Base Highway Network	WB74 - 84	012
Strahnet	WB74 - 85	100
Fed Funct Class	WB74 - 87	026
National Truck Net	WB74 - 89	110
Lane Use Direction	WB74 - 90	102
Horizontal Clearance Route Dir	WB74 - 91	047
Horizontal Clearance Reverse Dir	WB74 - 95	047
Max Vertical Clearance Route Dir	WB74 - 99	110
Detour Length	WB74 - 103	119
Main Span Material	WB75 - 32	043A
Main Span Design	WB75 - 33	043B
Service On	WB75 - 44	042A
Service Under	WB75 - 45	042B

Tunnels shall be coded as an "under" record only; that is, they shall not be coded as a bridge carrying highway traffic.

hwy_class
WB74 - 33
FHWA Item 005B

Inventory Route Highway Class *(Fatal)*

This code identifies what type of highway the inventoried route is on using the following:

1 Interstate highway
2 U.S. numbered highway
3 State highway
4 County road
5 City street
6 Federal lands road
7 State lands road
8 Other (include toll roads not otherwise identified.)

When two or more routes are concurrent, the highest class of route will be used. The hierarchy is in the order listed above.

serv_level_
WB74 - 34
FHWA Item 005C

Inventory Route Service Level *(Fatal)*

This code describes the designated level of service provided by the inventoried route:

1 Mainline (most local agency bridges)
2 Alternate
3 Bypass
4 Spur
6 Business
7 Ramp or "Y"
8 Service and/or unclassified Frontage Road
Ø None of the above

route
WB74 - 35
FHWA Item 005D

Route *(Fatal)*

The number of the inventory route on (or under) the bridge must be entered in this field. County agencies should enter the County Road Log Number as the inventory route number. City agencies should enter a route number If one has been assigned. If not, the city can enter any unique number in this field; however, rather than arbitrarily assigning a random number, it is recommended that city agencies enter their city number code. This will ensure that two cities within the same county will not enter an identical route number.

Example:

If the bridge is located on highway 14, code **00014**.
If the bridge is located in Sprague, code **01225**.

traffic_flow
WB74 - 40
FHWA Item 01

Milepost *(Fatal)*

The Linear Referencing System (LRS) milepost is used to establish the location of the bridge on the Base Highway Network (see WB74 - 84). It must be from the same LRS Inventory Route and milepost system as reported in the Highway Performance Monitoring System (HPMS). The milepost coded in this item directly relates to WB74 - 67 and WB74 - 77, the LRS Inventory Route, and Subroute Number.

This item must be coded for all bridges reportable to the NBI. Code a five-digit number to represent the milepost distance in miles to the nearest hundredth (with an assumed decimal point). For bridges carrying the Inventory Route, code the milepost at the beginning of the bridge (i.e., the lowest milepost on the bridge). When the Inventory Route goes under the bridge (WB74 - 32 coded 2 or A-Z), then code the milepost on the underpassing route where the bridge is first encountered.

For records where mileposts are not provided, use a logical referencing system. Mileposts of zero are undesirable. Mileposts may be coded for bridges that are not located on the Base Highway Network; however, WB74 - 84, Base Highway Network shall be coded 0 for these records.

The milepost is coded aligned to the assumed decimal point and zero filled where needed to fill the five digits.

Examples	**Code**
milepost is 130.34	13034
milepost is 9.60	00960

adt
WB74 - 45
FHWA Item 029

ADT on the Inventory Route *(Required)*

This is the Average Daily Traffic (ADT) volume carried on the route being inventoried. If bridges on a divided highway are coded as parallel, then the ADT is the volume carried on the individual bridge, not the cumulative volume carried on the route. The determined ADT volume must be **no more than four (4) years old**. Add leading zeros to fill all spaces in the field.

adt_truck_pct
WB74 - 51
FHWA Item 109

Truck ADT Percentage *(Required)*

This is the percentage of the ADT volume that is truck traffic. It does not include vans, pickups, or other light delivery trucks. Code to the nearest whole percent.

adt_year
WB74 - 53
FHWA Item 030

ADT Year *(Required)*

This is the year in which the estimate of the ADT volume was determined. If the year entered in this field is more than four years in the past, a new ADT volume must be determined and entered in the **ADT (WB74 - 45)** and the year the ADT was determined in this field.

future_adt
WB74 - 57
FHWA Item 114

Future ADT *(Required)*

This is the ADT volume that the inventory route is expected to carry 20 years in the future. This field may be updated whenever a new projection is made. The field must be updated any time the projected date of this forecast is less than 17 years, but not more than 22 years from the current year.

This volume is intended to provide a basis for forecasting future construction needs.

future_adt_year
WB74 - 63
FHWA Item 115

Future ADT Year *(Required)*

This is the year for which WB74 - 57 has been projected.

This date must be at least 17, but no more than 22 years from the current year. If the date in this field is outside these limits, then a new value will be required for WB74 - 57 and a new year will need to be entered in this field.

lrs_route
WB74 - 67
FHWA Item 013A

Linear Referencing System Route *(Required)*

If WB74 - 84, Base Highway Network, has been or is to be coded Ø, then this field should be left blank.

The LRS inventory route and subroute numbers are a 12-digit code composed of two segments. These items must correspond to the LRS inventory route and subroute numbers reported by Washington State for the Highway Performance Monitoring System (HPMS).

If WB74 - 84, Base Highway Network, has been coded 1, the LRS inventory route number is ten digits, right justified, and zero filled. The code can be alphanumeric but cannot contain blanks. The LRS inventory route number is not necessarily the same as the route number posted along the roadway, but is a number used to uniquely identify a route within at least a county and perhaps throughout the state.

George will identify where this can be located.

Example 1: WB74 - 84 has been coded zero, structure carries route 99
WB74 - 67 LRS code will be: blank

Example 2: WB74 - 84 has been coded one, structure carries route 99
WB74 - 67 LRS code will be: 0000000099

lrs_sub_route
WB74 - 77
FHWA Item 013B

LRS Sub Route *(Required)*

If WB74 - 84, Base Highway Network, has been or is to be coded 0, then this two-digit field should be left blank.

This is the second segment of the LRS inventory route number. It is a number that uniquely identifies portions of an inventory route sections where duplicate mileposts occur or where a route passes through another agencies jurisdiction. If there is no sub route number, code 00 in this segment.

fed_aid_route
WB74 - 79

Federal Aid Route Number *(Required)*

If the route being inventoried is a federal aid highway, enter its federal aid route number in this field.

Federal Aid Route Numbers are shown on the Statewide National Functional Classification System Maps. These maps are located at local agency planning departments or at WSDOT Service Center Planning.

If the bridge is not on a federal aid highway, the field should be filled with zeros.

fed_hwy_system_
WB74 - 83
FHWA Item 104

National Highway System *(Required)*

This item shall be coded for all records in the inventory. For the inventory route identified in WB74 - 35, indicate whether the inventory route is on the NHS or not on that system. This code shall reflect an inventory route on the NHS as described in the TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY (TEA21). State of Washington National Highway System Maps are located at local agency planning departments or at WSDOT Service Center Planning.

If more than one federal aid highway is carried on or under the bridge, indicate only the classification of the more primary route.

0 Inventory Route is not on the NHS.
1 Inventory Route is on the NHS.

base_hwy_net
WB74 - 84
FHWA Item 012

Base Highway Network *(Fatal)*

This item shall be coded for all records in the inventory, both on and under records.

For the inventory route identified in WB74 - 35 (Route), indicate whether or not the inventory route is a part of the Base Highway Network.

The Base Highway Network includes the through lane (mainline) portions of the NHS system, rural and urban principal arterials, and rural minor arterials. Ramps, frontage roads, and other roadways are not included in the Base Highway Network. If WB74 - 87 (Federal Function Class) is coded one of the following: 01, 02, 06, 11, 12, 14, this field should be coded 1.

0 Inventory route is not on the Base Highway Network.
1 Inventory route is on the Base Highway Network.

strahnet_hwy **STRAHNET Highway** *(Required)*
WB74 - 85
FHWA Item 100

This item shall be coded for all records in the inventory.

For identification of STRAHNET routes, see the State of Washington National Highway System map. State of Washington Highway System maps are located at local agency planning departments or at WSDOT Service Center Planning.

For the inventory route identified in WB74 - 35, indicate STRAHNET highway status using one of the following codes:

0 The inventory route is not a STRAHNET highway.
1 The inventory route is an Interstate STRAHNET highway.
2 The inventory route is a non-Interstate STRAHNET highway.
3 The inventory route connects with a Department of Defense facility.

fed_lands_hwy_ **Federal Lands Highway** *(Required)*
WB74 - 86
FHWA Item 105

This code identifies bridges on roads which lead to and traverse through federal lands. These bridges may be eligible to receive funding from the Federal Lands Highway Program.

Washington State Forest Highways maps can be found in the Emergency Relief chapter of the Local Agencies Guidelines (LAG) manual.

As of January 1, 2000, there are three Land Management Systems. There are two in Douglas County and one in Lincoln County.

Use one of the following codes:

0 Not Applicable
1 Indian Reservation Road (IRR)
2 Forest Highway (FH)
3 Land Management Highway System (LMHS)
4 Both IRR and FH
5 Both IRR and LMHS
6 Both FH and LMHS
9 Combined IRR, FH, and LMHS

For definition of IRR (Indian Reservation Roads), see Title 23 USC Section 101.

fed_functional_class Federal Functional Class *(Required)*
WB74 - 87
FHWA Item 026

This code describes the Federal Functional classification of the inventory route as classified according to Statewide National Functional Classification System maps. Statewide National Functional Classification System maps are located at local agency planning departments or WSDOT Service Center Planning.

Separate codes are used to distinguish roadways located in rural or in urban areas. Routes shall be coded rural If they are not inside a designated urban area, Codes 08, 09, 17 and 19 are for roads off the Federal Aid System. See WB74 - 79, Federal Aid Route Number to reference whether the bridge is on or off the Federal Aid Route system.

Rural Codes
01 Principal Arterial-Interstate
02 Principal Arterial-Other
06 Minor Arterial
07 Major Collector (Federal Aid Secondary)
08 Minor Collector
09 Local

Urban Codes
11 Principal Arterial-Interstate
12 Principal Arterial-Other Freeway or Expressway
14 Other Principal Arterial
16 Minor Arterial
17 Collector
19 Local

nat_truck_ntwrk_ National Truck Network *(Required)*
WB74 - 89
FHWA Item 110

A one letter code is entered in this field to indicate whether the inventory route carried on or under the bridge is part of the National Network for Trucks. This network includes the Interstate System and the Federal Aid Primary System. Routes considered to be a part of the Federal Aid Primary System are “rural arterials and their extensions into or through urban areas in existence on June 1, 1991” (as identified in the Code of Federal Regulations (23 CFR 658)). Roadways on this network are available for use by commercial motor vehicles of the dimensions and configurations described in the Code of Federal Regulations.

Y Inventory route is part of the National Truck Network.
N Inventory route is not part of the National Truck Network.

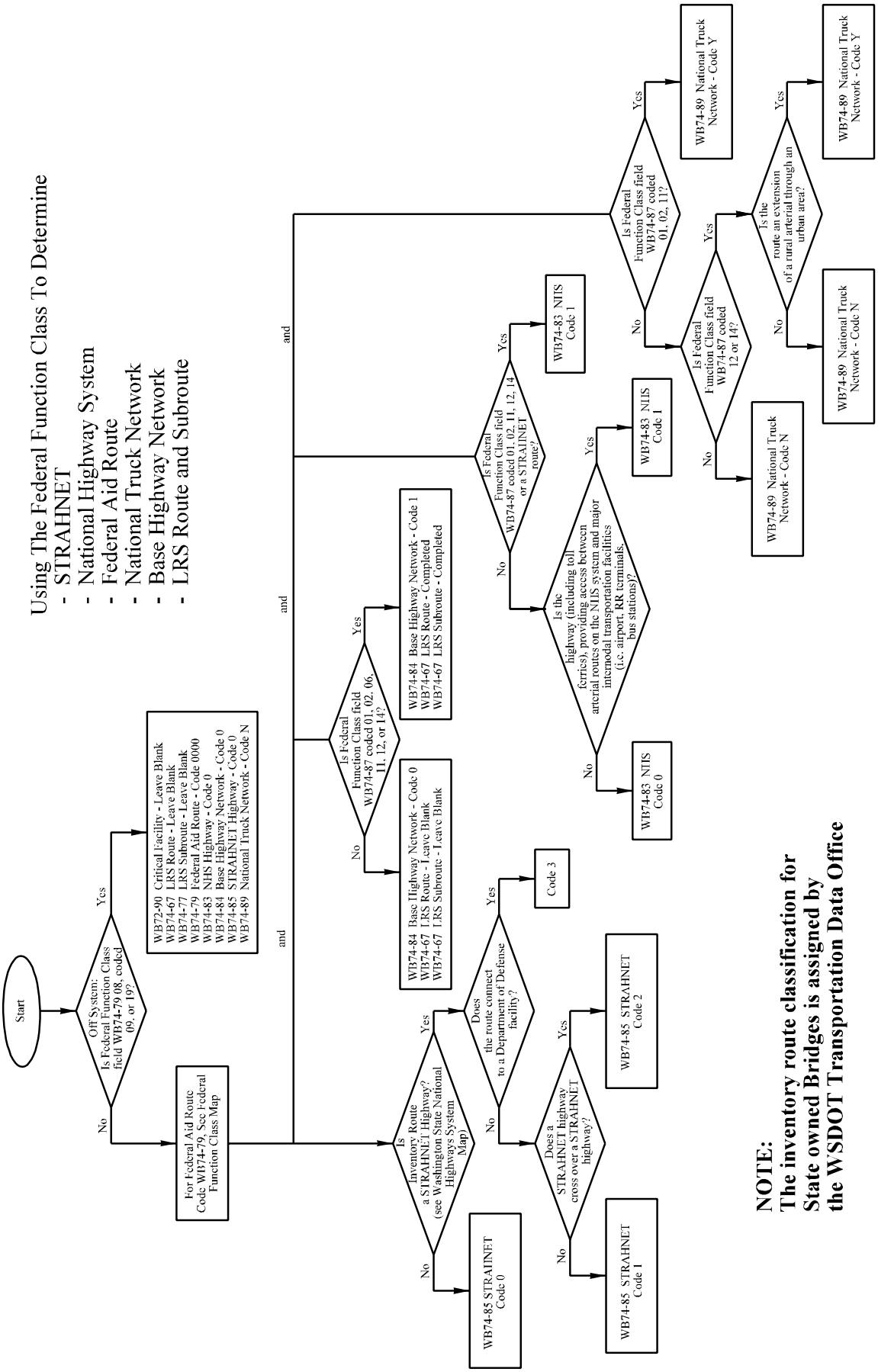


Figure WB74 -67 through 89

lane_direction_ **Lane Use Direction** *(Required)*
WB74 - 90
FHWA Item 102

Code the direction of traffic on the inventory route identified in WB74 - 35 as a one-digit number using one of the codes below. This item must be compatible with other traffic-related items such as WB73 - 52, WB73 - 56, WB74 - 45, and WB74 - 91.

0 No highway traffic carried.
1 One-way traffic carried.
2 Two-way traffic carried.
3 Two-way and reversible traffic carried.
4 Reversible traffic only carried.
5 Two-way traffic carried on one-lane bridge (curb-to-curb distance must be < 16´).

horiz_clrnc_route **Horizontal Clearance, Route Direction** *(Required)*
WB74 - 91
FHWA Item 047

This clearance is the maximum horizontal distance available for wide loads moving across (or under) the bridge or culvert. This measurement should be coded in feet and inches. See Figure WB74 - 91.

For undivided highways (or one-way ramps or streets), the measurement of horizontal clearance is taken from one side of the roadway to the other.

The measurement of horizontal clearance for divided highways is taken only for one side of the roadway, which carries traffic in the direction of increasing mileposts or, in the absence of mileposts, toward the east or north. The measurement of horizontal clearance for the lanes carrying traffic in the opposite direction, called the Reverse Direction, is entered in WB74 - 95 (Horizontal Clearance Reverse Direction).

If the inventory route is carried on the bridge, measure and code the smallest distance between the inside faces of the bridge rail, nonmountable curbs, or the truss members.

If the inventory route is carried under the bridge, measure and code the smallest distance between a substructure element and the median barrier. (If the horizontal clearance is restricted by an embankment, measure to the toe of the slope.)

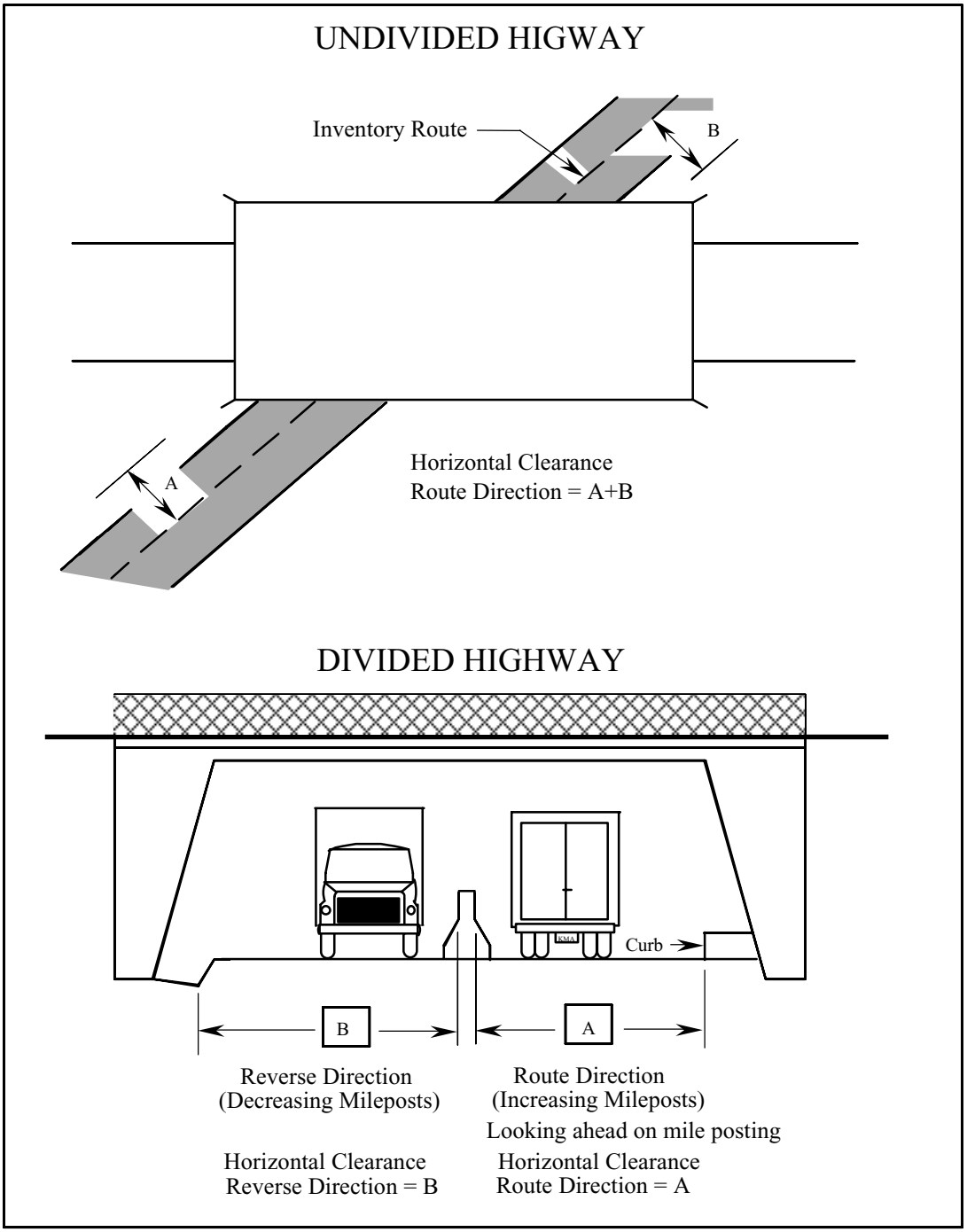


Figure WB74 – 91 through 95

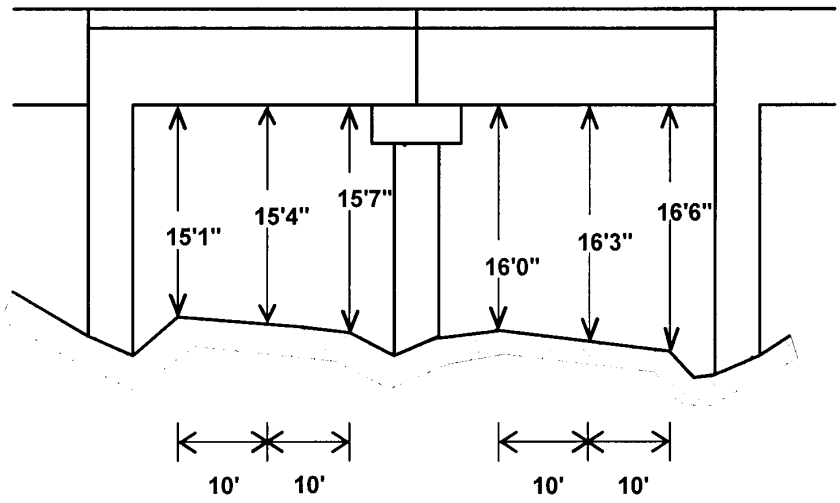
horiz_clrnc_rvrs **Horizontal Clearance, Reverse Direction** *(Required)*
WB74 - 95
FHWA Item 047

This is the minimum horizontal clearance for that side of the divided roadway which carries traffic in the direction of decreasing mileposts, or, in the absence of mileposts, to the south or west (see Figure WB74 - 91). This is called the reverse direction. The measurement should be coded in feet and inches.

If the inventory route is not a divided highway, leave this field blank.

vert_clrnc_route_max **Maximum Vertical Clearance Route Direction**
WB74 - 99
FHWA Item 010

A value must be entered in this field to indicate If any height restrictions (imposed by this bridge) apply to loads carried **on the inventory** route. This measurement is coded in feet and inches. If the inventory route is carried **on or under the bridge**, code the vertical clearance for the 10-foot width of the traveled part of the roadway which will allow passage of the highest vehicle without striking the bridge. The maximum vertical height allowed in any 10 foot roadway width is the least vertical clearance in the 10 foot width of the roadway with the maximum vertical clearance. If there is no vertical restriction caused by the bridge, leave the field blank (see Figure WB74 - 99).



Code "1603": The maximum vertical height allowed in any 10 foot roadway width is the least vertical clearance in the 10 foot width of roadway with the maximum vertical clearance.

Figure WB74 - 99

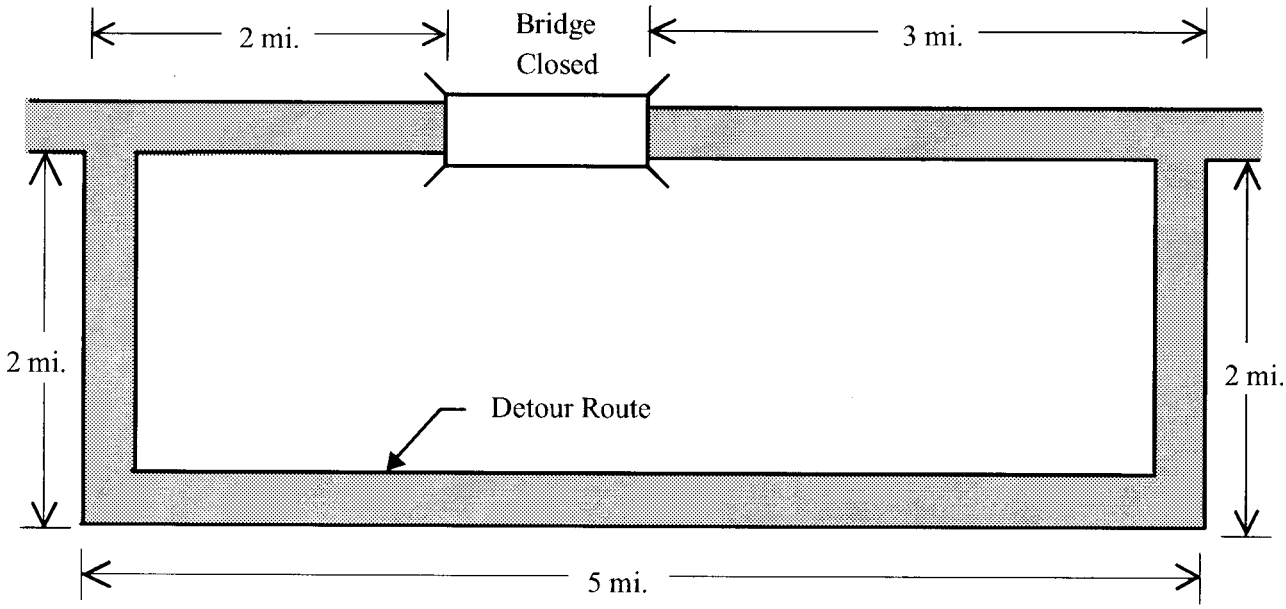
detour_length **Detour Length** *(Fatal)*
WB74 - 103
FHWA Item 019

The detour length is the distance a vehicle, when starting at one end of the bridge, must travel along the shortest alternate route to reach the opposite end of the bridge. The total detour length is coded to the nearest mile. To be an acceptable detour, an alternate route must be a public road and must be able to provide a similar level of load-carrying capacity as the inventory route (see Figure WB74 - 103).

If the bridge is at an interchange and a ground-level bypass or the other side of a parallel bridge can be used as the detour route, code Ø in this field.

If the bridge is not at an interchange and a ground level bypass or parallel bridge can be used as a detour route, code Ø1.

If the bridge is on a dead-end road where there is no alternate route, or If the distance that must be traveled is greater than 98 miles, code 99 in the field.



Detour Length = 2 + 2 + 5 + 2 + 3 = 14 miles

Figure WB74 - 103

2. WB75

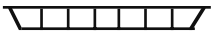
fed_main_material_ **Main Span Material** *(Required)*
WB75 - 32
FHWA Item 043A This code describes the kind of material and /or design used in the bridge's main span.

When coding this field, indicate the composition of the superstructure's main load carrying member. That is, If the bridge has a concrete deck carried on timber stringers, code 7 (for timber). Or, If the bridge has a concrete deck carried on steel beams, code 3 (for steel).

1 Concrete
2 Concrete continuous
3 Steel
4 Steel continuous
5 Prestressed concrete
6 Prestressed concrete continuous
7 Timber
8 Masonry
9 Aluminum, wrought iron, cast iron
0 Other

Both pre-tensioned concrete and post-tensioned concrete are considered prestressed concrete.

fed_main_design_ **Main Span Design** *(Required)*
WB75 - 33
FHWA Item 043B This code describes the predominant type of design and/or type of construction used in the bridge's main span. This is a Fatal Field for WSDOT only.

01 Slab
02 Stringer/multi-beam or girder
03 Girder and floorbeam system
04 Tee beam
05 Box beam/box girder-multiple 
06 Box beam/box girder-single or spread
07 Rigid frame
08 Orthotropic
09 Truss-deck
10 Truss – through (Includes Pony Truss)
11 Arch-deck
12 Arch – through (With or without overhead lateral bracing)
13 Suspension
14 Stayed girder
15 Movable-lift
16 Movable-bascule
17 Movable-swing
18 Tunnel
19 Culvert

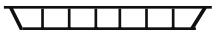
21 Segmental box girder
22 Channel beam (bathtub unit)
00 Other

fed_aprch_material_ **Approach Span Material** *(Required)*
WB75 - 35
FHWA Item 044A This code identifies the kind of material used in the bridge's approach spans.

1 Concrete
2 Concrete continuous
3 Steel
4 Steel continuous
5 Prestressed concrete
6 Prestressed concrete continuous
7 Timber
8 Masonry
9 Aluminum, wrought iron, cast iron
0 Other

When coding this field, indicate the composition of the superstructure's main load carrying member. That is, If the bridge has a concrete deck carried on timber stringers, code 7 (for timber). Or, If the bridge has a concrete deck carried on steel beams, code 3 (for steel).

fed_aprch_design_ **Approach Span Design** *(Required)*
WB75 - 36
FHWA Item 044B This code identifies the predominant type of design and/or type of construction used in the bridge's approach spans. BMS element descriptions may differ from the following approach span design types.

01 Slab
02 Stringer/multi-beam or girder
03 Girder and floorbeam system
04 Tee beam
05 Box beam/box girder-multiple 
06 Box beam/box girder-single or spread
07 Rigid frame
08 Orthotropic
09 Truss-deck
10 Truss-through
11 Arch-deck
12 Arch-through
13 Suspension
14 Stayed girder
15 Movable-lift
16 Movable-bascule
17 Movable-swing
18 Tunnel
19 Culvert

20 Mixed types
21 Segmental box girder
22 Channel beam (bathtub unit)
00 Other

main_span_qty **Number of Main Spans** *(Required)*
WB75 - 38
FHWA Item 045

This is the number of spans in the main or major unit of the bridge. A bridge will contain at least one span. Most bridges will contain a main unit with no approach spans. In such cases, code the number of spans in this field and enter zeroes in WB75 - 41. If the bridge contains a main section and approach sections, code the number of spans in the main section only in this field, and code the number of spans in the approach section(s) in WB75 - 41.

aprch_span_qty **Number of Approach Spans** *(Required)*
WB75 - 41
FHWA Item 046

This is the number of spans in the approach(es) to the main section of the bridge.

If the bridge has no approach spans, enter zeros.

serv_on_code **Service On** *(Fatal)*
WB75 - 44
FHWA Item 042A

This field describes the type of service carried on the bridge.

1 Highway
2 Railroad
3 Pedestrian exclusively
4 Highway and railroad
5 Highway and pedestrian
6 Overpass bridge at an interchange or second level of a multilevel interchange
7 Third level of a multilevel interchange
8 Fourth level of a multilevel interchange
9 Building or plaza
0 Other

serv_under_code **Service Under** *(Required)*
WB75 - 45
FHWA Item 042B

This field describes the type of service under the bridge.

1 Highway, with or without pedestrian traffic
2 Railroad
3 Pedestrians exclusively
4 Highway and railroad
5 Waterway
6 Highway and waterway
7 Railroad and waterway
8 Highway, waterway, and railroad
9 Relief for waterway
0 Other

fed_deck_type **Deck Type** *(Required)*
WB75 - 46
FHWA Item 107

This is the federal code for the type of deck system on the bridge.

If the deck is composed of more than one type of material, indicate what type of material is the most predominant.

If the bridge is a culvert and the roadway is carried on fill, code N to indicate that the deck type is not applicable. WB75 - 47, Wearing Surface, WB75 - 48, Membrane, and WB75 - 49, Deck Protection will also be coded N in this case.

1 Concrete cast-in-place
2 Concrete precast panels
3 Steel grating-open
4 Steel grating-filled with concrete
5 Steel plate (including orthotropic)
6 Corrugated steel
7 Aluminum
8 Treated timber
9 Untreated timber
Ø Other
A Filled arches
B Precast integral with beam
N Not applicable (bridge has no deck)

fed_wear_surf **Wearing Surface** *(Required)*
WB75 - 47
FHWA Item 108A

This is the federal code for the type of wearing surface on the bridge deck.

1 Concrete
2 Integral concrete (non-modified concrete layer added)
3 Latex modified or other modified concrete
4 Low slump concrete
5 Protective overlays (epoxy, methyl methacrylate, polyester)
6 Bituminous (i.e., ACP or BST)
7 Timber
8 Gravel (ballast)
9 Other
Ø None (traffic does not ride on wearing surface)
N Not applicable (bridge has no deck)

fed_membrane **Membrane** *(Required)*
WB75 - 48
FHWA Item 108B This is the federal code for the type of deck membrane used on the bridge.

1 Built-up (roofing tar or liquid asphalt)
2 Preformed fabric
3 Epoxy
8 Unknown
9 Other
Ø None
N Not applicable (bridge has no deck)

fed_deck_prot **Deck Protection** *(Required)*
WB75 - 49
FHWA Item 108C This is the federal code for the type of deck-protective system on the bridge.

1 Epoxy coated reinforcing
2 Galvanized reinforcing
3 Other coated reinforcing bar
4 Cathodic protection
6 Polymer impregnated
7 Internally sealed
8 Unknown
9 Other
Ø None
N Not applicable (bridge has no deck)

design_load_ **Design Load** *(Required)*
WB75 - 50
FHWA Item 031 This code expresses the type and amount of live load the bridge has been designed to carry. Classify any other loading, when feasible, using the nearest equivalent valid code.

Description

1 H 10
2 H 15
3 HS 15
4 H 20
5 HS 20
6 HS 20 + Military Mod
7 Pedestrian
8 Railroad
9 HS 25
0 Other or Unknown
A HL-93
B HS-30

oper_rtng_meth **Operating Rating Method** *(Required)*
WB75 - 51
FHWA Item 063

Code this field with one of the following codes to indicate which load rating method was used to determine the Operating Rating for this bridge. FHWA has chosen the Load Factor Method as the standard for computing Operating and Inventory ratings reported to the NBI. For proper coding, see load rating section of Chapter 5.

Code	Description
F	Load Factor
W	Working Stress
L	Load and Resistance Factor
T	Load Testing
N	No rating analysis was performed
A	Administrative

oper_rtng_tons **Operating Rating Tons** *(Required)*
WB75 - 52
FHWA Item 064

This field contains a value which indicates the absolute maximum gross weight (in tons) to which the bridge may be subjected for the type of vehicle used in the operating rating.

HS loading shall be used in the rating. The following conditions will apply:

- If the bridge will not carry a minimum of 3 tons of live load, code zeros, and consistent with the direction of the AASHTO Manual for Condition Evaluation of Bridges, it shall be closed.
- If the bridge has been closed, code zeros.
- If the bridge is a temporary bridge, code zeros in this field (since there is no permanent bridge) even though the temporary bridge is rated for as much as a full legal load.
- If the bridge is shored up or repaired on a temporary basis, it is considered a temporary bridge and should be coded as If the shoring were not in place.
- Code 99 for a bridge under sufficient fill such that according to AASHTO design the live load is insignificant in the bridge load capacity.

invt_rtng_meth **Inventory Rating Method** *(Required)*
WB75 - 54
FHWA Item 065

Code this field with one of the codes listed below to indicate which load rating method was used to determine the Inventory Rating coded for this bridge. FHWA has chosen the Load Factor Method as the standard for computing Operating and Inventory rating reported to the NBI.

Code	Description
F	Load Factor
W	Working Stress
L	Load and Resistance Factor
T	Load Testing
N	No rating analysis was performed
A	Administrative

invt_rtng_tons **Inventory Rating Tons** *(Required)*
WB75 - 55
FHWA Item 066

This is the capacity rating, in tons, which results in a load level which can safely utilize an existing bridge for an indefinite period of time. HS loading shall be used in the rating. The following conditions will apply:

- If the bridge has been closed, code zeros.
- If the bridge is a temporary bridge, code zeros in this field (since there is no permanent bridge) even though the temporary bridge is rated for as much as a full legal load.
- If the bridge is shored up or repaired on a temporary basis, it is considered a temporary bridge and should be coded as If the shoring were not in place.
- Code 99 for a bridge under sufficient fill such that according to AASHTO design the live load is insignificant in the bridge load capacity.

design_exception_date **Design Exception Date** *(Optional)*
WB75 - 57

If a design exception has been granted by the FHWA to permit a deviation from required standards, this is the effective date of FHWA approval.

For example, If approval to build a one-lane bridge on a low volume road was granted, enter the date approval was given for this exception. Indicate the date in the MMDDYYYY format. If no design exception has been granted, leave the field blank.

fed_aid_project **Federal Aid Project** *(Optional)*
WB75 - 65

This is the most recent federal aid project number under which federal funds have been used for construction or reconstruction from the year 1970 forward.

Left justify and leave unused columns blank. If the construction work has been assigned more than one federal aid project number, enter the number for the most recently completed (or current) portion of the project. If federal funds have not been used, leave the field blank.

border_state_code **Border Bridge State Code** *(Required)*
WB75 - 85
FHWA Item 098A

For bridges which do not cross a Washington State border, leave this field blank.

This is the code of the neighboring state with which Washington State, or a Local Agency within Washington State, shares responsibility for improvements on the existing bridge which crosses state borders. Valid codes are:

160	Idaho
410	Oregon
CAN	Canada

border_pct **Border Bridge Percent** *(Required)*
WB75 - 88
FHWA Item 098B

For bridges which do not cross a Washington State border, leave the field blank.

This is the percentage of responsibility a neighboring state accepts for improvements on an existing bridge which crosses state borders.

Code the percentage of square footage of the existing bridge that the neighbor is responsible for funding.

border_structure_id **Border Bridge Structure Identifier** *(Required)*
WB75 - 90
FHWA Item 099

If the bridge does not cross a Washington State border, leave this field blank.

This is the neighboring state's 15 character National Bridge Inventory Structure Number.

The entire 15 character field must be filled in exactly, including any blank spaces and any leading, trailing, or imbedded zeros.

The Bridge Inspection Report (BIR) NBI section has numbers in parentheses that reflect the inventory form WB76. For example, WB 76 - 57, Structural Adequacy Appraisal, is (657) on the BIR.

2. WB76

Type	Field Name	WSBIS	FHWA
ItemInspection Elements			
Reqd.	Routine Inspection Frequency	WB76 - 32	091
Fatal	Date of Last Routine Inspection	WB76 - 34	090
Optl.	Routine Inspection Hours on Site	WB76 - 42	
Reqd.	Inspector's Initials	WB76 - 46	
Fatal	Inspector's Certification Number	WB76 - 49	
Optl.	Co-Inspector's Initials	WB76 - 54	
Adequacy Appraisals			
Gen.	Structural	WB76 - 57	067
Gen.	Deck Geometry	WB76 - 58	068
Gen.	Underclearance	WB76 - 59	069
Reqd.	Operating Level	WB76 - 60	070
Reqd.	Alignment	WB76 - 61	072
Reqd.	Waterway	WB76 - 62	071
Inspection Conditions			
Reqd.	Overall Deck Condition	WB76 - 63	058
Optl.	Drain Condition	WB76 - 64	
Optl.	Drain Status	WB76 - 65	
Optl.	Deck Scaling Severity	WB76 - 66	
Optl.	Deck Scaling Percent	WB76 - 67	
Optl.	Deck Rutting	WB76 - 69	
Optl.	Deck Exposed Steel Code	WB76 - 70	
Reqd.	Superstructure Overall	WB76 - 71	059
Optl.	Curb Condition	WB76 - 72	
Optl	Sidewalk Condition	WB76 - 73	
Optl.	Paint Condition	WB76 - 74	
Optl	Number of Utilities	WB76 - 75	
Reqd.	Substructure Condition	WB76 - 76	060
Reqd.	Channel Protection	WB76 - 77	061
Reqd.	Culvert Condition	WB76 - 78	062
Reqd.	Pier / Abutment Protection	WB76 - 79	111
Reqd.	Scour	WB76 - 80	113
Reqd.	Approach Roadway Condition	WB76 - 81	
Optl.	Retaining Walls Condition	WB76 - 82	
Optl.	Pier Protection Condition	WB76 - 83	
Reqd.	Traffic Safety, Bridge Rails	WB76 - 840	36A
Reqd.	Traffic Safety, Bridge Rails	WB76 - 850	36B
Reqd.	Traffic Safety, Bridge Rails	WB76 - 860	36C
Reqd.	Traffic Safety, Bridge Rails	WB76 - 870	36D

Bridge Condition Inspection Fields
Table WB76 - 32

inspn_freq
WB76 - 32
FHWA Item 091

Routine Inspection Frequency *(Required)*

This is the number of months between consecutive routine inspections.

The standard maximum frequency of NBI bridges for Routine Inspections is 24 months.

last_inspn_date
WB76 - 34
FHWA Item 090

Date of Last Routine Inspection *(Fatal)*

This is the date the most recent routine inspection was performed on this bridge.

inspn_hours
WB76 - 42

Routine Inspection Hours on Site *(Optional)*
This is the total number of inspection hours (to the tenth of an hour) that the inspection team spent on the bridge during a Routine Inspection.

inspr_initials
WB76 - 46

Inspector's Initials *(Required)*
These are the initials of the inspector whose certification number appears in WB76 - 49.

cert_no
WB76 - 49

Inspector's Certification Number *(Fatal)*
This is the certification number of the lead inspector at the bridge site performing the routine inspection.

co_inspr_initials
WB76 - 54

Co-Inspector's Initials *(Optional)*
These are the initials of the individual who assisted the lead inspector in performing a routine inspection.

Adequacy Appraisal There are six fields used to appraise the adequacy of the bridge in relation to the level of service it provides on the highway system of which it is a part. To make this appraisal, the present condition of the bridge is compared to the condition of a new bridge built to current standards for that particular classification of road (with the exception of underclearance).

The appraisal codes for Structural Adequacy Appraisal, Deck Geometry Appraisal, and Underclearance Adequacy Appraisal are computed automatically by the WSBIS system.

The appraisal codes for Operating Level, Alignment Adequacy Appraisal, and Water Way Adequacy Appraisal are not computed automatically and must be entered by the bridge inspector. See the field descriptions that follow.

structure_adqcy **Structural Adequacy Appraisal** *(Generated)*
WB76 - 57
FHWA Item 067

The value in this field is generated by the WSBIS system and rates the adequacy of the structure's condition, taking into account any major structural deficiencies. This rating is based on the overall condition of the superstructure, substructure, the inventory rating, and the ADT.

Table WB76 - 57 explains how the inventory rating may further lower this code. The code for this item is no higher than the lowest of the condition codes for Superstructure Overall, Substructure Condition, or Culvert Condition.

ADT			**Structural Adequacy Appraisal Rating Code**
0-500	501-5000	>5000	
Inventory Rating HS Truck (Tons)			
	Not applicable		9
36	36	36	8
31	31	31	7
23	25	27	6
18	20	22	5
12	14	18	4
Inventory rating less than value in rating codeof 4 and requiring corrective action.			3
Inventory rating is less than above and bridgerequires replacement, WB78 - 44 is coded 31 or 32.			2
Bridge is closed and requires replacement.			Ø

Structural Adequacy Appraisal Rating
Table WB76 - 57

deck_geometry_aprsl Deck Geometry Appraisal *(Generated)*
WB76 - 58
FHWA Item 068 The value in this field is generated by the WSBIS system. This is the

adequacy appraisal rating of the bridge's deck geometry. The level of service provided by the bridge is evaluated with respect to the highway system of which it is a part. This appraisal is based on the number of traffic lanes, the curb-to-curb width, the minimum vertical clearance over the bridge deck, the ADT, and the federal functional classification.

The following Tables, WB76 - 58A through E, explain how the values are determined with respect to the highway system of which the bridge is a part. The lowest code determined from the tables is used.

Curb-to-Curb Bridge Roadway Width (In feet)						Deck Geometry Appraisal Rating Code
Average Daily Traffic (ADT) (Both Directions)						
0-100	**101-400**	**401-1000**	**1001-2000**	**2001-5000**	**>5000**	
Not applicable						9
≥ 32	≥ 36	≥ 40	≥ 44	> 44	> 44	8
28	32	36	40	44	44	7
24	28	30	34	40	44	6
20	24	26	28	34	38	5
18	20	22	24	28	32 (28)	4
16	18	20	22	26	30 (26)	3
Bridge is open and has a width less than required for a rating code of 3 and WB78 - 44 is coded 31.						2
Bridge is closed.						Ø

NOTES:
1. For bridges longer than 200 feet, use the values shown in parentheses.
2. Use the lower rating code for roadway widths between those shown.
3. For bridges with 3 or more undivided lanes of 2-way traffic, use Table WB76 - 58C under the column NUMBER of LANES (Other Roadways).

Deck Geometry Appraisal Rating 2-Lane Bridge With 2-Way Traffic
Table WB76 - 58A

Curb-to-Curb Bridge Roadway Width (In feet)		Deck Geometry Appraisal Rating Code
Average Daily Traffic (ADT) (Both Directions)		
0-100	**>100**	
Not applicable		9
15′11″	-	8
15	-	7
14	-	6
13	-	5
12	-	4
11	15′11″	3
Bridge is open and has a width less than required for a rating code of 3 and WB78 - 44 is coded 31.		2
Bridge is closed.		Ø

NOTES:
1. Use the lower rating code for a roadway widths between those shown.
2. All single lane bridges with a deck width less than 16 feet and an ADT > 100 should be rated at 3 or below.

Deck Geometry Appraisal Rating 1-Lane Bridge With 2-Way Traffic

Table WB76 - 58B

Curb-to-Curb Bridge Roadway Width (In feet) Two or More Lanes in Each Direction				**Deck Geometry Appraisal Rating Code**
Number of Lanes (Interstate)		Number of Lanes (Other Roadways)		
2 Lanes	> 2 Lanes	2 Lanes	> 2 Lanes	
Not applicable				9
≥ 42	≥ 12N + 24	≥ 42	≥ 12N + 18	8
40	12N + 20	38	12N + 15	7
38	12N + 16	36	12N + 12	6
36	12N + 14	33	11N + 10	5
34 (29)	11N + 12 (11N + 7)	30	11N + 6	4
33 (28)	11N + 11 (11N + 6)	27	11N + 5	3
Bridge is open and has a width less than required for rating code of 3 and WB78 - 44 is coded 31.				2
Bridge is closed				Ø

NOTES:
1. N = Number of traffic lanes.
2. Use the lower rating code for roadway widths between those shown.
3. For bridges longer than 200 feet, use the values shown in parentheses.

Deck Geometry Appraisal Rating Bridges With 2-Way Traffic

Table WB76 - 58C

Bridge/Ramp Width (In feet)		Deck Geometry Appraisal Rating Code
Number of Lanes		
1 Lane	> 1 Lane	
Not applicable		9
≥ 26	≥ 12N + 12	8
24	12N + 10	7
22	12N + 8	6
20	12N +6	5
18	12N +4	4
16	12N + 2	3
Bridge is open and has deck width less than required for a rating code of 3 and WB78 - 44 is coded 31.		2
Bridge is closed.		Ø

NOTES:
1. N = Number of traffic lanes.
2. Use the lower rating code for a roadway width between those shown.

Deck Geometry Appraisal Rating Bridges or Ramps With 1-Way Traffic

Table WB76 - 58D

Functional Class				Deck Geometry Appraisal Rating Code
Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	
Designated Routes*	Undesignated Routes*			
Minimum Vertical Clearance				
Not Applicable				9
≥ 17′0″	≥ 16′0″	≥ 16′6″	≥ 16′6″	8
16′9″	15′6″	15′6″	15′6″	7
16′6″	14′6″	14′6″	14′6″	6
15′9″	14′3″	14′3″	14′3″	5
15′0″	14′0″	14′0″	14′0″	4
Vertical clearance is less than value for rating of 4; corrective action is required.				3
Vertical clearance is less than value for rating of 4 and WB78 - 44 is coded 31; replacement is required.				2
Bridge is closed.				Ø

NOTES:
*Use the first column (Designated Routes) for all routes except designated routes in urban areas where there is an alternative interstate of freeway facility with a minimum clearance of at least 16’0”. Use the second column (Undesignated Routes) for all undesignated interstate or freeway facilities.
1. Use the lower rating code for any vertical clearance measurements between those shown.\

Deck Geometry Appraisal Rating

Table WB76 - 58E

underclrnc_aprsl **Underclearance Adequacy Appraisal** *(Generated)*
WB76 - 59
FHWA Item 069

The code for this field is generated by the WSBIS system.

It rates the adequacy of the bridge's underclearance. This appraisal is based on the vertical and lateral underclearances beneath the bridge as related to the federal functional classification of the roadway carried beneath the bridge. If the bridge is not over a highway or a railroad, the field will be set to 9.

See Tables WB76 - 59A and B for an explanation of how the values are calculated.

Functional Class					Under-clearance Adequacy Appraisal Rating Code
Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroads	
Designated Routes*	Undesignated Routes*				
Minimum Vertical Underclearance					
Not Applicable					9
≥ 17′0″	≥ 16′0″	≥ 16’6″	≥ 16′6″	≥ 23′0″	8
16′9″	15′6″	15′6″	15′6″	22′6″	7
16′6″	14′6″	14′6″	14′6″	22′0″	6
15′9″	14′3″	14′3″	14′3″	21′0″	5
15′0″	14′0″	14′0″	14′0″	20′0″	4
Vertical clearance is less than value for rating of 4; corrective action is required.					3
Vertical clearance is less than value for rating of 4 and WB 78 - 44 is coded 31; replacement is required.					2
Bridge is closed.					Ø

NOTES:
*Use the first column (Designated Routes) for all routes except designated routes in urban areas where there is an alternative interstate of freeway facility with a minimum clearance of at least 16’0”. Use the second column (Undesignated Routes) for all undesignated interstate or freeway facilities.
1. Use the lower rating code for any vertical clearance measurements between those shown.

Underclearance Adequacy Appraisal Rating
Table WB76 - 59A

Functional Class							Under-clearance Adequacy Appraisal Rating Code
1-Way Traffic				2-Way Traffic		Railroads	
Principal Arterials (Interstate, etc.)				Other Principal and Minor Arterials	Major and Minor Collectors and Locals		
Main Line		Ramp					
Lt.	Rt.	Lt.	Rt.				
Minimum Lateral Underclearance (Feet)							
Not Applicable							9
≥ 30	≥ 30	≥ 4	≥ 10	≥ 30	≥ 12	≥ 20	8
18	21	3	9	21	11	17	7
6	12	2	8	12	10	14	6
5	11	2	6	10	8	11	5
4	10	2	4	8	6	8	4
Underclearance is less than value for rating of 4; corrective action is required.							3
Underclearance is less than value for rating of 4 and WB 78 - 44 is coded 31; replacement is required.							2
Bridge is closed.							Ø

NOTES:
1. Use the lower rating code for any underclearance measurements between those shown.
2. Use the value from the Right Ramp column to determine the rating code when acceleration or deceleration lanes or ramps are provided under 2-way traffic.

Underclearance Adequacy Rating
Table WB76 - 59B

safe_load_code **Operating Level** *(Required)*
WB76 - 60
FHWA Item 070

This appraisal is a consideration of the relationship between the load that may legally use the bridge and the desired load capacity for this type of bridge in the state of Washington. It is to be based on the bridge's operating rating.

When the maximum legal load allowed in the state exceeds the operating rating, the bridge must be posted. This is in accordance with the requirements of the NBIS. Agencies, however, may elect to post bridges at lower rating capacities. If this is done, WB72 - 93 may show that the bridge is posted while the field may show that posting is not required. Such coding information is not in conflict but is acceptable and correct.

If the bridge is a temporary bridge, the operating level appraisal rating must reflect its actual load-carrying capacity at the operating rating. The rating should be made based on the loads the bridge is actually carrying. This also applies to bridges which have been shored up or repaired on a temporary basis.

Refer to Table WB76 - 60 and the Federal coding guide to determine the proper code to enter in this field (see Figure 5.03A-1 for AASHTO Trucks).

Code	Relationship of Operating Rating to Maximum Legal Load	Operating Rating (Tons)		
		Type 3	Type 3S2	Type 3-3
5	Equal to or above legal load; no posting is required.	≥ 25.0	≥ 36.0	≥ 40.0
4	0.1% to 9.9% below legal load; posting is required.	≥ 22.5	≥ 32.4	≥ 36.0
3	10.0% to 19.9% below legal load; posting is required.	≥ 20.0	≥ 28.8	≥ 32.0
2	20.0% to 29.9% below legal load; posting is required.	≥ 17.5	≥ 25.2	≥ 28.0
1	30.0% to 39.9% below legal load; posting is required.	≥ 15.0	≥ 21.6	≥ 24.0
Ø	Greater than 39.9% below legal load; posting is required.	<15.0	< 21.6	< 24.0

Note: These codes are to be used as a guide for coding purposes only. They are not intended to be used for design or posting considerations.

Operating Level Appraisal Rating
Table WB76 - 60

alignment_aprsl **Alignment Adequacy Appraisal** *(Required)*
WB76 - 61
FHWA Item 072

The evaluation of the approach roadway alignment is based on an assessment of how that alignment relates to the general alignment of the section of highway the bridge is on. The approach roadway alignment is not intended for comparison to current standards, but rather to the existing highway alignment. This field identifies bridges which do not function properly or safely due to the alignment of their approach roadways.

Speed reductions necessary because of the width of the bridge deck will not be considered.

The following codes are to be used:

9 Not applicable (non-vehicular traffic use).
8 No reduction in speed required for vehicle as it approaches the bridge.
6 Minor reduction in speed required for vehicle as it approaches the bridge.
3 Horizontal or vertical curvature of approach roadway requires substantial reduction in the speed of vehicle as it approaches the bridge.

waterway_aprsl **Waterway Adequacy Appraisal** *(Required)*
WB76 - 62
FHWA Item 071

This item appraises the waterway opening with respect to passage of flow beneath the bridge. The following codes shall be used in evaluating waterway adequacy (interpolate where appropriate). Site conditions may warrant somewhat higher or lower rating than indicated by Table WB76 - 62 (i.e., flooding of an urban area due to a restricted bridge opening).

The frequency of overtopping means the following:

Remote	greater than 100 years
Slight	11 to 100 years
Occasional	3 to 10 years
Frequent	less than 3 years

Adjectives describing traffic delays mean the following:

Insignificant	Minor inconvenience. Highway passable in a matter of hours.
Significant	Traffic delays of up to several days.
Severe	Long-term delays to traffic with resulting hardship.

Description	Functional Class*		
	1	2	3
	Code		
Bridge not over a waterway	9	9	9
Bridge deck and roadway approaches above flood(high) water elevations. Chance of overtopping remote.	8	8	8
Bridge deck above roadway approaches. Slight chanceof overtopping roadway approaches.	7	7	8
Slight chance of overtopping bridge deck and roadwayapproaches.	6	6	7
Bridge deck is higher than approaches. Occasionalovertopping of roadway approaches with insignificantdelays.	4	5	6
Bridge deck is higher than approaches. Occasionalovertopping of roadway approaches with significantdelays.	3	4	5
Occasional overtopping of both bridge deck and roadwayapproaches with significant delays.	2	3	4
Frequent overtopping of both bridge deck and roadwayapproaches with significant delays.	2	2	3
Occasional or frequent overtopping of both bridge deckand roadway approaches with severe delays.	2	2	2
Bridge closed - hydraulics problem	Ø	Ø	Ø

*FUNCTIONAL CLASS:
1 = Principal arterials, interstates, freeways, or expressways.
2 = Other principal arterials, minor arterials, and major collectors.
3 = Minor collectors and local roadways.

Waterway Adequacy Appraisal Rating
Table WB76 - 62

Condition Rating Codes

Codes are entered in WB76 - 63 to WB76 - 83 to describe (rate) the current condition of the existing, in-place bridge as compared to its as built condition. WB76 - 71 and WB76 - 76 are based on the overall condition of the bridge elements that comprise either the superstructure or substructure.

Condition codes are properly used when they provide an overall characterization of the general condition of the entire set of components being rated. They are improperly used If they attempt to describe localized or nominally occurring instances of deterioration or disrepair. In assigning condition codes, therefore, the engineer should consider both the severity of deterioration or disrepair and the extent to which it is widespread throughout the components being rated.

The existing condition of the bridge should be the only consideration in making these evaluations. The fact that a bridge may be posted or may have been designed for less than the current legal load should have no bearing on the evaluation of its present condition. Similarly, the fact that portions of a bridge are being supported or strengthened by temporary braces should not be considered. In such instances, the bridge is to be rated **as If the temporary braces were not in place**.

A completed bridge not yet open to traffic should be coded as If it were open to traffic.

Use Table WB76 - 63A to determine the proper code to enter for all primary load carrying bridge members (i.e., superstructure, substructure, etc.). Use Table WB76 - 64 to determine the proper code to enter for all secondary bridge members (i.e., curbs, sidewalks, rails, etc.). Where other coding values are appropriate, the field description will specify what codes to enter.

deck_overall_cond **Overall Deck Condition** *(Required)*
WB76 - 63
FHWA Item 058

This item describes the overall condition rating of the deck. BMS will address local conditions (see Chapter 4). Rate

and code the deck condition in accordance with the general condition ratings by using Table WB76 - 63A Condition Codes for Primary Bridge Members (Deck) based on a visual inspection and/or Table WB76 - 63B Condition Rating Guide for Deck Conditions/Overall based on deck testing results (chloride, delamination, rebar cover).

Use a code of “9” for culverts and other bridges without a deck (i.e., filled arch bridge).

The condition of the wearing surface/protective system, joints, expansion devices, curbs, sidewalks, parapets, facias, bridge rail, and scuppers shall not be considered in the overall deck evaluation. However, their condition should be noted on the inspection form.

Decks integral with the superstructure will be rated as a deck only and may influence the superstructure rating (for example, rigid frame, slab, deck girder or T-beam, voided slab, box girder, etc.). The superstructure of an integral deck-type bridge will not influence the deck rating.

If deck testing has been completed then the deck condition rating will be determined from the lowest rating obtained from Tables WB76 - 63A and WB76 - 63B. If deck testing has not been completed, then the deck condition rating will be based only on Table WB76 - 63A.

If the bridge has a concrete deck that has been rehabilitated with a protective concrete overlay (such as Latex or Microsilica) then the deck shall be rated based on Table WB76 - 63A. The deck testing results and Table WB76 - 63B will no longer be used to determine the deck condition rating in this case.

For slab type bridges, deck condition codes shall match the superstructure condition code.

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.
3	Serious Condition. Loss of section, deterioration, spalling, or scourhave seriously affected primary structural components. Local failuresare possible. Fatigue cracks in steel or shear cracks in concrete maybe present.
2	Critical Condition. Advanced deterioration of primary structuralelements. Fatigue cracks in steel or shear cracks in concrete maybepresent or scour may have removed substructure support. Unlessclosely monitored, it may be necessary to close the bridge untilcorrective action is taken.
1	Imminent Failure Condition. Major deterioration or section losspresent in critical structural components or obvious vertical orhorizontal movement affecting structure stability. Bridge is closedtotraffic but corrective action may put back in light service.
Ø	Failed Condition. Out of service. Beyond corrective action.

Condition Rating for Primary Bridge Members (Deck)
Table WB76 - 63A

Rebar Cover	Visible Cracking	Visible Spalls &/or Delamination	Chloride Content at Rebar Level	Code
N/A	N/A	N/A	N/A	9
No exposed Rebar	Minor Shrinkage	None	None > 1# / C.Y.	8
No exposed Rebar	Minor – Medium Longitudinal/ Transverse	None	None > 2# / C.Y.	7
Random Exposed Rebar	Medium Map Cracking	< 1% (of deck area)	< 20% has > 2# / C.Y.	6
Exposed Rebar< 1% (of deck area)	Extensive Map Cracking	1% - 2% (of deck area)	21-40% has > 2# / C.Y.	5
Exposed Rebar > 1% (of deck area)	Extensive Cracking w/ Rebar Corrosion	2% - 5% (of deck area)	41-60% has > 2# / C.Y.	4
N/A	N/A>	5% (of deck area)	> 60% has> 2# / C.Y.	3

Condition Rating Guide for Deck Conditions/Overall
Table WB76 - 63B

drain_cond
WB76 - 64

Drains Condition *(Optional)*
This is the condition rating of the drains in the bridge deck.

A rating of 5 should be used to indicate the drains are completely plugged with dirt and debris. Use Table WB76 - 64 Condition Rating for Secondary Bridge Members (Drains).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, or scour.

Condition Rating for Secondary Bridge Members (Drains)
Table WB76 - 64

drain_status_
WB76 - 65

Drains Status *(Optional)*
This code describes the present status of the drains on the bridge.

0 Drains do not exist
1 Drains exist as built
2 Drains have been permanently blocked
3 Drains have been replaced by another type
4 Drains have been disconnected
9 Drains status is unknown

deck_scaling_
WB76 - 66

Deck Scaling Severity *(Optional)*
This code describes the severity of any deck scaling present.

The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code N.

N None
L Light (scaling up to 1/4↑ deep)
M Moderate (scaling up to 1/2↑ deep)
H Heavy (scaling or spalls up to 1↑ deep)
S Severe (over 1↑ deep)

deck_scaling_pct
WB76 - 67

Deck Scaling Percent *(Optional)*
This value is the percentage of the total deck area where scaling and/or spalling are present. It includes any areas which have been patched.

In scaled areas of more than 1 percent, estimate the percentage at 5 percent increments. The amount and type of deterioration present in the top surface of concrete bridge decks is to be calculated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code 00.

deck_rutting_
WB76 - 69

Deck Rutting *(Optional)*
The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated using the following codes. If the bridge does not have a concrete deck (i.e., it has an asphalt overlay or a steel or timber deck), code Ø.

8 No wear
7 Exposed aggregate
5 Visible wheel track rutting
3 Wheel track rutting has exposed reinforcing steel
0 Not applicable

deck_exposed_steel_ Deck Exposed Steel *(Optional)*

WB76 - 70

This code describes the degree to which the deck area shows exposed reinforcing steel.

The amount and type of deterioration present in the top surface of concrete bridge decks is to be rated. If the bridge does not have a concrete deck (for example, it has an asphalt overlay or a steel or timber deck), code Ø.

8 None
7 Some cracking in deck over reinforcing steel
5 0 to 5 percent of deck area shows exposed reinforcing steel
3 More than 5 percent of deck area shows exposed reinforcing steel
0 Not applicable

superstructure_cond Superstructure Overall *(Required)*

WB76 - 71

FHWA Item 059

This item describes the physical condition of all structural members comprising the superstructure. Rate and code the condition in accordance with the previously described general condition ratings. BMS will address local conditions (see Chapter 4). Code 9 for all culverts.

The condition of secondary members such as bracing, diaphragms, bearings, joints, paint system, etc., shall not be included in this rating, except in extreme situations, but should be noted on the inspection form.

On bridges where the deck is integral with the superstructure, the superstructure condition rating may be affected by the deck condition. The resultant superstructure condition rating may be lower than the deck condition rating where the girders have deteriorated or been damaged.

Use Table WB76 - 71 Condition Rating for Primary Bridge Members (Superstructure).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.
3	Serious Condition. Loss of section, deterioration, spalling, or scourhave seriously affected primary structural components. Local failuresare possible. Fatigue cracks in steel or shear cracks in concrete maybe present.
2	Critical Condition. Advanced deterioration of primary structuralelements. Fatigue cracks in steel or shear cracks in concrete maybepresent or scour may have removed substructure support. Unlessclosely monitored, it may be necessary to close the bridge untilcorrective action is taken.
1	Imminent Failure Condition. Major deterioration or section losspresent in critical structural components or obvious vertical orhorizontal movement affecting structure stability. Bridge is closedtotraffic but corrective action may put back in light service.
Ø	Failed Condition. Out of service. Beyond corrective action.

Condition Rating for Primary Bridge Members (Superstructure)
Table WB76 - 71

curb_cond **Curb Condition** *(Optional)*
WB76 - 72 This is the condition rating of any curbs located on the bridge. Use Table WB76 - 72 Condition Rating for Secondary Bridge Members (Curbs).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.

Condition Rating for Secondary Bridge Members (Curbs)
Table WB76 - 72

sdwk_cond **Sidewalk Condition** *(Optional)*
WB76 - 73 This is the condition rating of any sidewalks which are an integral part of or are attached to the bridge. This rating considers the condition of any structural members (i.e., stringers, etc.) which may support the sidewalk.

To be considered a sidewalk, the member must be greater than or equal to three feet in width. Use Table WB76 - 73 Condition Rating for Secondary Bridge Members (Sidewalk).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.

Condition Rating for Secondary Bridge Members (Sidewalk)
Table WB76 - 73

paint_cond **Paint Condition** *(Optional)*
WB76 - 74

This field contains the condition rating of any paint applied to the bridge to protect the primary structural steel members.

If paint has been applied only on secondary members such as bridge rails or light posts, code 9 in this field.

9 Not applicable.
8 Bridge has recently been painted.
7 Paint is in good condition with only minor weathering.
6 Bridge needs to be painted within five years.
5 Bridge needs to be painted within three years.
4 Bridge needs to be painted within two years.

A paint code of '5' or '4' needs to have at least one paint inspection form completed as part of the inspection report in the bridge file. The bridge is also a candidate for paint testing.

utilities_qty **Number of Utilities** *(Optional)*
WB76 - 75

This field indicates the number of franchise utilities attached to the bridge. Utilities include — but are not limited to — water pipes, sewer lines, telephone lines, power lines, and gas lines. Conduit for electricity used on the bridge is not considered a utility. a conduit cluster (i.e., a telephone cluster) is considered one utility.

This field is not used to evaluate the condition of utilities on the bridge, only the number of utilities present.

If more than nine utilities are attached to the bridge, code 9. If there are no utilities, code Ø. If the number of utilities is not known, leave this field blank.

substructure_cond **Substructure Condition** *(Required)*
WB76 - 76
FHWA Item 060

This item describes the overall physical condition of piers, abutments, piles, fenders, footings, or other components. Rate and code the condition in accordance with the previously described general condition ratings. Code 9 for all culverts. BMS will address local conditions (see Chapter 4)

The condition of secondary members such as bracing, diaphragms, bearings, joints, paint system, etc., shall not be included in this rating, except in extreme situations, but should be noted on the inspection form.

The rating given by WB76 - 80, Scour, may have a significant effect on this item If scour has substantially affected the overall condition of the substructure.

The substructure condition rating shall be made independent of the deck and superstructure.

Integral-abutment wing walls to the first construction or expansion joint shall be included in the evaluation. For non-integral superstructure and substructure units, the substructure shall be considered as the portion below the bearings.

Use Table WB76 - 76 Condition Rating for Primary Bridge Members (Substructure).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.
3	Serious Condition. Loss of section, deterioration, spalling, or scourhave seriously affected primary structural components. Local failuresare possible. Fatigue cracks in steel or shear cracks in concrete maybe present.
2	Critical Condition. Advanced deterioration of primary structuralelements. Fatigue cracks in steel or shear cracks in concrete maybepresent or scour may have removed substructure support. Unlessclosely monitored, it may be necessary to close the bridge untilcorrective action is taken.
1	Imminent Failure Condition. Major deterioration or section losspresent in critical structural components or obvious vertical orhorizontal movement affecting structure stability. Bridge is closedtotraffic but corrective action may put back in light service.
Ø	Failed Condition. Out of service. Beyond corrective action.

Condition Rating for Primary Bridge Members (Substructure)
Table WB76 - 76

channel_prot
WB76 - 77
FHWA Item 061

Channel Protection *(Required)*

This item describes the physical conditions associated with the flow of water beneath the bridge such as stream stability and the condition of the channel, riprap, slope protection, or stream control devices including spur dikes. The inspector should be particularly concerned with visible signs of excessive water velocity which may affect undermining of slope protection, erosion of banks, and realignment of the stream which may result in immediate or potential problems. Accumulation of drift and debris on the superstructure and substructure should be noted on the inspection form but not included in the condition rating.

If more than one condition is present, enter the lowest of the codes that apply. Use Table WB76 - 77.

DevicesDescription	Code
Bridge is not over a waterway.	9
Protected, well vegetated banks. No river control devices required or they arein stable condition.	8
Bank protection needs minor repair. River control devices/slope protectionshow minor damage. Banks and/or channel show minor accumulation of drift.	7
Bank beginning to slump. River control devices/slope protection showwidespread damage. Minor movement of streambed. Debris restricts waterway.	6
Eroded bank protection. River control devices/slope protection have majordamage. Trees and brush restrict waterway.	5
Banks severely undermined. River control devices/slope protection havesevere damage. Large deposits of debris in waterway.	4
Failed bank protection. River control devices are destroyed. Waterway haschanged course so it now threatens the bridge and/ or approach roadway.	3
Waterway has changed course to extent that bridge is now near collapse.	2
Bridge closed - may be able to be repaired.	1
Bridge closed - beyond repair.	0

Rating for Channel and Channel Protection
Table WB76 - 77

culvert_cond **Culvert Condition** *(Required)*
WB76 - 78
FHWA Item 062

This is the general overall condition rating of any bridge which is a culvert.

A culvert is defined in the FHWA *Culvert Inspection Manual* as a drainage opening beneath an embankment, usually a pipe, which has been designed to allow the even flow of water beneath a roadway and designed to take advantage of submergence. This is a bridge with WB75 - 33 coded 19.

If the bridge is not a culvert, code 9 in this field.

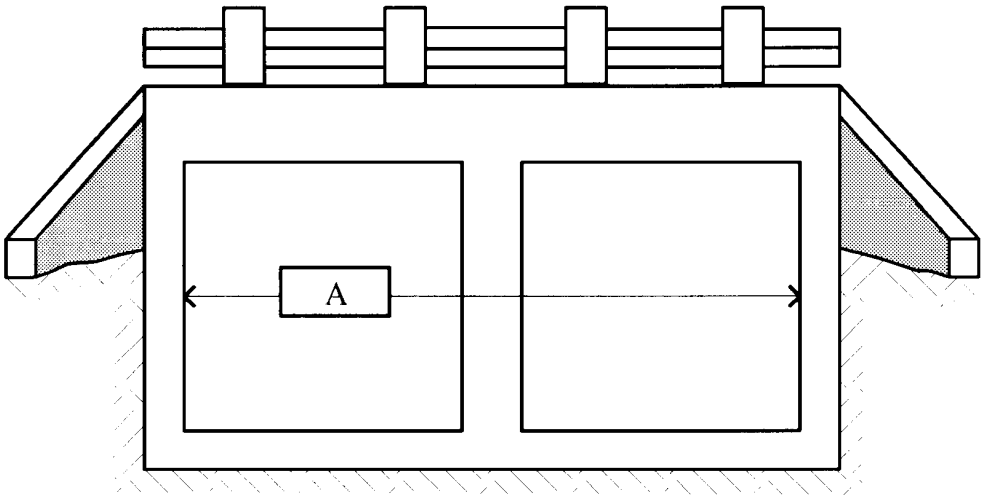
Any culvert with a clear opening of more than 20 feet when measured along the center of the roadway, must be inventoried. In addition, any multiple pipes with a total span of more than 20 feet and a clear distance between openings of less than half of the smaller contiguous opening must also be inventoried. Culverts or multiple pipes which measure less than 20 feet may be inventoried at the agency's discretion.

When rating the general condition of the culvert, evaluate the alignment, degree of settlement, and structural integrity. Wingwalls which have been poured integral to the culvert's first construction or expansion joint should be included in this evaluation. Refer to the FHWA *Culvert Inspection Manual* for a detailed discussion regarding the inspection and rating of culverts. See Figure WB76 - 78 and Table WB76 - 78A Rating for Concrete Culverts or Table WB76 - 78B Rating for Metal Culverts.

When culvert condition is coded (not including 9), code the following fields a 9.			
Type	**Field Name**	**WSBIS**	**FHWA Item**
Reqd.	Overall Deck Dondition	WB76 - 63	058
Reqd.	Superstructure Overall	WB76 - 71	059
Reqd.	Substructure Condition	WB76 - 76	060

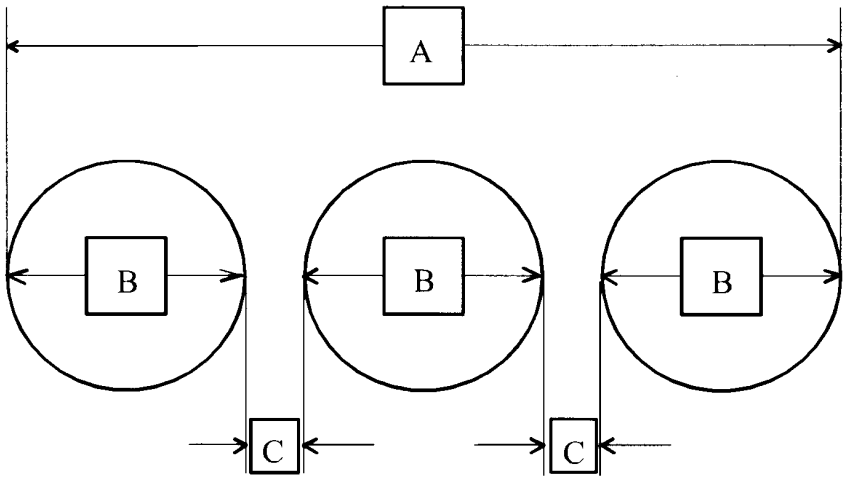
Table WB76 - 78

BOX CULVERT



If A > 20'
then culvert's condition must be rated.

MULTIPLE PIPES



If A > 20' and B/2 > C
then culvert's condition must be rated.

Figure WB76 - 78

Description	Code
Bridge is not a culvert.	9
No noticeable or noteworthy defects.	8
Cracking, light scaling and spalling which does not expose reinforcing steel. Minor damage from drift. Insignificant scouring near wingwalls or pipes.	7
Minor deterioration, chloride contamination cracking, leaching, or spalling. Minor scouring near wingwalls or pipes.	6
Moderate to major deterioration, cracking, leaching or spalling. Minor settlement or misalignment. Moderate scouring or erosion at wingwalls or pipes.	5
Major deterioration (large spalls, heavy scaling, wide cracks, open construction joints, etc). Considerable settlement or misalignment. Considerable scouring or erosion at wingwalls or pipes.	4
Extensive deterioration. Severe movement, differential settlement of segments, loss of fill. Holes in walls or slab. Wingwalls nearly severed. Severe scouring or erosion at wingwalls or pipes.	3
Collapsed wingwalls, severe settlement of roadway due to loss of fill. Section failure of culvert. Complete undermining at wingwalls or pipes.	2
Bridge closed - culvert may be able to be repaired.	1
Bridge closed - culvert beyond repair.	Ø

Rating for Concrete Culverts
Table WB76 - 78A

Description	Code
Bridge is not a culvert	9
No noticeable or noteworthy defects. Bolts are in good condition, in place, and tight.	8
Smooth, symmetrical curvature with superficial corrosion and no pitting. Bolts may have superficial corrosion, are in place and tight.	7
Smooth curvature, non-symmetrical shape, and significant corrosion or moderate pitting. Bolts may have significant corrosion and 10 percent of the bolts in a panel seam maybe missing or loose.	6
Significant distortion and deflection in one section. Significant corrosion or deep pitting. Bolts may have significant corrosion and 20 percent of the bolts in a panel seam maybe missing or loose.	5
Significant distortion and deflection throughout. Extensive corrosion or deep pitting. Bolts may have extensive corrosion and 30 percent of the bolts in a panel seam maybe missing or loose.	4
Extreme distortion and deflection in one section. Extensive corrosion or deep pitting with scattered perforations. Bolts may have extensive corrosion and 40 percent of the bolts in a panel seam maybe missing or loose.	3
Extreme distortion and deflection in one section. Extensive perforations due to corrosion. Bolts may have extensive corrosion and 50 percent of the bolts in a panel seam maybe missing or loose.	2
Bridge closed - culvert may be able to be repaired.	1
Bridge closed - culvert beyond repair.	Ø

Rating for Metal Culverts
Table WB76 - 78B

Description	Code
Bridge is not a culvert	9
No noticeable or noteworthy defects	8
Insignificant deterioration, decay or scour. No structural loss.	7
Minor deterioration, decay or scour. All primary structural elements are sound.	6
Moderate deterioration, decay or scour. All primary structural elements are sound but have some section loss.	5
Major deterioration, decay or scour. Advanced section loss or scour that affects the load capacity of the structure.	4
Extensive deterioration, decay or scour. Advanced section loss or scour that significantly affects the load capacity of the structure.	3
Severe deterioration, decay or scour. Critical structural members have obvious vertical or horizontal movement affecting structural stability.	2
Bridge closed - culvert may be able to be repaired.	1
Bridge closed - culvert beyond repair.	Ø

Rating for Timber Culverts
Table WB76 - 78C

pier_abutment_prot **Pier / Abutment Protection** *(Required)*
WB76 - 79
FHWA Item 111

This is only required If the bridge crosses a navigable channel. This item contains a code which indicates the presence and adequacy of pier and/or abutment navigation protection features (i.e., fenders and dolphins).

WB76 - 79 evaluates the adequacy of the pier protection features and is **not** an evaluation of their general condition. WB76 - 83 is to be used for rating their general condition. However, the adequacy evaluation of these features should correspond to condition ratings entered in WB76 - 83 in the manner noted.

If WB73 - 86 has not been coded 1, code N in this field.

1 No pier protection is required.
2 Pier protection is in place and functioning properly (it has a condition rating of 6, 7, or 8).
3 Pier protection is in place but is in a deteriorating condition (it has a condition rating of 4 or 5),
4 Pier protection is in place but a reevaluation of its design is needed.
5 No pier protection is present but a reevaluation of the need for it should be made.
N Not applicable.

scour_
WB76 - 80
FHWA Item 113

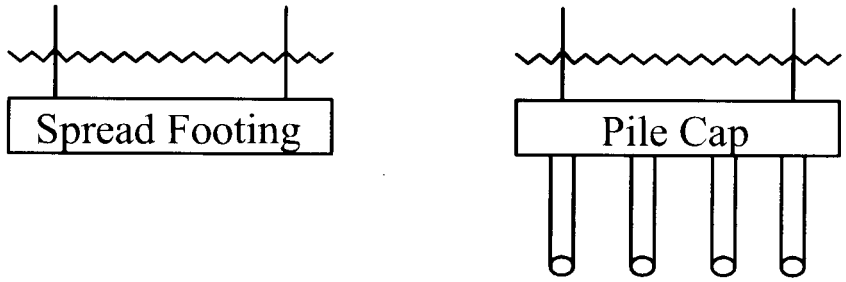
Scour *(Required)*

This rating is used to identify the current status of a bridge regarding its vulnerability to scour. Details on conducting a scour analysis are included in Chapter 5 of this manual. Whenever a rating factor of 4 or below is determined for this item, the rating factor for WB76 - 76, Substructure may need to be revised to reflect the severity of actual scour and resultant damage to the bridge. a scour critical bridge is one with abutment or pier foundations which are rated as unstable due to (1) observed scour at the bridge site or (2) a scour potential as determined from a scour evaluation study.

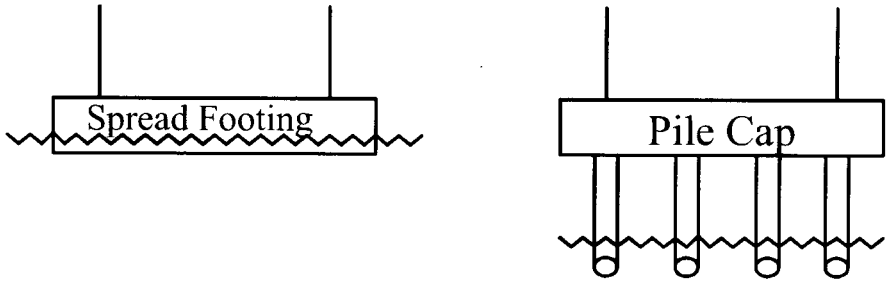
When a bridge inspector identifies an actual or potential scour problem, the bridge must be further evaluated to determine whether or not it should be considered scour critical. This evaluation process includes field observations by an individual (or individuals) with a knowledge of foundation, hydraulic, and geotechnical engineering and may require that calculations of anticipated scour depths be made.

See Figure WB76 - 80 and Table WB76 - 80 Rating for Scour.

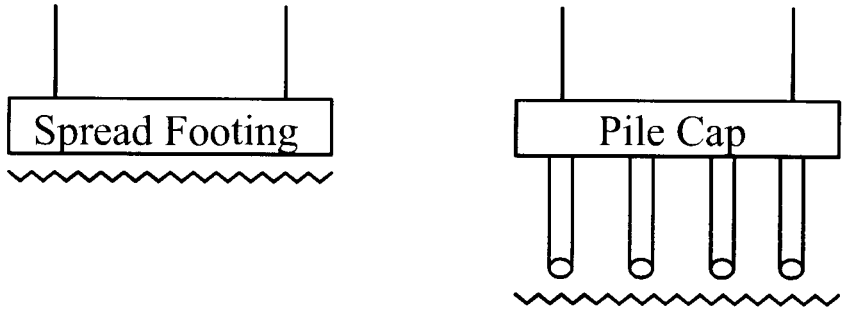
Remove 6 from table add notation that 6 is no longer acceptable.



Example A: If calculated scour depth is above top of footing, code 8.
(No action is required.)



Example B: If calculated scour depth is within limits of footing,
code 5 or 3 and conduct foundation structural analysis.



Example C: If calculated scour depth is below pile tips or spread
footing base, code 3 and provide for monitoring and
scour countermeasures as needed.

= Calculated Scour Depth

Figure WB76 - 80

Description	Code
Bridge is not over a waterway.	N
Bridge with “unknown” foundation that has not been evaluated for scour. Since risk cannot be determined, flag for monitoring during flood events and, If appropriate, closure	U
Bridge is over “tidal” waters and has not been evaluated for scour. Considered low risk. Bridge will be monitored with regular inspection cycle and with appropriate underwater inspections.	T
Bridge foundations (including piles) well above flood water elevations.	9
Bridge foundations determined stable for calculated/evaluated scour conditions. Calculated/evaluated scour is above top of footing. (Figure WB76 - 80, A)	8
Countermeasures have been installed to correct a previously existing scour problem. Bridge is no longer scour critical.	7
Acode of 6 is no longer an acceptable value	
Bridge foundations determined stable for evaluated scour conditions. Scour is within limits of footing or piles. (Figure WB 76 - 80B)	5
Bridge foundations determined stable for calculated scour conditions: field review indicates action is required to protect exposed foundations from effects of additional erosion or corrosion.	4
Bridge is scour critical; bridge foundations determined unstable for calculated scour depths: 1) Within limits of footings or piles (Figure WB 76 - 80B) Below footing base or pile tips (Figure WB76 - 80C)	3
Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations. Immediate action is required to provide scour countermeasures.	2
Bridge is scour critical; field review indicates that failure of piers/ abutments is imminent. Bridge is closed to traffic.	1
Bridge is scour critical. Bridge has failed and is closed to traffic.	Ø

Rating for Scour
Table WB76 - 80

aprch_cond **Approach Roadway Condition** *(Optional)*

WB76 - 81 This is the general physical condition rating of the approach roadway. This evaluation takes into consideration visible signs of wear, cracking, spalling, etc., but does not consider the alignment or width of this roadway.

9 Not applicable.

8 Smooth approach onto the bridge structure.

6 Less than 1↑ of settlement of the approach roadway causing minor bouncing and load impact onto the bridge. Monitor the settlement.

3 More than 1↑ of settlement of the approach roadway causing bouncing and load impact onto the bridge. Needs to be ACP feather repaired to provide a smooth transition onto the bridge.

Note: Code 6 for well maintained gravel roads. Code 3 for gravel roads in rough condition.

retaining_wall_cond **Retaining Walls Condition** *(Optional)*

WB76 - 82 This field contains the general condition rating of any retaining walls associated with the bridge. This evaluation should take into consideration whether movement, cracking, or settling has occurred.

Wingwalls and curtain walls should not be considered under this code as they are considered part of the abutment. Use Table WB76 - 82 Condition Rating for Retaining Walls.

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.
3	Serious Condition. Loss of section, deterioration, spalling, or scourhave seriously affected primary structural components. Local failuresare possible. Fatigue cracks in steel or shear cracks in concrete maybe present.
2	Critical Condition. Advanced deterioration of primary structuralelements. Fatigue cracks in steel or shear cracks in concrete maybepresent or scour may have removed substructure support. Unlessclosely monitored, it may be necessary to close the bridge untilcorrective action is taken.
1	Imminent Failure Condition. Major deterioration or section losspresent in critical structural components or obvious vertical orhorizontal movement affecting structure stability. Bridge is closedtotraffic but corrective action may put back in light service.
Ø	Failed Condition. Out of service. Beyond corrective action.

Condition Rating for Retaining Walls
Table WB76 - 82

pier_prot **Pier Protection Condition** *(Optional)*
WB76 - 83

This rating describes the general condition rating of any pier and/or abutment protection features (i.e., fenders and dolphins) which have been put in place to protect the bridge against collisions from vessels or objects in tow.

This field is used for rating the general condition of the bridge's pier protection features and does not evaluate the adequacy of those features.

If no pier protection exists, code 9. Use Table WB76 - 83 Condition Rating for Secondary Bridge Members (Pier Protection).

9	Not Applicable.
8	Very Good Condition. No problems noted.
7	Good Condition. Some minor problems.
6	Satisfactory Condition. Structural elements show some minordeterioration.
5	Fair Condition. All primary structural elements are sound but mayhave deficiencies such as minor section loss, deterioration, cracking,spalling, or scour.
4	Poor Condition. Advanced deficiencies such as section loss,deterioration, cracking, spalling, orscour.

Condition Rating for Secondary Bridge Members (Pier Protection)
Table WB76 - 83

bridge_rail_adqcy **Traffic Safety, Bridge Rails** *(Required)*
WB76 - 84
FHWA Item 036A

This code indicates whether or not the bridge railings meet current design standards as established by the AASHTO Standards Specifications for Highway Bridges. To meet current design standards, bridge railings must be capable of smoothly redirecting an impacting vehicle and meet current crash test standards. Factors which may affect this capability are bridge rail height, strength, type of material, and geometric design. See Figure WB76 - 84.

0 Does not meet currently acceptable standards or a feature is required but not provided.
1 Meets currently acceptable standards.
N Not applicable, or not required, such as a non-vehicular bridge.

rail_trans_adqcy **Traffic Safety, Transitions** *(Required)*
WB76 - 85
FHWA Item 036B

This rating indicates whether or not the transition between the bridge rail and the approach guardrail meets current design standards. See Figure WB76 - 87. To meet design standards, the transition must provide for the following:

- A gradual stiffening of the approach guardrail in a manner that will not cause sagging or pocketing due to vehicle impact.
- A firm attachment between the approach guardrail and the bridge by a WSDOT Type F anchor, a WSDOT Type 3 beam guardrail anchor, or extension of the concrete barrier.
- A gradual tapering out of the curb ends.

0 Does not meet currently acceptable standards or a feature is required but not provided.
1 Meets currently acceptable standards.
N Not applicable, or not required, such as a non-vehicular bridge.

aprch_rail_adqcy **Traffic Safety, Guardrails** *(Required)*
WB76 - 86
FHWA Item 036C

This rating indicates whether or not the approach guardrail meets current design standards. To meet standards, the approach guardrail should be of adequate length, height, and structural quality to shield motorists from bridge ends or from other hazards at the bridge site. Design standards are given in the AASHTO Roadside Design Guide. See Figure WB76 - 87.

Ø Does not meet currently acceptable standards or a feature is required but not provided.
1 Meets currently acceptable standards.
N Not applicable, or not required, such as a non-vehicular bridge.

rail_end_adqcy **Traffic Safety, Terminals** *(Required)*
WB76 - 87
FHWA Item 036D

This code indicates whether or not the terminals (guardrail ends) meet current design standards. To meet standards, the terminals should either be flared, buried, shielded, or able to break away. Design standards for terminals are given in the AASHTO Roadside Design Guide. See Figure WB76 - 87.

Ø Does not meet currently acceptable standards or a feature is required but not provided.
1 Meets currently acceptable standards.
N Not applicable, or not required, such as a non-vehicular bridge.

rating_calc_
WB76 - 88

Rating *(Optional)*
This code indicates whether or not the load ratings WB75 - 52 and WB75 - 55 need to be reviewed or calculated.

- Y Yes, operating and/or inventory ratings need to be reviewed, or original ratings need to be established.
- N No, operating and/or inventory ratings need not be reviewed.

repair_status_
WB76 - 89

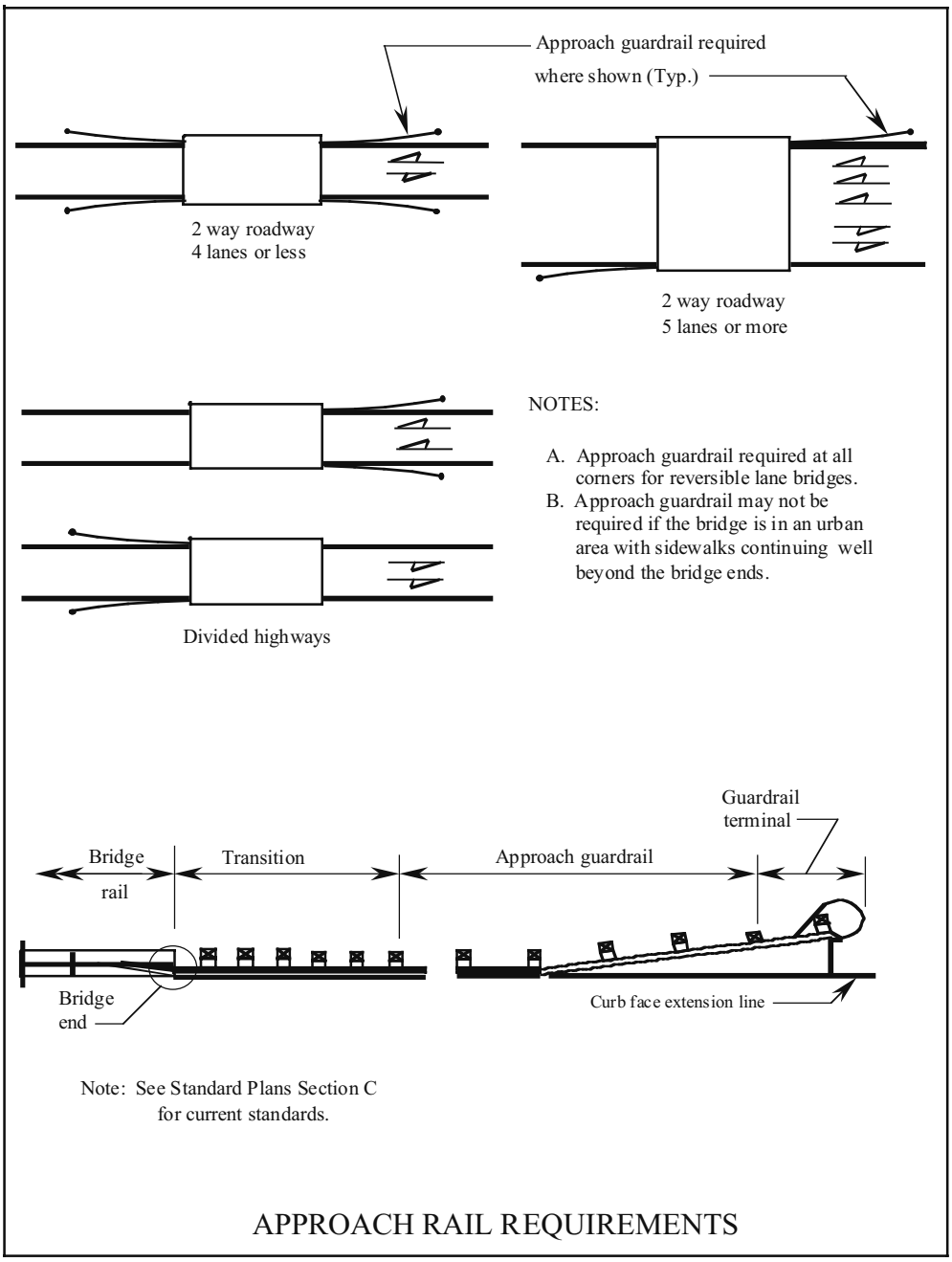
Repair Status *(Optional)*
The inspector should code this field Y If there are recommended repairs.

- Y Recommended repair add to Bridge Repair List items.
- N No Recommended Repairs.

card_check_
WB76 - 90

Card Check *(Optional)*
This field indicates that a Kardex card check is required as part of this inspection. This is either a new or rebuilt bridge. Used by WSDOT personnel only.

- Y Yes, perform a card check as part of this inspection.
- N No, do not perform a card check.



Approach Rail Requirements
Figures WB76 - 84 through WB76 - 87

inspn_photo_ **Photographs** *(Optional)*
WB76 - 91 This code identifies the types of photographs to be taken during this inspection.

D Take deck photographs.
E Take elevation photographs.
P Take both deck and elevation photographs.

Leave this field blank If photographs are not required. Use an asterisk to remove a code.

inspn_season_ **Season** *(Optional)*
WB76 - 92 This field specifies the time of year in which this bridge should be inspected, either summer, winter, or another seasonal inspection.

L During low water
S Summer
W Winter
B Outside bird nesting season
F Outside fish windows
K Call for utility

Use an asterisk to remove a code.

inspn_soundings_ **Soundings** *(Optional)*
WB76 - 93 This code indicates whether or not soundings of the streambed are required.

Y Soundings should be taken.
N Soundings need not be taken.

measure_clrnc_ **Clearances** *(Optional)*
WB76 - 94 This field identifies which clearances need to be checked on a bridge.

C Measure both horizontal and vertical clearances.
H Measure horizontal clearances.
V Measure vertical clearances.

Leave this field blank If clearances are not required. Use an asterisk to remove a code.

monitor_structure_ **Monitor Structure** *(Optional)*
WB76 - 95 This field prompts the inspector to review comments from the previous inspection to identify what to monitor during an inspection.

Y Yes
N No

2. WB77

inspn_fracture_type **Fracture Critical/UBIT Inspection, Type** *(Required)*
WB77 - 32
FHWA Item 92A Code If a fracture critical inspection is required or whether an Under Bridge Inspection Truck (UBIT) is needed.

- U A Fracture Critical inspection is required (using a UBIT).
- Y A Fracture Critical inspection is required (without using a UBIT).
- I Requires UBIT for inspection, not Fracture Critical.
- N No Fracture Critical inspection is required.

fracture_inspn_freq **Fracture Critical/UBIT Inspection, Frequency** *(Required)*
WB77 - 33
FHWA Item 92A A two-digit code representing the number of months between consecutive fracture critical or UBIT inspections.

fracture_inspn_date **Fracture Critical/UBIT Inspection Last Inspection Date** *(Fatal)*
WB77 - 35
FHWA Item 93A The date on which the most recent fracture critical inspection was completed. Code this field in the mmddyyyy format.

fracture_inspn_hours **Fracture Critical/UBIT Inspection Hours** *(Required)*
WB77 - 43 The total number of inspection hours (to the nearest tenth of an hour) that the inspection team spent on the bridge during the most recent fracture critical/ UBIT inspection. Use leading zeros.

fracture_inspr_initials **Fracture Critical/UBIT Inspection Inspector (Optional)**
WB77 - 47 The initials of the lead inspector of the inspection team who performed the most recent fracture critical/UBIT inspection.

fracture_cert_no **Fracture Critical/UBIT Inspector Identification No** *(Fatal)*
WB77 - 50 The certification number of the lead inspector at the bridge site during the most recent fracture critical /UBIT inspection.

fracture_co_ inspr_initials **Fracture Critical/UBIT Co-Inspector** *(Optional)*
WB77 - 55 The initials of the individual who assisted the lead inspector in performing the most recent fracture critical /UBIT inspection.

inspn_underwater_type **Underwater Inspection, Type** *(Required)*
WB77 - 58
FHWA Item 92B The type of underwater inspection that is required for the bridge.

- D Underwater inspection with a diver (and fathometer, If necessary) is required.
- N No underwater inspection is required.
- O Other type of underwater inspection is required (submarine, ROV, etc.).
- W Underwater inspection w/o diver (wading) is required.

underwater_inspn_freq **Underwater Inspection, Frequency** *(Required)*
WB77 - 59
FHWA Item 92B A two-digit code representing the number of months between consecutive underwater inspections.

underwater_ inspn_date **Underwater Inspection Last Inspection Date** *(Fatal)*
WB77 - 61
FHWA Item 93B The date on which the most recent underwater inspection was completed. Code this field in the mmddyyyy format.

underwater_ inspn_hours **Underwater Inspection Hours** *(Optional)*
WB77 - 69 The total number of inspection hours (to the nearest tenth of an hour) that the inspection team spent at the bridge during the most recent underwater inspection. Use leading zeros.

underwater_ inspr_initials **Underwater Inspection Inspector** *(Required)*
WB77 - 73 The initials of the lead inspector of the inspection team who performed the most recent underwater inspection.

underwater_cert_no **Underwater Inspection Inspector Identification No** *(Fatal)*
WB77 - 76 The certification number of the lead inspector at the bridge site during the most recent underwater inspection.

underwater_co_ inspr_initials **Underwater Inspection Co-Inspector** *(Optional)*
WB77 - 81 The initials of the individual who assisted the lead inspector in performing the most recent underwater inspection.

inspn_special_type **Other Special Inspections, Type** *(Required)*
WB77 - 84
FHWA Item 92C This field identifies the type of special inspection that is required for the bridge.

1 Movable bridge.
2 Floating bridge.
3 Suspension bridge.
4 Redundant pin/hanger bridge.
5 Segmental.
6 Ferry terminal.
7 High strength steel bridge.
8 Bridges with temporary supports (require intermediate inspections).
9 Cable stayed.
Ø Other special features.
N No special inspection is required.

special_inspn_freq **Special Inspection Frequency** *(Required)*
WB77 - 85
FHWA Item 92C A two-digit code representing the number of months between consecutive special inspections.

special_inspn_date **Special Inspection Date** *(Fatal)*
WB77 - 87
FHWA Item 93C The date on which the most recent special inspection was completed. Code this field in the mmddyyyy format.

special_inspn_hours **Special Inspection Hours** *(Optional)*
WB77 - 95 The total number of inspection hours (to the nearest tenth of an hour) that the inspection team spent at the bridge during the most recent special inspection.

special_inspr_initials **Other Special Inspector's Initials** *(Required)*
WB77 - 99 The initials of the lead inspector of the inspection team who performed the most recent special inspection.

special_cert_no **Other Special Inspector Certification No.** *(Fatal)*
WB77 - 102 The certification number of the lead inspector at the bridge site during the most recent special inspection.

special_co_inspr_initials **Other Special Co-Inspector's Initials** *(Optional)*
WB77 - 107 The initials of the individual who assisted the lead inspector in performing the most recent special inspection.

2. WB78

water_type **Water Type** *(Required)*
WB78 - 32 This field describes the type of water the bridge crosses over.

B Brackish (a mixture of fresh and salt water).
F Fresh water.
S Salt water.
T Tidal.

Leave blank If not over water.

flood_plain_intrusion_ **Flood Plain Intrusion** *(Required)*
WB78 - 33 This code indicates whether or not the structure's approach roadway or abutment intrude into the flood plain of the waterway (i.e., whether or not previous or possible flooding could cause or has caused water to rise so it touches the structure's approach roadway embankment or abutment).

A No intrusion into the flood plain.
B Bridge or approaches intrude into the waterway causing minor backwater.
C Overtopping of approach roadway has occurred.
D A portion of the superstructure has been under water.
U Flood plain intrusion is unknown.

Leave blank If not over water.

flood_control_ **Flood Control** *(Required)*
WB78 - 34 This field indicates If there is any existing type of flood control on the waterway the bridge crosses. To be considered, this flood control must be in place either upstream or downstream from the bridge and must be near enough to have an effect on the bridge. Flood control may be provided by dams, dikes, fill, or other means.

B Both upstream and downstream.
U Upstream.
D Downstream.
N No flood control.

Leave blank If not over water.

scour_history_ **Scour History** *(Required)*
WB78 - 35 This code describes scour conditions at the bridge site.

C Current scour problems.
H History of scour problems but scour conditions are now stable.
N No history of scour.
U Scour history is unknown.

Leave blank If not over water.

streambed_material_type **Streambed Material Type** *(Required)*

WB78 - 36 This code describes the composition of the streambed at the bridge site. Enter one of the following codes to indicate the predominant type of material that is evident.

1 Bedrock
2 Sediment
3 Gravel
4 Sand
5 Cobbles
6 Lined Canal
7 Vegetation
8 Alluvial Fan
9 Unknown

Leave blank If not over water.

substructure_ stability_ **Substructure Stability** *(Required)*

WB78 - 37 This code describes the type of material upon which the bridge's substructure rests. This code is used to determine the degree of stability that can be expected in the bridge substructure.

Code the lower number value If different sections of a continuous span bridge are supported by different materials.

1 Spread footing, simple spans.
2 Spread footing, continuous spans.
3 Pile foundation, simple spans.
4 Pile foundation, continuous spans.
5 Bedrock, simple spans.
6 Bedrock, continuous spans.
7 Unknown, simple spans.
8 Unknown, continuous spans

Leave blank If not over water.

waterway_ obstruction **Waterway Obstruction** *(Required)*

WB78 - 38 This code indicates any conditions in the waterway which affect the flow of water beneath the bridge.

A Debris accumulates at the bridge.
B Ice accumulates at the bridge.
C The waterway is overgrown with vegetation.
D A and C above.
E A and B above.
F B and C above.
G A, B, and C above.
N No obstruction to the flow of water beneath the bridge.

Leave blank If not over water.

streambed_ stability_ Streambed Stability *(Required)*

WB78 - 39 This code describes any existing stream conditions which may influence scour at the bridge site.

A Sharp bends.
B Significant lateral shifts.
C Steep slopes.
D High water velocity.
E Degradation.
F Aggredation.
G No conditions influencing scour exist.
H Streambed conditions are unknown.

Leave blank If not over water.

streambed_ anabranch_ Streambed Anabranch *(Required)*

WB78 - 40 This field indicates whether or not confluences or shifting anabranches are present in the waterway. a confluence is a flowing together of two or more streams. An anabranch is a river branch that re-enters the main stream, creating an island in the waterway.

Code only those conditions which exist near the bridge site.

A Anabranches are present.
B Both anabranches and confluences are present.
C Confluences are present.
N Neither anabranches nor confluences are present.
U Waterway configuration is unknown.

Leave blank If not over water.

piers_in_waterway Piers in Water *(Required)*

WB78 - 41 This field contains the number of the structure's piers in the water at normal yearly high water.

If the bridge is inspected at low water, look for evidence that the piers or pile bents have been in the water.

0 No piers in the water.
1-9 Number of piers in the water.
M More than nine piers in the water.

Leave blank If not over water.

prpsed_serv_ on_code **Proposed Improvement Service On** *(Required)*
WB78 - 42

This field identifies the type of service to be carried on the proposed bridge.

1 Highway.
2 Railroad.
3 Pedestrian exclusively.
4 Highway and railroad.
5 Highway and pedestrian.
6 Overpass bridge at an interchange or second level of a multilevel interchange.
7 Third level of a multilevel interchange.
8 Fourth level of a multilevel interchange.
9 Building or plaza.
0 Other or Not Applicable.

The code Ø means "Other" only If there are proposed improvements. If there are no proposed improvements to the bridge, the code Ø means "not applicable."

prpsed_serv_ under_code **Proposed Improvement Service Under** *(Required)*
WB78 - 43

This field identifies the type of service under the proposed bridge.

1 Highway, with or without pedestrian traffic.
2 Railroad.
3 Pedestrians exclusively.
4 Highway and railroad.
5 Waterway.
6 Highway and waterway.
7 Railroad and waterway.
8 Highway, waterway, and railroad.
9 Relief.
0 Other or Not Applicable

The code 0 means "Other" only If there are proposed improvements. If there are no proposed improvements to the bridge, the code 0 means "not applicable."

prpsed_work_ type **Proposed Improvement Work Type** *(Required)*
WB78 - 44
FHWA Item 075A

This field identifies the type of work to be accomplished on the proposed improvement. The proposed work should improve the bridge to the degree that it can provide the type of service needed. This field must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. To be eligible, a bridge must carry highway traffic, be deficient and have a sufficiency rating of 80.0 or less.

31 Replacement of bridge because of substandard load-carrying capacity or substandard bridge roadway geometry.
32 Replacement of bridge because of relocation of road.

33 Widening of existing bridge without deck rehabilitation or replacement OR lengthening of a culvert.
34 Widening of existing bridge with deck rehabilitation or replacement.
35 Rehabilitation of bridge because of general structural deterioration or inadequate strength.
36 Rehabilitation of bridge deck with only incidental widening.
37 Replacement of bridge deck with only incidental widening.
38 Other structural work, includes hydraulic replacements.
00 If there are no proposed improvements to the bridge, the code 00 means "not applicable."

If there are no proposed improvements to the bridge, the code 00 means "not applicable."

prpsed_work_meth **Proposed Improvement Work Method** *(Required)*
WB78 - 46
FHWA Item 075B

This field indicates who will perform the work (as indicated in WB78 - 44) on the proposed improvement.

1 Work to be done by contract.
2 Work to be done by the agency which owns the bridge.

prpsed_length **Proposed Improvement Length** *(Required)*
WB78 - 47
FHWA Item 76

This field contains the length of the proposed improvement. The measurement is to the nearest foot. This should be a measurement of the proposed length of the bridge only, not the length of the project. (Do not include the length of approach guardrails.)

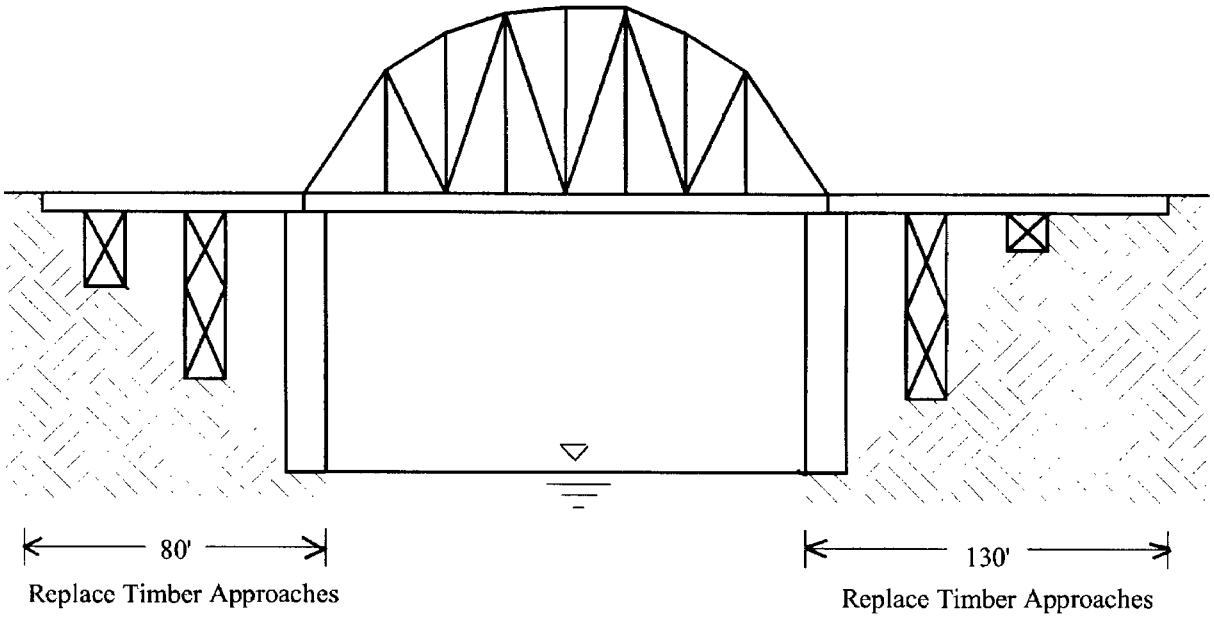
If only a portion of the bridge is to be rehabilitated or replaced, the improvement length is a measurement of the portion being improved only. If the entire bridge is being rehabilitated or replaced, the improvement length is measured from back to back of abutment backwalls or from pavement notch to pavement notch. See Figure WB78 - 47A.

If the bridge is a pipe or culvert, the improvement length is measured along the centerline of the barrel, regardless of pipe or culvert depth below grade. For pipes, code the total length of the pipe before ends have been mitered. This is not the length as is referenced in WB74 - 40. See Figure WB78 - 47B.

If the proposed improvement is to the substructure or channel beneath the bridge, code the length of the bridge directly over, or supported by, the substructure or channel.

This field must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program.

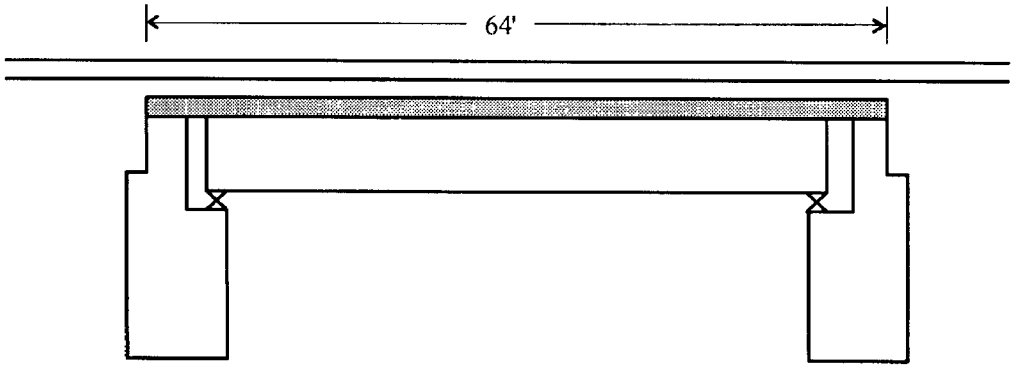
Example A



If the proposed improvement is to replace the timber approaches of both ends of the structure, the total length of improvement is:

80' + 130' = Code 000210

Example B

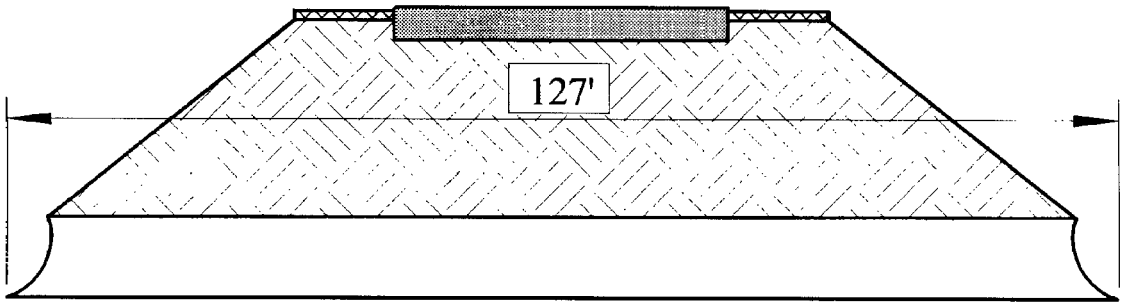


If the proposed improvement is to replace the entire structure, the total length of improvement is a measurement from paving notch to paving notch, or 64 feet , in the example above.

Code: 000064

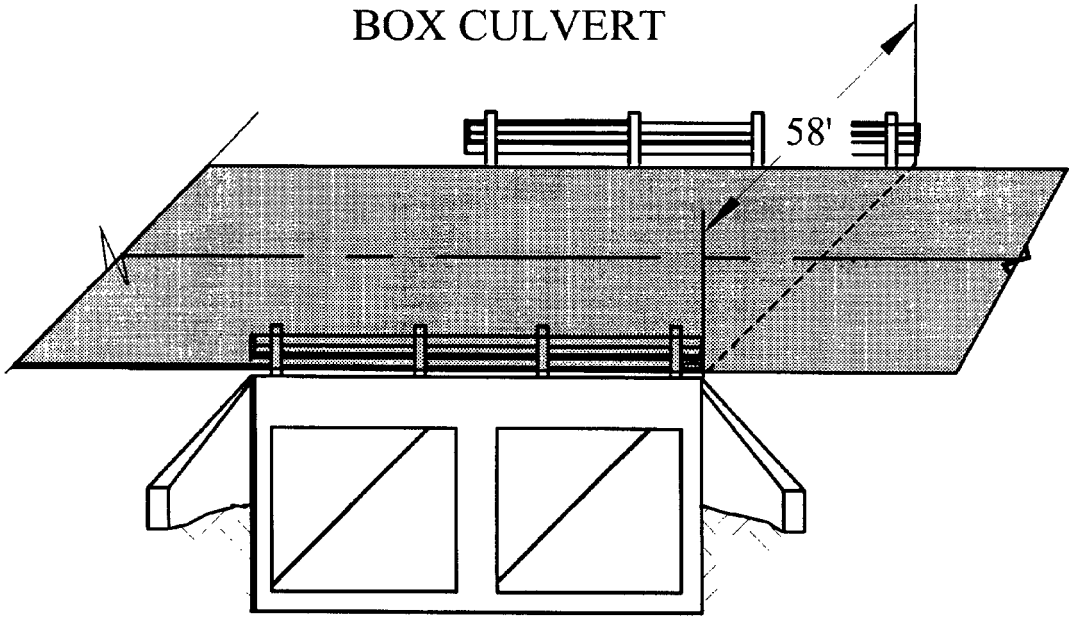
Figure WB78 - 47A

PIPE CULVERT
CROSS SECTION



If the proposed improvement is to replace a length of pipe, the total length of improvement is the length of the pipe (before ends have been mitered).
Code: 000127

BOX CULVERT



If the proposed improvement is to replace a box culvert, the total length of improvement is the length of the culvert between parapet walls.
Code: 000058

Figure WB78 - 47B

prpsed_roadway_width **Proposed Improvement Roadway Width** *(Required)*
WB78 - 53 This field contains the curb-to-curb width of the roadway on the proposed bridge. This measurement is coded to the nearest foot.

prpsed_lanes_on **Proposed Improvement Lanes On** *(Required)*
WB78 - 57 This field contains the number of through lanes the proposed bridge will carry.

prpsed_lanes_under **Proposed Improvement Lanes Under** *(Required)*
WB78 - 59 This field contains the number of lanes that will pass beneath the proposed bridge.

prpsed_total_cost **Proposed Improvement Total Cost** *(Required)*
WB78 - 61
FHWA Item 096 This field must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. This field contains the total cost of the proposed improvements in thousands of dollars. This value includes the bridge cost, the roadway cost, and all incidental costs normally associated with the proposed bridge improvement project. The total project cost will, therefore, usually be greater than the sum of the bridge and roadway costs.

If WB78 - 83 is coded N, the cost will not be automatically generated.

If no improvement is needed, code all zeroes.

Do not use this field to estimate maintenance costs.

prpsed_structure_cost **Proposed Improvement Structure Cost** *(Required)*
WB78 - 67
FHWA Item 094 This field must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. This field contains the estimated cost, in thousands of dollars, for the proposed bridge or major bridge improvements. This total should include only bridge construction costs.

It excludes any roadway, right of way, detour, demolition, preliminary engineering, maintenance, guardrail, or paving costs that are not part of the bridge cost.

If WB78 - 83 is coded N, the cost will not automatically be generated.

If no improvement is needed, code all zeroes.

prpsed_roadway_cost **Proposed Improvement Roadway Cost** *(Required)*
WB78 - 73
FHWA Item 095 This field contains the estimated cost, in thousands of dollars, for any proposed roadway improvements. This total includes all roadway construction costs, including guardrail and paving costs, but does not include bridge , right of way, detour, extensive roadway realignment, preliminary engineering, or maintenance costs.

If WB78 - 83 is coded N, the cost will not automatically be generated.

This field must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program.

prpsed_estimate_year **Proposed Improvement Estimate Year** *(Required)*
WB78 - 79
FHWA Item 097

This field contains the year in which the project cost estimates have been made. If this date is more than eight years old, the cost estimates entered in WB78 - 61, WB78 - 67, and WB78 - 73 must be revised and a new estimate year must be entered in this field.

prpsed_cost_calc_ **Proposed Improvement Calculation** *(Required)*
WB78 - 83

This field directs the WSBIS system to compute costs for any proposed bridge improvements.

If no improvements are proposed for the bridge, this field should be left blank.

Y Yes, compute the replacement costs automatically.
N No, do not automatically compute the replacement costs.

inspn_agency_id **Inspecting Agency** *(Optional)*
WB78 - 84

If the agency which owns the bridge does not have primary responsibility for inspecting it, this field describes the type of agency inspecting the bridge.

If the owner agency has primary responsibility for inspecting the bridge, leave this field blank, otherwise enter a code to indicate the type of agency inspecting the bridge.

When the agency which owns the bridge performs routine inspections on it and uses other agencies to perform special inspections (for example, a consultant performs underwater inspections), the primary responsibility for inspecting the bridge is still considered to rest with the owner agency. The field should be left blank. Use the following codes.

01 State Highway Agency
02 County Highway Agency
03 Town or Township Highway Agency
04 City or Municipal Highway Agency
11 State Park, Forest, or Reservation Agency
12 County Park, Forest, or Reservation Agency
13 City/Other Park, Forest, or Reservation Agency
21 Other State Agencies
24 Other County Agencies
25 Other City or Local Agencies
26 Private (Consultant)
27 Railroad
31 State Toll Authority
32 County Toll Authority
33 City or Other Toll Authority
60 Other Federal Agencies (not listed below)
61 Indian Tribal Government
62 Bureau of Indian Affairs
63 Bureau of Fish and Wildlife

64 U.S. Forest Service
66 National Park Service
68 Bureau of Land Management
69 Bureau of Reclamation
70 Corps of Engineers (Civilian)
71 Corps of Engineers (Military)
72 Air Force
73 Navy/Marines
74 Army
75 NASA
76 Metroplitan Washington Airport Services
80 Unknown
91 Canada
92 Idaho
93 Oregon

city_inspn_no **Inspecting Agency Number** *(Optional)*

WB78 - 86

If the agency which owns the bridge does not have primary responsibility for inspecting it, this field contains a code which indicates the entity which is performing the inspections.

Use the following criteria for determining the proper code to enter:

1 If the inspecting entity is a county, code that county's number in the first two field positions and leave the last two field positions blank.

2 If the inspecting agency is a city, code that city's four-digit number in the field.

3 If the inspecting entity is WSDOT or an agency outside Washington State, code all zeroes in the field.

If the owner agency is inspecting the bridge, leave this field blank

seismic_superstrctr_main_b **Seismic Status Superstructure Main Biennium** *(Optional)*

WB78 - 90

This field contains the biennium in which the superstructure main span group was fitted with seismic restraining devices.

Enter the beginning and ending years of the biennium. For example, code the 1997-1999 biennium as 9799.

Leave this field blank If the superstructure of the main span group has not been fitted with seismic restraining devices.

seismic_ superstrctr_aprch_b **Seismic Status Superstructure Approach Biennium** *(Optional)*

WB78 - 94 This field contains the biennium in which the superstructure approach span group was fitted with seismic restraining devices.

Enter the beginning and ending years of the biennium. For example, code the 1997-1999 biennium as 9799.

Leave this field blank If either there are no approach spans or If the superstructure of the approach span group has not been fitted with seismic restraining devices.

seismic_substrctr_main_b **Seismic Status Substructure Main Biennium** *(Optional)*

WB78 - 98 This field contains the biennium in which the substructure main span group was fitted with seismic restraining devices.

Enter the beginning and ending years of the biennium. For example, code the 1997-1999 biennium as 9799.

Leave this field blank If the substructure of the main span group has not been fitted with seismic restraining devices.

seismic_substrctr_aprch_b **Seismic Status Substructure Approach Biennium** *(Optional)*

WB78 - 102 This field contains the biennium in which the substructure approach span group was fitted with seismic restraining devices.

Enter the beginning and ending years of the biennium. For example, code the 1997-1999 biennium as 9799.

Leave this field blank If either there are no approach spans or If the substructure of the approach span group has not been fitted with seismic restraining devices.

2. Edit Process & Error Codes

2.05 Edit Process

The WSBIS system has been designed so that various checks of the coded values are made before the form is processed and the information stored in WSBIS. These edit checks are made each time information is added or updated. There are four different types of edit checks performed and each is described below.

A. Valid Range Edits

Each field is edited to see If a complete entry was made and whether the coded values fall within the acceptable range of values for that field. For example, acceptable values for SECTION (WB71 - 81) are the numbers Ø1 through 36. The number 42, therefore, is an invalid entry in this field.

When a valid range error is found during processing, the error is underlined in the field and asterisks are printed in the Card Indicator Box corresponding to that field. (Card WB71 in the example above). These errors should be corrected and the form resubmitted. Refer to the VALID RANGE EDITS table on the following pages for a listing of valid values for each field.

B. Fatal Field Edits

Certain fields are considered critical and must contain acceptable values for information to be added or updated on the form. These are called Fatal Fields. For example, COUNTY NUMBER is considered a Fatal Field. Therefore, an acceptable value (a number between Ø1 and 39) must be coded in the field.

If a Fatal Field error is found when data is first being added, the inventory record will not be created. When a Fatal Field error is found as the form is being updated, the original data will be left in the field and an error message will be displayed. Refer to the FATAL FIELD EDITS table on the following pages for a list of Fatal Fields, and the field descriptions.

C. Dependency Edits

Certain fields are cross-checked against each other to confirm compatibility of codes in related fields. For example, If the MAXIMUM SPAN LENGTH has been coded ØØ78, then the BRIDGE LENGTH (WB73 - 40) must be coded as greater than ØØ78 (since the total length of the structure is usually greater than the length of the maximum span). Similarly, If NAVIGATION CONTROL (WB73 - 86) has been coded 1 (to indicate that navigation control exists) then NAVIGATION VERTICAL CLEARANCE and NAVIGATION HORIZONTAL CLEARANCE must be coded with values greater than Ø (since a navigable channel must have some vertical and horizontal clearance).

When a dependency error is found during processing of the form, the problematic fields are marked and an error message code is printed at the top of the form. These messages are preceded by the letter E and indicate the source of the problem. For a listing of the error codes which may appear on the form and what each means, refer to the ERROR CODES table on the following pages.

D. Logical Edits

Values coded in certain fields are checked to see If they are reasonable. For example, for the MINIMUM VERTICAL CLEARANCE UNDER BRIDGE (WB73 - 74) to be coded at 8 feet, would be questionable. Values coded in certain fields are also checked against other values to see If a reasonable relationship exists between two fields. For example, If YEAR BUILT (WB73 - 32) has been coded to show that the bridge has been built in the past five years, it would be unreasonable for the DECK CONDITION OVERALL to be coded Ø through 4 (how could a five year old bridge deck be in such deteriorated condition?)

When logical coding errors are found during the processing of the form, the problematic fields are marked and an error message code is printed at the top of the form. These messages are preceded either by the letter R or the letter L and indicate the source of the problem. For a listing of error codes which may appear on the form and what each means, refer to the ERROR CODES table on the following pages.

2.06 Error Codes

E400 One of the following conditions is true:

- **National Highway System (WB74 - 83)** is coded "1" *and* **Highway Class (WB74 - 33)** is in the range "4" through "8"
  OR
- **National Highway System (WB74 - 83)** is not coded "1" *and* **Highway Class (WB74 - 33)** is coded "1"

E401 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* one of the following conditions is true:

- **Lanes On (WB73 - 52)** is greater than "/ØØ" *and* **Service On (WB75 - 44)** is coded "Ø", "2", "3", or "9"
  OR
- **Lanes On (WB73 - 52)** is coded "/ØØ" *and* **Service On (WB75 - 44)** code is coded "1" or is in the range "4" through "8"

E402 One of the following conditions is true:

- **Lanes Under (WB73 - 54)** is greater than "/ØØ" *and* **Service Under (WB75 - 45)** is not "1", "4", "6", or "8"

  OR
- **Lanes Under (WB73 - 54)** is coded "/ØØ" *and* **Service Under (WB75 - 45)** is not "2", "3", "5", "7", "9", or "Ø"

E403 One of the following conditions is true:

- **National Highway System (WB74 - 83)** is coded "Ø" *and* **Federal Functional Classification (WB74 - 87)** is coded "Ø1", "Ø2", "11", "12", or "14")

  OR
- **National Highway System (WB74 - 83)** is coded "1" *and* **Federal Functional Classification (WB74 - 87)** is coded "Ø6", "Ø7", "Ø8", "Ø9", "16", "17", or "19"

E404 **Deck Geometry (WB76 - 58)** is coded in the range "Ø" through "5" *and* one of the following conditions is true:

- **Year Built (WB73 - 32)** is within 10 years of current year

  OR
- **Year Rebuilt (WB73 - 36)** is within 10 years of current year

E405 If **Year Rebuilt (WB73 - 36)** > ' ØØØØ' *and* **Year Rebuilt (WB73 - 36)** is earlier than **Year Built (WB73 - 32)**

E406 **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "5" *and* one of the following conditions is true:

- **Year Built (WB73 - 32)** is within 10 years of current year

  OR
- **Year Rebuilt (WB73 - 36)** is within 10 years of current year

E407 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* **Lanes Under (WB73 - 54)** is coded "/ØØ"

E408 **On/Under (WB74 - 32)** is coded "1" *and* one of the following conditions is true:

- **Navigation Control (WB73 - 86)** is coded "1" *and* **Navigation Horizontal Clearance (WB73 - 90)** is coded " ØØØØ"

  OR
- **Navigation Control (WB73 - 86)** is coded "Ø" or "N" *and* **Navigation Horizontal Clearance (WB73 - 90)** is greater than " ØØØØ"

E409 **On/Under (WB74 - 32)** is coded "1" *and* one of the following conditions is true:

- **Navigation Control (WB73 - 86)** is coded "1" *and* **Navigation Vertical Clearance (WB73 - 87)** is coded " ØØØØ"

  OR
- **Navigation Control (WB73 - 86)** is coded "Ø" or "N" *and* **Navigation Vertical Clearance (WB73 - 87)** is greater than " ØØØØ"

E410 **Maximum Span Length (WB73 - 48)** is greater than **Bridge Length (WB73 - 40)**

E411 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "3" *and* none of the following are true:

- **Service Under (WB75 - 45)** is coded "1" or "6" *and* **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is less than 15 feet *and* **STRAHNET (WB74 - 85)** is coded "2"

  OR
- **Service Under (WB75 - 45)** is coded "1" or "6" *and* **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is less than 14 feet *and* **STRAHNET (WB74 - 85)** is coded "Ø" or "1"

  OR
- **Service Under (WB75 - 45)** is coded "2", "4", "7", or "8" *and* **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is less than 20 feet

  OR
- **Service Under (WB75 - 45)** is coded "Ø", "3", "5", or "9"

E412 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "3" *and* **Service Under (WB75 - 45)** is coded "2", "4", "7", or "8" *and* the lesser of **Horizontal Clearance Route Direction (WB74 - 91)** *and* **Horizontal Clearance Reverse Direction (WB74 - 95)** is less than 8 feet.

E415 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "3" *and* **Service Under (WB75 - 45)** is coded "1", "4", "6", or "8" *and* **Median (WB72 - 91)** is greater than "Ø" *and* either of the following is false:

- **ADT (WB74 - 45)** is greater than 249 *and* less than 999999 *and* **Minimum Lateral Underclearance Left (WB73 - 83)** is less than 2 feet

  OR
- **ADT (WB74 - 45)** is less than 25Ø or equal to 999999 *and* **Minimum Lateral Underclearance Left (WB73 - 83)** is less than 1´Ø6↑

E416 **On/Under (WB74 - 32)** is coded “2” or is in the range “A” through “Z” *and* **Underclearance Adequacy (WB76 - 59)** is in the range “Ø” through “3” *and* **Minimum Lateral Underclearance Right Code (WB73 - 82)** is “H *and* one of the following is false:

- **ADT (WB74 - 45)** is greater than 249 *and* less than 999999 *and* **Minimum Lateral Underclearance Right (WB73 - 79)** is less than 6 feet

  OR
- **ADT (WB74 - 45)** is less than 25Ø or equal to 999999 *and* **Minimum Lateral Underclearance Right (WB73 - 79)** is less than 4′ Ø6↑

E417 **STRAHNET (WB74 - 85)** is coded “1” or “2” *and* **Horizontal Clearance Route Direction (WB74 - 91)** is zero *and* **Horizontal Clearance Reverse Direction (WB74 - 95)** is zero

E418 **STRAHNET (WB74 - 85)** is coded “1” or “2” and **Latitude (WB71 - 88)** is not within range

E419 **STRAHNET (WB74 - 85)** is coded “1” or “2” *and* **Longitude (WB71 - 96)** is not within range

E420 **Curb to Curb Width (WB73 - 56)** is coded “ ØØØØ” *and* **Main Span Design (WB75 - 33)** does not equal “19”

E421 **Out to Out Deck Width (WB73 - 60)** is coded “ ØØØØ” *and* **Main Span Design (WB75 - 33)** does not equal “19”

E422 One of the following conditions is true:

- **Main Span Design (WB75 - 33)** is coded “19” *and* **Deck Overall (WB76 - 63)** is in the range “Ø” through “8”

  OR
- **Main Span Design (WB75 - 33)** is not coded “19” *and* **Deck Overall (WB76 63)** is coded “9”

E423 One of the following conditions is true:

- **Main Span Design (WB75 - 33)** is coded “19” *and* **Superstructure Overall (WB76 - 71)** is in the range “Ø” through “8”

  OR
- **Main Span Design (WB75 - 33)** is not coded “19” *and* **Superstructure Overall (WB76 - 71)** is coded “9”

E424 One of the following conditions is true:

- **Main Span Design (WB75 - 33)** is coded “19” *and* **Substructure Overall (WB76 - 76)** is in the range “Ø” through “8”

  OR
- **Main Span Design (WB75 - 33)** is not coded “19” *and* **Substructure Overall (WB76 - 76)** is coded “9”

E425 One of the following conditions is true:

- **Main Span Design (WB75 - 33)** is coded "19" *and* **Culvert (WB76 - 78)** is coded "9"
  OR
- **Main Span Design (WB75 - 33)** is not coded "19" *and* **Culvert (WB76 - 78)** is in the range "Ø" through "8"

E426 **Open Closed (WB72 - 93)** is coded "E" or "K" *and* **Operating Rating Tons (WB75 - 52)** is greater than zero

E427 **Open Closed (WB72 - 93)** is coded "E" or "K" *and* **Inventory Rating Tons (WB75 - 55)** is greater than zero

E428 **Proposed Improvements Total Cost (WB78 - 61)** is less than the sum of **Proposed Improvements Structure Cost (WB78 - 67)** *plus* **Proposed Improvements Roadway Cost (WB78 - 73)**

E429 **Proposed Improvements Estimate Year (WB78 - 79)** is greater than " ØØØØ" *and* one of the following conditions is true:

- **Proposed Improvements Structure Cost (WB78 - 67)** is zero
  OR
- **Proposed Improvements Roadway Cost (WB78 - 73)** is zero
  OR
- **Proposed Improvements Total Cost (WB78 - 61)** is zero

E430 **Main Span Design (WB75 - 33)** is coded "15" *and* **Vertical Lift Minimum Clearance (WB73 - 94)** is blank

E431 **ADT (WB74 - 45)** is greater than 1ØØ *and* **Truck ADT Percent (WB74 - 51)** is blank

E432 **NBIS Length (WB73 - 46)** is greater than or equal to 2Ø feet *and* **Bridge Length (WB73 - 40)** is less than 2Ø feet

E433 One of the following conditions is not met:

- **Border State Code (WB75 - 85)** = spaces *and* **Border State Percent (WB75 88)** = spaces *and* **Border State Structure Identifier (WB75 - 90)** = spaces
  OR
- **Border State Code (WB75 - 85)** not = spaces *and* **Border State Percent (WB75 - 88)** not = spaces *and* **Border State Structure Identifier (WB75 - 90)** not = spaces

E437 Sufficiency Rating is less than or equal to 8 Ø. ØØ *and* the Deficient Obsolete Status is "1" (SD) or "2" (FO) *and* one or more of the following fields are coded zero:

- **Proposed Improvement Work Type (WB78 - 44)**
- **Proposed Improvement Work Method (WB78 - 46)**
- **Proposed Improvement Structure Improvement Length (WB78 - 47)**
- **Proposed Improvement Structure Cost (WB78 - 67)**
- **Proposed Improvement Roadway Cost (WB78 - 73)**
- **Proposed Improvement Total Cost (WB78 - 61)**

E450 **On/Under (WB74 - 32)** is coded "1" *and* **Lanes On (WB73 - 52)** is coded "/ØØ"

E451 **On/Under (WB74 - 32)** is coded "1" and **Service On (WB75 - 44)** is coded "Ø", "2", "3", or "9"

E452 **On/Under (WB74 - 32)** is coded "2" or is in the range "A" through "Z" *and* **Service Under (WB75 - 45)** is coded "Ø", "2", "3", "5", "7", or "9"

E453 **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "8" *and* **Service Under (WB75 - 45)** is coded "Ø", "3", "5", or "9"

E454 **Waterway Adequacy (WB76 - 62)** is in the range "Ø" through "8" *and* **Service Under (WB75 - 45)** is coded "1", "2", "3", or "4"

E455 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Substructure Stability (WB78 - 37)** is blank

E456 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Flood Control (WB78 - 34)** is blank

E457 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Flood Plain Intrusion (WB78 - 33)** is blank

E459 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Piers in Water (WB78 - 41)** is blank

E460 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Scour (WB76 - 80)** is "N" or blank

E461 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Waterway Obstruction (WB78 - 38)** is blank

E462 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Streambed Anabranch (WB78 - 40)** is blank

E463 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Streambed Material (WB78 - 36)** is blank

E464 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Scour History (WB78 - 35)** is blank

E465 **Service Under (WB75 - 45)** is in the range "5" through "9" *and* **Streambed Stability (WB78 - 39)** is blank

E466 **Service Under (WB75 - 45)** is in the range “5” through “9” *and* **Channel Protection (WB76 - 77)** is coded “9”

E467 **Service Under (WB75 - 45)** is in the range “5” through “9” *and* **Water Type (WB78 - 32)** is blank

E468 One of the following conditions is true:

- **Navigation Control (WB73 - 86)** is coded “1” *and* **Pier / Abutment (WB76 79)** is coded “N” or blank

  OR

- **Navigation Control (WB73 - 86)** is coded “N” *and* **Pier / Abutment (WB76 79)** is in the range “1” through “5”

E470 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Substructure Stability (WB78 - 37)** is not blank

E471 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Flood Control (WB78 - 34)** is not blank

E472 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Flood Plain Intrusion (WB78 - 33)** is not blank

E473 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Navigation Control (WB73 - 86)** is coded “Ø” or “1”

E474 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Navigation Horizontal Clearance** is greater than zero

E475 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Navigation Vertical Clearance** is greater than zero

E476 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Pier / Abutment (WB76 - 79)** is in the range “1” through “5”

E477 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Piers in Water (WB78 - 41)** is not blank

E478 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Channel Protection (WB76 - 77)** is in the range “Ø” through “8”

E479 One of the following conditions is true:

- **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Scour (WB76 - 80)** is coded “U” or “T” or in the range “Ø” through “9”)

  OR

- **Service Under (WB75 - 45)** is in the range “5” through “9” *and* **Scour (WB76 80)** is coded “N”

E480 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Waterway Obstruction (WB78 - 38)** is not blank

E481 **Service Under (WB75 - 45)** is in the range “1” through “4” or “Ø” *and* **Streambed Anabranch (WB78 - 40)** is not blank

E482 **Service Under (WB75 - 45)** is in the range "1" through "4" or "Ø" *and* **Streambed Material (WB78 - 36)** is not blank

E483 **Service Under (WB75 - 45)** is in the range "1" through "4" or "Ø" *and* **Scour History (WB78 - 35)** is not blank

E484 **Service Under (WB75 - 45)** is in the range "1" through "4" or "Ø" *and* **Streambed Stability (WB78 - 39)** is not blank

E485 **Service Under (WB75 - 45)** is in the range "1" through "4" or "Ø" *and* **Water Type (WB78 - 32)** is not blank

E489 **Curb to Curb Width (WB73 - 56)** is greater than **Out to Out Deck Width (WB73 60)**

E490 **Inventory Rating Tons (WB75 - 55)** is greater than **Operating Rating Tons (WB75 - 52)**

E491 **Superstructure Overall (WB76 - 71)** is coded "Ø" or "1" *and* **Open Closed (WB72 - 93)** is not coded "D", "E", or "K"

E492 **Substructure Overall (WB76 - 76)** is coded "Ø" or "1" *and* **Open Closed (WB72 93)** is not coded "D", "E", or "K"

E493 **Culvert (WB76 - 78)** is coded "Ø" or "1" *and* **Open Closed (WB72 - 93)** is not coded "D", "E", or "K"

E494 One of the following conditions is true:

- **Temporary Structure (WB72 - 89)** is coded "T" *and* **Open Closed (WB72 93)** is not coded "D", "E", or "P"

  OR

- **Open Closed (WB72 - 93)** is coded "D" or "E" *and* **Temporary Structure (WB72 - 89)** is not coded "T"

E495 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Estimate Year (WB78 - 79)** is coded zero or is blank

E496 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Lanes On (WB73 - 52)** is coded zero or is blank

E497 **Proposed Improvements Work Type (WB78 - 44)** greater than "/ØØ" *and* **Proposed Improvements Structure Improvement Length**
(WB78 - 47) is coded zero or is blank

E499 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Roadway Width (WB78 - 53)** is coded zero or is blank

E500 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Service On (WB75 - 44)** is coded zero or is blank

E501 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Structure Cost (WB78 - 67)** is coded zero or is blank

E502 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Total Cost (WB78 - 61)** is coded zero or blank

E504 **Proposed Improvements Work Type (WB78 - 44)** is greater than "/ØØ" *and* **Proposed Improvements Work Method (WB78 - 46)** is coded zero or is blank

E507 One of the following conditions is true:

- **Inspecting Agency Code (WB78 - 84)** is in the group ("Ø1", "11", "21", "26", "27", "31", "62", "63", "64", "66" thru "71", or "8Ø") *and* **Inspecting Agency Number (WB78 - 86)** does not = spaces

  OR
- **Inspecting Agency Code (WB78 - 84)** is in the group ("Ø2", "12", "24", or "32") *and* **Inspecting Agency Number (WB78 - 86)** is not in County Table

  OR
- **Inspecting Agency Code (WB78 - 84)** is in the group ("Ø3", "Ø4", "13", "25", or "33") *and* **Inspecting Agency Number (WB78 - 86)** is not in City Table

E511 One of the following conditions is true:

- **Base Highway Network (WB74 - 84)** = "1" *and* Linear **Referencing System Route (WB74 - 67)** *and* **Linear Referencing System Sub Route (WB74 - 77)** are not coded

  OR
- **Base Highway Network (WB74 - 84)** = "Ø" *and* Linear **Referencing System Route (WB74 - 67)** is coded or **Linear Referencing System Sub Route (WB74 - 77)** is coded

E512 **Base Highway Network (WB74 - 84)** is coded "1" *and* **Federal Functional Classification (WB74 - 87)** is not coded "Ø1", "Ø2", "Ø6", "11", "12", or "14"

E513 **Lanes On (WB73 - 52)** is coded "1" *and* **Lane Use Direction (WB74 - 90)** is not coded "1" or "5"

E515 **On/Under (WB74 - 32)** is coded "2" or in the range "A" through "Z" *and* **Lanes Under (WB73 - 54)** is coded "1" *and* **Lane Use Direction (WB74 - 90)** is not coded "1" or "5"

E516 One of the following conditions is true:

- **Lanes On (WB73 - 52)** is coded "/ØØ" *and* **Service On (WB75 - 44)** not = "Ø", "2", "3", or "9"

  OR

- **Lanes On (WB73 - 52)** is greater than "/ØØ" *and* **Service On (WB75 - 44)** is coded "Ø", "2", "3", or "9"

E603 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Curb Condition (WB76 - 72)** is blank

E605 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Sidewalk Condition (WB76 - 73)** is blank

E613 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Paint Condition (WB76 - 74)** is blank

E616 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Pier Protection (WB76 - 83)** is blank

E617 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Number of Utilities (WB76 - 75)** is blank

E618 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Scaling Severity (WB76 - 66)** is blank

E619 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Scaling Percent (WB76 - 67)** is blank

E620 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Deck Rutting (WB76 - 69)** is blank

E621 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Exposed Reinforcing Steel (WB76 - 70)** is blank

E622 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Drain Condition (WB76 - 64)** is blank

E623 **Owner (Control Field)** is coded "Ø1" *and* **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Retaining Walls (WB76 - 82)** is blank

E630 One of the following conditions is true

- **Lane Use Direction (WB74 - 90)** is coded "Ø" *and* **Lanes On (WB73 - 52)** is greater than zero
  OR
- **On/Under (WB74 - 32)** is coded "1" *and* **Lane Use Direction (WB74 - 90)** is in the range "1" through "5" *and* **Lanes On (WB73 - 52)** is equal to zero

L007 **Future ADT (WB74 - 57)** is greater than 2ØØ,ØØØ

L008 **Future ADT Year (WB74 - 63)** is not in the range of 17 to 23 years in the future

L009 **ADT (WB74 - 45)** is greater than 2ØØ,ØØØ

L010 **Truck ADT Percent (WB74 - 51)** is greater than 4Ø

L011 **ADT Year (WB74 - 53)** is more than 4 years old

L012 **Alignment Adequacy (WB76 - 61)** is coded "Ø" or "1"

L047 **Channel Protection (WB76 - 77)** is coded "Ø" or "1"

L085 **Deck Geometry (WB76 - 58)** is coded "Ø" or "1"

L092 **Deck Overall (WB76 - 63)** is coded "Ø" or "1"

L132 One of the following conditions is true:

- **Main Span Design (WB75 - 33)** is coded "/ØØ"
  OR
- **Main Span Material (WB75 - 32)** is coded "Ø"

L158 **Horizontal Clearance Reverse Direction (WB74 - 95)** is less than 8 feet

L159 **Horizontal Clearance Route Direction (WB74 - 91)** is less than 8 feet

L163 **Routine Inspection Frequency (WB76 - 32)** is greater than 24 months

L183 **Lanes On (WB73 - 52)** is greater than 14

L184 **Lanes Under (WB73 - 54)** is greater than 2 Ø

L185 **Routine Inspection Last Inspection Date (WB76 - 34)** is more than three years old

L210 **Maximum Span Length (WB73 - 48)** is greater than 984 feet

L223 **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is greater than zero *and* less than 7 feet

L228 **Navigation Horizontal Clearance (WB73 - 90)** is greater than 984 ft.

L229 **Navigation Vertical Clearance (WB73 - 87)** is greater than 25Ø feet.

L231 **Proposed Improvements Estimate Year (WB78 - 79)** is more than 8 years old

L232 **Number of Main Spans (WB75 - 38)** is greater than 5Ø

L233 **Number of Approach Spans (WB75 - 41)** is greater than 5Ø

L318 **Operating Level (WB76 - 60)** is coded "Ø" or "1"

L321 **Sidewalk Curb Left (WB73 - 64)** is greater than 12 feet

L322 **Sidewalk Curb Right (WB73 - 67)** is greater than 12 feet

L339 **Bridge Length (WB73 - 40)** is greater than 3937 feet

L341 **Structural Adequacy (WB76 - 57)** is coded "Ø" or "1"

L368 **Underclearance Adequacy (WB76 - 59)** is coded "Ø" or "1"

L378 **Maximum Vertical Clearance Route Direction (WB74 - 99)** is less than 8 feet

L382 **Waterway Adequacy (WB76 - 62)** is coded "Ø" or "1"

R700 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Deck Overall (WB76 - 63)** is less than 5

R701 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Superstructure Overall (WB76 - 71)** is less than 5

R702 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Substructure Overall (WB76 - 76)** is less than 5

R703 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Channel Protection (WB76 - 77)** is less than 5

R704 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Culvert (WB76 - 78)** is less than 5

R705 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Structural Adequacy (WB76 - 57)** is less than 5

R706 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Deck Geometry (WB76 - 58)** is less than 5

R707 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Underclearance Adequacy (WB76 - 59)** is less 5

R708 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Operating Level (WB76 - 60)** is less than 5

R709 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Waterway Adequacy (WB76 - 62)** is less than 5

R710 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Alignment Adequacy (WB76 - 61)** is less than 5

R711 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Inventory Rating Tons (WB75 - 55)** is less than 2Ø tons

R712 **On/Under (WB74 - 32)** is coded "1" *and* **Year Built (WB73 - 32)** is within the last 5 years *and* **Operating Rating Tons (WB75 - 52)** is less than 2Ø tons

R713 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Deck Overall (WB76 - 63)** is in the range "Ø" through "5"

R714 **On/Under (WB74 - 32)** is code d "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Superstructure Overall (WB76 - 71)** is in the range "Ø" through "4"

R715 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Substructure Overall (WB76 - 76)** is in the range "Ø" through "4"

R716 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Channel Protection (WB76 - 77)** is in the range "Ø" through "4"

R717 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Culvert (WB76 - 78)** is in the range "Ø" through "4"

R718 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Structural Adequacy (WB76 - 57)** is in the range "Ø" through "4"

R719 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Deck Geometry (WB76 - 58)** is in the range "Ø" through "4"

R720 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Underclearance Adequacy (WB76 - 59)** is in the range "Ø" through "4"

R721 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Operating Level (WB76 - 60)** is in the range "Ø" through "4"

R722 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Waterway Adequacy (WB76 - 62)** is in the range "Ø" through "4"

R723 **On/Under (WB74 - 32)** is coded "1" *and* **Year Rebuilt (WB73 - 36)** is within 5 years *and* **Alignment Adequacy (WB76 - 61)** is in the range "Ø" through "4"

R727 **Median (WB72 - 91)** is coded "Ø", or in the range "2" through "7", or "9" *and* **Minimum Lateral Underclearance Left (WB73 - 83)** is coded 99.9

R729 **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Approach Roadway Width (WB73 - 97)** is less than 8 feet

R730 **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Curb to Curb Width (WB73 - 56)** is less than 9 feet

R731 **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Out to Out Deck Width (WB73 - 60)** is less than 9 feet

R732 **Service On (WB75 - 44)** is coded "1" or is in the range "4" through "8" *and* **Minimum Vertical Clearance Over Deck (WB73 - 70)** is less than 7 feet

R733 **Service Under (WB75 - 45)** is coded "1", "2", "4", "6", "7" or "8" *and* **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is zero

R736 **Main Span Design (WB75 - 33)** is in the range "/ØØ" through "18", or "21", or "22" *and* **Curb to Curb Width (WB73 - 56)** is between Ø *and* 9 feet or between 15Ø feet *and* 999 feet

R737 **Main Span Design (WB75 - 33)** is in the range "/ØØ" through "18", or "21", or "22" *and* **Out to Out Deck Width (WB73 - 60)** is between Ø *and* 9 feet or between 15Ø feet *and* 999 feet.

R738 **Bridge Length (WB73 - 40)** is between 19 feet *and* 23 feet *and* **NBIS Length (WB73 - 46)** is blank

R742 **Open Closed (WB72 - 93)** is coded "A" *and* **Superstructure Overall (WB76 - 71)** is in the range "Ø" through "4"

R743 **Open Closed (WB72 - 93)** is coded "A" *and* **Substructure Overall (WB76 - 76)** is in the range "Ø" through "4"

R744 **Open Closed (WB72 - 93)** is coded "A" *and* **Culvert (WB76 - 78)** is in the range "Ø" through "4"

R745 **Open Closed (WB72 - 93)** is coded "A" *and* **Superstructure Overall (WB76 - 71)** is greater than "4" *and* **Substructure Overall (WB76 - 76)** is greater than "4" *and* **Culvert (WB76 - 78)** is greater than "4" *and* **Operating Rating Tons (WB75 - 52)** is greater than 36 tons *and* **Structural Adequacy (WB76 - 57)** is in the range "Ø" through "3"

R746 **Open Closed (WB72 - 93)** is coded "A" *and* **Operating Level (WB76 - 60)** is in the range "Ø" through "4"

R747 **On/Under (WB74 - 32)** is coded "1" *and* **Operating Rating Tons (WB75 - 52)** is coded zero *and* **Open Closed (WB72 - 93)** is not coded "K" *and* **Temporary Structure (WB72 - 89)** is blank

R762 **Routine Inspection Last Inspection Date (WB76 - 34)** is less than the current date minus **Routine Inspection Frequency (WB76 - 32)**

R763 **Curb to Curb Width (WB73 - 56)** does not equal zero *and* **Lanes On (WB73 - 52)** is greater than 3 *and* **Approach Roadway Width (WB73 - 97)** is greater than 1.5 times **Curb to Curb Width (WB73 - 56)**

R764 **Curb to Curb Width (WB73 - 56)** does not equal zero *and* **Lanes On (WB73 - 52)** is less or equal to 3 *and* **Approach Roadway Width (WB73 - 97)** is greater than or equal to 2 times **Curb to Curb Width (WB73 - 56)**

R765 **Open Closed (WB72 - 93)** is coded "B", "D", "E", "P" or "R" *and* **Routine Inspection Frequency (WB76 - 32)** is not less than 24 months

R766 **Open Closed (WB72 - 93)** is not coded "D", "E", or "K" *and* any of the following fields is coded "Ø" *and* all others of this group are coded "2" or greater

- **Deck Overall (WB76 - 63)**
- **Superstructure Overall (WB76 - 71)**
- **Substructure Overall (WB76 - 76)**
- **Culvert (WB76 - 78)**
- **Structural Adequacy (WB76 - 57)**
- **Deck Geometry (WB76 - 58)**
- **Underclearance Adequacy (WB76 - 59)**
- **Waterway Adequacy (WB76 - 62)**

R767 **Operating Level (WB76 - 60)** is coded "5" *and* **Superstructure Overall (WB76 71)** is coded "Ø", "1", "2", or "3"

R768 **Operating Level (WB76 - 60)** is coded "5" *and* **Substructure Overall (WB76 - 76)** is coded "Ø", "1", "2", or "3"

R769 **Operating Level (WB76 - 60)** is coded "5" *and* **Culvert (WB76 - 78)** is coded "Ø", "1", "2", or "3"

R770 **Fracture Critical/UBIT Inspection Type (WB77 - 32)** is not coded "N" *and* Fracture **Critical/UBIT Inspection Frequency (WB77 - 33)** is greater than "/ØØ" *and* **Fracture Critical/ UBIT Inspection Last Inspection Date (WB77 - 35)** is older than current date minus the Fracture **Critical/UBIT Inspection Frequency (WB77 - 33)**

R771 **Underwater Inspection Type (WB77 - 58)** is not coded "N" *and* **Underwater Inspection Frequency (WB77 - 59)** is greater than "/ØØ" *and* **Underwater Inspection Last Inspection Date (WB77 - 61)** is older than current date minus the **Underwater Inspection Frequency (WB77 - 59)**

R772 **Other Special Inspection Type (WB77 - 84)** is not coded "N" *and* **Other Special Inspection Frequency (WB77 - 85)** is greater than "/ØØ" *and* **Other Special Inspection Last Inspection Date (WB77 - 87)** is older than current date minus the **Other Special Inspection Frequency (WB77 - 85)**

R773 **Future ADT (WB74 - 57)** is less than four-tenths **ADT (WB74 - 45)**

R774 **Future ADT (WB74 - 57)** is greater than 4 times **ADT (WB74 - 45)**

R775 **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is coded "R" *and* **Minimum Vertical Clearance Under Bridge (WB73 - 74)** is less than 15´ Ø9↑

R776 **Minimum Lateral Underclearance Right (WB73 - 79)** is coded "R" *and* **Minimum Lateral Underclearance Right (WB73 - 79)** is less than 4´11↑

R777 **Curb to Curb Width (WB73 - 56)** is less than 16´ /ØØ↑ *and* **Lanes On (WB73 - 52)** is greater than 1

R778 The following conditions are not met:

- **Curb to Curb Width (WB73 - 56)** is greater than 16´ /ØØ↑ *and*
- **Lanes On (WB73 - 52)** is 2 or greater *and*
- **Service Level (WB74 - 34)** is not coded "7"

R779 **Curb to Curb Width (WB73 - 56)** is less than half of **Out to Out Deck Width (WB73 - 60)**

R780 One of the following conditions is true:

- **National Highway System (WB74 - 83)** is coded "1" *and* **Federal Functional Classification (WB74 - 87)** is not coded "Ø1", "Ø2", "11", "12", *and* "14"

  OR

- **National Highway System (WB74 - 83)** is coded "Ø" *and* **Federal Functional Classification (WB74 - 87)** is not coded "Ø6", "Ø7", "Ø8", "Ø9", "16", "17", and "19"

R781 **National Highway System (WB74 - 83)** is coded "1" *and* **Highway Class (WB74 33)** is coded "2" or "3"

Appendix

2-A Half Bridges

Forms

WSBIS Inventory Coding Form

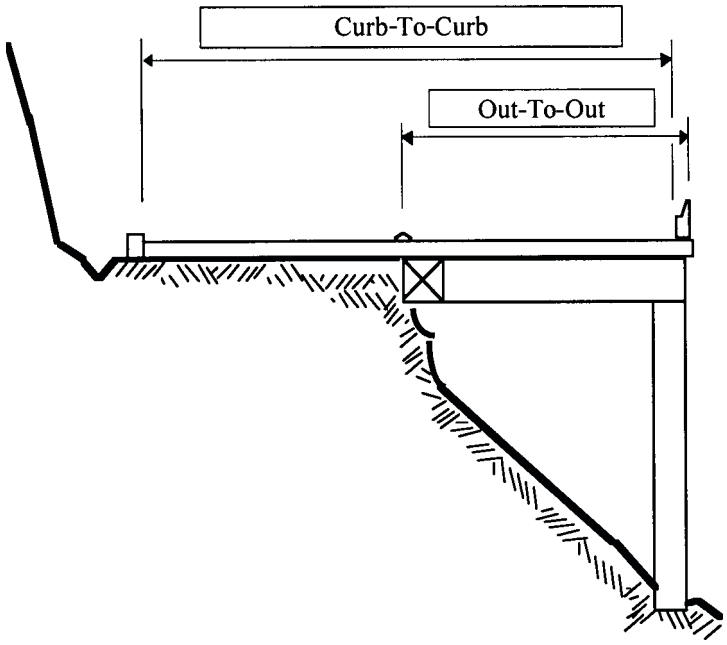
Washington State Legislative Districts Map

2. Appendix

See diagram below for the correct method of coding Side Hill Viaducts(HalfBridges).

The Items of concern are LANES ON, ADT - TOTAL FOR BOTH DIRECTION,APPROACH ROADWAY WIDTH, INVENTORY ROUTE - TOTAL HORIZON-TAL CLEARANCE, CURB TO CURB, OUT TO OUT, LANE USE DIRECTION.The problem is trying to maintain compatibility between these different dataelements, especially in determining the deck geometry rating, and the bridge deckarea used in calculating apportionments. Therefore, the items above are coded asthey apply to the inventoried route, i.e., ADT, Lane Use Direction, etc., are codedfor the entire inventory route and not just that portion carried by the bridge.

The following figure illustrates the best way to code these viaducts since they donot fit the mold of a standard bridge. This coding scheme will ensure compatibilitybetween the Items listed above. At the same time, the actual structure deck areawill be recorded. The fact that the CURB-TO-CURB width will be more than theOUT-TO-OUT width will cause an error message in the Edit / Update Program.However, this is not a fatal error and can be checked and ignored for these typesofstructures.



2. Forms

Washington State Department of Transportation

WSBIS Inventory Report

Structure Identifier	Bridge Number	Owner Code	County Number	City Number	Update

	Bridge Name	Location	Sec-tion	Town-ship	Range	Latitude	Longitude
WB71						° ' "	° ' "

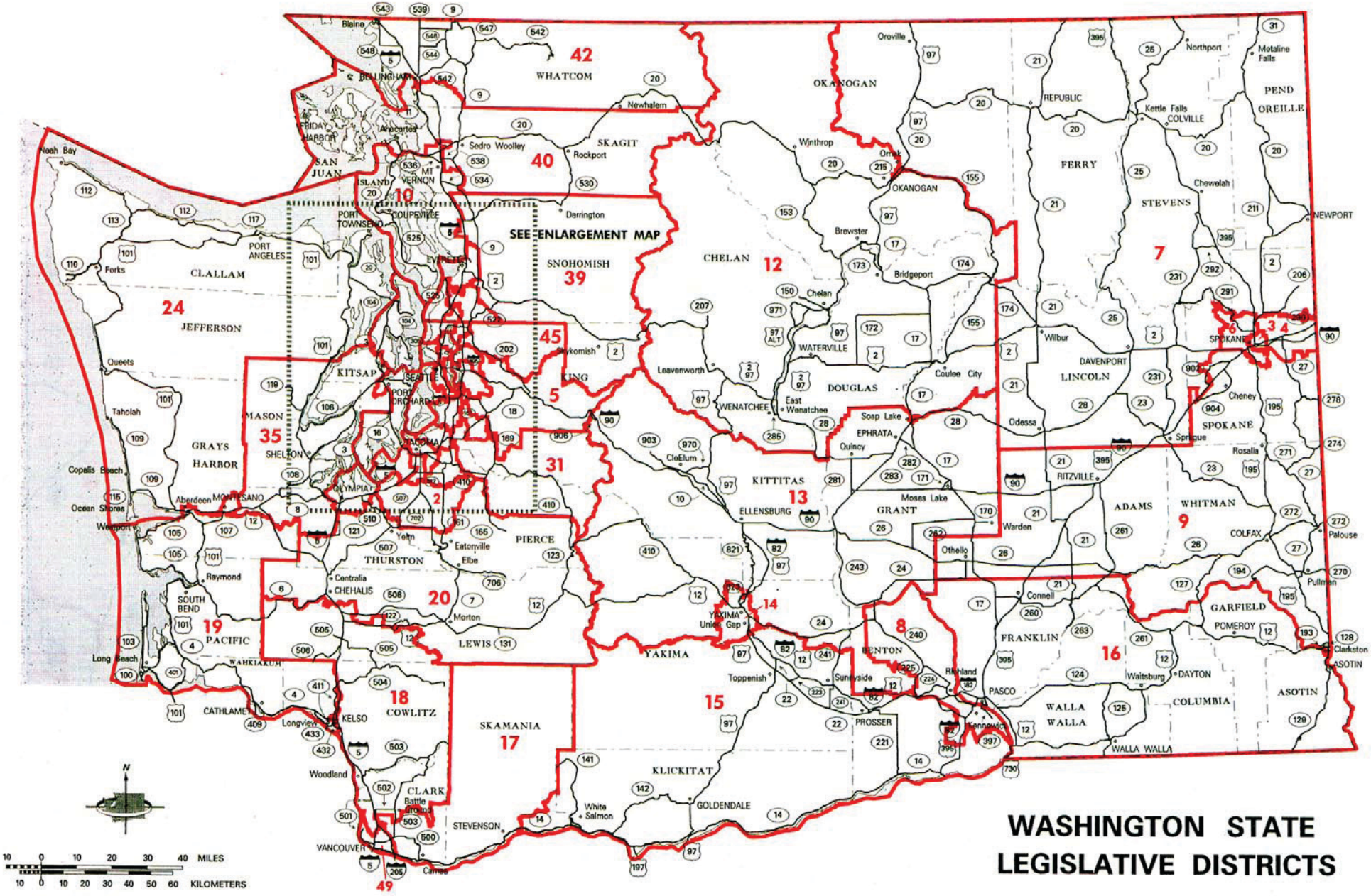
	Feature Intersected	Facilities Carried	Region	FIPS Place Code	Legis Dist (1)	Legis Dist (2)	Toll	Custodian	Parallel Structure	Temporary Structure	Critical Facility	Median	Historical Significance	Open Closed	Program Year
WB72															

	Year Built	Year ReBuilt	Bridge Length	NBIS Length	Maximum Span Length	Lanes On	Lanes Under	Curb to Curb Deck Width	Out to Out Deck Width	Sidewalk Curb Left	Sidewalk Curb Right	Min Vert Clearance Over Deck	Min Vert Clearance Under Bridge	Code	Min Lat UnderClr Right	Code	Min Lat UnderClr Left	Navigation Control	Navigation Vertical Clearance	Navigation Horizontal Clearance	Vertical Lift Min Clearance	Approach Roadway Width	Skew Angle	Flare
WB73			'	'	'			. '	. '	. '	. '	' "	' "		. '		. '		'	'	'	'	°	

	On/Under	Highway Classification	Service Level	Route Number	Mile Post	ADT on Inventory Route	Truck ADT PCT	ADT Year	Future ADT	Future ADT Year	Linear Referencing System Route	LRS Sub Route	Fed Aid Route	Nat Hwy System	Base Hwy Network	Strahnet	Fed Lands Highway	Fed Funct Class	National Truck Network	Lane Use Direction	Horizontal Clearance Route Dir	Horizontal Clearance Reverse Dir	Max Vertical Clearance Route Dir	Detour Length
WB74					.																' "	' "	' "	

	Main Span Material	Main Span Design	Appr Span Material	Appr Span Design	Number of Main Spans	Number of Appr Spans	Service On	Service Under	Deck Type	Wearing Surface	Membrance	Fed Deck Protection	Design Load	Oper Rtng Method	Oper Rtng Tons	Invt Rtng Method	Invt Rtng Tons	Design Exception Date	Federal Aid Project	Border State Code	Border State PCT	Border State Structure Identifier
WB75																		/ /				

| | Routine Inspection | | | | | | | | | | | | | | | | | |

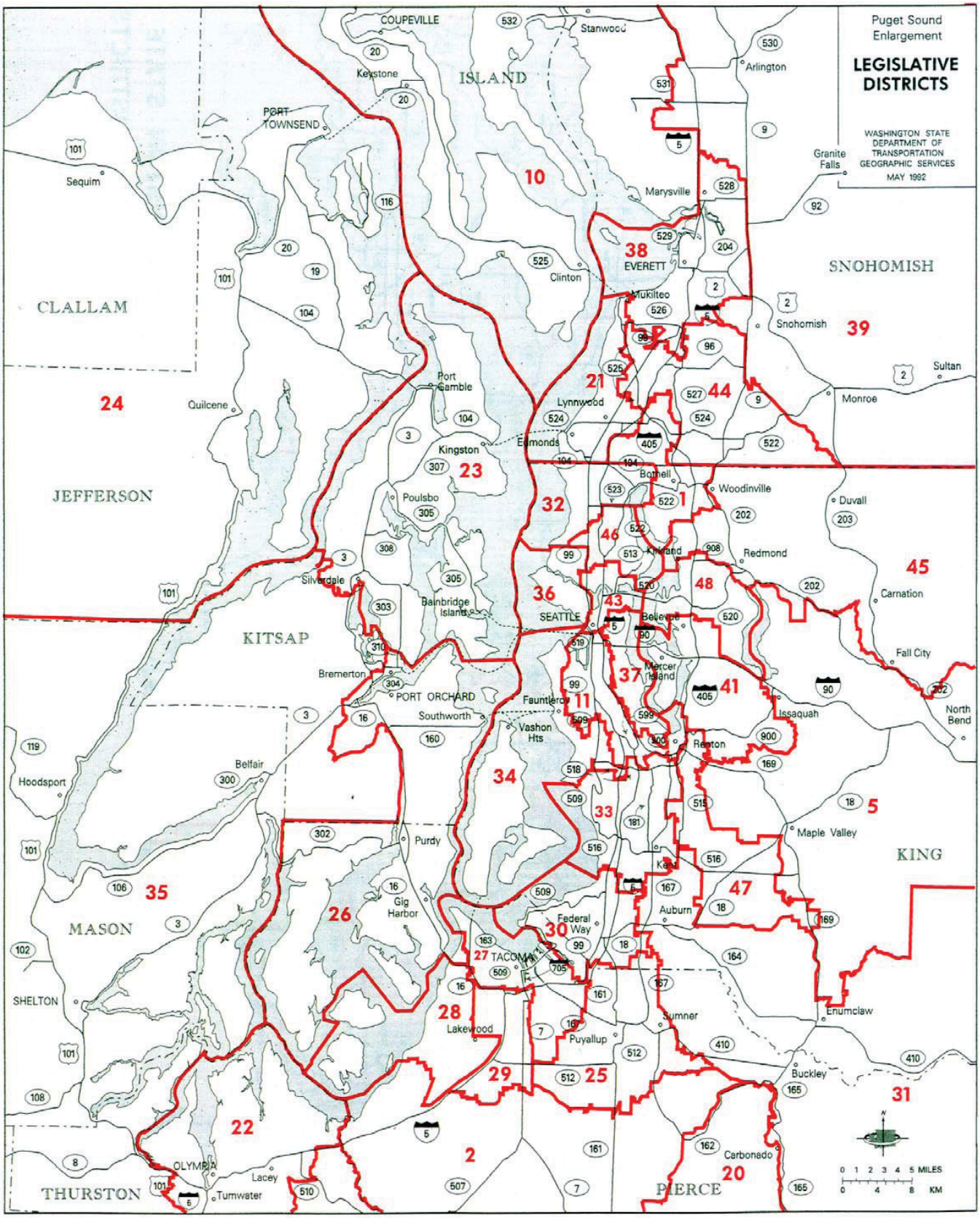


WASHINGTON STATE LEGISLATIVE DISTRICTS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
GEOGRAPHIC SERVICES

BASE MAP
MAY 1992

PLOT DATE
26-MAY-1993


Puget Sound
Enlargement
LEGISLATIVE DISTRICTS
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION GEOGRAPHIC SERVICES
MAY 1992
ISLAND
SNOHOMISH
CLALLAM
JEFFERSON
KITSAP
MASON
THURSTON
PIERCE
KING
COUPEVILLE
Stanwood
Arlington
Keystone
PORT TOWNSEND
Sequim
Granite Falls
Marysville
EVERETT
Clinton
Mukilteo
Snohomish
Sultan
Monroe
Port Gamble
Quilcene
Lynnwood
Edmonds
Kingston
Bothell
Woodinville
Duvall
Poulsbo
Kirkland
Redmond
Carnation
Silverdale
Bainbridge Island
SEATTLE
Bellevue
Fall City
Bremerton
Mercer Island
PORT ORCHARD
Fauntleroy
Issaquah
North Bend
Southworth
Vashon Hts
Renton
Belfair
Hoodsport
Maple Valley
Purdy
Kent
Gig Harbor
Auburn
Federal Way
TACOMA
SHELTON
Sumner
Enumclaw
Lakewood
Puyallup
Buckley
OLYMPIA
Lacey
Tumwater
Carbonado
0 1 2 3 4 5 MILES
0 4 8 KM

3. Inspection and Reports

3.01 General

This section provides guidelines to inspect bridges, including documentation.

The **FHWA NHI 03-001 Bridge Inspector's Reference Manual BIRM (Section 3 – Fundamentals of Bridge Inspection)** provides guidelines regarding what preparation is necessary, how to inspect, what to look for, when inspections are required, how to document the results of the inspections, and provide appropriate follow-up to the inspection.

A number of different types of inspections have been developed to address specific needs. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections)** discusses the need and requirements for each type of bridge inspection. This section of the manual will identify and briefly describe each inspection type.

Required Inspection Types

Inventory Inspection - the initial data collection and baseline assessment of the condition of the bridge.

Routine Inspection - the standard type performed at least every 24 months on each bridge.

Inspection Types That May Be Required

Equipment Inspection - if the underside of the bridge deck cannot be given close or adequate inspection from the ground (the bridge crosses a deep ravine, for example) or from the shore (the bridge crosses a wide body of water), then a special inspection using a boat or an under bridge inspection truck (UBIT), is required.

Underwater Inspection - performed at least every 60 months if the bridge has piers or pilings in water too deep or too muddy to permit their visual inspection from the surface, a wading inspection must be done, or a diver must be used to conduct an underwater inspection.

Scour Evaluation/Inspection - if the bridge crosses a waterway or streambed, then an evaluation of the scour potential at the bridge site must be made and, if necessary, a scour inspection performed

Fracture Critical Inspection - performed at least every 24 months if the bridge has fracture critical members whose failure could cause a portion of or the entire bridge to collapse (a pin-connected truss, for example), then a fracture critical inspection must be performed.

Critical Damage - Bridge Repair Report - must be completed whenever problems which require major repair are discovered (see Chapter 6). When the repairs are completed, a follow-up report is submitted verifying that the work has been accomplished.

Supplemental Inspection Types

In-Depth Inspection - if conditions that cannot be adequately evaluated by the routine inspection are found.

Damage Inspection - may be appropriate if the bridge has been damaged by a vehicle impact, earthquake, or fire.

Flood Inspection - may be necessary after a high water event.

These supplemental inspections may be performed separately or concurrently with routine or other types of inspections.

3.02 Office Planning and Preparations

Prior to inspecting a bridge, the team leader inspector must plan and prepare in order to use time efficiently, to have adequate knowledge of the bridge and to obtain the necessary equipment. **The BIRM (Section 3 - Topic 3.1 - Duties of the Bridge Inspection Team)** discusses this subject in detail.

3.03 Inspection Equipment and Tools

Bridge inspections are conducted to determine the condition and functionality of the bridge elements, and to provide a continuous record of the bridge condition and the rate of deterioration. A successful bridge inspection program is dependent on proper planning and techniques, adequate equipment, understanding the properties of bridge materials, and the types of defects and their locations. The **BIRM (Section 3 – Topic 3.4 - Inspection Equipment**) discusses the many different tools necessary for bridge inspection.

3.04 Bridge Inspections

Before beginning a bridge inspection, there are various items to note at the bridge site, followed by the specific items to inspect based upon the type of bridge being inspected and the type of inspection being performed. The inspector should refer to the **BIRM (Section 3 – Topic 3.1.5 - Performing the Inspection)** This section of the BIRM also discusses each of the common types of bridge decks, superstructures, and substructures and procedures to use for inspection.

A component numbering system is needed so that there is a consistency in the inspection reports. The component numbers system for the Washington State Department of Transportation (WSDOT) goes from the west to east and from the south to the north or in the direction of increasing mile post. The subcomponents are numbered from the left to the right. The component numbering system for the system needs to follow their agency convention. If WSDOT inspects bridges for the agency, they will follow WSDOT convention (see Figure 3.02-A and 3.02-B) or follow established agency orientation.

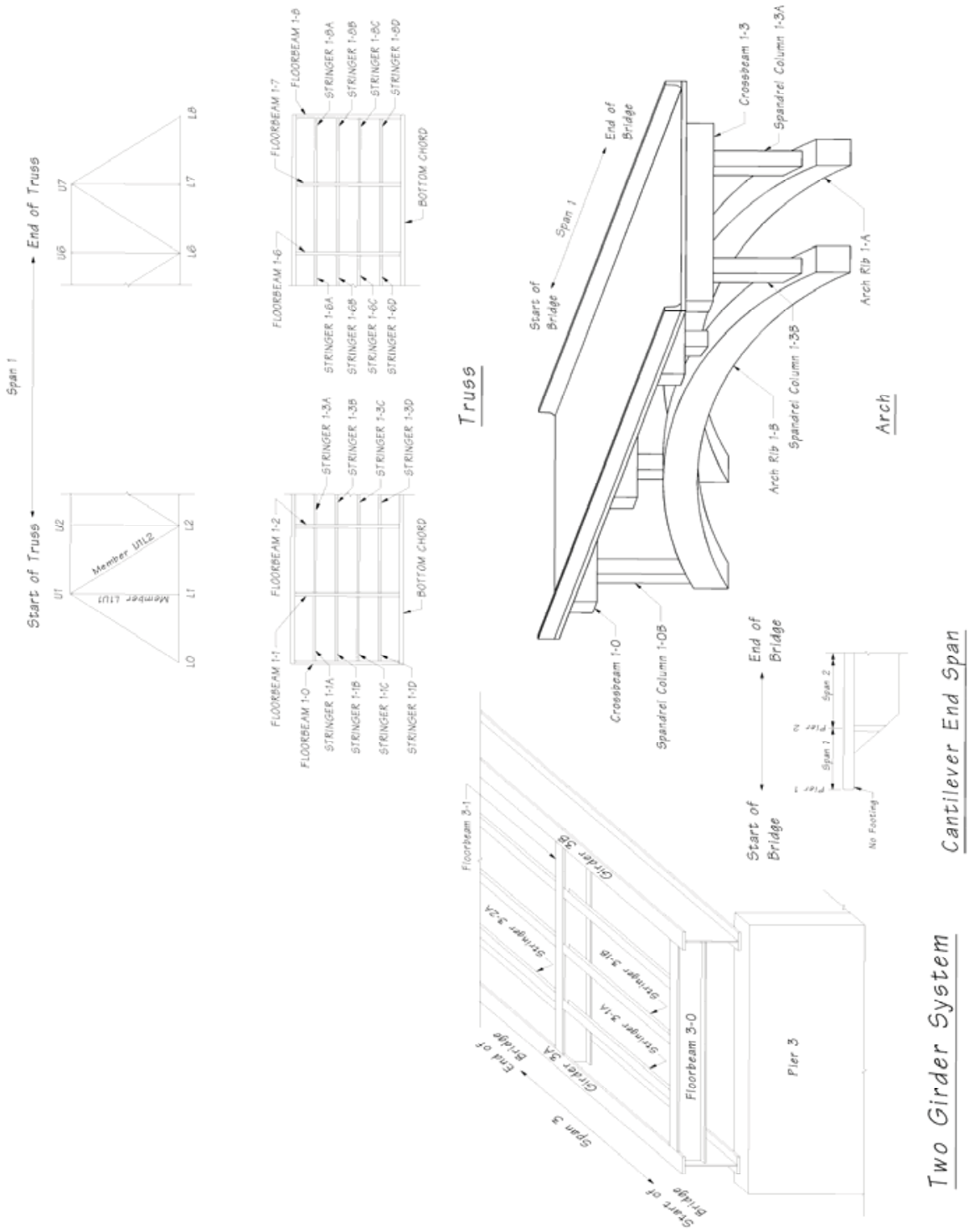
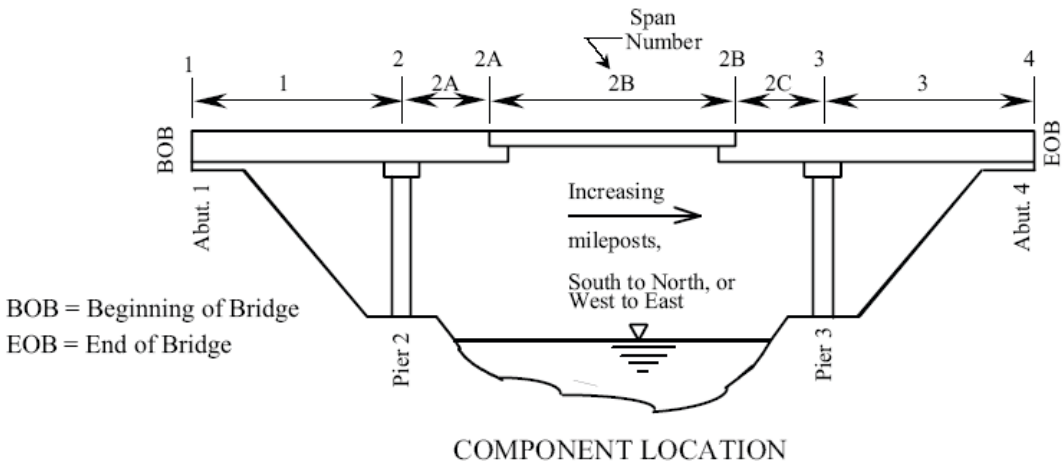

Start of Truss
Span 1
End of Truss
U1
U2
U6
U7
L0
L1
L2
L6
L7
L8
Member U1L2
Member L1U1
FLOORBEAM 1-0
FLOORBEAM 1-1
FLOORBEAM 1-2
FLOORBEAM 1-6
FLOORBEAM 1-7
FLOORBEAM 1-8
STRINGER 1-1A
STRINGER 1-1B
STRINGER 1-1C
STRINGER 1-1D
STRINGER 1-3A
STRINGER 1-3B
STRINGER 1-3C
STRINGER 1-3D
STRINGER 1-6A
STRINGER 1-6B
STRINGER 1-6C
STRINGER 1-6D
STRINGER 1-8A
STRINGER 1-8B
STRINGER 1-8C
STRINGER 1-8D
BOTTOM CHORD
BOTTOM CHORD
Truss
Start of Bridge
Span 1
End of Bridge
Crossbeam 1-0
Spandrel Column 1-0B
Arch Rib 1-B
Spandrel Column 1-3B
Arch Rib 1-A
Spandrel Column 1-3A
Crossbeam 1-3
Arch
Start of Bridge
End of Bridge
Span 1
Span 2
No Footing
Cantilever End Span
Floorbeam 3-1
Girder 3B
Stringer 3-2A
Stringer 3-1B
Stringer 3-1A
Girder 3A
Floorbeam 3-0
Pier 3
Start of Bridge
Span 3
End of Bridge
Two Girder System

Figure 3.02-A



ORIENTATION: B.O.B. NORMALLY SOUTH OR WEST ENDS FOLLOWING ROUTE ORIENTATION.

EXCEPTIONS INCLUDE:
ONE WAY RAMPS – B.O.B. = FIRST END TO RECEIVE TRAFFIC.
SELECTED BRIDGES THAT FOLLOW PLAN ORIENTATION.

THERE IS NO GOLDEN RULE ABOUT ORIENTATION EXCEPT THAT B.O.B. MUST ALWAYS BE IDENTIFIED IN THE '0' NOTE ALONG WITH BASIS FOR THIS ASSUMPTION. IT IS HELPFUL TO REFER TO GEOGRAPHICAL MARKERS (STREETS, RIVERS, ETC) WHEN DESCRIBING THE B.O.B.

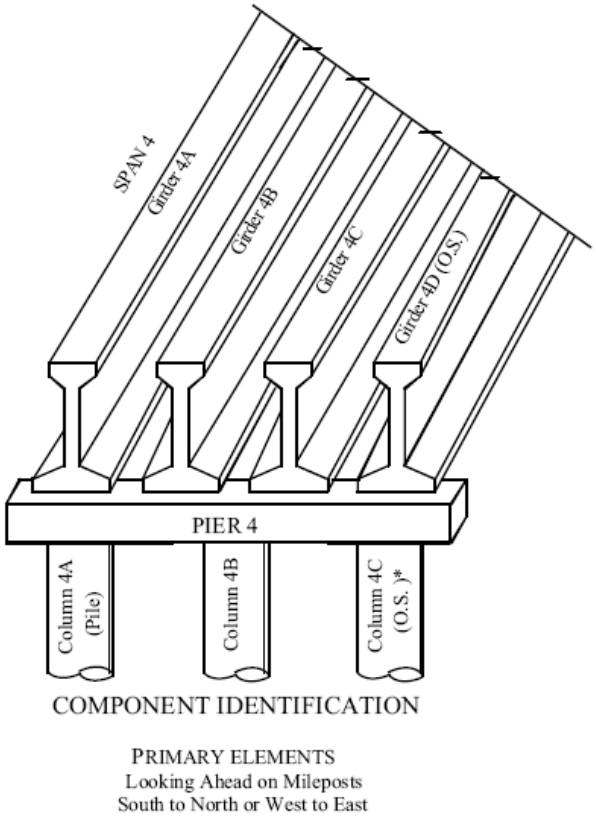


Figure 3.02-B

Appendix 3.06-A (WSDOT Bridge Preservation Office Inspection Guidelines) provides guidelines for inspection processes and procedures specific to the WSDOT Bridge Preservation Office. These guidelines can be used as a reference or can be implemented.

3.05 Types of Inspections and Reporting

A. Inventory

The first inspection performed on any bridge is the inventory inspection. An inventory inspection is also performed after rehabilitation work that changes a bridge's dimensions or clearances. The purpose of this inspection is to add the bridge to the statewide inventory of bridges and to establish certain baseline information. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections)** also discusses Inventory Inspections.

1. ***Office***

   Establish baseline information about the bridge from the original construction plans or as-built plans.

   Record the required WSBIS data on the WSBIS Inventory Record and in a PC-based WSBIS system. Also record the required Bridge Management System (BMS) elements on the Bridge Inspection Report Form and PC-based system.

   For new bridges, much of the required Inventory Record information can be obtained from the original construction plans or from the as-built plans (see Chapter 2). During this office procedure, BMS elements and their condition states are recorded, as are the WSBIS bridge condition ratings, which are coded as new. Any information not known or which cannot be determined from the plans, can be left blank until site inspection.

2. ***Site Inspection***

   Visit the bridge site to verify and update the inventory information.

   After the bridge has been completed, and preferably before it is placed in service, the inspector must visit the bridge site to verify the inventory information that has been coded and to establish any information that was not known. At the bridge site, the inspector can review the information on the form to confirm the actual bridge dimensions and clearance measurements and to verify the condition of all bridge elements. For example, the inspector may find that damage has taken place during construction so that a BMS Condition State should be changed or the condition of a bridge element warrants a WSBIS condition code of less than 8. Or, the inspector may find that the bridge's actual physical dimensions or clearances are different than those indicated on the plans.

   These changes or additions to the WSBIS data, or to the Bridge Inspection Report Form, and to the BMS elements, must either be noted on the inspection form and entered into the PC-based system. The information is sent via electronic file to the WSDOT Local Agency Bridge Engineer for Local Agency Bridges who then forwards the file to the Bridge Inventory Engineer.

3. ***Check Coding***

   Record the inspection findings on the Bridge Inspection Report Form, and on the WSBIS Inventory Record Form.

   The inventory inspection findings should be recorded on the Bridge Inspection Report Form and on the WSBIS Inventory Record. The Bridge Inspection Report Form should note any inconsistencies found between the planned and the as-built bridge and should provide an explanation of any coding changes made. For example, if surface cracks have been found in a newly-poured bridge deck but these cracks do not warrant lowering the condition coding for the deck, the inspector should note the location and extent of the cracking so that it can be looked for and further evaluated during future inspections.

   As part of this report, two photographs of the bridge should be taken: an elevation and a deck photograph. The elevation photograph should be taken (looking north or east) to show a view from one side of the bridge. The deck photograph should be taken (ahead on station) to show a view of the bridge looking onto the bridge deck.

4. ***Updating***

   The WSBIS Inventory Record, the Bridge Inspection Report Form, and the two photographs provide a record of the inventory inspection. These items should be placed in the bridge file created for the given bridge. Each time the bridge is revisited, additional inspection reports, any new photos, and any updates to the WSBIS and to the Bridge Inspection Report Form are added to the file so that the bridge records remain current.

B. Routine

A regular inspection of the entire bridge is to be performed at least once every 24 months throughout the life of the bridge. This is known as the routine inspection. The purpose of the routine inspection is to determine the bridge's current structural adequacy and condition, verify that previously recommended repairs have been made, monitor known deficiencies, and determine if further analysis or investigation of the structure's adequacy or condition is needed. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections**) also discusses Routine Inspections.

No two bridges will be alike; thus, there is no single set of procedures which can be followed in all cases. Clearly, the procedure to follow when inspecting a 50-year-old steel truss will be much different than those used to inspect a 6-year-old concrete box girder. In addition, certain bridge elements or design features may require other types of inspection altogether. For example, a bridge with piers in water too deep to allow for visual inspection of the piers from the surface will require an underwater inspection in addition to the routine inspection. Accomplishing any routine inspection, therefore, will require the inspector to use their best engineering judgment, expertise, and common sense.

1. ***Inspecting Bridge Components***

   The **BIRM (Sections 5 through 13)** describes the general inspection procedures to be followed for inspecting any concrete, steel, or timber bridge, and the specific procedures to follow for inspecting a given bridge element (i.e., the bridge abutments). These steps can be used by the inspector as a checklist to help accomplish the inspection and to help spot particular types of problems a given bridge or bridge element will be prone to. Following these procedures will help ensure a thorough and comprehensive inspection is achieved.

   As can be true with any inspection, however, specific problems not covered in these general procedures may be encountered. If that is the case, the inspector will want to refer to the manuals which describe special inspection procedures in greater detail:

   - *AASHTO Manual for Condition Evaluation of Bridges, 2nd Edition, 2003 Interim* (with yearly revisions)
   - *HEC 18 Evaluating Scour of Bridges, Fourth Edition*
   - *HEC 20 Stream Stability at Highway Structures, Third Edition*
   - *HEC 23 Bridge Scour and Stream Instability Countermeasures Experience, Selection, and Design Guidance Second Edition.*

   If the inspector still does not find the guidance needed, the problem may be beyond their expertise. If that is the case, call on experts or those in specialty fields to analyze or assess a given problem.

   For state bridges, contact the WSDOT Regional Bridge Inspection Engineers at (360) 570-2530 or 2552. For local agency bridges, contact the WSDOT Bridge Engineer for Local Agencies at (360) 705-7870.

2. ***Inspecting for Scour***

   The routine inspection of any bridge over water should include an assessment of existing scour conditions, their affect on the bridge, effectiveness of countermeasures, and recommendations for repair, if appropriate. The **BIRM (Section 11 – Inspection and Evaluation of Waterways)** discusses inspection of bridges over water. The field inspection is used in conjunction with the scour analysis (Section 5.05) to identify and verify the potential of harmful effects of scour to the bridge.

   The Scour Field Evaluation Form was developed to supplement the Bridge Inspection Report for water crossings. It is to be completed by the inspection team leader during the on-site inspection. A sample of this report form is shown in the Section 3.07, Forms.

   Soundings of streambed elevations should be taken during the routine inspection or another scheduled inspection. For details on sounding procedures, refer to Section 3.05-D. The report should note the location and depth of the streambed at each point where a sounding was taken. This information should be plotted and shown on a map. A sample of a soundings report form is shown in the Section 3.07, Forms.

The report should also note the specific location and extent of any deterioration, damage, or undermining in:

- The stream channel and stream banks.
- The substructure elements (i.e., intermediate bents, pier walls, web walls, columns, or shafts).
- The foundation (i.e., footings and seals).
- Channel protection devices (i.e., dams and levees).
- Scour countermeasures (i.e., riprap or shielding).

Finally, the report should recommend any repairs, replacement, or maintenance required. Such comments need to be included in the Bridge Inspection Report Form.

a. Some upstream and downstream observations to make include:

   - Observe the condition of the banks. (Are they stable or is there evidence of sloughing or undermining?)
   - Observe the condition of the main channel. (Is it clear and open or are there islands or debris in the waterway?)
   - Observe the overall floodplain. (Is there evidence of flooding or overtopping of the bridge or the approach roadway?)
   - Note the presence of debris. (Is it blocking the stream flow or accumulating in the waterway?)
   - Note the influence of other bridges, dams, tributaries, etc., on the stream.

b. Some bridge site observations include:

   - Observe the condition of the substructure. (Is there evidence of movement of the piers or abutments? Is there any damage to scour countermeasures? Is there a change in the streambed elevation at the foundations? Are there changes in the streambed cross-section?)
   - Observe the condition of the superstructure. (Is there evidence of overtopping? Does the superstructure obstruct the stream flow so that debris collects? Is the bridge design nonredundant so the bridge is subject to collapse if the foundation moves or shifts?)
   - Observe the condition of any channel protection devices or scour countermeasures in place. (Is riprap adequately stationed? Are any guidebanks in place? Is the main current striking upon the piers or abutments at an angle which may cause scouring to occur? Has the stream channel changed course?)
   - Note the waterway area. (Is the waterway too small? Do bars or islands constrict the flow of water under the bridge? Are the approach roadways regularly overtopped?)

3. ***Routine Inspection Reports***

   An inspection report must be prepared at the completion of each routine inspection. The purpose of this report is to record the inspection findings, provide a narrative description of conditions at the bridge site, and note any changes in the WSBIS coding information. The inspector may record and submit the findings of the routine inspection on the Bridge Inspection Report Form or use a PC-based WSBIS system for this purpose. The **BIRM (Section 4 - Bridge Inspection Reporting System)** discusses inspection reporting.

   The information and procedures described on the following pages pertain to the use of the Bridge Inspection Report Form.

   Verify that the information preprinted on the form correctly identifies the bridge. (If it does **not,** you will need to submit an update to the WSBIS to correct it.)

   The Bridge Inspection Report Form will have the following preprinted information that will identify the bridge:

   - BRIDGE NUMBER:
   - BRIDGE NAME:
   - STRUCTURE ID:
   - ROUTE: The number of the inventory route carried on or under the bridge.
   - MILEPOST: The bridge's milepost location on the inventory route.
   - INTERSECTING: The feature or features which intersect with the bridge. See WB72-32.
   - LOCATION: The physical location of the bridge. See WB 71-56.
   - SUFFICIENCY RATING: The structure's calculated sufficiency rating and whether it is functionally obsolete (FO) or structurally deficient (SD).
   - YEAR BUILT/REBUILT: The year the bridge was completed and the year of the last major reconstruction, if any.
   - STRUCTURE TYPE: The structure type (for local agency bridges, this field may be blank).

4. ***Completing the Bridge Inspection Report***

   a. Review the Adequacy Appraisal codes, NBI condition codes, BMS elements, and their respective condition states, and make the necessary changes. Complete the narrative describing the existing conditions.

   b. Enter on the inspection report: team leader initials, team leader identification number, co-inspector initials, date of inspection, and total number of hours at the bridge site, regardless of the number of inspectors in the team. The team leader and co-inspector (assisting team leader) are required to sign the permanent bridge file copy of the Bridge Inspection Report Form and place it in the bridge file.

c. Updating the WSBIS Inventory Record

WSDOT Inspectors: The bridge inspection laptop computers are downloaded by the Bridge Inspectors.

Local Agency Inspectors: Local agency inspectors enter inspection information on the Laptop98 bridge inspection software available for download at http://www.wsdot.wa.gov/TA/Software/. Laptop98 generates an update file that is submitted by e-mail to the WSDOT Local Agency Bridge Engineer. The update information is reviewed and forwarded to the WSBIS Inventory Engineer for incorporation into the bridge inventory. See WSBIM Chapter 2 for special record submittals such as record creation, record deletion, and transfer of ownership.

d. After the data is processed by the WSBIS Engineer, the WSBIS main database is then updated with the new bridge information. A new WSBIS Inventory Record is generated for each bridge that has changes. The error codes on the newly generated form need to be reconciled, and may require additional data submittal correcting these errors.

e. The updated WSBIS Inventory Record and other applicable reports need to be filed in their respective bridge files.

At the conclusion of the routine inspection, complete the Inspection Report and Inventory Record. Confirm the condition and adequacy coding for the various bridge elements and make any changes necessary in this coding.

Recommend any of the following special inspections:

- An underwater inspection by wading or by a diver if one is needed to inspect underwater portions of the bridge.
- A fracture critical inspection if the bridge contains fracture critical members.
- A UBIT inspection if, during the routine inspection, certain bridge elements cannot be reached for sufficient examination.
- An in-depth inspection if certain bridge elements warrant more detailed inspection or analysis.
- Special features inspection.

Conclusions and findings from special inspections should be incorporated into the routine Bridge Inspection Report to support the codes and ratings.

Prepare a list of any bridge elements in need of repair and recommend the type of repair that should be done. A photo of repair areas should be taken with each type of recommended repair. Examples of some (though not all) of the things the inspector may wish to recommend are:

- Repair cracks, improper welds, or spalled areas.
- Straighten or strengthen deformed members.
- Replace a broken member.
- Replace deformed, sheared, or missing rivets or bolts.

- Replace missing, broken, or severely deteriorated elements.
- Clean and paint surface areas.
- Strengthen corroded areas.
- Contact a structural engineer to evaluate the condition of deformed or misplaced main structural members.

If it is felt that a critical bridge deficiency has been identified resulting in an emergency load restriction, lane closure, bridge closure or a failed bridge, submit a formal recommendation for repair by completing the Critical Damage Bridge Repair Report Form. When this type of damage is encountered a special tracking procedure is initiated. For an explanation of this procedure, see Chapter 6.

Update the WSBIS Inventory Record Form as necessary. Verify that the load rating of the bridge is properly recorded and/or recompute the load rating if necessary. (If the bridge's load-carrying capacity is substandard, the bridge will require posting in accordance with the *AASHTO Manual for Condition Evaluation of Bridges, 2nd Edition, 2003 Interim.* Chapter 5 discusses and illustrates the type of signs used for posting bridges.

C. Fracture Critical

The National Bridge Inspection Standards (NBIS) require that a fracture critical inspection be performed at least once every 24 months on bridge members identified as fracture critical. According to the AASHTO definition, a fracture critical member is a steel tension member in a bridge whose failure could result in the partial or total collapse of the bridge.

The Silver Bridge collapse in 1967, which spawned the NBIS, was due to the failure of a fracture critical member. The Mianus River Bridge collapse in Connecticut in 1983, which influenced the 1988 revisions to the NBIS, was also due to the failure of a fracture critical member. The consequences of these major bridge failures have been severe. They have included:

- Loss of life.
- Financial loss due to litigation.
- Loss of capital investment in the bridge itself.
- Economic loss to nearby businesses or industries that rely on the bridge for public transportation.
- Loss of public confidence in bridge inspection programs and their ability to foresee or forestall such catastrophes.

The fracture critical inspection is to ensure that fracture critical bridge members are identified and are then inspected with care and caution. The degree of caution that must be exercised during the inspection cannot be overemphasized; this is largely due to the manner in which fracture critical problems manifest themselves. By the time a hairline fracture is visible on the surface of a steel member, over 95 percent of the life of that member has expired. This hairline fracture can spread and widen within a short time until the member fractures and there is a sudden and catastrophic collapse of the entire bridge.

The following pages provide information to assist the bridge inspector in identifying fracture critical bridge members, preparing written procedures, planning effective fracture critical inspections, performing such inspections, and completing the required inspection report. The information presented here is meant as a summary of the main points of the fracture critical inspection. A complete description of the fracture critical members and the fracture critical inspection procedure is provided in the **BIRM (Section 8 - Inspection and Evaluation Of Common Steel Superstructures)**.

1. ***General***

   Determine which bridges have fracture critical elements and identify the particular fracture critical members within each bridge.

   A fracture critical member is defined by AASHTO as a steel tension member or steel tension component of a member, of a bridge whose failure would be expected to result in the collapse of the bridge. For this member to be considered fracture critical then, two conditions must exist. First, the member must be in tension. The area of the bridge where the member is located must be subject to tensioning (expanding) forces. Second, there must be no redundancy in the member or the bridge. There must be no other structural elements able to carry the load of the member if the given member fails.

   There are three types of redundancy — load path, structural, and internal. Only load path redundancy is evaluated to determine whether a member is fracture critical. Load path redundancy is the number of supporting elements, usually parallel, such a girders or trusses. AASHTO neglects structural and internal redundancies in determining whether a member is fracture critical. For a bridge to be nonredundant, it must have two or less load paths.

   Each agency should identify the bridges within its jurisdiction to determine which contain fracture critical members. An experienced structural engineer may need to be consulted in order to help make this determination.

2. ***Bridge Types***

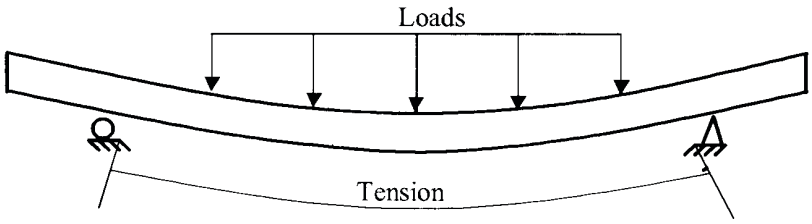
   The following is a list of the types of bridges in which fracture critical members will be found. Figures are also shown which illustrate these bridge types and note the location of the fracture critical areas.

   a. Two-beam or Two-girder Systems (Figure 3.05.C-1)

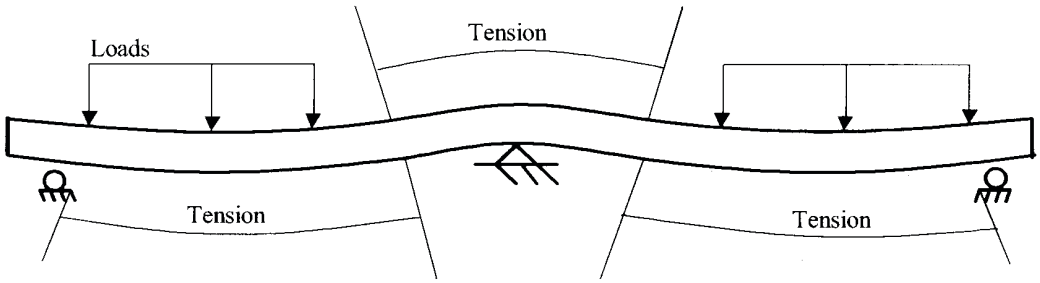
      (1) Simple Spans: Each beam or girder should be considered fracture critical as failure of either one could cause the bridge to collapse (Example A).

      (2) Continuous Spans: In general, at the midpoint of the span, the bottom of the girder should be considered fracture critical and over the pier, the top of the girder should be considered fracture critical. A structural engineer may need to assess the bridge to determine the actual redundancy and presence of fracture critical elements (Example B).

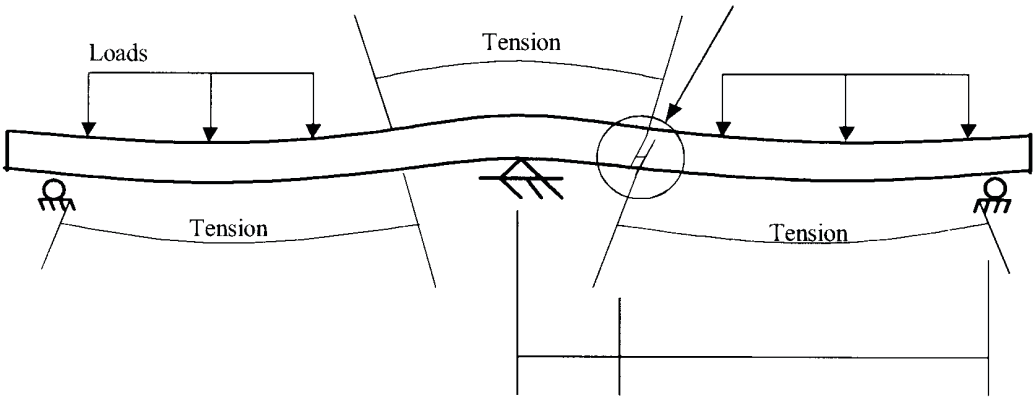
      (3) Cantilever-suspended Span: In addition to the bottom of the girder at mid-span and the top of the girder over the pier, the top flange and adjacent portion of the web in the area of the cantilevered support should be considered fracture critical (Example C).



EXAMPLE A: SIMPLE BEAM



EXAMPLE B: CONTINUOUS SPANS



EXAMPLE C: CANTILEVER - SUSPENDED SPANS

Figure 3.05.C-1

b. Truss Systems (Figure 3.05.C-2)

Most truss bridges employ only two trusses and are thus considered fracture critical. For inspectors, all truss members in tension should be regarded as fracture critical. The exception is, when a detailed analysis by an experienced structural engineer, verifies loss of a member would not result in collapse of the bridge or major component.

The following elements within any truss bridge should also warrant special attention:

(1) Pin-connections: Any pin connections on a truss bridge should be considered fracture critical.

(2) Category D and E Welds: On a truss bridge, any tension member containing a Category D or E weld. (See *Inspecting Steel Bridges for Fatigue Damage* published by Pennsylvania DOT.)

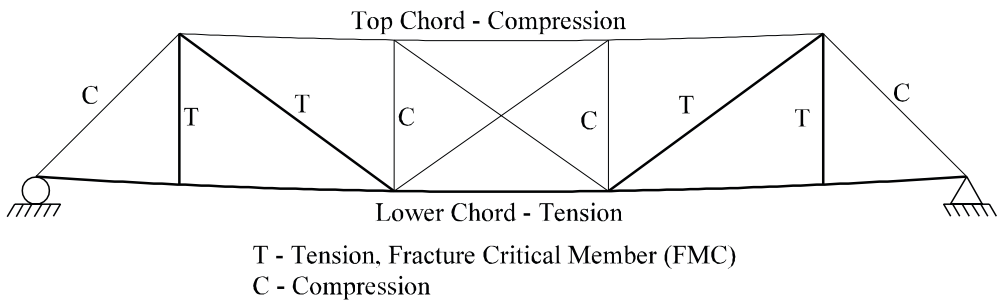


Figure 3.05.C-2

c. Tied Arches (Figure 3.05.C-3)

The tie girder which keeps the supports from spreading apart is in tension and should be considered fracture critical.

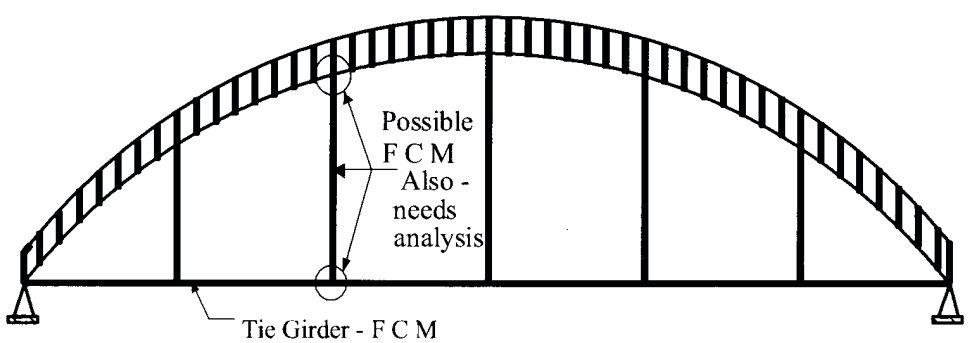
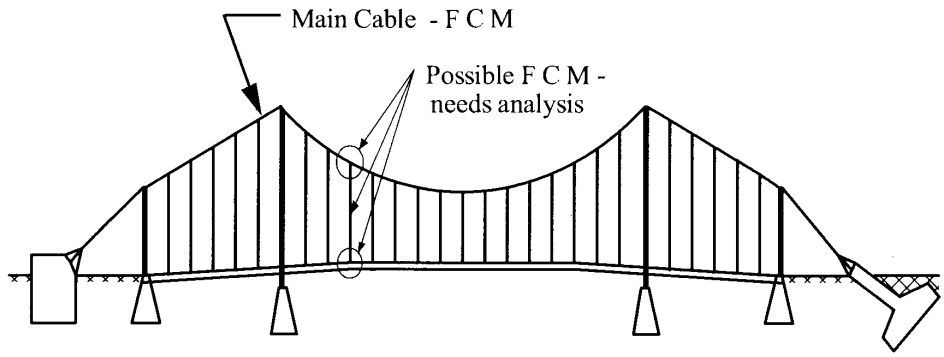


Figure 3.05.C-3

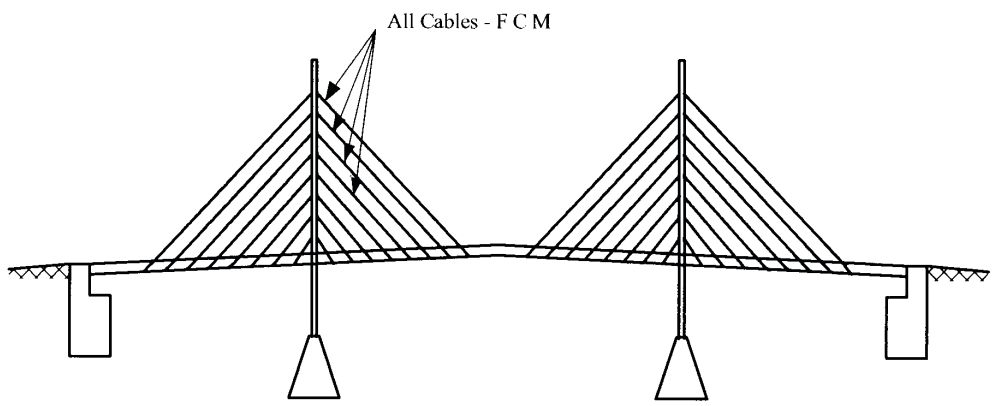
d. Suspension Spans (Figure 3.05.C-4)

(1) Cables: If the main suspension member is a cable, the cable should be considered fracture critical. (Example A)

(2) Cable Stayed Bridge: The bridge is of such complexity that it should be reviewed by a structural engineer to determine the criticality of the various ties to fracture. (Example B)



Example A: Cable Suspension Bridge



Example B: Cable Stayed Bridge

Figure 3.05.C-4

e. Other Fracture Critical Bridge Details

(1) Steel Cross Beams and Caps: In mid-span, the lower portion of the I-section or box beam is in tension and should be considered fracture critical. (Figure 3.05.C-5)

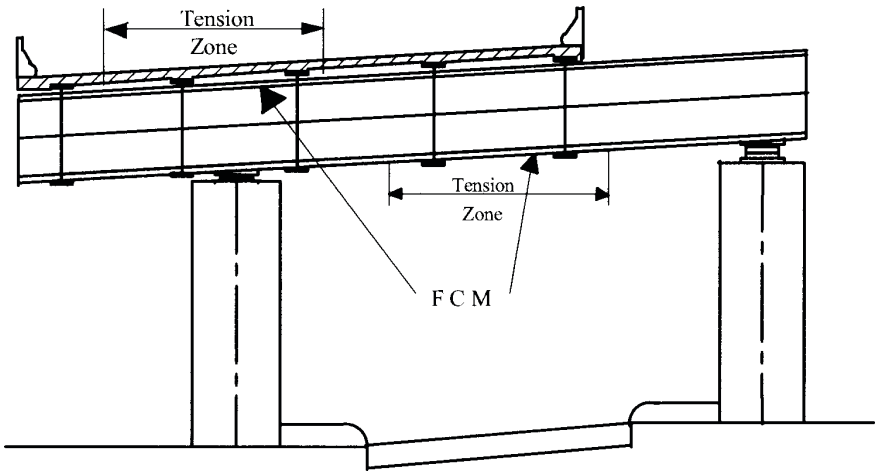


Figure 3.05.C-5

(2) Pin and Hanger Supports: The pin and hanger connection used to support a suspended span from a cantilever span should be considered fracture critical if the member is nonredundant. The pin connection and hanger support in a two-girder or three-girder system is fracture critical as the bridge has no built in redundancy. The same connections in a multi-beam system (more than 3 beams) are not fracture critical as the bridge has a high degree of redundancy. Pin connections in such bridges should be inspected with the same techniques and methods as fracture critical pins. (Figure 3.05.C-6)

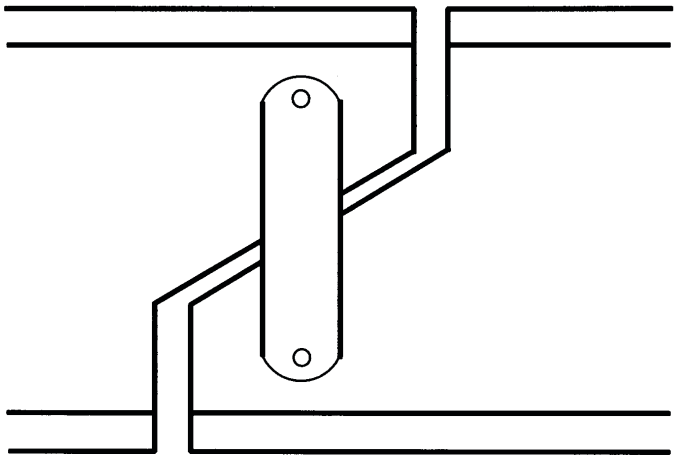


Figure 3.05.C-6

3. ***Prepare Written Procedures***

Once the fracture critical members within a bridge have been identified, the agency must prepare a detailed plan as to how it will accomplish the fracture critical inspection. This written procedure may be developed by others being hired to perform the fracture critical inspection. However, if this is done, the team leader for the agency should carefully review the written plan to ensure that a sufficient analysis of the member will be made and that the task will be accomplished in a reasonable manner. ***These written inspection procedures are to be kept in each bridge file.***

Fracture critical inspections can prove costly; therefore, in the development of the inspection plan, particular attention should be given to each of the following:

a. Scheduling

Generally, it will be best to schedule a fracture critical inspection during cold weather (as cracks will be more visible), at low water (if the fracture critical member is underwater at high water), during daylight hours, and when traffic on the bridge will be lightest (as some form of traffic control may be necessary).

b. Equipment

The bridge inspector will require close access to each fracture critical member; thus, some type of equipment may be needed to provide sufficient access. Ladders, scaffolding, aerial work platforms, or UBITs may be deemed appropriate for a given situation. The choice of equipment will depend on the cost of rental, the time needed to perform the inspection using that equipment, and equipment availability. If a UBIT is used, it should be determined, before its use, whether it could overload the bridge, operate on the bridge grade, has sufficient reach, and if it might damage the deck. Use of a UBIT may also create a need for traffic control.

c. Workforce

In order to keep the amount of time spent at the bridge site to a minimum, consideration should be given to the level of manpower needed. Once the number of individuals needed is determined, the duties to be performed by each individual should be clearly defined.

d. Tools

The standard tools common to any routine inspection should be on hand for the fracture critical inspection. In particular, a wire brush, a magnifying glass, and a light source able to provide 50- to 100-foot candlepower should be considered mandatory. In addition, specialized tools for carrying out nondestructive testing may also be warranted (i.e., a dye penetrant kit or ultrasonic testing device).

e. Inspection Procedures

The Fracture Critical Member inspection plan should identify the inspection frequency and method(s) to be used. These should be developed depending on the criticality of the feature based on experience with other similar details or structures, calculated remaining fatigue life, current indications, material properties, consequences and likelihood of rapid failure, etc.

If several types of inspection are employed, identify when, where and how they are to be used. For example, a pinned truss bridge may require each of the pins to be examined visually during each inspection, supplemented by ultrasonic testing of 1/3 of the pins during each inspection. So all of the pins would be inspected ultrasonically in a 72 month period, if the inspection frequency was 24 months.

4. ***Perform the Fracture Critical Inspection***

The purpose of the fracture critical inspection is to assess the structural condition of each bridge member identified as fracture critical. When inspecting these members, it is always best to err on the side of conservatism. The consequences of dismissing or failing to note a blemish on a fracture critical member are too great. Therefore, the inspection should be conducted carefully and thoroughly. Such close inspection of single members can be tedious; however, the inspector should work in a manner that insures the same degree of care and attention to the last area inspected as the first. The previous pages described the general areas within a bridge where fracture critical members will be located. The following pages describe the particular features to note.

First, the inspector must gain access to the fracture critical area. The inspector should be no further than **24 inches** from the surface being inspected and should work with a light source of at least 50- to 100-foot candles. The best viewing angle is at approximately 120°. The inspector will want to look for deteriorated surfaces or surface cracks. The **BIRM (Section 8 - Inspection and Evaluation Of Common Steel Superstructures)** discusses inspection procedures and the types of problems that may be found.)

The following areas or members should be checked:

- Areas vulnerable to corrosion (under deck joints, on surfaces where water collects, in places where dissimilar materials meet).
- Areas where there is a change in the bridge cross section, where stress is concentrated, or which show out-of-plane bending.
- Web stiffeners (especially at the ends).
- Coped sections and/or re-entrant corners.
- Eyebars.
- Shear connectors.
- Pin and hanger assemblies.

- Punched holes.
- Rivet and bolt heads.
- Tack welds and field welds (especially at weld ends or returns).

If any cracks, blemishes, or other irregularities are found, the inspector will need to evaluate these further, which may include the use of a magnifying glass. A dye penetrant kit can be used to establish the limits of a crack. Use of magnetic or ultrasonic testing devices may be required to detect internal problems not apparent to the eye. Some of these devices will provide more accurate and dependable information than others. The agency will need to determine which devices will be the most cost effective and reliable for the given situation.

Finally, the inspector will need to record the location and size of any cracks found. Mark and date the crack ends in permanent marker for follow up on the structure. In most cases, it will be helpful to take a photograph of such cracks to provide visual documentation. This information and the photographs are to be included in the Fracture Critical Inspection Report.

5. ***Prepare the Fracture Critical Inspection Report***

At the conclusion of the fracture critical inspection, a Fracture Critical Inspection Report should be prepared to provide detailed verification of the inspection findings. The report should provide qualitative and quantitative information concerning the fracture critical member. This information is important for a number of reasons: it can offer insight about the condition of the member, it can provide a history of the bridge, and it can be used to substantiate the thoroughness of the inspection effort in the event of litigation arising from a bridge failure. See Appendix 3.06-D For an example Fracture Critical Report.

The inspection report should:

- Identify what parts of the bridge were inspected and the location of each fracture critical bridge member. (This can be shown on a photograph or sketch of the bridge.)
- Describe the procedures followed to inspect the fracture critical member.
- Describe the condition of the fracture critical member.
- Provide the following details about any defects found:
  a. What the defect is.
  b. Where the defect is located (using a sketch to illustrate its location relative to the ends of the member, and its position in the cross section of the member).
  c. Why the defect has occurred (if it can be determined).
  - Summarize the inspection findings (addressing how individual defects affect the member's overall condition.
  - Make any appropriate recommendations (i.e., repair the fracture critical member, recalculate load ratings, close the bridge).

6. ***Update the WSBIS Inventory Record and the Master List***

   Any changes that need to be made to the **WSBIS** Inventory Record (the fracture critical inspection fields) should be submitted so that the **WSBIS** Inventory Record can be updated (see Chapter 2).

   The Master List should also be updated so that it contains the most current information about the bridge (see Chapter 5).

7. ***Update the Bridge File as Needed***

   Place the Fracture Critical Inspection Report in the bridge file. This report can be referred to if necessary to help determine the appropriate inspection frequency for the bridge, evaluate the degree to which bridge conditions have changed from one inspection to the next, and determine what maintenance or repair may be required on the bridge.

D. Underwater Inspections

Bridges over water have special inspection requirements. If the bridge has members in water too deep to permit a visual or tactile (hands-on and/or wading) inspection from the surface at low water or during seasonal low stream flows, a diver must conduct an underwater inspection, also an evaluation of the bridge's susceptibility to scour needs to be conducted (see Section 5.05). Most bridge failures are due to underwater or scour problems; therefore, the importance of these types of inspection cannot be overemphasized. There may be environmental restrictions that need to be taken into consideration prior to conducting an underwater inspection.

An underwater inspection on the underwater elements of a bridge, is required at least once every 60 months. The purpose of the underwater inspection is to examine the underwater elements to the extent necessary to determine their structural condition and adequacy. At a minimum, a diver must swim by and look at all underwater portions of the bridge, clean surface encrustation's from and tactically inspect at least 10 percent of the underwater portion of the bridge, and probe the stream bottom around the piers or at other locations to determine the condition of the streambed. If significant problems are encountered during the course of the inspection, a more detailed inspection of the bridge may be needed.

Existing scour conditions must be evaluated during an underwater inspection. The inspector must assess condition and depth of the streambed, determine the susceptibility of the streambed to scour, and determine what countermeasures can be taken to safeguard the bridge. The primary requirement of the scour inspection is to establish a cross-section of the streambed. This is accomplished by sounding and can be carried out with either a fathometer (also known as a "fish finder") or a lead line. See the **BIRM (Section 11 – Topic 11.3 – Underwater Inspections)** for guidance on performing underwater inspections.

With each underwater and/or scour inspection performed, an inspection report must be prepared to document the findings. This report should provide details about the observations made, provide visual documentation (sketches, photographs, and/or video recordings) of any problem areas, and make recommendations for repair or subsequent monitoring. Updates shall be made to the WSBIS inventory data, the Bridge Inspection Report, and/or to the Master List as a result of the underwater or scour inspection findings. **A copy of each report is to be kept in the agency bridge file.**

Prepare Written Procedures

Written inspection procedures need to be developed for each bridge requiring an underwater inspection. The inspection plan should detail as a minimum:

- Type and frequency of required inspection
- Location of members to be inspected
- Type(s) of foundation
- Bottom of foundation elevation or pile tip elevation
- Identification of scour critical substructure units
- Special equipment requirements
- Follow-up actions taken on findings of last inspection

Document the Underwater Inspection

Prepare a Daily Dive Report after each dive and prepare an Underwater Inspection Report when inspection of the entire underwater portion of the bridge is concluded. See Appendix 3.06C for an example underwater inspection report.

a. Daily Dive Report

This report must be completed by the inspection team leader (in concert with the diver). Section 3.07, Forms, provides a sample of this report. The report should summarize what equipment was used in the dive, what procedures were employed, what problems were encountered (such as strong currents or underwater obstructions or accumulations of debris), and should provide any information which may be helpful for planning future dives. A separate Daily Dive Report should be completed for each dive made.

It may be helpful to tape the conversation between the diver and the inspection team leader when the diver comes out of the water. If the report is prepared later, it will be difficult to remember all the observations made at the time. A tape recording can capture these words and make writing the report much easier.

b. Underwater Inspection Report

This report must be completed by the inspection team leader and reviewed by the diver. In the appendix is a sample of this report. The report should be thorough and include the following information for the various levels of inspection performed.

(1) For a Routine Underwater Inspection, note:

- The areas of the bridge that were cleaned (which pilings, at what depths, etc.).
- What conditions were found as a result of cleaning.
- The condition of any protective coatings.
- Evidence of any significant defects or damage.
- Evidence of scour or the build-up of debris at the piers.
- The location of exposed foundation elements.

- The condition of the streambed around each pier (from probing).
- The water flow (whether high, medium, or low) and an approximation of the velocity (ft/sec.).
- The influence of any significant environmental conditions (i.e., corrosive pollutants, salt water, etc.).
- Any changes to the surrounding area which have or may alter the flow characteristics around the pilings (i.e., logs upstream, construction going on nearby).
- Any discrepancies between the bridge design and its actual configuration.
- Any recommendations for repairs, a subsequent scour inspection, a change in inspection frequency, or an in-depth inspection.

(2) For an In-Depth Underwater Inspection, note:

- The areas tested.
- The amount and type of testing performed.
- Testing results and/or findings.
- Any recommendations for repair or replacement of individual members or the bridge itself.

In addition to the written information provided in the report, problem areas in the bridge should be carefully identified and documented with drawings, photographs, and/or video recordings. Although underwater photos and video recordings are often preferred, they may not always offer clear views of the problem areas so sketches may need to be relied upon. If a recommendation is made for bridge repair, visual documentation of the problem will be required.

Update the WSBIS Inventory Record and the Master List

Any changes to the inventory coding information (the date of underwater inspection, the condition coding for piers, intermediate bents, etc.) should be entered so that the WSBIS Inventory Record can be updated accordingly (see Chapter 2).

Update the Bridge File

After the Underwater Inspection Report is completed, the summary findings need to be included on the current Bridge Inspection Report. This can be added as a dated note in the "notes" portion of the laptop Bridge Inspection Report. The date, type of underwater inspection, hours, inspector's and co-inspector's initials, inspectors certification number, and any NBIS or BMS codes (that need to be changed with this added information) are updated on the WSBIS Inventory Record. Once this form is filled out, it needs to be submitted to the Bridge Inventory Engineer.

The Underwater Inspection Report and the Daily Dive Report should be placed in the bridge file. These reports can be referred to as necessary to help determine the appropriate inspection frequency for the bridge, evaluate the degree to which bridge conditions have changed from one inspection to the next, and determine what maintenance or repair may be required.

E. Special Features

Special bridges include bridges with special features such as movable bridges, floating bridges, suspension and cable-stayed bridges, and ferry terminals. Also included are bridges built with special materials such as high strength steel, and bridges that were built using techniques such as segmentally constructed post-tensioned concrete boxes. Bridges with pin and hanger connections are also considered to be special bridges.

Written procedures must be developed and included in the bridge file for all **Special Features Inspections**. Procedures should include:

- Type, detail, and frequency of required inspection.
- The location of members to be inspected.
- Special equipment required.

Complex bridge types normally have detailed maintenance and inspection manuals specific to each bridge.

1. ***Movable Bridges***

   There are three basic types of movable bridges: vertical lifts, bascules, and swings. All of these structures are operated either by electro-mechanical drive systems or by hydraulic systems. See the **BIRM (Section 12 – Topic 12.2 – Movable Bridges)** for guidance on performing inspections on movable bridges.

2. ***Floating Bridges***

   Floating bridges in Washington State consist of concrete pontoons that are bolted together longitudinally and are held in position by steel cables connected to anchors on the bottom of the waterway. Some of the bridges are reinforced with prestressing steel. Two of Washington State's floating bridges contain movable spans that have unique operating characteristics.

   Unique inspection components in floating bridges are the anchor cables and their anchors, the sockets on the ends of the cables, and the watertight hatches that allow access to the interior of the pontoons and between cells inside each pontoon. Tracks, bolts and/or pins provided to adjust the tension in the anchor cables require inspection, as well as the portals where the anchor cables enter the pontoons. Water sensors in the pontoons and any cathodic anchor cable protection systems should be tested to ensure they are working properly. The bolts between the pontoons as well as the water-tightness of the concrete pontoons themselves must be inspected. Other special components on floating bridges with movable spans include vertical and horizontal guide wheels, guide wheel tracks, center and end locks, lift cylinders and span leveling devices, span drive machinery, control systems, and weather monitoring equipment. Each of the floating bridges in Washington State have dedicated "Operation, Inspection, and Maintenance Manuals" detailing the special features and procedures.

3. ***Suspension Bridges***

   Suspension bridges consist of a pair of main cables hanging between and passing over two towers and anchored by backstays into large counterweights on opposite shores. Suspender ropes hang from the main cables and support a pair of stiffening trusses or girders that run the length of the suspended spans. The stiffening trusses or girders support floor beams, stringers, and a roadway deck. Orthotropic decks may be used in place of the stringers and roadway deck. See the **BIRM (Section 12 - Topic 12.1 - Cable Supported Bridges)** for guidance on performing inspections of suspension bridges.

4. ***Cable-Stayed Bridges***

   Cable-stayed bridges are very distinct structures with many unique details that require special inspection. On a cable-stayed bridge the longitudinal structural components that support the road deck are supported by inclined cables or stays that extend directly into anchors or saddles in one or two towers. One cantilevered component is balanced by another cantilevered component on the opposite side of the support tower. Typically, the deck is anchored to the ground in at least one spot to resist seismic forces and any unbalance in the cantilevered spans. See the **BIRM (Section 12 – Topic 12.1 – Cable Supported Bridges)** for guidance on performing inspections on cable-stayed bridges.

5. ***Precast Segmental Bridges***

   Precast segmental bridges are unique due to their construction. A precast segmental girder is a single or multiple box girder that is formed from precast segments post-tensioned together. This type of construction takes advantage of the standardization of the manufacturing process. See the **BIRM (Section 7 – Topic 7.11 – Concrete Box Girders Including Segmental)** for guidance on performing inspections of precast concrete segmental bridges.

6. ***Ferry Terminals***

   Ferry terminals usually have a dock or holding area built over the water and a movable transition span to carry the traffic on to the ferry deck. The holding area can be constructed of treated timber, concrete, or steel components. The movable spans generally are steel trusses or girders with one end supported on the fixed pier and a free end which can be raised or lowered onto the boat to accommodate tidal changes.

   The marine environment is very harsh to steel and timber. The inspector should monitor the paint condition of steel and check carefully for section loss due to corrosion. Treated timber rots from the inside out. Timber members that appear solid may only be a hollow shell. The inspector should sound all timber regularly and inspect for insect infestation and damage. Divers should inspect structural members that are submerged at maximum 60 month intervals and more often when needed.

   Because of the complexity of ferry terminal inspections, WSDOT has the *Ferry Terminal Inspection Procedures Manual* to describe the report.

7. ***Pin and Hanger Connections***

   A pin and hanger is a system used to connect suspended spans to cantilevered spans. The hanger is connected to a beam or girder by a pin on one or both ends. In two-girder and three-girder systems, the pin and hanger connection is fracture critical. Even when used in a multi-beam system where the bridge has a high degree of redundancy, the connection should still be inspected as closely as any fracture critical element. This is due to problems experienced in other states with pins in multi-beam suspended spans. See the **BIRM (Section 8 – Topic 8.4 – Pin and Hanger Assemblies)** for guidance on performing inspections of pin and hanger assemblies.

8. ***A-514 Steel High Performance Steel***

   A-514 steel is used in high stress areas of larger steel bridges to reduce member size and total weight of steel. A typical location would be the top and bottom flanges of plate girders over the intermediate piers.

   Bridges fabricated from A514 steel have suffered from hydrogen cracks which occurred during fabrication. Also, higher strength steels generally are subject to larger stress ranges than the lower strength steels. In tension zones, cracks may initiate and propagate faster than in the lower strength steels. It is important that inspectors check tension zones closely for cracks particularly at welds, bolt holes, copes, and other fatigue prone locations.

F. Other Inspections

A variety of other inspections may be performed on a bridge during its service life. The need for these inspections should be determined by the team leader. The types of inspection that may be called for include:

1. ***Damage***

   Any time the bridge has been struck and damaged due to a collision from a vehicle or a vessel, or damage due to flood, etc., a damage inspection should be performed to determine the extent and the appropriate action(s) to take. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections**) also discusses Damage Inspections. To conduct a damage inspection:

   a. Collision

      (1) Assess Damage

      The purpose of the damage inspection is to assess the extent of any structural damage to the bridge. A thorough examination of the damaged areas should be made, along with an assessment of any residual damage to other bridge components. The amount of time and effort required to make this assessment will obviously depend upon the extent and seriousness of the damage.

      If significant damage has occurred, the inspector will need to:

      - Identify any fractured members.
      - Determine any loss of foundation support.
      - Compute the amount of any section loss.

- Measure the amount any member is out of alignment.
- Recalculate load ratings, if necessary.

As a result of the damage inspection, the inspector may determine that load restrictions are needed or that the bridge should be closed until repairs can be accomplished. If so a Critical Damage-Bridge Repair Report needs to be completed.

(2) Reporting

Record the inspection findings on the Damage Inspection Report. See Appendix 3.07 WSDOT FORMS for a blank form. The following information should be noted:

- The location, extent, and type of any damage found.
- The amount of any section loss.
- The degree to which any members are out of alignment.
- The need for new load ratings, if applicable.
- Any recommendations for repair or maintenance.

(3) Critical Damage-Bridge Repair Reporting

If the bridge has been damaged to the extent that has resulted in an emergency load restriction, lane closure, bridge closure or a failed bridge, the inspector must submit a formal recommendation for repair by completing the Critical Damage-Bridge Repair Report (see Chapter 6).

(4) Update the WSBIS Inventory Record

If any changes to the WSBIS Inventory Record (the inventory or load ratings, for example) are needed, they should be submitted on the WSBIS Inventory Report.

(5) Update the Bridge File

A copy of the Damage Inspection Report and an updated copy of the WSBIS Inventory Record (if applicable) should be placed in the bridge file at the completion of the Damage Inspection.

b. Floods

Any time flooding has occurred on the waterway the bridge crosses, an inspection should be conducted both during and immediately after the flooding to assess what effects the increased water flow is having, or had, on the bridge. The following explains these procedures:

(1) During Event Inspection

An inspection during the flood can provide information about the structure's safety and condition under adverse conditions. Observations made during the flood may help the inspector recommend appropriate measures to protect the bridge from failure or damage due to any future flooding.

To the extent possible during the flood, the inspector should look for the suggestion or the presence of any of the following:

- Streambed scour around underwater bridge elements.
- Bank erosion.
- Lateral migrations in the channel.
- Sediment transport or accumulation.
- Debris transport or accumulation (especially around piers).

(2) Follow-up Inspection

The bridge should be revisited immediately after the flood to assess any damage to the bridge and to provide information about the actual impact of the flood. The inspector should assess the impact of any of the following:

- Streambed scour around underwater bridge elements.
- Bank erosion.
- Lateral migrations in the channel.
- Sediment transport or accumulation.
- Debris transport or accumulation (especially around piers).

(3) Reporting

If the bridge is damaged as a result of the flood or if conditions have changed at the bridge site, a Damage Inspection Report and a new Scour Field Evaluation must be completed (see Chapter 5).

The report should provide the following information:

- Flood stage at which the bridge was visited.
- Approximate streamflow volume and velocity at the time of the visit.
- Location and extent of any damage to the bridge.
- Current condition of any bridge elements affected by the flood.
- Any recommendations for scour countermeasures, bank protection, channel protection, etc., which may protect the bridge from damage during future flooding or reduce the potential for future flooding.

(4) Update the WSBIS Inventory Record

(5) Update Bridge File

A copy of the new Scour Field Evaluation Form shall be placed in the bridge file and must be cross referenced to the current Bridge Inspection Report. See Section 3.07 WSDOT FORMS for a blank scour field evaluation form.

2. ***In-Depth***

Any time a bridge element or portion of the bridge requires further evaluation, analysis, or investigation to accurately assess its condition, complete an in-depth inspection. This inspection may involve testing, monitoring, or conducting specific analyses of given bridge elements. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections**) also discusses In-Depth Inspections. For an in-depth inspection:

a. *Identify Need*

Any time the structural condition of an element **cannot** be determined in the course of a routine inspection, an in-depth inspection is required. The in-depth inspection is performed obtain more sophisticated data, perform special testing, and/or bring in other experts to assess a particular problem.

The need for an in-depth inspection generally arises as a result of a routine inspection; however, such a need may also be the result of a damage, flood, or interim inspection. Whenever such a need is discovered, an in-depth inspection should be performed.

b. Performing the Inspection

The in-depth inspection should include as detailed an analysis as necessary to determine the condition of the given bridge element. There can be no standard set of procedures to follow or observations to be made. Many factors will influence the depth and extent of analysis required. To facilitate accomplishment of the inspection, the inspector should make sure that any traffic control measures or necessary special equipment will be available.

c. Reporting

There is no standard form to be completed for reporting in-depth inspection findings. When the inspection is concluded, the inspector should prepare a formal written report to note:

- The location of each bridge element inspected.
- The procedures used to analyze and assess the particular bridge element.
- The names, titles, and observations made by any specialists who were consulted.
- The results of any testing performed.
- Any recommendations for maintenance or repair.

d. Update the WSBIS Inventory Record

If any changes to the WSBIS inventory data (the inventory or load ratings, for example) are needed.

e. Update the Bridge File

A copy of the report and an updated copy of the WSBIS Inventory Record (if applicable) must be placed in the bridge file at the completion of the In-Depth Inspection and must be cross referenced to the current Bridge Inspection Report.

3. ***Interim***

Any time a known or suspected deficiency needs to be monitored between routine inspections, an interim inspection may be required. The **BIRM (Section 3 – Topic 3.1.8 - Types of Bridge Inspections**) also discusses Interim Inspections.

a. Identifying Need

The interim inspection is performed to monitor a particular known or suspected deficiency and is carried out between regularly scheduled routine inspections. For example, if noticeable settling has occurred in the foundation, or if a particular bridge member shows signs of rapid deterioration. The inspector should observe and monitor this condition to determine the effect on the bridge or the danger posed to the bridge.

b. Performing Inspection

The inspector is free to schedule an interim inspection at his or her discretion as the need arises. This type of inspection can be accomplished by any suitable person who has some familiarity with the bridge. That is, the team leader need not be present during the inspection. However, if someone other than the team leader will perform the inspection, this individual should be carefully instructed as to what to look for, what measurements to take, what results might be expected, and/or how the problem can affect the structural integrity of the bridge.

c. Reporting

A report documenting the inspection findings should be prepared by the individual who performed the inspection. Any of the following information may be appropriate to include:

- The date of inspection.
- The inspector's name.
- The location of the element or elements inspected.
- Any measurements taken.
- The procedures utilized to analyze and assess the given bridge element(s).
- The results of any testing performed.
- Any recommendations for maintenance or repair.

d. Update the WSBIS Inventory Record

If any changes to the WSBIS Inventory Record (i.e., the inventory or load ratings) are needed, they must be submitted on the WSBIS Inventory Report. The routine bridge inspection date should not be changed due to an interim inspection.

e. Update the Bridge File

A copy of the report and an updated copy of the WSBIS Inventory Record (if applicable) must be placed in the bridge file at the completion of the interim inspection and must be cross referenced to the current Bridge Inspection Report.

3.06 Appendixes

3.06-A WSDOT Bridge Preservation Inspection Guidelines

3.06-B UBIT Owners & UBIT Inspections and Procedures

3.06-C Example Underwater Inspection Report

3.06-D Example Fracture Critical Inspection Report & Procedures

3.07 Forms

Bridge Inspection Report

Inspection Report (Supplemental Form)

WSBIS Inventory Record

Inventory Report

Scour Field Evaluation

Underwater Inspection Report

Daily Site Dive Log

Fracture Critical Inspection Report

Prestressed Concrete Damage Report and Steel Damage Report

Fall Protection Plan

Emergency Action Plan

Lead Exposure Control Work Plan

Respirator Record

Confined Space Entry and Hot Work Permit

3. Appendix

Appendix 3.06-A WSDOT Bridge Preservation Inspection Guidelines

The following describe specific inspection processes and procedures used by the WSDOT Bridge Preservation Office.

Contents

General 3.06-A-2

SOUNDINGS 3.06-A-8

CULVERT CODING 3.06-A-10

BRIDGE RAIL (WB76-84) 3.06-A-10

TRANSITIONS (WB76-85)**,*** 3.06-A-10

GUARDRAIL (WB76-86)**,*** 3.06-A-11

TERMINALS (WB76-87)*,** 3.06-A-11

BRIDGE INSPECTION NOTES STANDARD PRACTICE 2005 ..... 3.06-A-13

ADMINISTRATIVE GUIDELINESSTATE OWNED PEDESTRIAN BRIDGES/SHORT SPANS 3.06-A-17

INVENTORY INSPECTIONS 3.06-A-17

SAFETY INSPECTIONS 3.06-A-18

EMERGENCY/DAMAGE INSPECTIONS 3.06-A-18

BRIDGE DECK WALKING GUIDELINES FOR BRIDGE INSPECTIONS 3.06-A-19

REPAIRS 3.06-A-20

PRIORITY REPAIRS (Section 7.03) 3.06-A-21

CHANGING EXISTING REPAIRS 3.06-A-22

LOCAL AGENCY REPORTS 3.06-A-23

LOCAL AGENCY BRIDGE SCOUR 3.06-A-23

RENTAL EQUIPMENT 3.06-A-24

INSPECTION PROCEDURES March 2006

BMP (Chapter 3)

General

- Inspection report comments are required for the National Bridge Inventory (NBI) Deck Overall (*663*), Superstructure (*671*), and Substructure (*676*) codes of 5 or less.
- Detailed notes are to be entered separately under each Bridge Management System (BMS) element. NBI 'smart flags' can reference the appropriate BMS element note.
- Inspection report summary comments are required for any BMS element in Condition State (CS) 3 or 4 and recommended for CS 2.
- Specific dates should be used (e.g. "Soundings taken during 2001 inspection." or "Soundings taken 10/1/01." Not "Soundings taken today.").
- Refer to specific joints by pier or span numbers instead of joint numbers.
- Whenever an in-span hinge separates two bridges, the bearings and joint are to be coded with the "dependent" structure. Explain any exceptions to this rule in the *0* note.
- Whenever measurements are taken, whether for joint openings, monitored conditions, or anything else, include in the report the date, the surface temperature or air temperature, and the time of day measurements were taken.
- Timber structures:
  - A Yellow Tagged (YT) member is one that has rot and a shell between 1-½" and 3". A YT member requires a Priority 4 repair.
  - A Red Tagged (RT) member is one that has rot and a shell less than 1-½". A RT member requires a Priority 1 repair.
- Spot-check the BMS elements and quantities. Pay attention to the Smart Flags (especially BMS element #361) and all elements of new bridges.
- When circumstances prevent any required work from being completed at the time of inspection, report this fact to your supervisor. In the inspection report clearly identify both why the work wasn't completed and what is required of the next inspector to achieve the task.
- When submitting reports for initial review, include field notes in the review package along with a clean copy of the report, the Washington State Bridge Inventory System (WSBIS) sheet, the inspection photographs, and other relevant reports (fracture critical, soundings, etc.).
- Avoid using the phrase "open crack" without a further description such as width, location, and repetitive nature. Mark the specific crack location on the bridge with the crack width, inspectors' initials, and the date. Consider taking a photo of the marked crack to include in the inspection report. See Page 4-7 of the Washington State Bridge Inspection Manual (WSBIM).

0 Note

- Bridge orientation and identification of the pier/span numbering system is always required, stating the basis of orientation such as "increasing mileposts", "ramp direction", or per plans. Any potentially confusing orientation issues or deviations from standards (west to east or south to north) must be clearly identified. Describe photos with respect to bridge orientation, not geographic direction.
- If interim inspections are required, provide the schedule for inspections in the following format: "Interim inspections of RT timber are done in odd numbered years and routine inspections of the entire bridge are done in even numbered years." Briefly describe what is to be accomplished during the interim inspections.
- Place any special instructions and information that doesn't fit anywhere else under the *0* note.
- During the first inspection cycle, state the date when the initial inventory inspection was performed on a new bridge under the *0* note.

48 - MONTH FREQUENCY CANDIDATES

Place this note as a separate paragraph under the *0* Note:

> "Continue to validate the status of this bridge each inspection as a 48-month inspection candidate. Verify condition ratings, load ratings, vertical clearances, ADT, scour codes when applicable, and that no major maintenance has been completed in the last two years." Refer to the WSDOT letter sent to FHWA, dated July 28, 1998, for further details. The electronic file is located in the N:*Inspection Guidelines* folder.

1 Note

This note is maintained by the inspector and is used for every bridge that is fracture critical and/or requires a special feature inspection (see WB77-84, codes 4, 5, 7, and 0). Use this note to identify the inspection schedule, type of equipment used, and areas inspected. Examples: "Use a manlift to inspect the upper portions of the south truss", or "UBIT cannot deploy off south side due to the close proximity of a parallel bridge".

5 Note

Program Management (Bruce Thill) maintains this note. It contains information regarding scheduled rehabilitation or replacement, and other upcoming program management items.

9 Note

The *9* note is used to insert information contained in an Underwater Report, which could be pertinent to the coding of the bridge substructure. The BPO Dive Team or a consultant firm can provide this note. This note should provide information about the consultant (when appropriate), date of inspection, and a brief synopsis of the findings and relationship to previously found conditions. The Scour Engineer, Harold Redman, usually edits this, but the lead inspector can also enter information. This is tied to WB77-58 if there is a "D" entered.

If possible, attach a copy of the report or a summary sheet from the Underwater Inspection Report to the Bridge Inspection Report.

11 Note

The Load Rating Engineer, Mohammad Al-Salman, maintains this field. It is used to explain any load restrictions placed on a bridge. This note is closely associated with NBI note *688*.

361 Scour Note (BMS Element #361)

A BMS #361 element and note is required for all bridges over water. Note the following:

- State the direction of stream flow in the BMS element #361 note.
- The BMS quantity must match WB78-41 (verify both fields) recording piers in "normal yearly high water". In the event that there are more than nine piers in the water, the BMS quantity should record the actual number, not "M". Also note that this represents piers in the water, not columns in the water. Note that the BMS quantity may be "0" in cases where the piers or abutments are well clear of normal high water.
- Where element #361 has condition states of 2 or greater, provide detailed notes and photos describing the condition.
- Any inspection directive in the NBI *680* field must be specifically responded to by the inspector in the BMS element #361 note and the NBI *677* note. As an example, the *680* note could say, "Riprap at Pier 3 must be maintained". Based on this statement, the inspector must state the condition as found with a date in element #361: "Riprap at Pier 3 found in good condition on 2/20/03".
- If the NBI *680* field states that the riprap must be maintained, review the scour plans located on the Bridge Engineering Information System (BEIST) web site before inspecting the bridge in order to determine the designed riprap placement.
- If high water or any other obstruction prevents an adequate inspection of an element specifically identified in *680*, or if the bridge has a scour code of 2, 3, or 6, use the seasonal code under the WB-77 tab stating the reason why an inspection was impossible and the appropriate time of year in which to conduct an adequate inspection.

676 NBI Substructure Note

In all the following cases, document the scour condition thoroughly and notify Harold Redman upon return to the office.

- Spread footing bridges with undermined footings, or footings where the full face is exposed:

  If the NBI Scour code (*680*) is 2, 3, or 6, the NBI Substructure code (*676*) should be assigned based on the actual condition of the substructure, taking into account the degree of scour of the foundation. For a substructure whose load carrying capacity is not reduced and is not unstable, drop the Substructure code to a 5 (fair condition). A code of 4 (poor condition) would be appropriate if the scour had undermined the foundation, reducing the load carrying capacity of the pier or abutment or if it was potentially unstable. If local failure of the foundation or substructure element were possible, it would be best coded a 3 (serious condition). Evaluate and comment on any riprap or other scour countermeasures in place.

  If the NBI Scour code is 5, the NBI Substructure code is not affected by scour. Carefully document the scour condition and establish the distance between the exposed bottom of the footing and some point on the bridge that can be used to compare with the plans. This allows Harold to establish the elevation of the footings as found.

  If the NBI Scour code is 7, the NBI Substructure code is not affected by scour. Evaluate and document the condition of the scour countermeasures. Since the footings are fully exposed or undermined, it is likely that the scour countermeasures are failed or inadequate. The Substructure code should be assigned based on the actual condition of the substructure taking into account the degree of scour of the foundation. The NBI chan/protection code (*677*) may also be coded down if the channel embankments are affected.

  If the NBI Scour code is 8, the NBI Substructure code is not affected by scour. Attempt to confirm bedrock foundation and specifically comment on what you could or could not confirm. Unless there is contrary evidence, or significant undermining, assume the bridge is founded on non-erodable material and do not lower the Substructure code. Carefully document any undermining and establish a monitor flag. If it is judged that the scour is significant, use your judgment as to how the Substructure code is affected.

- Spread footing bridges with footing tops and/or some face exposed:

  If the NBI Scour code is 2, 3, or 6, drop the NBI Substructure code to 5 and comment that the Substructure rating is based on the scour condition. Evaluate and comment on any riprap or other scour countermeasures in place. Document the scour condition thoroughly.

  If the NBI Scour code is 5, the NBI Substructure code is not affected by scour. Document the scour condition and establish the distance between the ground line and some point on the bridge that can be used to compare with the plans. This allows Harold to establish the elevations of the ground line at the footings.

If the NBI Scour code is 7, the NBI Substructure code is not affected by scour. Evaluate and document the condition of the scour countermeasures. Since the footings are exposed, it is likely that the scour countermeasures are inadequate, and the Substructure code should be a 5, although it is possible that there are exceptions. Document the scour condition.

If the NBI Scour code is 8, the NBI Substructure code is not affected by scour. Assume the bridge is founded on non-erodable material and do not lower the Substructure code. Note the exposed footings in the report comments and confirm bedrock if possible.

- Spread footing bridges with scour holes or embankment erosion near the structure, but no exposed footings:

  The NBI Substructure code is not affected by the scour condition.

  If the NBI Scour code is 2, 3, or 6, the bridge is scour critical or analysis has not been done. Document the scour condition thoroughly.

  If the NBI Scour code is 5, foundations are stable for evaluated scour conditions. Scour is within limits of footing or piles.

  If the NBI Scour code is 7, scour countermeasures have been installed. Evaluate and document the condition of the scour countermeasures.

  If the NBI Scour code is 8, the structure is stable and the scour depths are above the piles or footings, or the footings are on non-erodable material. Note the scour conditions in the report comments.

- Pile founded bridges with evidence of scour:

  Check NBI Scour note (*680*) for comments from Harold Redman about embedded pile depth.

  If scour holes have reached embedded depths to between 5 and 10 feet, drop the NBI Substructure code to a 5 and comment that the Substructure rating is based on the pile embedment length. Evaluate and comment on any riprap or other scour countermeasures that are in place. Make a recommendation to evaluate the pile for lateral stability. Document the scour condition thoroughly.

  If scour holes have reduced embedded depths to 5 feet or less, drop the NBI Substructure code to 3 and directly comment that the Substructure rating is based on the pile embedment length. Evaluate and comment on any riprap or other scour countermeasures that are in place. Make a recommendation to evaluate the pile for lateral stability. Document the scour condition thoroughly.

677 Channel Protection Note

The NBI Chan/Protection code (*677*), rating the channel and the potential danger to the bridge or approaches, is required for all bridges over water.

- This note should be kept separate from the BMS element *361* note.
- Inspection notes are required for codes of 7 or less.
- Note that a bridge with no scour potential (piles founded or on bedrock) can have a very low channel rating based on a threat to the approach fill. In this situation the *677* code is the only way to flag the problem.

- Note that roadway embankment erosion due to bridge or roadway runoff is NOT included in this field. These issues are addressed in the abutment BMS field.

679 Pier/Abutment Protection and 683 Pier Protection Notes

The *679* and *683* notes are ONLY used for navigable channels (WB73-86 is coded 1); otherwise they should be coded "N"' and 9.

680 NBI Scour Note

The Scour Engineer, Harold Redman, maintains this field. Any scour comments by the field inspector should be placed in BMS element #361 (scour) or NBI *677* (channel condition), depending upon which is most appropriate.

688 Revise Rating Flag/Note

The Revise Rating Flag/Note should be turned on by the inspector when:

- The thickness of the overlay increases to at least five inches. Make sure you note the total thickness of the overlay; otherwise revisions cannot be made.
- The bridge rails have been removed and replaced with heavier rails (e.g. thrie-beam with steel posts replaced with concrete bridge rails).
- The condition of a structural element has deteriorated or has been damaged. For example: broken strands or section loss of reinforcing bars or steel members (over 10 percent) in the main structural members or rot in the timber elements. Identify the location of the deterioration based on span length and top or bottom of the affected member.

Short span bridges do not have the *688* flag turned on. Currently we do not have ratings for these bridges and in most cases we do not have design plans in order to rate them. If you observe any deterioration that will compromise the structural integrity of a short span structure, recommend Priority 1 or Urgent repairs for the affected members.

For State owned bridges, do not use the Priority L repair. Any load rating issues should be addressed under NBI Item *688*. Correct any old inspection reports using this type of repair.

Delete any *688* notes that don't have relevance to the existing condition of the bridge.

Make sure you write a note under *688* identifying the reasons for turning the flag on. If you have any questions contact the Load Rating Engineer, Mohamad Al-Salman.

691 Photos Flag

- Photos should identify the orientation, location, and what is photographed.
- All photos except deck and elevation photos must be referenced in a BMS element note and should have the photo number.
- In the BMS *#691* note include the date (or inspection year) when the deck and elevation photos were taken.

- Photos that are no longer relevant to the inspection report should be deleted. Keep the repair photos in the report for an additional inspection cycle so that the Bridge Repair Engineer, Glen Scroggins, can compare them. The deleted photo numbers must be documented in the *BMS #691* note under an ARCHIVED PHOTOS heading. Enter the date a particular photo was archived. This archived list is kept in the report.
- Do not place a new photo over an existing photo in the photo log. Every photo must have its own number in the archive for possible future reference.
- Use a "P" when a photo other than deck or elevation is needed.
- Photos should be referenced with respect to the assumed bridge orientation, consistent with the rest of the report.

SOUNDINGS

The Scour Engineer, Harold Redman, determines which bridges need stream cross sections (soundings) by placing a "Y" in the NBI soundings flag (*693*). When this is required as part of the inspection, perform the following:

1. Enter data into the *Scour Field Evaluation* Excel spreadsheet (a read-only copy is in *N:\Soundings\Scour Field Evaluation Form.xlt*). This spreadsheet replaces the Filemaker Pro, electronic form *234-037EF*.
   a. If you could not take soundings on the initial inspection trip, plan on getting them on another trip, either by coordinating with another lead inspector or by doing it yourself.
   b. If there is a reason soundings should be taken at a different time of the year (e.g. low water, low tide, or fish windows), add a 9300 note stating the reason.
2. Save the file under the bridge number (e.g. 5_24S.xls) in the appropriate year Soundings folder found in Nailcommon on Dotbrgnail.
3. Attach the completed form to the appropriate bridge *Mobile Bridge* inspection report File tab.
4. Change the *693* flag from "Y" to "N".
5. Place the date soundings were taken in the *693* note. (e.g. 'Soundings taken 2/1/2004').
6. When you return to the office submit an e-mail to Harold Redman stating that the soundings have been completed and that the findings are in the Soundings folder for his review.
7. Harold will e-mail an electronic stream profile file that you will attach to the report Files tab.
   a. Replace any existing stream profile file with the updated one.
   b. Print the stream profile file sent to you by Harold and include it with your inspection review packet.
   c. When preparing for an inspection that requires soundings, print any existing stream profile file to include in your inspection field packet.

WSBIS Coding:

- Secondary WSBIS and NBI elements are no longer used on either the State or Local Agency bridge reports.
- For *688* to *694* flags still being used, change "Y" to "N" after the inspection, leaving fields blank where possible.
- Curb notes should be moved into the sidewalk or bridge rail BMS element note.
- If a timber bridge has had repairs or replacement of primary structural timber elements, establish that WB72-89 is coded a "T" and that WB72-93 is coded a "D" and that the related NBI codes remain low. Code the respective BMS elements as to the actual condition state found during the inspection.
- Compare Curb to Curb Deck Width (WB73-56) and Horizontal Clearance (WB74-91 and 95) and investigate differences (typically they should be the same, except for non-mountable median barrier).

WB-77 Panel

- This panel now contains report types and the ability to add resources to a given report type. The inspection types include: Routine, Fracture Critical, Underwater, Special, Interim, Equipment, Damage, Safety, Short Span, 2 Man UBIT (for local agency inspections), Informational and Inventory. The two new report types are the Short Span and the Informational. The resources panel is used for the 9000 codes and equipment resources such as a UBIT, bucket truck, platform truck, boat, flagging, keys, manual, or special.
- The Short Span inspection option allows the separation of short span bridges for scheduling purposes, as these are not reported to the NBI. If you are doing this type of inspection, report it as a Short Span and not a Routine inspection type.
- The Informational Report option gives us a means to add notes, and attach files or photos to the report between scheduled inspections. Select the Informational check box and add the new information to the appropriate part of the report. The Informational Report will not show up on the inspection report as an inspection. Be aware that this is a 'one time use only' report. In other words, at this time Mobile Bridge can only accommodate one report of any specific type at a time.
- If you have a routine inspection report of a bridge that is not fracture critical and the UBIT is used with the same frequency as the inspection, attach resources to the Routine report including the UBIT as a resource.
- If you have a Fracture Critical inspection report using a UBIT, attach resources to the Fracture Critical Report Type, including the UBIT as a resource.
- If you use a UBIT on an inspection that is not the same frequency as the routine inspection, use a Routine Report and an Equipment Report. Attach the resources, including the UBIT, to the Equipment Report.
- If you have an old inspection type that needs to be removed from your report (e.g. a Routine with Equipment from a previous inspection date), change the inspection from a "Y" to an "N". This report type will still be entered on the current inspection report when printed, but will not be present on any subsequent report.

CULVERT CODING

- Concrete three-sided rigid frames carrying deck traffic are coded as bridges.
- Concrete three-sided rigid frames with any embankment on them are coded as culverts.
- Concrete Boxes with or without embankment are coded as culverts.
- Steel Pipe Arches are coded as culverts.

The BMS quantity is determined by measuring from inlet to outlet of one barrel/pipe and is not dependent upon the number of barrels or pipes.

Do not code any of the *684* to *687* NBI codes as "N" unless they meet the definition of "not applicable", or "not required", such as when there is sufficient roadway fill allowing guardrail placement that is not attached to the culvert structure.

The *Deck Type* (WB75-46) should be coded an "N" for culverts under roadway fill.

The Repair Engineer, Glen Scroggins, will address questions regarding the absence of bridge or guardrails on culverts and short span bridges (*yet to be determined*).

BRIDGE RAIL (WB76-84)

Coding of the WB76-84 entry on the Washington State Bridge Inventory System (WSBIS) sheet should reflect the current standards.

Acceptable crash tested bridge rails are shown on sheet #6 and fall into two general categories:

⇒ Thrie-beam retrofit

- Thrie-beam mounted to baluster rail
- Steel truss and thrie-beam
- Edge mounted thrie-beam
- Thrie-beam mounted to steel posts on concrete deck
- Thrie-beam mounted to concrete girder

⇒ Concrete rail

- New Jersey style rail
- F-shaped concrete rail
- Single slope concrete rail
- 32" vertical concrete parapet

TRANSITIONS (WB76-85)**,***

Transition details are shown in Standard Plans C-3 thru C-3c. Features that the inspector should note are:

- Transitions must be nested (two layers). In most cases this will be thrie-beam. W-beam is allowed only when there is insufficient bridge rail height to accommodate the thrie-beam transition.

- Post spacing should decrease in the transition resulting in gradual stiffening as a vehicle moves along the transition from a flexible guardrail to the more stiff concrete bridge rail.
- Type III transitions (hollow steel post) are not acceptable on two-way highways. On one-way highways, these posts are acceptable on the trailing edge.

GUARDRAIL (WB76-86)**,***

W-beam and thrie-beam are acceptable rail types. Details of these rails are shown in Standard Plans C-1 thru C-1b. Features that the inspector should pay close attention to while inspecting the approach rail are:

W-beam:

- Posts should be 6” x 8” timber (nominal), or W6x9’s, spaced at 6’ 3” o.c.
- Guardrail height (from ground to top of W-beam) should be between 24” and 27”.

Thrie-beam:

- Posts should be 6” x 8” timber (nominal), or W6x9’s, spaced at 6’ 3” o.c. Nested thrie-beam is also acceptable but requires lower post spacing (see Standard Plans).
- Guardrail height (from ground to top of thrie-beam) should be 30”.

TERMINALS (WB76-87)*,**

Acceptable guardrail terminals are:

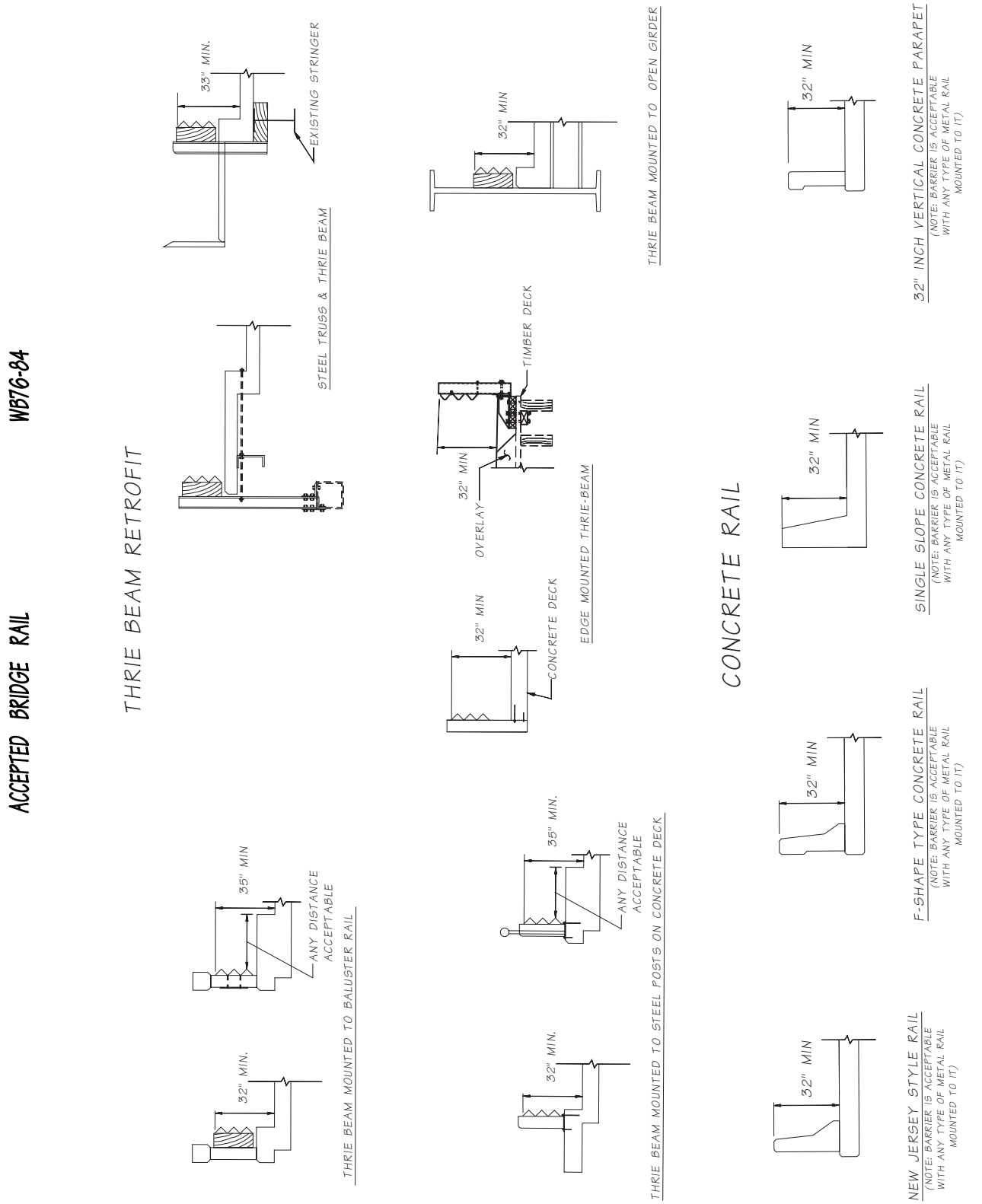
1) Buried terminals[1]
2) Bent back, slotted terminals with anchor cables[2]
3) Square terminals with end piece designed to turn over when impacted3
4) Attenuator style terminals (don’t need to be slotted)4
5) Inertial barriers (barrels filled with sand)[5]
6) Median bullnose terminals[6]

* Terminals should only be coded if within reasonable distance of the bridge. On a fill embankment, this would be near the bottom of the fill slope (Derived from the Design Manual, Figure 700-5).

** Rails are not necessarily required at all four corners of the bridge. For clarification, see the Washington State Bridge Inspection Manual, page 2-113.

*** Note: Concrete rail is also acceptable

[1] Standard Plans C-4 and C-4a
[2] Design Manual Figure 710-13
[3] Design Manual Figure 710-13
[4] Design Manual Section 720
[5] Design Manual Section 720
[6] Standard Plan C-4f
[7] Washington State Design Manual 710-06.2.e


ACCEPTED BRIDGE RAIL
WB76-84
THRIE BEAM RETROFIT
33" MIN.
EXISTING STRINGER
STEEL TRUSS & THRIE BEAM
32" MIN
THRIE BEAM MOUNTED TO OPEN GIRDER
32" MIN
TIMBER DECK
OVERLAY
32" MIN
CONCRETE DECK
EDGE MOUNTED THRIE-BEAM
35" MIN
ANY DISTANCE ACCEPTABLE
32" MIN.
THRIE BEAM MOUNTED TO BALUSTER RAIL
35" MIN.
ANY DISTANCE ACCEPTABLE
32" MIN.
THRIE BEAM MOUNTED TO STEEL POSTS ON CONCRETE DECK
CONCRETE RAIL
32" MIN
32" INCH VERTICAL CONCRETE PARAPET
(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)
32" MIN
SINGLE SLOPE CONCRETE RAIL
(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)
32" MIN
F-SHAPE TYPE CONCRETE RAIL
(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)
32" MIN
NEW JERSEY STYLE RAIL
(NOTE: BARRIER IS ACCEPTABLE WITH ANY TYPE OF METAL RAIL MOUNTED TO IT)

BRIDGE INSPECTION NOTES STANDARD PRACTICE 2005

A. Cardinal directions (north, south, east, and west) are never capitalized, except at the beginning of a sentence. These directions are also not abbreviated. The directions northeast, southeast, northwest, and southwest may be abbreviated NE, SE, NW, and SW.

B. For acronyms, follow the standard practice of spelling out the first time use with the acronym in parenthesis following (e.g.: Highways and Local Programs [H&LP]).

C. Use of abbreviations should be limited. The following are allowed abbreviations:

F	Fahrenheit	A.M.	a.m.
in. or “	inch (inches)	P.M.	p.m.
ft.	foot (feet)	NW NE SW SE	directions
sq. ft.	square feet	etc.	etcetera
psi	pounds per sq.in.	YT	Yellow tagged
psf	pounds per sq.ft.	RT	Red tagged
ACP	asphalt concrete pavement	LMC	latex modified concrete
BST	bituminous surface treatment	HMA	hot mix asphalt
SR	State Route	US	National Highway
I	Interstate		

The following abbreviations can be used on sketches, tables, and other supporting documents where space limitations justify it:

elev.	elevation	dia.	diameter
deg.	degree	o.c.	on center
approx.	approximately	horiz.	horizontal
misc.	miscellaneous	vert.	vertical
transv.	transverse	alum.	aluminum
longit.	longitudinal	galv.	galvanized
max.	maximum	ss	stainless steel
min.	minimum	RR	railroad
avg.	average	O.D.	outside diameter
		I.D.	inside diameter

D. Limit the use of symbols to ° for degrees and % for percent.

E. Dimensions are noted with a space between feet and inches, and a hyphen between whole inches and fractions of an inch. When combined with other dimensions, a '0' should precede bare fractions of an inch. Measurements greater than 12" may be listed in inches, if appropriate. Decimal inches may also be used. For example:

   a. 1' 1-1/16" x 6' 0-7/8"

   b. 6" x 14" timber stringers.

   c. 8" x 14" x 1/2" deep spall.

   d. 3 ft. wide x 14 ft. long x 2.5 ft. tall bridge corbel.

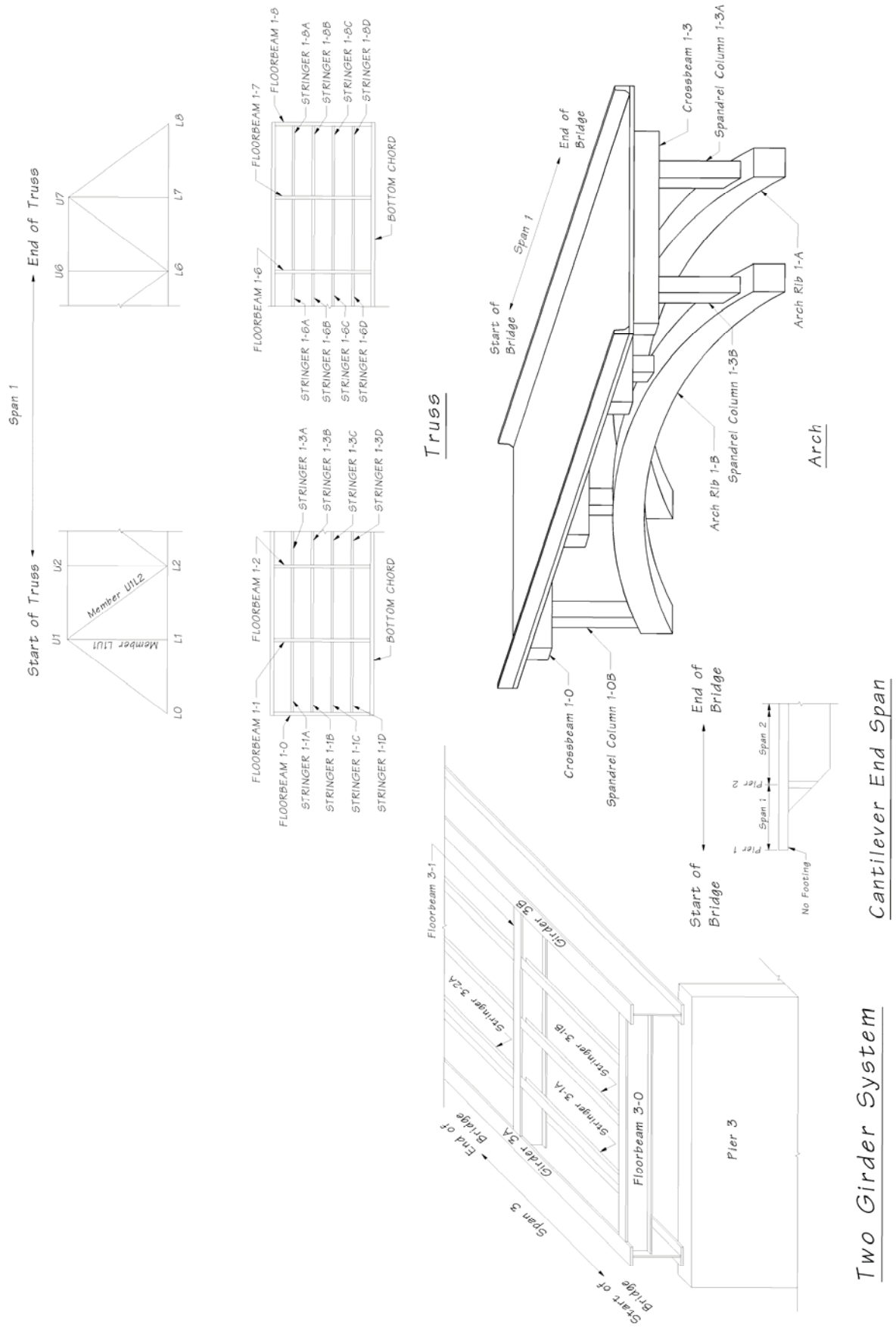
   e. 12 ft. (L) x 15' 6" (W) x 3" (D) popout in south face of Pier 2.

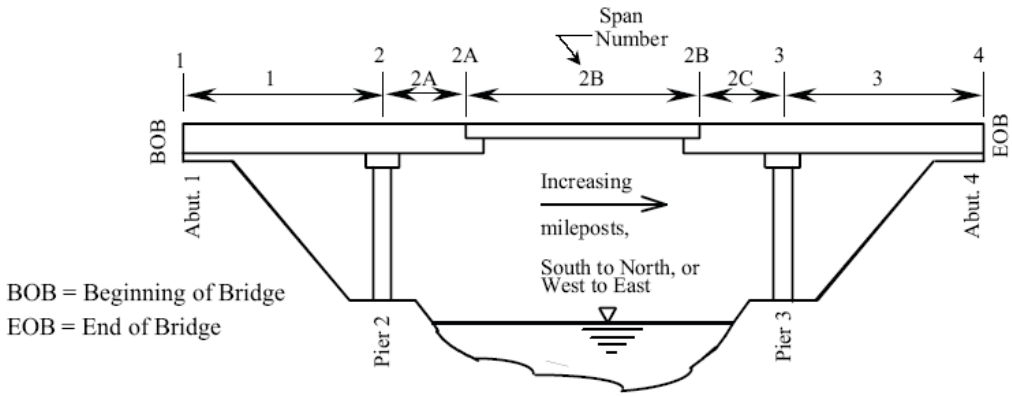
   f. 1' 0-3/4"(l) x 0.125"(w) crack in east face of Girder 2F.

   g. 42.2" long anchor bolts.

F. Floorbeam is one word. Pier 1 is not abbreviated P1. Prestressed and post-tensioned are the correct spellings of those words.

G. Deck photos need not be labeled as "roadway" deck.


Start of Truss
Span 1
End of Truss
U1
U2
U6
U7
L0
L1
L2
L6
L7
L8
Member U1L1
Member U1L2
FLOORBEAM 1-0
FLOORBEAM 1-1
FLOORBEAM 1-2
FLOORBEAM 1-6
FLOORBEAM 1-7
FLOORBEAM 1-8
STRINGER 1-1A
STRINGER 1-1B
STRINGER 1-1C
STRINGER 1-1D
STRINGER 1-3A
STRINGER 1-3B
STRINGER 1-3C
STRINGER 1-3D
STRINGER 1-6A
STRINGER 1-6B
STRINGER 1-6C
STRINGER 1-6D
STRINGER 1-8A
STRINGER 1-8B
STRINGER 1-8C
STRINGER 1-8D
BOTTOM CHORD
BOTTOM CHORD
Truss
Start of Bridge
Span 1
End of Bridge
Crossbeam 1-0
Spandrel Column 1-0B
Arch Rib 1-B
Spandrel Column 1-3B
Arch Rib 1-A
Crossbeam 1-3
Spandrel Column 1-3A
Arch
Start of Bridge
End of Bridge
Pier 1
Span 1
Pier 2
Span 2
No Footing
Cantilever End Span
Start of Bridge
Span 3
End of Bridge
Floorbeam 3-1
Girder 3A
Girder 3B
Stringer 3-1A
Stringer 3-1B
Stringer 3-2A
Floorbeam 3-0
Pier 3
Two Girder System

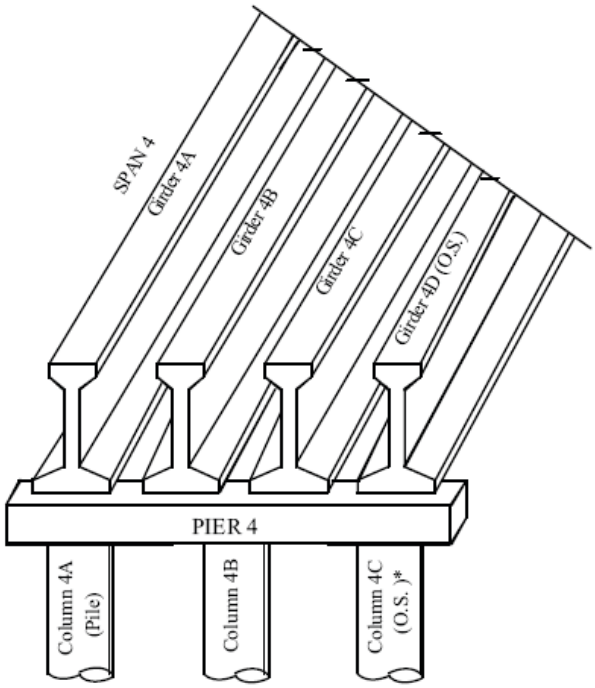


COMPONENT LOCATION

ORIENTATION: B.O.B. NORMALLY SOUTH OR WEST ENDS FOLLOWING ROUTE ORIENTATION.

EXCEPTIONS INCLUDE:
ONE WAY RAMPS – B.O.B. = FIRST END TO RECEIVE TRAFFIC.
SELECTED BRIDGES THAT FOLLOW PLAN ORIENTATION.

THERE IS NO GOLDEN RULE ABOUT ORIENTATION EXCEPT THAT B.O.B. MUST ALWAYS BE IDENTIFIED IN THE '0' NOTE ALONG WITH BASIS FOR THIS ASSUMPTION.



COMPONENT IDENTIFICATION

PRIMARY ELEMENTS
Looking Ahead on Mileposts
South to North or West to East

ADMINISTRATIVE GUIDELINES
STATE OWNED PEDESTRIAN BRIDGES/SHORT SPANS

These bridges are not submitted to the Federal Highway Administration (FHWA). The reports should be written as though they are submitted. Include all BMS elements that apply and code the NBI section as you would any other state bridge.

INVENTORY INSPECTIONS

Bridges receiving their first inspections (usually new bridges, but also widenings, agency transfers, etc.) require a thorough check of the WSBIS and BMS elements and quantities.

Inventory inspections fall into three categories:

1. Inventory inspections of structures under contract at "substantial completion". These must be closely coordinated with the construction project office and carefully timed to be part of the punch list at "substantial completion". The Bridge Preservation Office (BPO) makes every effort to perform inventory inspections this way. The following information is taken from N:\Inspection Guidelines\Inventory Inspections.doc. See the file for additional information taken from the Construction Manual.

   Inspection of Structures Under Contract

   - Inventory Inspection Packet organized by the Bridge Inventory Technician will include the Project Office contact and contract numbers.
   - For inventory inspection or safety inspection under contract, the BPO inspector **MUST** make contact with the Project Office (Project Engineer if possible) prior to performing inspection.
   - If construction defects or safety issues are found during inspection:
   - Emergency contacts:
     1st) Project Engineer
     2nd) Harvey Coffman / Glen Scroggins
     3rd) Construction Office
   - Routine Maintenance - contact the Project Office and Regional Maintenance Staff.
   - When you discover a bridge to be inspected that is under contract, try to make contact with the project office and get permission to enter. If no contact can be made, **skip inspection** until contact can be made and permission is granted.
   - **Do not** directly talk to contractor.
   - Construction Office Contacts:

Mohammad (Mo) Sheikhizadeh	(360) 705-7828
Virgil Schmidt	(360) 705-7825
Mark Gaines	(360) 705-7827

2. Inventory inspections conducted after contract completion: Sometimes it isn't possible to schedule inventory inspections to match the date of "substantial completion". In these situations, the inspector needs to make sure that there is no construction activity before performing the inspection. If there are signs of activity, the inspector must contact the project office and obtain permission to enter the site.
3. Inventory/safety inspections of structures under contract before "substantial completion": These inspections are required because the partially completed bridge is opened to traffic but significant phases of the construction work are not yet completed. These inspections must also be closely coordinated with the construction office and performed within 90 days of opening to traffic. This type of inspection is really a safety inspection, and no BMS element coding is required. See SAFETY INSPECTIONS below.

SAFETY INSPECTIONS

The Bridge Preservation Engineer, Harvey Coffman, has directed that the following bridges receive safety inspections, although there is no federal mandate to perform these.

1. Non-State owned bridges crossing over state routes. The NBI codes for deck (*663*), superstructure (*671*) and substructure (*676*) should be coded a 9. These bridges could be railroads, local roads, local agency pedestrian bridges, or utility bridges owned by the utility. The inspection frequency is generally 72 months, and the only BMS code used is element #366.
2. New State bridges under construction that are not "substantially complete" yet open to traffic. The NBI codes for deck (*663*), superstructure (*671*) and substructure (*676*) should be coded as appropriate for a routine inspection. All appropriate NBI codes shall be entered, but only BMS element #366 is used. The maximum inspection frequency in this case is 12 months.

Note that all state owned bridges; even if they are not NBI bridges (pedestrian and short spans) should receive full NBI and BMS inspections. The inspection frequency is generally 24, 48, or 72 months. The 24-month frequency is used for timber bridges or bridges needing repair.

EMERGENCY/DAMAGE INSPECTIONS

- If called upon to do an Emergency/Damage Inspection, fill out a damage inspection report in Mobile Bridge. Add comments under the appropriate BMS elements describing the damage. Add an Impact Damage (362) element if required. Add the damage photos and revise the BMS condition state codes if necessary. Write a repair if one is required. Attach the ALERT form and the Critical Damage-Bridge Repair Report (CDBRR) form (if used) to the report. Submit the report to 'Review' in Mobile Bridge. Deliver a clean copy of the damage report as well as your field notes to your supervisor for review.
- An ALERT form is required for all Emergency/Damage inspections. An electronic copy of this form can be found in Nailcommon\BridgeDamage\ALERT.
- A CDBRR form (#140-151EF) is submitted to the Bridge Preservation Engineer, Harvey Coffman. This form is required when a bridge fails, a lane

or bridge closure is required due to structural damage affecting load carrying capacity, or the bridge is load posted until repairs are made. See Section 7.02 of the WSBIM for further clarification.

- Place all electronic files, including emails and photos, associated with an Emergency/Damage inspection into Nailcommon\BridgeDamage\2005\(bridge number and date).
- Send an e-mail, with relevant forms and photos attached, to the Bridge Preservation Supervisor, Glen Scroggins, informing him of the bridge damage inspection.
- The review process for a damage report will be similar to that of a regular report. However if the report has repairs related to the damage, the report will require Glenn Scroggins' approval and agreement to the repairs called out.
- After the inspection report package has been signed place the report, attachments, and relevant photos in the "for scanning" tray located in Sharan Linzy's cubicle.
- The report will ultimately be scanned and submitted to the Bridge Engineering Information System (BEIST) as a Damage Report. The Bridge Information Unit will place a copy of the approved/signed damage inspection report including all associated files and photos in the bridge letter file.

BRIDGE DECK WALKING GUIDELINES FOR BRIDGE INSPECTIONS

For routes/locations other than those designated for rolling attenuator inspection or rolling video inspection:

DON'T COMPROMISE YOUR SAFETY! Decks must be walked facing traffic.

DO consider these conditions before judging it safe to walk the deck:

Traffic volume and speed

Weather conditions: rain, fog, ice

Time of day, ambient light, visibility

Time of day: peak vs. low traffic volumes

Length of time required on deck for inspection

Shoulder width, sidewalk width

Bridge length

Can inspection team return at another better time?

Can inspection team use traffic control, schedule rolling attenuator inspection, or use rolling video inspection?

The lead inspector and co-inspector shall agree on the course of action; if either judges it unsafe the bridge deck shall not be walked. If you can return to walk the deck at a safe time do so. Otherwise note in the report that deck wasn't inspected and why, with your recommendation as to whether it needs weekend deck walking, traffic control, rolling attenuator inspection, or rolling video inspection.

REPAIRS

The Bridge Repair Engineer, Glen Scroggins, wants to increase the use of standard descriptions for similar types of repairs. See Glen for repair description guidance.

Please note that the inspector's repair priority recommendations are subject to change during review. Consequently, the descriptions in the inspection report must be very specific regarding the condition. Avoid any statements in the BMS element note concerning the need for repair or type of repair, except as indicated below. All such descriptions must be placed in the repair note itself.

- A "REPAIR" notation should be put in the individual element note with the appropriate repair number.
  - Example (element #113, Steel Stringer): Stringer F in Panel 2 at Floorbeam 2 has a 4-½" long crack at the top cope. See photo #7. REPAIR 123456.
  - Example (element #311, Moveable Bearings): Rocker bearings measured at 55 degrees F on 6/16/2004 at 10:30 a.m. The offset of rocker axis from the vertical was measured at the center of the top pin. REPAIR 123456. Rocker bearings at Pier 7 are tipped as follows:

    Rocker A: 2" expansion side (north). See photo #3.

    Rocker B: 1-¾" expansion side. See photo #4.

    Rocker C: 2" expansion side. See photo #6.

Note that these examples could be Priority 1 through Priority 4 (Monitor).

- A completed repair should have the verification date along with the repair number in the individual element note. Remove this verification note during the subsequent inspection.
  - Example (element #113, Steel Stringer): Stringer F in Panel 2 at Floorbeam 2 crack, REPAIR 123456 verified 1/20/02. See photo #9.
- A photo must be taken of every proposed and completed repair of any priority. Multiple photographs, **including an overall view**, are helpful to bridge maintenance personnel. If repair photos are not taken, someone will need to return to the site to obtain them. If there is a chance that a defect may require a repair, take a photo.
- The text in the description of all repairs should be concise and detailed, including exact measurements and location.
- Do not put multiple repairs in the same repair note, unless they are similar.

  SIMILAR: 'Replace 10 ft. red tagged (RT) timber cap at Pier 2 and 5 ft. RT timber cap at Pier 3.'

  NOT SIMILAR: 'Replace upper 10 ft. RT Timber Pile 5A and entire Submerged Timber Pile 4B.'
- Any portion of a primary BMS element that has been repaired should be coded CS 2.
- For any repairs that require instructions from the BPO office, consult Glen Scroggins for the required repair design lead-time.

- For repairs involving exterior girders having embankment material piled up against them, first check the plans in order to determine if the bearings are designed with a caulking detail allowing fill to be placed against the girders. If this caulking detail is not present, use a Priority 2 repair when the bearings are affected and a Priority 3 repair when they are not.
- Investigate fully and report any and all joint noises and their origination.

PRIORITY REPAIRS (Section 7.03)

- **Priority 1:** These are repairs that affect the structural integrity of the bridge or are potentially unsafe for vehicle or pedestrian traffic. This type of repair should be completed as soon as possible. The frequency may be shortened in order to verify that repairs have been completed and that safety concerns have been addressed.

  Examples: Exposure of damaged strands and/or rebar, existing potential for material falling from the bridge, loose or missing balusters in pedestrian and/or bridge rail, 'D' spalls in the joint header at the bridge (this could be a Priority 2).

- **Priority 2:** This type of repair is for deficiencies in structural components. These defects do not cause major impact to the safe operation of vehicle or pedestrian traffic.

  Example: Spalling in the deck soffit and/or concrete girders (if not excessive this could be a Priority 3).

- **Priority 3:** These repairs are usually not structural in nature. They are generally "housekeeping" type of repairs.

  Examples: Clean drains, remove ivy from abutment, and remove debris from around bearings.

- **Priority 4:** Priority 4 (monitor) repairs require no action from the region bridge crews, but they should be aware of the condition, since the problem/defect could evolve into a repair. A reduced inspection frequency may be necessary in order to monitor the problem/defect. **Significant refinements to monitor repairs will be implemented in 2006, as follows:**

  1. Every monitor repair note must be updated at each routine or interim inspection with a clear statement of findings. This update including the inspection date, inspector initials, and notes on the changed condition will be appended to the existing repair note. If the condition is unchanged simply state, "No changes noted." If there are changes, documentation of the changed condition must be attached.
  2. Every monitor repair note must include measurable information about the condition of interest, allowing subsequent inspectors to more easily and accurately determine if the condition is changing. Photos, sketches, and/or measurements are among the ways to provide this information, which must also clearly include location and date. It may be appropriate to reference an attached file with historical data in the monitor repair note.

3. Over time, every monitor repair note will provide information on what circumstances warrant repair action. Inspectors will be expected to provide this information when possible, but it is recognized that this information may require more detailed evaluation and structural analysis beyond the scope of bridge inspection work.

Some existing monitor repairs may not meet the requirements listed above. In this case, please coordinate with Glen Scroggins to determine if a monitor repair is appropriate.

- **Priority J:** This type of repair should be used for repairs not directly affecting or directly attached to the bridge. Approach roadways as well as guardrail and guardrail attachments to the bridge rail are usually Priority J. Deck joints and defects on both sides of the abutment headers are not Priority J.

  Examples: Trim tree branches, removal of trees that are in the operating path of the UBIT, erosion gullies not affecting foundation, and potholes in the approaches.

- **Priority S:** This is a flag for further evaluation by the Scour Engineer, Harold Redman, and should be used to identify new or changed scour conditions. If there is a Priority 1 through 4 scour repair but the condition has changed, change the priority to "S" and add descriptive text to the repair note including your initials and the date.

  Contact Harold with information when it is apparent that repairs have been made and allow him to verify them. Include photos and other information about the repairs. Put a note in BMS element #361 with the date Harold was contacted.

- **Priority V:** This is a flag for a repair used for the physical posting of height restrictive bridges. All WSDOT bridges require vertical posting if the vertical clearance is less than or equal to 15 ft. (see WSBIM page 2-43). The verbiage in the note should indicate the height to be shown on the posting signs (3" less than the measured height) and where that measurement was taken (e.g. 'centerline', 'white edge stripe', 'yellow fog line'). This repair note should also state: 'Region maintenance please verify this height prior to installing the posting signs'.

  The actual measured height is shown in WB73-70 and at the far right of the NBI codes on the Bridge Inspection Report.

  WB76-94 should be populated if a measurement needs to be taken (See Page 2-114 of the WSBIM).

CHANGING EXISTING REPAIRS

- Add a dated and initialed note in parenthesis briefly explaining the reasons for any changes to an existing repair note, including a priority change.
- If you need to rewrite a repair, eliminate the original repair description by entering a date in the "Verified" column. Add a note in parenthesis in the repair description stating reasons for its removal, and then enter the new repair with the original repair date.

- Break out and rewrite repairs when dissimilar elements are called out in the same repair. Date the new repair with the original repair date.
- Be sure to revise the BMS element notes where the new and old repairs are referenced.
- Maintain repair notes with multiple items that are similar in nature. For each item in a given repair, add a dated verified note opposite each item when that particular repair is completed.

LOCAL AGENCY REPORTS

- After the local agency reports are finalized and signed, submit a complete package to the Bridge Resource Technician, Sharan Linzy. Sharan scans the reports and forwards them to Highways and Local Programs (H&LP). H&LP sends the packets to the local agency.

  A complete package consists of:

  WSBIS sheet

  Signed inspection report in complete status

  Color copies of photos (no need for signatures) must be clean with no markings

  Signed Fracture Critical Report (procedures, report, drawings) when applicable

  Sounding Report when applicable

  Any and all reports/documents required/requested

- Changes to the inspection frequency, after discussion between the Regional Inspection Engineer (Craig Yasuda or Jody Bywater) and the H&LP Engineer (Grant Griffin), are to be noted in an "N" repair.

LOCAL AGENCY BRIDGE SCOUR

- **All scour critical bridges need soundings at every routine inspection.** Bridges with NBI *680* scour codes of 2, 3, and 4 are definitely scour critical. We are assuming that bridges with scour codes of 6, "U", or "T" are scour critical. The NBI *693* note needs the following comment: "Take soundings every routine inspection on this scour critical bridge." Also ensure that the *693* flag code is a "Y" at all times. This will help the process stay in place over time.
- Bridges that are not scour critical do not need cross sections unless there is some specific need that is documented in the report. If for some reason there is a flag to perform a cross section, look for some justification and take the soundings, but indicate in the *693* note to discontinue soundings in the future.
- Scour critical bridges (and those with codes of 6, "U", or "T" that are assumed to be scour critical) that have exposed footings or have a history of scour caused exposed footings REQUIRE a priority 1 scour repair. This repair should read as follows: "Scour mitigation needs to be evaluated."

- Bridges with a scour code of 6, “U”, or “T” need an “N” priority repair with the following statement: “WB76-80 is coded [6, “U”, or “T”] indicating that the bridge foundation [has not been evaluated, is not known, is tidal, and has not been evaluated]. This inspection report assumes the bridge is scour critical.”

RENTAL EQUIPMENT

For rented access equipment the following is required:

- Review the invoice when you receive it from the BPO Accountant, Alice Nabors, making sure that the rate and time used are correct.
- Notify the rental office of any discrepancies found.
- Write the bridge number and dates used on the invoice.
- Return it to Alice for processing.

Contact the Individuals Below for Prices

Owner	Contact Person	Specifications
	*** WASHINGTON ***	
WSDOT	Regional Bridge Inspection Engineer 360-570-2530 360-570-2552	Four UBIT's with operators available for rent. One weighs approximately 33,000 lbs. with approximately 30´ of horizontal reach, two weigh 64,800 lbs. with a 50´ horizontal reach, and one weighs 64,600 lbs. with a 60´ horizontal reach. Available for rent only when state bridge inspect schedule allows. Call for additional specifications.
City of Spokane	City Bridge Engineer 509-625-7738	UBIT with operator available for rent. UBIT weighs 61,000 lbs. and has about a 50´ horizontal reach.
City of Seattle	Bridge Maintenance and Operations Manager 206-684-8325	UBIT (UB50) with operator available for rent. The UBIT weighs 60,000 lb. Max.horizontal reach is 51´, the max.vertical reach is 63´.
B.E.R. LLC. Underbridge Equipment Rentals	1-888-806-0204 Fax 201-934-0369	UBIT trucks and truck mounted platforms advertised for rent. Call for rates and specifications.
	*** OREGON ***	
ODOT	State of Oregon Transportation Services UBIT Dispatcher 503-986-2743	Two trucks available for rent. Call for rates and specifications.
WEST COAST Bridge Access Equipment	503-209-9011 Office/Fax 503-632-1885	Hydra Platform – 1000 lb Capacity
City of Portland	Bridge Maintenance Engineer 503-823-6668	UBIT with optional platform available for rent. Call for rates and specifications.
	*** BRITISH COLUMBIA ***	
Al Ferris Contracting	Al Ferris 604-936-5344	UBIT with two operators available; weighs 58,000 lbs. and has 37´ horizontal reach.

UBIT Inspections and Procedures

The following explains the procedures for Under Bridge Inspection Truck (UBIT) inspections.

1. Determine Those Bridges Which Will Require Inspection With a UBIT

   On some structures the inspector will not be unable to gain sufficient access to determine the structural condition of the member (for example, floorbeam and stringer connections, a pier cap, or a bearing device in midspan or on top of interior piers that are too high for ladders). If this is the case, a UBIT, ladder, scaffolding, catwalk, boat, or some other means maybe required to provide sufficient access.

   Make a Master List of all the bridges needing a Routine UBIT Inspection.

2. Provide for the Use of the UBIT

   The UBIT is an expensive piece of equipment and only a few agencies have enough budget to purchase one. There are only a few UBIT owners in the Pacific Northwest. In addition, these trucks are complicated pieces of equipment which require special expertise to operate. A trained driver must be used to operate the truck.

   The Washington State Department of Transportation (WSDOT) has purchased UBITs. WSDOT Highways and Local Programs Service Center funds for all Washington State local agency UBIT inspections.

3. Conduct the UBIT Inspection

   The UBIT inspection gives “hands on” access to under bridge elements for the routine inspection. The inspector should make the same observations and assessments as would be made during a routine inspection. (See the heading ROUTINE INSPECTIONS for details.) Given the expense of contracting for the use of this equipment, special care should be taken to ensure that the UBIT inspection is performed effectively.

   It is a good idea to map out an inspection plan that will allow an inspection of the entire under portion of the bridge in as few steps as possible and with as few changes in the positioning of the UBIT as needed. Contact between the inspector in the bucket and the truck operator should be maintained at all times to ensure the safety of the operation and to allow for proper positioning for the inspection. The inspector should be sure to carry along any and all inspection equipment required (test hammer, note pad, camera, etc.). Finally, the inspector should ensure that needed traffic control can be provided and that all other necessary special equipment will be available. If these steps are taken, the UBIT inspection can be accomplished quickly and at minimum expense.

4. Record the Inspection Findings on the Bridge Inspection Report

   The UBIT inspection findings should be recorded on the Bridge Inspection Report. The same procedures can be followed as were described Routine Inspection Reports in Section 3.05-B.

5. Update the WSBIS Inventory Record and the Master List

   Any other changes needed for the WSBIS Inventory Record (add the inspection date for UBIT, Fracture Critical, and/or Special Inspections) should be submitted on the WSBIS inventory report (see Chapter 2).

   The Master List may also require updating so that it contains the most current information for the bridge schedule.

6. Frequency

   The federal training manual does not give any instructions of how often a routine UBIT inspection needs to be completed. To determine the frequency necessary, a history of the bridge condition and deterioration needs to be established. After a few Routine UBIT Inspections are completed the history and deterioration can be determined. For those bridges that don't need a UBIT Routine Inspection each time, the inspection frequency can be rotated. For a "rule of thumb," the state of Washington has chosen the following:

Type of Structure	Frequency (Months)
Timber	24
Steel Trusses	24
Steel Bridges with pins and hangers	24
Non-fracture Critical Steel Bridges	48
Concrete Bridges with movable bearing in the interior spans	48
Concrete Bridges with fixed bearing or no bearings maximum	72

7. Traffic Control

   A lane of traffic or equivalent shoulder width needs to be taken for the UBIT Inspection. The traffic control needs to follow the MUTCD Manual for proper signing and flagging in the temporary work zone. Local events and traffic disruptions need to be checked before scheduling an UBIT Truck. Emergency response agencies, schools, the public, and businesses affected by the inspection need to be notified so they can adjust as necessary. All these items need to be checked and completed before committing to the actual inspection date.

8. Fall Protection Plans

   L&I and the WAC require a Fall Protection Plan be completed at each UBIT Inspection site. The retrieval systems and the safety emergency plans need to be known and signed on the Fall Protection Form by all in the work zone prior to beginning the inspection. Costly fines can result if this is not completed.

Washington State
Department of Transportation

Bridge Preservation Dive Team

UNDERWATER INSPECTION REPORT
FOR THE
LAKE SAMISH BRIDGE

BRIDGE NO. 107

STRUCTURE ID 08363700

Inspection Date: August 30, 2005

Lead Inspector/Diver: Joe Anybody, P.E. **Cert. #:** G1407

(Signature)

Inspector/Diver: Jeff Somebody, P.E.

(Signature)

UNDERWATER INSPECTION REPORT
FOR THE
LAKE SAMISH BRIDGE
BRIDGE NO. 107
STRUCTURE ID: 08363700

EXECUTIVE SUMMARY

The WSDOT BPO Dive Team completed the underwater inspection of the Lake Samish Bridge on August 30, 2005.

Overall, the structure is in good condition. The timber piles and bracing were sounded an arm's length above the waterline down to the mudline. There was no indication of rot or decay in either of these elements. A sample of the bolted connections for the bracing were cleaned and inspected at each bent. There is some corrosion and minor surface pitting, but no significant structural defects. Water depths at the various bents were similar to the previous U/W report denoting no scour condition or real change in the channel profile. No repairs are recommended at this time.

INSPECTION FINDINGS

Horizontal bracing; approx. 6 ft below the waterline at Bents 3 and 4, and approx. 3 ft below waterline at Bents 2 and 5, was located. There is no mention of this bracing in the previous underwater report. At Bents 2 and 5, steel brackets with newer crossbeams were noted, but not inspected (see Photos #1 and #4).

Timber piling and bracing were sounded with no defects noted. A majority of the piles have structurally insignificant splits at the mudline due to pile driving operations. Throughout the structure, the bolted connections were cleaned for closer inspection. Minor corrosion and surface pitting was noted, but overall condition is good (see Photos #5 and #6).

At the mudline, there is some wooded debris, wire rope, and construction debris, but none is significant. The lake bottom consists mainly of sand with a silt layer on top. This layer is easily disturbed and reduces visibility instantly.

FATHOMETRIC SURVEY

A fathometric survey of the lakebed was not performed. Refer to the Layout sheets for water depths.

Washington State Department of Transportation

Daily Site Dive Log

Inspector	Date
Joe Anybody, P.E.	August 30, 2005

Bridge Number	Bridge Name
107	Lake Samish Bridge

Bridge Type	Waterway Name
Treated Timber Trestle	Lake Samish

Dive Objective
U/W inspection of bridge substructure components.

Diving Operation

Type of Operation ☒ SCUBA ☐ Submarine (ROV) ☐ Other _____
☐ Hard Hat ☐ Surface Supplied Air

Equipment

Suit	High Tide Pro Dry Suit
Air Supply	AGA Full Face Mask, Faber LP 95 Steel Tanks w/ Aluminum 19 Pony
Site Access	Jonboat (14' boat)
Inspection Tools	Wireless Comms., Hammer, U/W Lights, U/W Camera
Repair Tools	N/A
Repair Materials	N/A

Conditions

Water ☐ Salt ☒ Fresh Temperature 70 °F Visibility 15' +

Surface ☒ Calm ☐ Choppy ☐ Rough

Surf ☐ Small ☐ Medium ☐ Large ☒ N/A

Tide ☐ High ☐ Low ☐ Flood ☐ Ebb ☒ N/A

Current ☐ Fast ☐ Moderate ☐ Slow Velocity 0 ft/sec.

Weather ☐ Sunny ☐ Cloudy ☒ Overcast ☐ Rain Air Temperature 70 °F

Thermocline Temperature N/A Depth N/A ft.

Diver Checks

☒ First Aid Equipment on Site
☒ Comunication for EMS
☒ Dive Gear Inspection
☒ Air Source Checked
☒ Physical Condition of Diver(s) Checked
☒ Communications for Diver(s)
☒ Dive Team Briefed and Understand Dive
☒ Special Site Hazards Noted
☐ _____
☐ _____

Dive Plan and Dive Team Procedures

Conduct site tour and pre-dive safety checklist. Determine individual roles and responsibilities. Two person dive inspection team will dive adjacent piles beginning at Pier 2 then proceed on the surface in unison to the next pier. At completion of the inspection, check physical condition of the divers and perform post-dive safety briefing.

DOT Form 140-090 EF
4/98

Dive Schedule

Dive No.	Entry Time	Exit Time	Total Time in Water	Maximum Depth	Remarks
1	12:17 pm	1:20 pm	1:03:00	15 ft	

Dive Narrative

Arrived on-site, performed site tour and pre-dive safety checklist, then assigned roles and responsibilities. Joe Anybody would be the working diver with Jeff Somebody as the safety diver in a two person inspection team. Bob Nobody would control surface support and communications.

The divers began at Bent 2, sounding the timber piling an arm's length above the waterline down to mudline. At each bent, several of the bolted connections were cleaned to ascertain condition of the bolts and the bracing. Depths for each pile were recorded prior to moving to the next adjacent bent. This inspection procedure was utilized for each bent. The visibility allowed an excellent visual inspection of the substructure components, as well as constant visual contact between divers.

At the completion of the inspection, a physical check of the divers ensued with a post-dive briefing.

Dive Team Members		
	Joe Anybody, P.E. (Print Name)	Working Diver (Role)
	Jeff Somebody, P.E. (Print Name)	Safety Diver (Role)
	Bob Nobody, P.E. (Print Name)	Surface Support / Communications (Role)
	(Print Name)	(Role)
	(Print Name)	(Role)

DOT Form 140-090 EF
4/98

Washington State Department of Transportation

Underwater Inspection Report

Bridge Number	Route	Agency	Date
107	N Lake Samish DR	Whatcom County	8/30/2005

Bridge Name	Intersecting
Lake Samish Bridge	Lake Samish

Inspector	Identification No.	Hours on Site
Joe Anybody, P.E.	G1407	3

Dive Contractor
WSDOT BPO Dive Team

Diver Name	Diver Name
Joe Anybody, P.E.	Jeff Somebody, P.E.

Structure Type	Substructure Type
Treated Timber Trestle	Timber Pile

Foundation Type	Number of Spans	Number of Piers in Waterway
Timber Pile	5	4

6	Bents (1)	
	Abut/Pier Wall (2)	
	Web Wall (3)	
	Columns (4)	
	Shaft (5)	
	Piles (6)	
	Bracing (7)	
	Foundation (8)	
	Footing (9)	
	Seal (10)	
	Piles (11)	
N	Scour (12)	
	Scour Mitigat. (13)	
8	Channel (14)	
	Streambed (15)	
	Drift (16)	
	Flow (17)	

1	Bents 2 and 5 have recently installed steel brackets with newer crossbeam.
	See Photos #1 and #4.
4	Timber piles in good condition. No rot or decay noted.
6	A majority of the piles have splits at the mudline from pile driving operations.
	No structurally significant defects noted. Several piles have 1” diam. drilled holes
	from abandoned bracing connections. Not significant.
7	Bracing in good condition. Connections have typical corrosion and surface
	pitting, but are sound. Refer to Photos #5 and #6.
12	Scour is not applicable.
14	Channel is well vegetated.
15	Lakebed is mostly sand with light silt. Silt stirs up easily if disturbed.
16	Some wooded debris, wire rope, and construction debris at mudline. No significant hazard to structure or
	divers.
17	No flow.

DOT Form 234-026 EF
Revised 9/98

Page 1 of 1

Bridge Number	Bridge Name	Date
107	Lake Samish Bridge	Aug 30, 2005

Photograph 1 : Steel brackets with newer crossbeam at Bent 2 looking south.

Photograph 2 : Bent 3 looking south.

Page 1 of 3

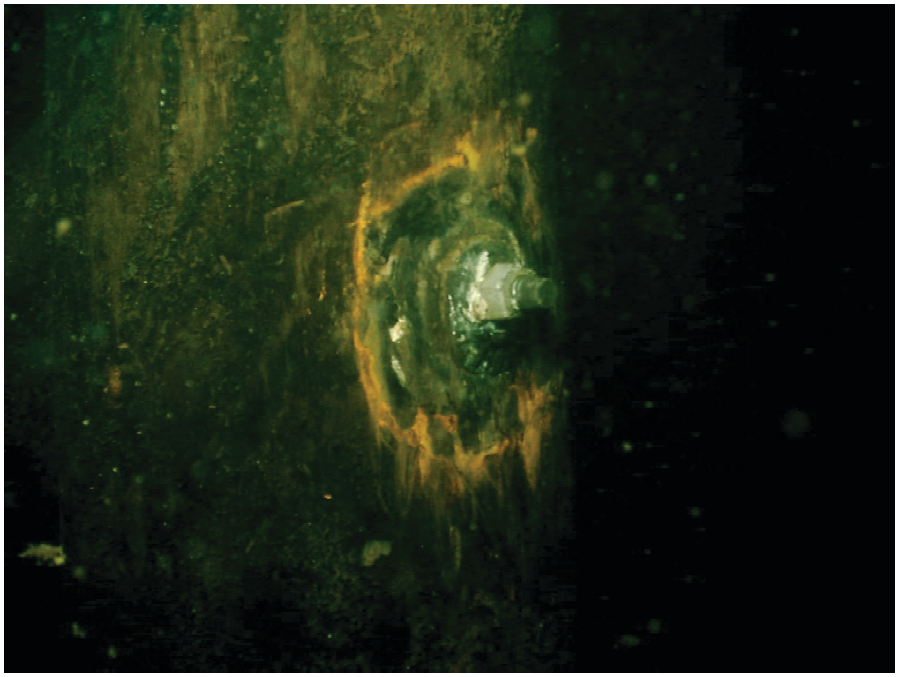
Bridge Number	Bridge Name	Date
107	Lake Samish Bridge	Aug 30, 2005

Photograph 3 : Bent 4 looking south.

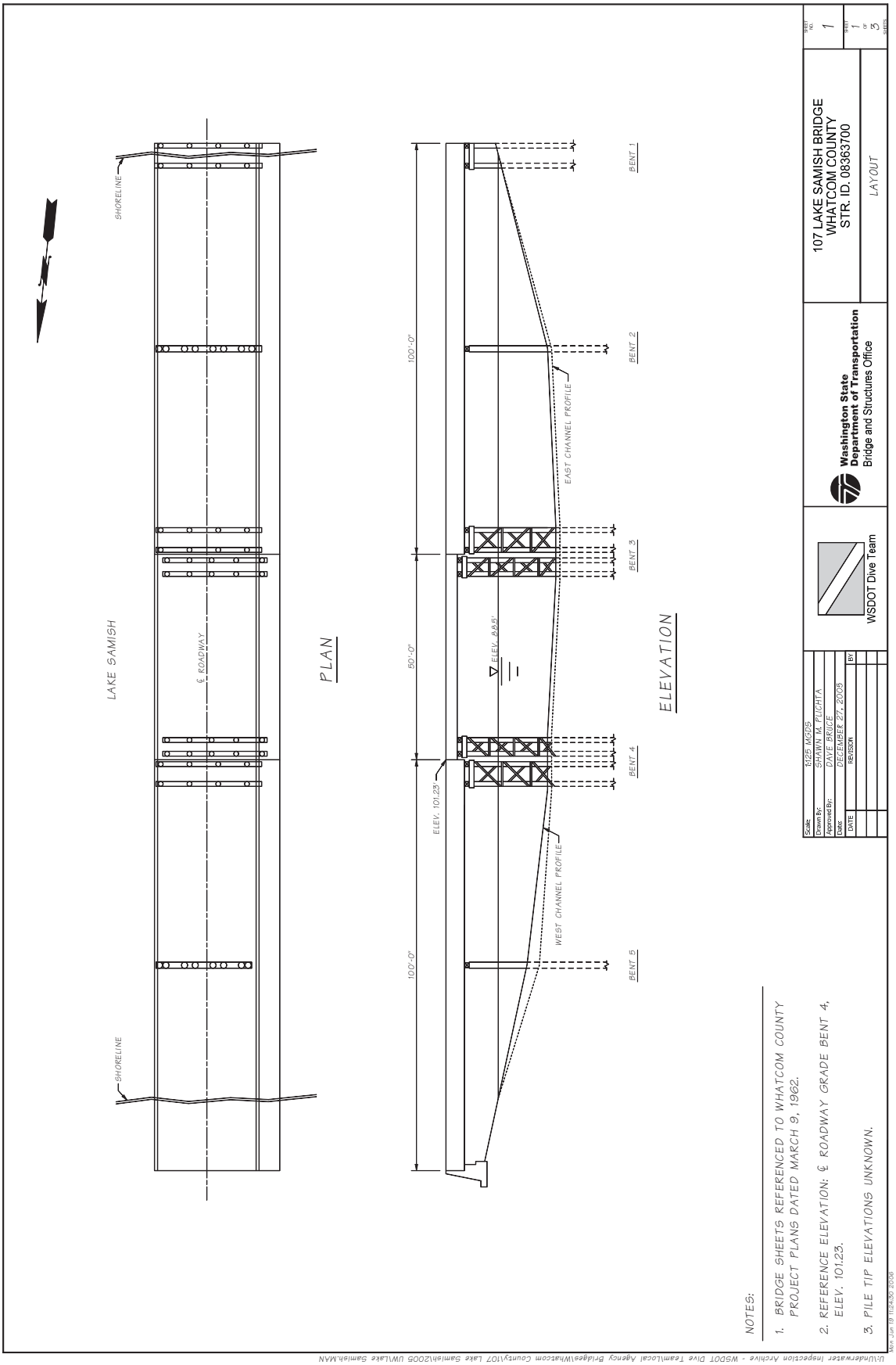
Photograph 4 : Steel brackets with newer crossbeam at Bent 5 looking south.

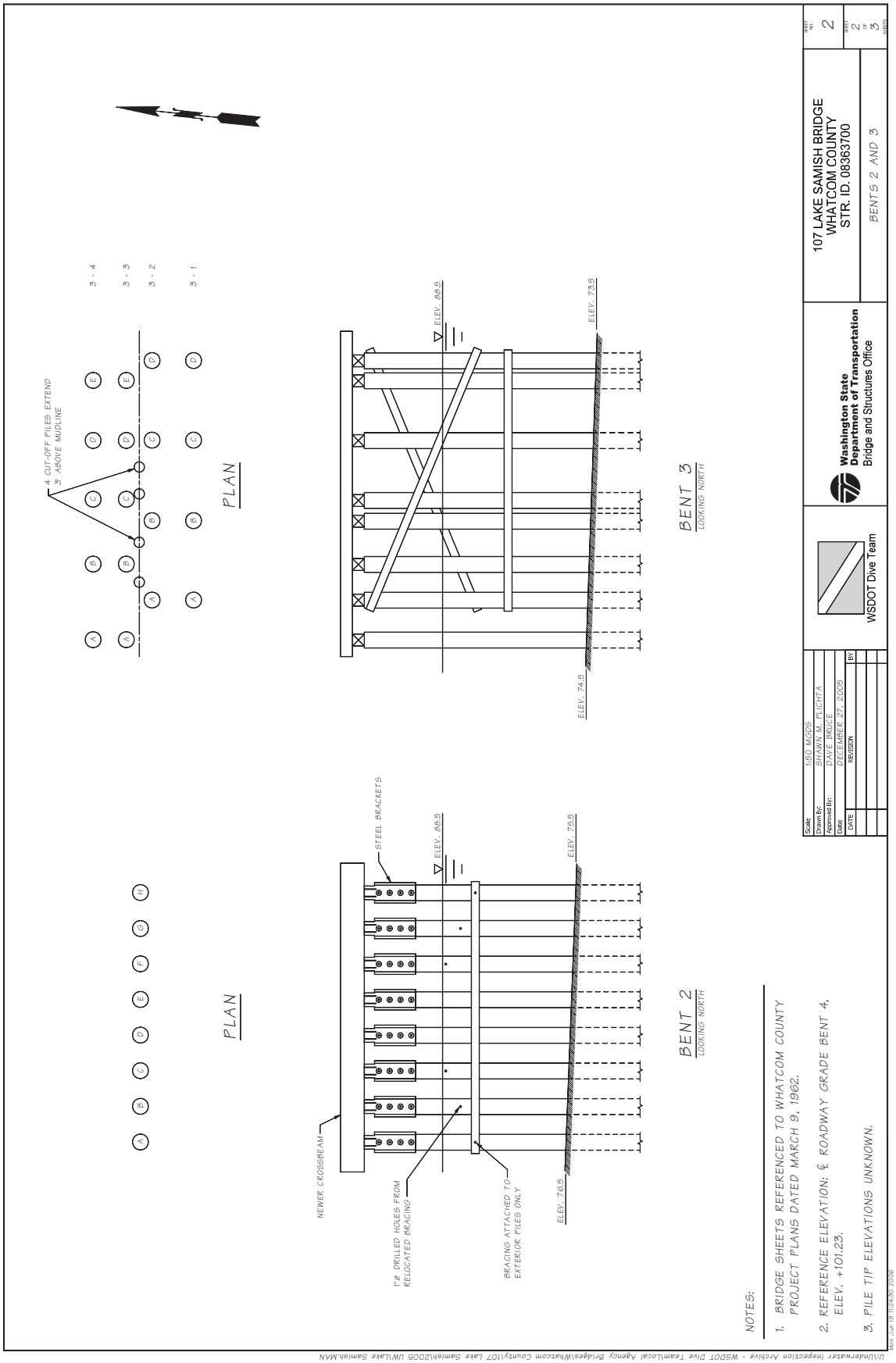
Bridge Number	Bridge Name	Date
107	Lake Samish Bridge	Aug 30, 2005

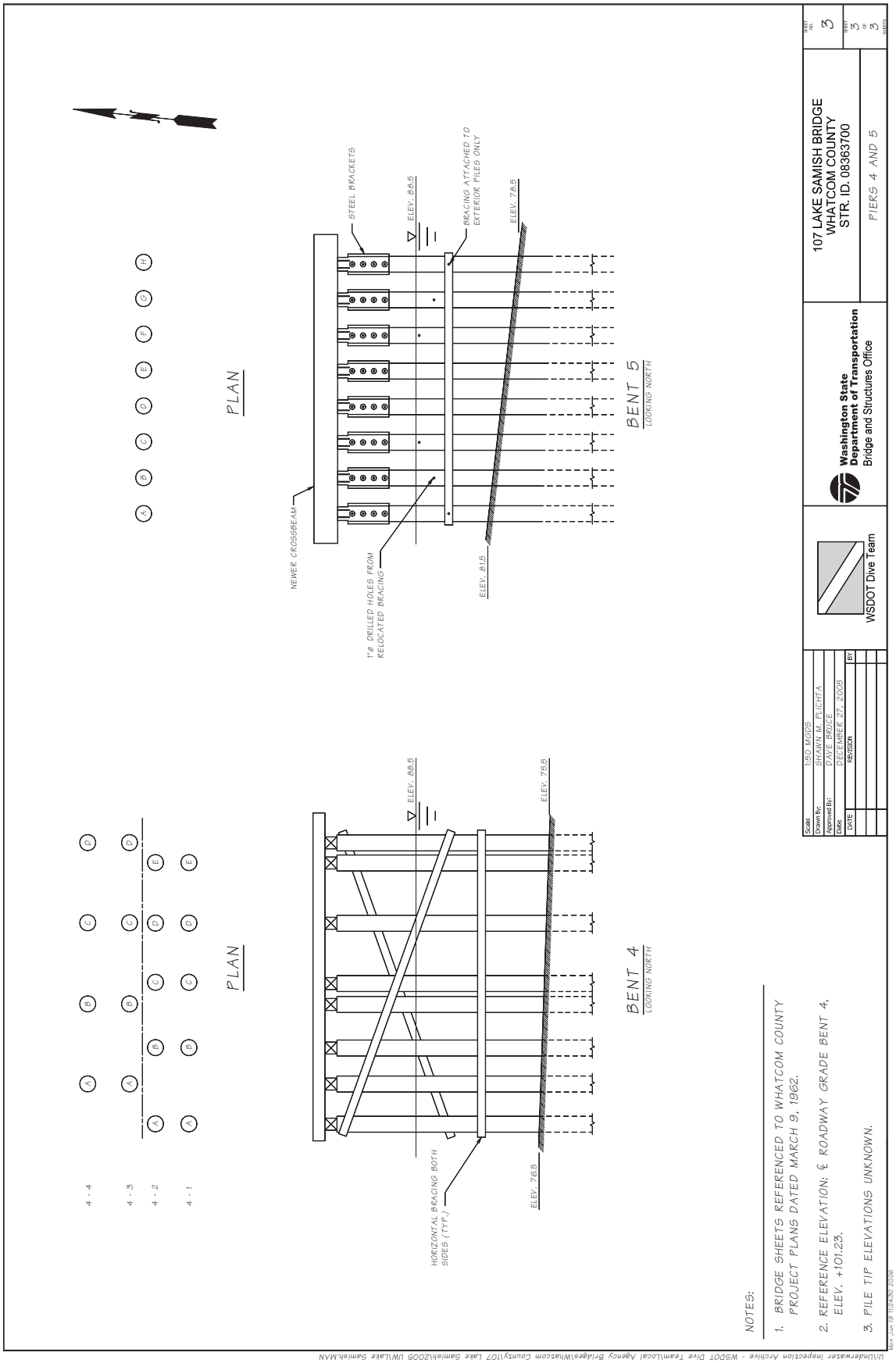
Photograph 5 : Typical condition of bolted connections prior to Level II inspection.



Photograph 6 : Typical condition of bolted connections after Level II cleaning of corrosion.


SHORELINE
LAKE SAMISH
℄ ROADWAY
SHORELINE
PLAN
100'-0"
80'-0"
100'-0"
ELEV. 101.23
ELEV. 88.5'
EAST CHANNEL PROFILE
WEST CHANNEL PROFILE
BENT 1
BENT 2
BENT 3
BENT 4
BENT 5
ELEVATION
NOTES:
1. BRIDGE SHEETS REFERENCED TO WHATCOM COUNTY PROJECT PLANS DATED MARCH 9, 1962.
2. REFERENCE ELEVATION: ℄ ROADWAY GRADE BENT 4, ELEV. 101.23.
3. PILE TIP ELEVATIONS UNKNOWN.
Scale: 1:125 MGDS
Drawn By: SHAWN M. FLICHTA
Approved By: DAVE BRUCE
Date: DECEMBER 27, 2005
DATE
REVISION
BY
WSDOT Dive Team
Washington State Department of Transportation
Bridge and Structures Office
107 LAKE SAMISH BRIDGE
WHATCOM COUNTY
STR. ID. 08363700
LAYOUT
SHEET NO. 1
SHEET 1 OF 3 SHEETS
U:\Underwater Inspection Archive - WSDOT Dive Team\Local Agency Bridges\Whatcom County\107 Lake Samish\2005 UW\Lake Samish.MAN
Mon Jun 19 11:24:30 2006


4 CUT-OFF PILES EXTEND 3' ABOVE MUDLINE
3 - 4
3 - 3
3 - 2
3 - 1
PLAN
ELEV. 88.5
ELEV. 73.5
ELEV. 74.5
BENT 3
LOOKING NORTH
PLAN
STEEL BRACKETS
ELEV. 88.5
ELEV. 75.5
NEWER CROSSBEAM
1"Ø DRILLED HOLES FROM RELOCATED BRACING
BRACING ATTACHED TO EXTERIOR PILES ONLY
ELEV. 76.5
BENT 2
LOOKING NORTH
NOTES:
1. BRIDGE SHEETS REFERENCED TO WHATCOM COUNTY PROJECT PLANS DATED MARCH 9, 1962.
2. REFERENCE ELEVATION: ℄ ROADWAY GRADE BENT 4, ELEV. +101.23.
3. PILE TIP ELEVATIONS UNKNOWN.
Scale: 1:80 MODS
Drawn By: SHAWN M. FLIGHTA
Approved By: DAVE BRUCE
Date: DECEMBER 27, 2006
DATE
REVISION
BY
WSDOT Dive Team
Washington State Department of Transportation
Bridge and Structures Office
107 LAKE SAMISH BRIDGE
WHATCOM COUNTY
STR. ID. 08363700
BENTS 2 AND 3
SHEET NO. 2
SHEET 2 OF 3 SHEETS
U:\Underwater Inspection Archive - WSDOT Dive Team\Local Agency Bridges\Whatcom County\107 Lake Samish\2005 UW\Lake Samish.MAN
Mon Jun 19 11:24:50 2006


PLAN
STEEL BRACKETS
ELEV. 88.5
BRACING ATTACHED TO EXTERIOR PILES ONLY
ELEV. 78.5
NEWER CROSSBEAM
1"ø DRILLED HOLES FROM RELOCATED BRACING
ELEV. 81.5
BENT 5
LOOKING NORTH
PLAN
4 - 4
4 - 3
4 - 2
4 - 1
ELEV. 88.5
ELEV. 78.5
HORIZONTAL BRACING BOTH SIDES (TYP.)
ELEV. 76.5
BENT 4
LOOKING NORTH
NOTES:
1. BRIDGE SHEETS REFERENCED TO WHATCOM COUNTY PROJECT PLANS DATED MARCH 9, 1962.
2. REFERENCE ELEVATION: ℄ ROADWAY GRADE BENT 4, ELEV. +101.23.
3. PILE TIP ELEVATIONS UNKNOWN.
Scale: 1:50 MODS
Drawn By: SHAWN M. FLICHTA
Approved By: DAVE BRUCE
Date: DECEMBER 27, 2005
DATE
REVISION
BY
WSDOT Dive Team
Washington State Department of Transportation
Bridge and Structures Office
107 LAKE SAMISH BRIDGE
WHATCOM COUNTY
STR. ID. 08363700
PIERS 4 AND 5
SHEET NO. 3
SHEET 3 OF 3 SHEETS
U:\Underwater Inspection Archive - WSDOT Dive Team\Local Agency Bridges\Whatcom County\107 Lake Samish\2005 UW\Lake Samish.MAN
Mon Jan 09 11:04:50 2006

FRACTURE CRITICAL BRIDGE
INSPECTION SUMMARY SHEET

Bridge Name: Black River Bridge
Bridge No: 012/076
Structure ID: 0001576C
Owner: WSDOT
Milepost: 37.59

Features to be inspected: Truss Tension Members (Riveted)

Procedures:

1. As required, use mirrors or other equipment to check inside surfaces of FCMs.
2. Check for loose or unevenly loaded member sub-elements.
3. Check all rivets at connection plates, with emphasis on first row. The first row is the row closest to the edge of the connection or gusset plate.
4. Check for any welds, including plug, tack, or repair welds. Record location of welds, regardless of condition, and document weld type and category.
5. Check FC members and associated connection or gusset plates for areas of heavy or pitted corrosion, nicks, gouges, sharp bends, and collision damage. Record location of all these conditions and estimated section loss, if applicable.
6. Check all heat straightened or repaired areas. Record location of these areas, regardless of condition.

FCM Location	FCM Type	FCM Per Girder or Truss Line	Rivet Server Plans		
			Sh. No.	Contract	Sh. Name
Span 2	Truss Tension Member	28	3	1576	Layout
	(riveted)			-----	Archived Standard Plan
					104 ft Steel Pony Truss
					G0580130.tif

Note: FCM = Fracture Critical Member

FRACTURE CRITICAL INSPECTION REPORT

Structure ID 0001576C
Bridge No. 12/76
Bridge Name BLACK RIVER
Structure Type ST CTB

Agency: WASHINGTON STATE

Date _____
Hours _____

Inspector: ORY GUNDUX UO2006
Co-Inspector: _____

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date
North	2	L0-L1	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L1-L2	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L2-L3	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L3-L4	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L4-L5	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L5-L6	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L6-L7	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L7-L8	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L9-L10	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L10-L11	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	L11-L12	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
North	2	U1-L2	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	L2-U3	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	U3-L4	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	L4-U5	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	U5-L6	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	L6-U7	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	U7-L8	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	L8-U9	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	U9-L10	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
North	2	L10-U11	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005

FRACTURE CRITICAL INSPECTION REPORT

Structure ID 0001576C
Bridge No. 12/76
Bridge Name BLACK RIVER
Structure Type ST CTB

Agency: WASHINGTON STATE

Date _____
Hours _____

Inspector: ORY GUNDUX UO2006
Co-Inspector: _____

Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date
South	2	L0-L1	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L1-L2	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L2-L3	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L3-L4	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L4-L5	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L5-L6	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L6-L7	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L7-L8	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L9-L10	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L10-L11	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	L11-L12	Other	Bottom Chord	VT	NO	Minor section loss in rivet heads.	9/27/2005
South	2	U1-L2	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	L2-U3	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	U3-L4	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	L4-U5	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	U5-L6	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	L6-U7	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	U7-L8	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	L8-U9	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	U9-L10	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005
South	2	L10-U11	Other	Diagonal Member	VT	NO	No defects noted.	9/27/2005

FRACTURE CRITICAL INSPECTION REPORT

Structure ID	0001576C	Agency: WASHINGTON STATE	Date _____
Bridge No.	12/76		Hours _____
Bridge Name	BLACK RIVER		
Structure Type	ST CTB	Inspector: ORY GUNDUX	UO2006
		Co-Inspector: _____	

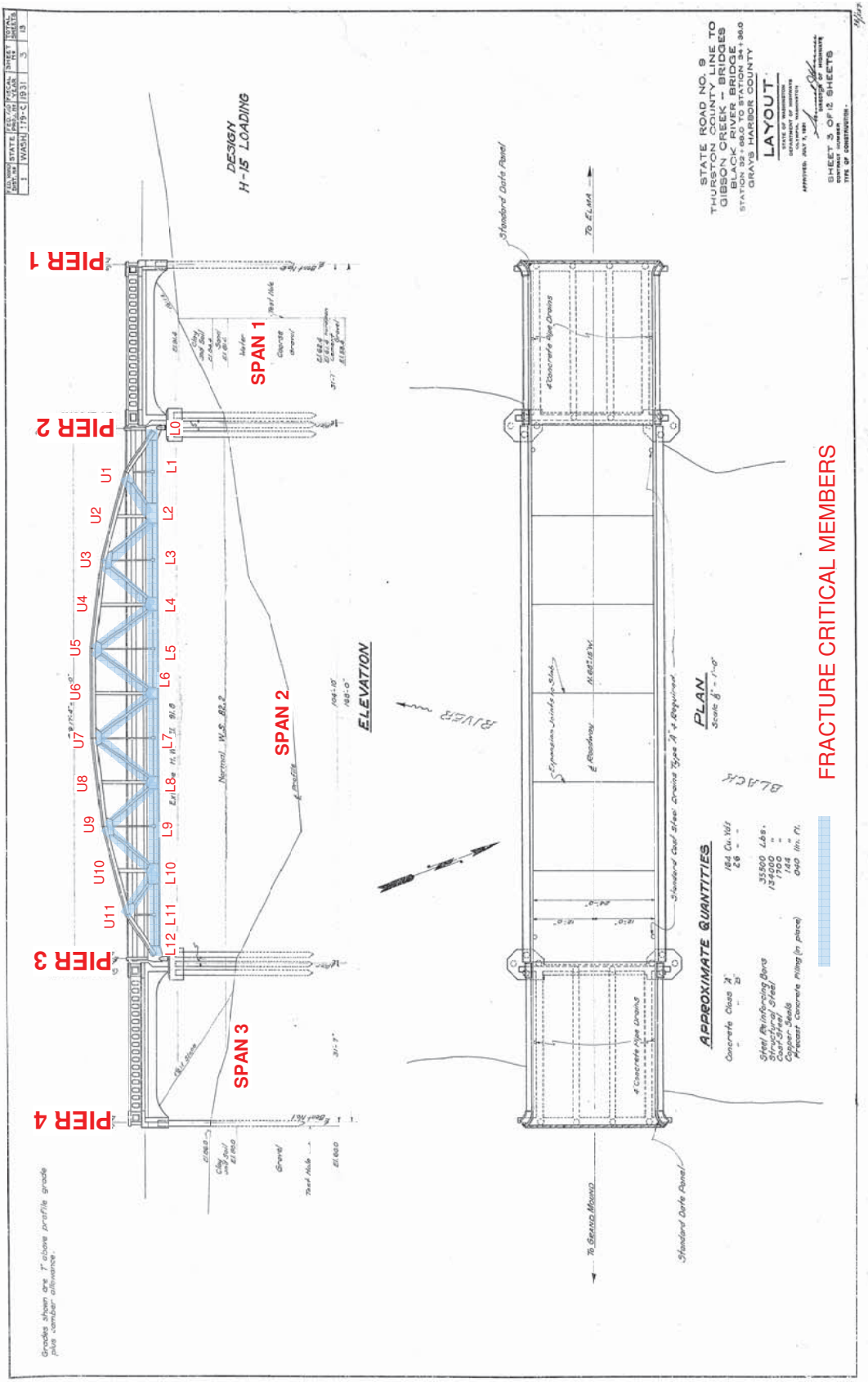
Truss / Girder	Span	Location	Feature Inspected	Detail Description	Inspection Method	Surface Preparation	Remarks	FC Inspection Date

INSPECTION METHODS

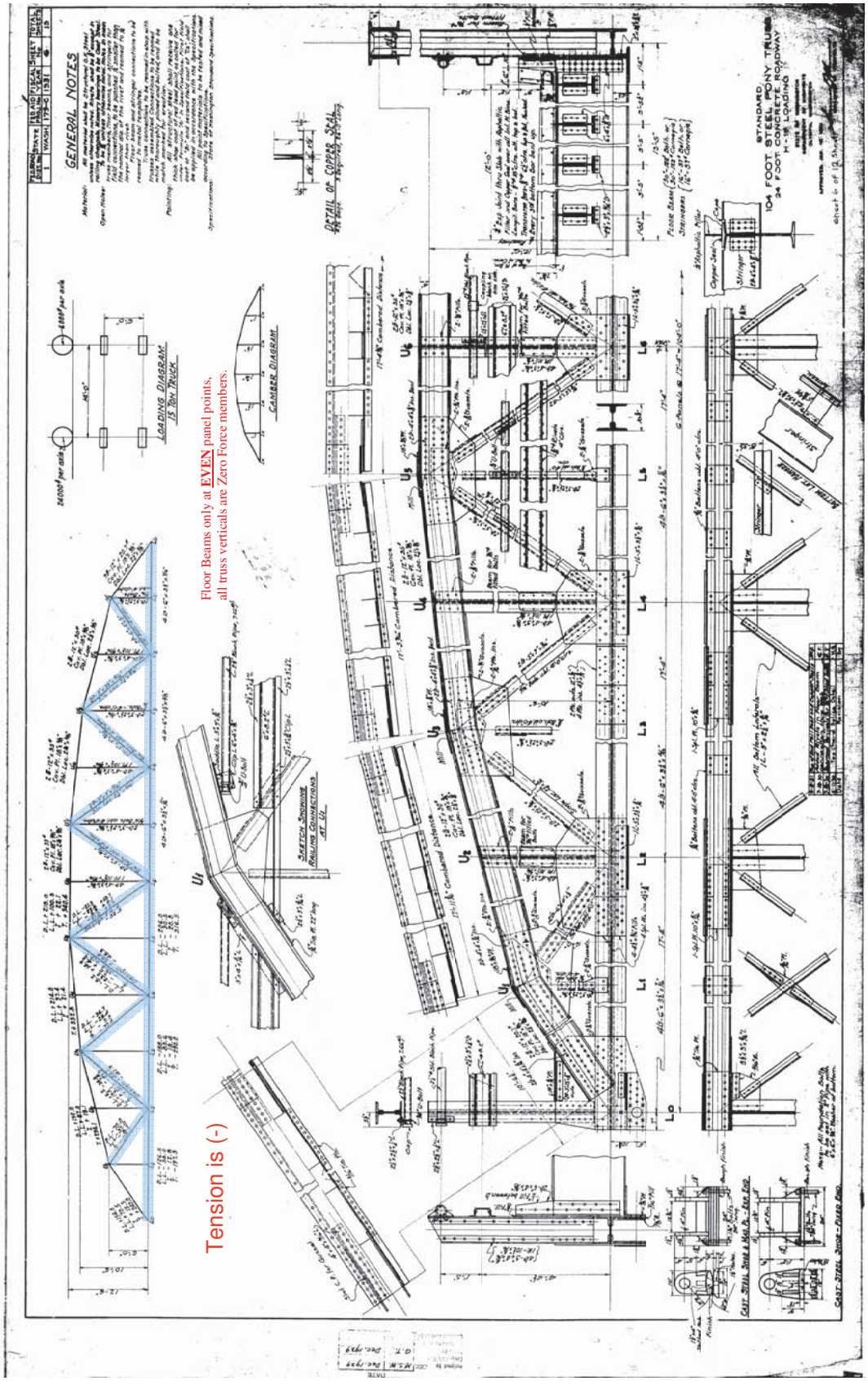
(VT) VISUAL
(PT) DYE PENETRANT
(UT) ULTRASONIC
(MT) MAGNETIC PARTICLE
(RT) RADIOGRAPHIC
(OT) OTHER

SURFACE PREPARATIONS

(NO) NONE
(WB) WIRE BRUSH
(GR) GRINDING
(CE) CHEMICAL
(SB) SAND BLASTING
(CH) CHIPPING HAMMER
(OT) OTHER



STRUCTURE ID #0001576C (12/76)



STRUCTURE ID #0001576C (12/76)

3. Inspection Forms

BRIDGE INSPECTION REPORT Agency _____

Bridge No. _____ Printed On 12/27/1999 Structure Type _____
Bridge Name _____ Route _____ Intersecting _____
Structure ID _____ MilePost _____ Location _____

Inspection Frequency ___ Months
Inspection Date ___ / ___ / ____
Inspection Hours ____ . ___

Inspector's Signature _____ Indent# _____ Co-Inspector's Signature _____

	Structural Adqcy	(657)	☐	Superstructure	(671)	☐	Bridge Rails (684)
	Deck Geometry	(658)	☐	Curbs	(672)	☐	Transition (685)
	Underclearance)	(659)	☐	Sidewalks	(673)	☐	Guardrails (686)
☐	Operating Level	(660)	☐	Paint	(674)	☐	Terminals (687)
☐	Alignment Adqcy	(661)	☐	Number Utilities	(675)	☐	Revise Rating (688)
☐	Waterway Adqcy	(662)	☐	Substructure	(676)	☐	Repair Flag (689)
☐	DeckOverall	(663)	☐	Chan/Protection	(677)	☐	Card Check Flag (690)
☐	Drains Condition	(664)	☐	Culvert	(678)	☐	Photos Flag (691)
☐	Drain Status	(665)	☐	Pier/Abut/Protect	(679)	☐	Seasonal Code (692)
☐	Deck Scaling	(666)	☐	Scour	(680)	☐	Soundings Flag (693)
☐	Scaling Percent	(667)	☐	Aproach/Rdwy	(681)	☐	Measure Clearance (694)
☐	Deck Rutting	(669)	☐	Retaining Walls	(682)	☐	Monitor Structure (695)
☐	Exposed Rebar	(670)	☐	Pier Protection	(683)		

_____ Year Built
_____ Year Rebuilt
_____ Operating Rating
_____ Inventory Rating
_____ Open Closed Posted
_____ Vertical Over Deck
_____ Vertical Under
_____ Vertical Under Code
____ __ Sufficiency Rating

Elem	Element Description	Total	Units	Env	State1	State2	State3	State4

	Notes

This form is not to be used as input to the WSDOT WSBIS computer system. In office use only.

Washington State Department of Transportation

Inspection Report

Bridge Number	Bridge Name	Date

Inspector	Co-Inspector

DOT Form 234-029 EF
Revised 9/98

Page _____ of _____

_____ **Inspection Report**

Bridge Number	Bridge Name	Date
Inspector	Co-Inspector	

DOT Form 234-029 EF
Revised 9/98

Datum _____ Page _____ of _____

WSBIS Inventory Coding Form

11/4/1999

Washington State Department of Transportation

Structure Identifier	Bridge Number	Owner Code	County Number	City Number	Update

	Bridge Name	Location	Sec-tion	Town-Ship	Range	Latitude	Longitude
WB71						0 ' "	0 ' "
						0 ' " .	0 ' " .

	Features Intersected	Facilities Carried	Region	FIPS Place Code	Legis Dist (1)	Legis Dist (2)	Toll	Custodian	Parallel Structure	Temporary Structure	Critical Facility	Median	Historical Significance	Open Closed	Program Year
WB72															

	Year Built	Year ReBuilt	Bridge Length	NBIS Length	Maximum Span Length	Lanes On	Lanes Under	Curb to Curb Deck Width	Out to Out Deck Width	Sidewalk Curb Left	Sidewalk Curb Right	Min Vert Clearance Over Deck	Min Vert Clearance Under Bridge	Code	Min Lat UnderClr Right	Code	Min Lat UnderClr Left	Navigation Control	Navigation Vertical Clearance	Navigation Horizontal Clearance	Vertical Lift Min Clearance	Approach Roadway Width	Skew Angle	Flare
WB73			'	'	'			'	'	'	'	' "	' "		'		'		'	'	'	'	0	
			'	'	'			' .	' .	' .	' .	' "	' "		' .		' .		'	'	'	'	0	

	On/Under	Highway Class	Service Level	Route Number	MilePost	ADT on Inventory Route	Truck ADT PCT	ADT Year	Future ADT	Future ADT Year	Linear Referencing System Route	LRS Sub Route	Fed Aid Route	Nat Hwy System	Bus Hwy Network	Strahnet	Fed Lands Highway	Fed Funct Class	National Truck Net	Lane Use Direction	Horizontal Clearance Route Dir	Horizontal Clearance Reverse Dir	Max Vertical Clearance Route Dir	Detour Length
WB74					.																' "	' "	' "	
																					' "	' "	' "	

	Main Span Material	Main Span Design	Appr Span Material	Appr Span Design	Number of Main Spans	Number of Appr Spans	Service On	Service Under	Deck Type	Wearing Surface	Membrane	Deck Protection	Design Load	Operating Rtng Method	Oper Rtng Tons	Invt Rtng Method	Invt Rtng Tons	Design Exception Date	Federal Aid Project	Border State Code	Border State Pct	Border State Structure Identifier
WB75																		/ /				

| | Routine inspection | | | | | | | | | | | | | | | | | | |

Washington State Department of Transportation

Scour Field Evaluation

Bridge Number	Bridge Name	Structure ID
Date	Lead Inspector / Co-Inspector	

- ☐ Heavy Growth Along Banks
- ☐ Ice/Debris in Channel
- ☐ Channel/Embankments are Eroding/Sloughing
- ☐ Damage to Riprap/Abutments/Piers
- ☐ Scour Holes Near Piers/Abutments
- ☐ Riprap in Place at Piers/Abutments
- ☐ Boat Required
- ☐ Divers Required
- ☐ UBIT Required
- ☐ Winter Inspection
- ☐ Repair Required
- ☐ Monitoring Required

Soundings
(Taken from top of the upstream bridge rail)

Location	Measurement (ft)

Thalweg (ft):	
Distance to thalweg (ft):	
Distance was measured from:	
Rail Height from Deck (ft):	

Inspector's Remarks:

Repairs Warranted:

N:\Soundings\Scour Field Evaluation Form.xlt

Washington State Department of Transportation

Underwater Inspection Report

Bridge Number	Route	Agency/Owner	Date
Bridge Name			Intersecting
Inspector		Identification No.	Hours on Site
Dive Contractor			
Diver Name		Diver Name	

Structure Type	Substructure Type	
Foundation Type	Number of Spans	Number of Piers in Waterway

- ☐ Bents (1)
  - Abut/Pier Wall (2)
  - Web Wall (3)
  - Columns (4)
  - Shaft (5)
  - Piles (6)
  - Bracing (7)
- Foundation (8)
  - Footing (9)
  - Seal (10)
  - Piles (11)
- ☐ Scour (12)
  - Scour Mitigat. (13)
- ☐ Channel (14)
  - Streambed (15)
  - Drift (16)
  - Flow (17)

Page _____ of _____

Washington State Department of Transportation

Daily Site Dive Log

Inspector		Date
Bridge Number	Bridge Name	
Bridge Type	Waterway Name	
Dive Objective		

Diving Operation

Type of Operation ☐ SCUBA ☐ Snorkel ☐ Other _____

Equipment

Suit _____

Air Supply _____

Site Access _____

Inspection Tools _____

Repair Tools _____

Repair Materials _____

Conditions

Water ☐ Salt ☐ Fresh ☐ Brackish Temperature _____ °F Visibility _____

Surface ☐ Calm ☐ Choppy ☐ Rough

Surf ☐ Small ☐ Medium ☐ Large ☐ N/A

Tide ☐ High ☐ Low ☐ Flood ☐ Ebb ☐ N/A

Current ☐ Fast ☐ Moderate ☐ Slow Velocity _____ ft/sec.

Weather ☐ Sunny ☐ Cloudy ☐ Overcast ☐ Rain Air Temperature _____ °F

Thermocline Temperature _____ °F Depth _____ ft.

Diver Checks

☐ First Aid Equipment on Site
☐ Communication for EMS
☐ Dive Gear Inspected
☐ Air Source Checked
☐ Physical Condition of Diver(s) Checked
☐ Communications for Diver(s) Checked
☐ Team Briefed and Understand Dive Plan
☐ Special Site Hazards Noted

☐ _____

☐ _____

Dive Plan and Dive Team Procedures

Page _____ of _____

Dive Schedule

Dive No.	Entry Time	Exit Time	Total Time in Water	Maximum Depth	Remarks

Dive Narrative

Dive Team Members

(Print Name)	(Role)
(Print Name)	(Role)
(Print Name)	(Role)
(Print Name)	(Role)
(Print Name)	(Role)

Page _____ of _____

Washington State Department of Transportation

Fracture Critical Inspection Report

Agency	Feature Inspection ☐ Weld ☐ Pin ☐ Other		Hours	Date
Bridge Number	Inspector	Title		Ident. Number
Bridge Name	Co-Inspector	Title		Ident. Number
Structure Type		Truss or Girder Location		

Span	Location	Detail Description	Remaining Fatigue L.E.	Inspection Method	Surface Prep.	Results	Remarks

Inspection Methods

- **VT** Visual
- **PT** Dye Penetrant
- **UT** Ultrasonic
- **MT** Magnetic Particle
- **RT** Radiographic
- **OT** Other (Specify)

Surface Preparation

- **NO** None
- **WB** Wire Brushing
- **GR** Grinding
- **CE** Chemical
- **SB** Sand Blasting
- **CH** Chipping Hammer
- **OT** Other Method

General Remarks

DOT Form 234-027 EF
Revised 9/98

Page _____ of _____

Feature Inspection ☐ Weld ☐ Pin ☐ Other	Truss or Girder Location	Date

Span	Location	Detail Description	Remaining Fatigue L.E.	Inspection Method	Surface Prep.	Results	Remarks

Inspection Methods

- **VT** Visual
- **PT** Dye Penetrant
- **UT** Ultrasonic
- **MT** Magnetic Particle
- **RT** Radiographic
- **OT** Other (Specify)

Surface Preparation

- **NO** None
- **WB** Wire Brushing
- **GR** Grinding
- **CE** Chemical
- **SB** Sand Blasting
- **CH** Chipping Hammer
- **OT** Other Method

General Remarks

DOT Form 234-027 EF
Revised 9/98

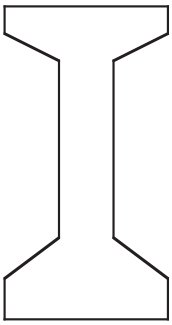
Page _____ of _____

Washington State Department of Transportation

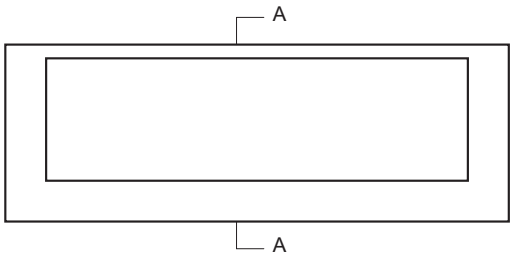
Prestressed Concrete Damage Report

Bridge Number	Bridge Name	Date
Inspector	Co-Inspector	

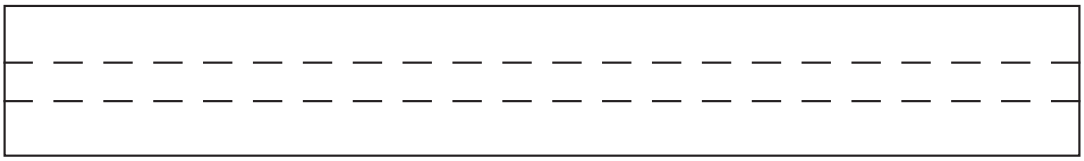
Description of Damage



Section A-A



Elevation View



Bottom View

Beam Number _____ Number of Damaged Strands _____

Reported By	Bridge No.	Bridge Name	
Room No.	Region		Priority

DOT Form 234-030 EF
Revised 9/98

Page _____ of _____

Steel Damage Report

Bridge Number	Bridge Name	Date
Inspector	Co-Inspector	

Description of Damage

Member Sizes

Reported By	Bridge No.	Bridge Name
Room No.	Region	Priority

DOT Form 234-030 EF
Revised 9/98

Page _____ of _____

Washington State Department of Transportation

Fall Protection Plan

Date	Location	Supervisor

Description of Work

Recognized Fall Hazards

- ☐ Ladders
- ☐ Forming
- ☐ Catwalks
- ☐ Sloped Access
- ☐ Work over Water
- ☐ Scaffold
- ☐ Pouring
- ☐ Welding at Height
- ☐ Set Girders
- ☐ Leading Edge
- ☐ Bridge Decks
- ☐ Excavations
- ☐ Drilling Shafts
- ☐ Connect Girders
- ☐ Work Decks
- ☐ Walkways / Ramps
- ☐ Stressing
- ☐ Tieback Strands
- ☐ Perimeter Edge, Stairwell, Roof, Window Opening

Personnel Hoisting

☐ Crane ☐ Boom Truck ☐ Forklift ☐ Other _____

Method of Protection

Fall Restraint

Type of Harness _____

Type of Lanyard _____

Anchorage _____

Control Zones/Warning Lines and Monitors _____

Guardrail ☐ Yes ☐ No

Nets ☐ Yes ☐ No

Other _____

Fall Arrest

Type of Harness _____

Type of Lanyard _____

Type of Life Line _____

Anchorage _____

Deceleration Device ☐ Yes ☐ No

Other Type of Equipment Used _____

Overhead Protection

- ☐ Hard Hats
- ☐ 3 1/2 inch (89mm) Toe Boards
- ☐ Warning Signs
- ☐ Debris Nets
- ☐ Other _____

Tool Handling, Storage, and Securing

- ☐ 3 1/2 inch (89mm) Toe Boards
- ☐ Debris Nets
- ☐ Tool Buckets
- ☐ Tool Belts
- ☐ Other _____

Procedure for Assembly, Maintenance, Inspection, and Disassembly of System

Assembly, disassembly, and maintenance of all equipment will be done according to manufacturer's recommended procedures.
A visual inspection of all safety equipment will be done daily or before each use.
Any defective equipment will be tagged and removed from service immediately.

DOT Form 750-001 EF
Revised 10/97

A Copy of This Work Plan Must Be On Job Site

Emergency Action Plan

First Aid / CPR

Names of Trained Personnel on Site	

Location of First Aid Equipment

Initiate Emergency Services (call or radio 911 if available)

Location of Phone	Phone Number of Sheriff or Police	Phone No. of Emergency Resp. Team

Describe Procedure for Removal of Injured Employee
(Note: No removal will be attempted without supervision of qualified emergency rescue personnel)

Crane ☐ Yes ☐ No Location _____

Hoist ☐ Yes ☐ No Location _____

Winch ☐ Yes ☐ No Location _____

Block / Tackle ☐ Yes ☐ No Location _____

Other (Describe)

Plan Reviewed at Job Site ☐ Yes ☐ No

Employee Signature	Employee Signature
Employee Signature	Employee Signature

DOT Form 750-001 EF
Revised 10/97

Washington State
Department of Transportation

Lead Exposure Control Work Plan

NOTE: This document is for field use only. A comprehensive plan is maintained by the supervisor/organization to document and track Lead Exposure Control efforts.

Date	Location	Competent Person

Description of Work

Activities Producing Exposure

- ☐ Welding/Cutting/Heating
- ☐ Spray Painting
- ☐ Demolition
- ☐ Inspection
- ☐ Abrasive Blasting
- ☐ Grinding/Scraping/Brushing
- ☐ Needle Scaling
- ☐ Housekeeping
- ☐ Containment Take Down
- ☐ Waste Handling
- ☐ Other (Specify) _____

Work Practices

- ☐ Paint Removal
- ☐ Debris Containment
- ☐ Inspection
- ☐ Housekeeping
- ☐ Containment Set-up/Take Down
- ☐ Site Control
- ☐ Hygiene Practices
- ☐ Other (Specify) _____

Personal Protective Equipment

☐ Coveralls ☐ Daily ☐ Weekly

Comments

- ☐ Faceshield/Eye Protection
- ☐ Gloves
- ☐ Ear Plugs and/or Muffs
- ☐ Hard Hat
- ☐ Welding Gloves
- ☐ Boots or Shoe Covers

Respiratory Protection

- ☐ Air-Line Helmet
- ☐ Air-Line 1/2 Mask
- ☐ Air-Line Full-Facepiece
- ☐ Air-Purifying Combination Cartridge
- ☐ Air-Purifying HEPA Filter

Hose Length _____ Air Pressure _____

Hygiene Facilities

- ☐ Hand Washing Location _____
- ☐ Change Area Location _____
- ☐ Lunch Area Location _____
- ☐ Showers Location _____
- ☐ Toilet Location _____

Housekeeping

- ☐ HEPA Vacuum
- ☐ Waste Containers

DOT Form 750-060 EF
8/94

Emergency Action Plan
First Aid / CPR

Names of Trained Personnel on Site	

Location(s) of First Aid Equipment

Initiate Emergency Services (Call or Radio 9 1 1 if Available)

Location of Telephone

Phone Number of Sheriff / Police	Phone Number of Emergency Response Team

Describe Procedures for Removal of Injured Employee

(NOTE: No removal will be attempted without supervision of qualified emergency rescue personnel)

Crane	☐ Yes ☐ No	Location	
Hoist	☐ Yes ☐ No	Location	
Winch	☐ Yes ☐ No	Location	
Block / Tackle	☐ Yes ☐ No	Location	

Other (Describe)

Plan Review at Job Site ☐ Yes ☐ No

Employee Signature	Employee Signature
Employee Signature	Employee Signature

DOT Form 750-060 EF
8/94

Washington State Department of Transportation

Respirator Record

Name	Social Security Number	Organization Code
Supervisor's Name	Telephone Number	

Exposure

- ☐ Welding/Cutting/Brazing
- ☐ Spray Painting
- ☐ Vehicle Body Repair
- ☐ Pavement Marking
- ☐ Lead
- ☐ Pestcides
- ☐ Asbestos
- ☐ Silica
- ☐ Solvents
- ☐ Bridge Maintenance
- ☐ Abrasive Blasting
- ☐ Grinding/Sanding
- ☐ Pigeon Droppings
- ☐ Other (Specify) _____

Restrictions

- ☐ Facial Hair
- ☐ Corrective Lenses
- ☐ Reduced Lung Function
- ☐ None
- ☐ Other (Explain) _____

Fit Test

Date of Fit Test	Type of Fit Test Used ☐ Qualitative ☐ Quantitative ☐ N/A
Tester	☐ Pass ☐ Fail

Respirator

Size
☐ Small ☐ Medium ☐ Large

Facepiece
☐ 1/2 Mask ☐ Full Face ☐ Hood/Helmet

Type
- ☐ SCBA
- ☐ PAPR
- ☐ Air Line
- ☐ Dust / Mist
- ☐ Other (Describe) _____
- ☐ Chemical Cartridge
- ☐ Gas Mask
- ☐ Combination

Manufacturer
- ☐ North
- ☐ MSA
- ☐ Willson
- ☐ Survivair
- ☐ 3M
- ☐ Bullard
- ☐ Northstar
- ☐ American Optical
- ☐ Scott
- ☐ Glendale
- ☐ Uvex
- ☐ Other _____

Model Number	Approval Number

Comments

DOT Form 750-090 EF
Revised 12/98

Washington State Department of Transportation

Confined Space Entry and Hot Work Permit

NOTE: This form is required to be completed, appropriately signed prior to, and utilized during entry into any confined space.

Confined Space ID No.	Region	Region Safety Manager
Type of Work: ☐ Overhead ☐ Under Foot	Location	
Purpose of Entry		
This space entered _____ times per ☐ Day ☐ Week ☐ Month ☐ Year		
Description of Work		
Employees Assigned Entry		Date / Time Issued
Authorized Attendants		Date / Time Expired

Have the Following Precautions Been Taken?	Yes	No	N/A
Were hazards, testing, and emergency procedures discussed?			
Have authorized entrants and attendants been trained regarding confined spaces?			
Has safety equipment been properly calibrated and checked?			
Have the duties of the authorized entrants and attendants been discussed?			
Have emergency response or rescue procedures been discussed?			

What are the Potential Work Hazards? (Check all that apply)

☐ Corrosives ☐ Flammable Materials ☐ Hazardous Atmosphere ☐ Mechanical ☐ Ladders Over 10 F
☐ Hot Work (riveting, welding, grinding, burning) ☐ Dust ☐ Electrical ☐ Biological ☐ Temperature

☐ Other (specify):

Personal Protective and Safety Equipment? (Check all that apply)

☐ Atmosphere Monitoring (complete next section) ☐ Communications Equipment ☐ Respiratory Protection ☐ Hearing
☐ Life Lines and Harness ☐ Ventilation Equipment ☐ Head, Hand, Foot, and Eye
☐ Other (specify):

DOT Form 750-094 EF
Revised 2/2000

Atmospheric Monitoring Equipment/Instrument

Make	Model	Serial No.
Date of Calibration	Other	

Atmospheric Monitoring Equipment - Equipment Check and Calibration

Concentration of Calibration Gases and Instrument Readings: Gas Concentration | Instrument Reading

Oxygen	Flammables	Carbon Monoxide	Other: _____
_____|_____	_____|_____	_____|_____	_____|_____

Note: Make sure calibration gas cylinders have not expired. If the instrument readings are not within 5-10% of the known gas concentrations, recalibrate or send in to manufacturer for recalibration.

Atmospheric Test Results

Date / Time	Oxygen	Flammability	Carbon Monoxide	Other

Is "hot work" (riveting, welding, cutting, brazing, burning, grinding) to be performed in the confined space? ☐ Yes ☐ No
If Yes, complete the Hot Work Section. If No, skip to Page 3, Qualified Person Verification and Signature Section

Hot Work

Description of Work or Equipment Presenting a Potential Ignition Source or Generating a Hazardous Atmosphere

Have employees been properly trained, advised, and monitored with regards to hot work performed in confined spaces?
☐ Yes ☐ No ***IF YOU ANSWERED NO, STOP ALL WORK ACTIVITIES AND CONSULT WITH MANAGERS.***

Does the working surface or equipment being used have a potential of generating toxic gases, fumes, dust, or vapors? Check all that apply:

☐ Welding Rods and Flux ☐ Silica or Respirable Dusts ☐ Oxygen Displacement ☐ Other _____
☐ Lead Paint / Paint ☐ Animal Wastes ☐ Carbon Monoxide _____

Describe in detail the type of ventilation (volumes, air exchanges, air intakes, that will be used to remove the gases, fumes, dust, or vapors.

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Revised 2/2000

Hot Work - Continued

Describe in detail the personal protective equipment to be used during the hot work activities:

Respiratory Requirements:
Atmosphere Monitoring Equipment:
Rescue Equipment or Rescue Team:
Fire Extinguishing Media:
Head, Foot, Hand, Eye:
Other:

Atmospheric Monitoring Data During Hot Work *(must be continuous)*

Date / Time	Oxygen	Flammability	Carbon Monoxide	Other

Is employee exposure monitoring being performed during the hot work activities? ☐ Yes ☐ No If yes, describe the monitoring:

Qualified Person Verification and Signature

I have verified the procedures and work activities and have briefed the Authorized Entrants and Attendants on the proper practices and associated hazards of confined spaces and the associated work activities.

Name of Qualified Person	Phone	Date
Signature of Qualified Person	Organization	

This Confined Space Entry and Hot Work Permit serves as a master record for data and information collected during the field operations and confined space entry. The qualified person shall annually provide copies of the completed forms to their respective Region Safety Manager. It is recommended that all completed forms be kept on file for at least five years.

DOT Form 750-094 EF
Revised 2/2000

Chapter 4 Bridge Management System Contents

4.0	Bridge Management System Introduction	4-1
4.1	Bridge Decks	4-5
4.2	Superstructure	4-11
4.3	Substructure	4-34
4.4	Culverts	4-46
4.5	Tunnels	4-48
4.6	Sidewalk and Supports	4-49
4.7	Bearings	4-51
4.8	Bridge Rail	4-54
4.9	Pedestrian Rail	4-55
4.10	Smart Flags	4-56
4.11	Seismic Restrainers	4-59
4.12	Expansion Joint BMS	4-61
4.13	Movable Bridges	4-70
4.14	Other Bridge Elements	4-70
4.15	Bridge Deck Overlays	4-73
4.16	Protective Coatings	4-73

4.0 Bridge Management System Introduction

This chapter provides an overview of the Bridge Management System (BMS) philosophy for the inspection of bridges. This chapter will provide a brief history of BMS, provide information about BMS computer programs, and outline the procedures for performing a BMS type inspection. The instructions in this chapter are intended to supplement those in Chapter 3 "Inspections and Reports."

The Federal Highway Administration (FHWA) requires each state to provide information about each bridge in their inventory as described in the FHWA's Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. This information is used to generate a National Bridge Inventory (NBI). The FHWA categorizes bridges as structurally deficient or functionally obsolete based on their condition and appraisal ratings. Bridge eligibility for rehabilitation and replacement is determined by a sufficiency rating formula. The NBI does not provide information that can be used to predict a bridge's future condition or provide an estimate on future maintenance and repair needs of an agency bridge inventory.

Recognizing that a different strategy towards future bridge preservation was needed, the National Cooperative Highway Research Program (NCHRP) published a report (Report 300) in December 1987 to provide the framework for a BMS. The overall objective of this report was to develop a model bridge management system that could be implemented by a state or local transportation agency. BMS is intended to ensure the effective use of available funds and identify the effects of various funding levels on an agency bridge network.

BMS is designed to provide information not currently available from NBI data. FHWA recommends agency use of BMS to provide comprehensive management of their bridge system. BMS can provide the following:

- Improvements in the type and quality of data that is collected, stored, managed, and used in a bridge system analysis.
- A logical method for setting priorities for current needs.
- Realistic and reliable forecasts of future needs.
- Ways to implement changes in management philosophies and goals.

4.01 Common BMS Bridge Elements

BMS elements are commonly used in highway bridge construction and encountered on bridge inspections. These elements are labeled "Commonly Recognized" (CoRe) structural elements because of their nationwide recognition and use. A single BMS element can incorporate only those components of a bridge that:

- Are made of the same material.
- In normal service be expected to deteriorate in a very similar fashion and at a similar rate.
- Can be inventoried with units that are easily assessed by the inspector.

The AASHTO Guide for Commonly Recognized (CoRe) Structural Elements provides basic definitions for CoRe elements. In general, all girders, trusses, arches, cables, floor beams, stringers, abutments, piers, pins and hangers, culverts, joints, bearings, railings, decks and slabs are identified as CoRe elements. AASHTO CoRe elements contain a description, definition, condition state language, a unit of measurement and a feasible action. The condition of a CoRe element is identified by condition states and corresponding condition state language. Each CoRe element has a range of 3 to 5 condition states. The first condition state (#1) would represent a like new condition while the last condition state would represent the worst condition. The AASHTO definitions have been significantly modified for use by the State of Washington.

"Smart Flags" are used to flag unique problems not identified by BMS elements. A Smart Flag can have multiple condition states. Smart-Flags do not have feasible actions associated with their condition states since the deterioration rate is not predictable. Examples of Smart Flags are Steel Fatigue (cracks in steel elements), Scour, Pack Rust, etc.

Information from each CoRe element along with expert input to predict how the condition of that element will change over time is used in BMS computer programs. The BMS programs can estimate future network funding levels based on the predicted future bridge conditions and the corresponding costs to repair or replace them.

4.02 BMS Inspections

As previously stated, a BMS inspection is intended to supplement but not replace an NBI type inspection. All procedures for bridge inspection outlined in Chapter 3 of need to be followed. The following outline provides a short BMS summary for a typical inspection and is discussed in the following paragraphs.

A. Identify the BMS elements that apply to the structure.

B. Determine the total quantity for each element.

C. Inspect bridge and record the deficient quantity for each element in the corresponding condition state.

WSDOT's Bridge Preservation Office uses a laptop computer program to allow an inspector to record information from both an NBI and a BMS type inspection. A sample Bridge Inspection Report (BIR) is shown in Chapter 3.

A. Identify the BMS Elements

Details about the design of the bridge are important when identifying the BMS elements. As-built plans provide the best resource for choosing the correct elements. Elements can be defined with as-built plans in the office prior to the inspection and then field verified. If as-built plans are not available, then the elements will have to be defined at the bridge site.

For example, let's say a bridge has a reinforced concrete bridge deck. In order to determine if the BMS coding for the concrete deck should be element No.12 or element No. 26 the type of steel reinforcing needs to be identified. Plans and special provisions would note if the reinforcing steel in a concrete deck was epoxy coated or not. A field inspection could not accurately determine if the steel was epoxy coated thus if as-built plans are not available then the type of element would need to be assumed. It should be noted that epoxy coated rebar in bridge decks became an industry standard in Washington State in the early 1980's.

An average bridge made of the same material will have six to ten elements. A large or complex bridge may have up to 20 elements. A typical bridge will have a bridge deck, possibly a deck overlay, bridge rails, a primary load carrying member like a prestressed concrete girder, primary substructure support like concrete columns, other elements like abutments, expansion joints and/or bearings.

B. Determine the Total Quantity of the Element

The units to be used for each element are defined with the corresponding element. The units are listed as "SF" (square feet), or "LF" (lineal feet), or "EA" (each).

The "SF" value is used to determine the area of a deck element and the area of steel for paint elements. For bridge decks use the curb-to-curb width of the deck by the length to determine the deck area.

The "LF" value is used to determine the total length of an element. The length of an element is based on the way it was constructed. For example: A bridge may have been built using five "Prestressed Concrete Girders." Each one was individually pre-cast and then put into place at the bridge site. If each girder were 100 feet in length then the total element quantity would be "500 LF." If the same bridge was a "Concrete Box Girder" then the total quantity would be "100 LF" since the box girder was constructed as one unit.

The quantity for the abutment elements is determined by estimating the length along the abutment. For example; if the abutment has integral wing walls then include them in the total length. If a retaining wall is being used for the abutment and the wall extends beyond the bridge then use the bridge out to out width value plus 40 feet for the total abutment length.

The "EA" value is used to determine the number of members in a condition state. For example: A two span bridge may have been built with 5 piles at each support for a total of 15 piles in the bridge. The pile is inspected, evaluated, and recorded in the appropriate condition state.

C. Inspect the Element and Record the Quantity in the Corresponding Condition State

The first step is to review the condition state language for the elements to be inspected. A complete list of the condition state descriptions is provided in this chapter. Code the appropriate quantity of the element in the corresponding condition state or condition states. The total quantity for those with units of "EA" would be coded in one condition state while elements with units of "LF" or "SF" could have quantities in one or all of the condition states.

Element condition state (CS) language is based on four condition states for all primary structural members, regardless of the materials. Similar to the NBI system of evaluation, the BMS requires the inspector to evaluate defects and also quantify the defect's impact to the element or possibly the bridge. Different philosophies apply to the non-primary structural elements such as deck/overlays, joints, paint, and smart flags. The following summarizes the general BMS condition state philosophy for primary structural members. It must be noted that a defect could be CS1, CS3, or CS4 depending on the location and/or quantity.

Condition State 1: Most parts of a bridge will be in this condition state for all BMS elements. The element may have some defects, but is in good condition. Many times new bridges have insignificant defects and older bridges will acquire insignificant defects with time. In order to determine if the defect is insignificant, the inspector must decide if the defect will impact the element load carrying capacity with time. Inspectors are cautioned to look at new construction that may not be CS1.

Condition State 2: This condition state documents repairs to structural members. Generally, these are easy to identify and report. Common repairs do not have the same integrity or longevity as original construction. Many times members are difficult to access and prohibit a good quality repair. Inspectors are cautioned to verify repairs to make sure they are functioning as intended. If a repair is not completed correctly or is not functioning properly, then the repair should be coded as CS3 or CS4.

Condition State 3: This condition state records any significant defect noticed by the inspector, but the defect does not significantly impact the capacity of the element. Capacity is not currently threatened, but if left unchecked, it could be threatened in the future. Repairs may apply to the elements in CS3 because the defects are more economical address now than to wait and repair later.

Condition State 4: This condition state documents members with defects that have impacted the structural capacity of the element. Based on the visual inspection, the owner of the bridge must address this deficiency in order to preserve or restore the capacity of the member and/or structure. Generally, these defects have reduced the structural capacity of the element, but are still within safe operating limits of design.

Concrete Cracking

The following table is reproduced from the Bridge Inspector's Reference Manual (BIRM), Volume 1, Table 2.2.3; and should be used to distinguish between different sizes of concrete cracks.

Concrete Crack With Guidelines				
	Reinforced Concrete		Prestressed Concrete	
	English	Metric	English	Metric
Hairline (HL)	< 1/16″	< 1.6 mm	< 0.004″	< 0.1 mm
	(0.0625)			
Narrow (N)	1/16″ to 1/8″	1.6 to 3.2 mm	0.004″ to 0.009″	0.1 to 0.23 mm
	0.0625″ - 0.125″			
Medium (M)	1/8″ to 3/16″	3.2 to 4.8 mm	0.010″ to 0.030″	0.25 to 0.76 mm
	0.125″ - 0.1875″			
Wide (W)	> 3/16″	> 4.8 mm	> 0.030″	> 0.76 mm
	> 0.1875″			

Concrete Structural cracking: For the purpose of BMS coding, concrete structural cracks are narrow (or wider) in regions of high shear or moment (see BIRM). Crack width is significant to the extent that it indicates exposure of rebar to water and/or a structural problem in a concrete element. Generally, most concrete elements have hairline cracking and not considered significant structurally.

4.03 BMS Computer Programs

WSDOT currently uses the Bridgit computer program for bridge network analysis only. One of the many functions of this software is to provide guidance on how best to allocate funds in an agency bridge network. Bridgit software will allow quick answers to various "What If?" funding scenarios, providing immediate feedback needed in the budgeting and programming process. A BMS element for the environment state is controlled by the BMS Engineer and used for modeling the "What If". This element is not coded by the bridge inspectors for the Washington bridges.

4.1 Bridge Decks

The intent of the bridge deck elements is to record the top surface deterioration. The Concrete Deck Soffit, slab, or deck-girder elements record the structural deterioration. Deck elements 12, 13, 14, 20, and 26 record deck patches in CS2, deck spalls in CS3, and delaminations in CS4. Other deck top surface distress such as cracking, scaling, and rutting are not tracked in the deck BMS condition states. These items should be described in the notes at the inspector's discretion. Do not count filling in of the rut as a patch. These locations have filled in a rut with ACP or Ure-Fast and are not considered a deck structural repair.

All bridges will have at least one deck element, even though some bridges do not have a traditional deck and use elements 13 or 14. (The one exception is a Luten Arch structure that is earth filled with an asphalt pavement only.)

Traditional concrete bridge decks use elements 12, 20, or 26 to record the top surface deterioration; and have the Structural Concrete Deck Element (35) to record the structural deterioration.

Non-Traditional concrete decks use elements 13 or 14 to record the top surface deterioration. The slab or deck-girder elements record the structural deterioration.

Steel and Timber decks use elements 28, 29, 30, 31 to record structural condition only, since there is little need to track the wearing surface defects.

Inspectors are encouraged to take the time to locate and describe the patches and spalls on larger structures using photos and descriptions. The preferred documentation format for patching is the number and SF per span. This format is easiest for the next inspector to identify quantity changes.

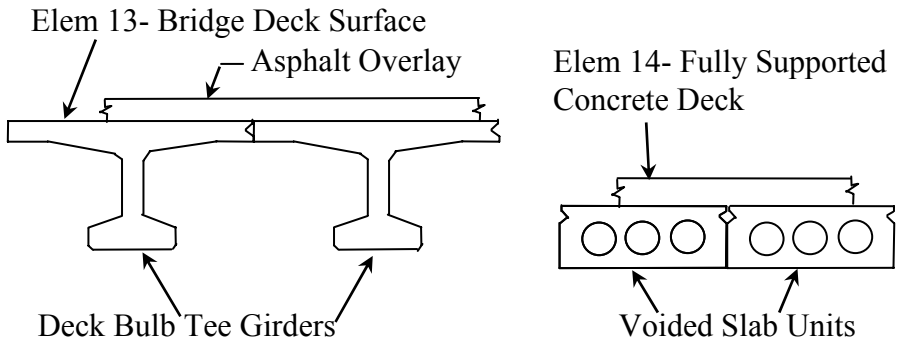
Quantity estimates must be based on the sum of the estimated length and width of the patched or spalled areas. Approximations based on the percent of area are not useful.

NBI Deck Overall Condition should be coded based on Table WB76-63B Chapter 2, page 88.

12	Concrete Deck	Units - SF

This element defines a concrete bridge deck constructed with uncoated steel reinforcement. The quantity should equal the deck's curb-to-curb width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling.
4. If the results of deck delamination testing are available, record the delaminated area (CS4) from element 376 in the deck CS4.



13	Bridge Deck Surface	Units - SF

This element defines a surface of a bridge deck that consists of a slab or girder without a traditional deck. Usually there is a deck protection system (overlay) present, but in some cases, traffic may be driving directly on the girder or slab. The Bridge Deck Surface consists of precast or prestressed girders with no span between the flanges. This element is generally used with superstructure elements 38, 49, 50, 51, 52, 54, 108, 109, or 114. The quantity should equal the "deck" curb-to-curb width times the length.

14	Fully Supported Concrete Deck	Units - SF

This element defines a fully supported concrete bridge deck constructed with one layer of coated reinforcement (epoxy, galvanizing, stainless steel, etc.). The bridge support surface consists of precast or prestressed girders with no span between the flanges. This element may apply to superstructure elements 50, 51, 108, 109, or 114. The quantity should equal the deck's curb-to-curb width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces have no exposed reinforcing. The deck surfaces may have hairline cracks, rock pockets and/or be worn exposing aggregate.
2. If the top of the slabs or girders are visible, area of deck with repairs.
3. If the top of the slabs or girders are visible, area of deck spalling
4. If the results of deck delamination testing are available, record the delaminated area (CS4) from element 376 in the deck CS4.

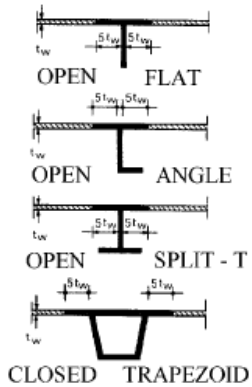
20	Concrete Deck – Lightweight Aggregate	Units - SF

This element defines a lightweight concrete bridge deck constructed with lightweight aggregate and steel reinforcement. The total design weight of the deck is approximately 120 lbs./C.Y. The quantity should equal the deck's curb-to-curb width times the length.

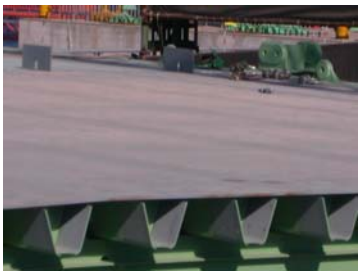
26	Concrete Deck w/Coated Bars	Units - SF

This element defines a concrete bridge deck constructed with coated (epoxy, galvanizing, stainless steel, etc.) reinforcement. The quantity should equal the deck's curb-to-curb width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Deck area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Deck area with spalling.
4. If the results of deck delamination testing are available, record the delaminated area (CS4) from element 376 in the deck CS4.



Orthotropic Deck Types



Closed Trapezoid Orthotropic Deck

27	Steel Orthotropic Deck	Units - SF

This element defines a bridge deck constructed of a flat, deck plate stiffened either longitudinally or transversely, or in both directions. See BIRM, Volume 1, Figure P.1.2.7. The quantity should equal the deck's curb-to-curb width times the length.

28	Steel Deck – Open Grid	Units - SF

This element defines a bridge deck constructed of steel grids that are open and unfilled. The quantity should equal the deck's curb-to-curb width times the length.

29	Steel Deck – Concrete Filled Grid	Units - SF

This element defines a bridge deck constructed of steel grids with either all of the openings or just those in the wheel lines filled with concrete. The quantity should equal the deck's curb-to-curb width times the length.

30	Deck – Corrugated or Other Steel system	Units - SF

This element generally defines a bridge deck constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete. This element may also be used to identify other non-standard steel decks. The quantity should equal the deck's curb-to-curb width times the length.

1. Defects are superficial. The connectors (such as welds, rivets, etc.) or concrete/ asphalt filler are functioning as designed.
2. Deck area with repairs or replaced panels.
3. Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Deck area with damage in significant locations or quantity and has reduced the structural capacity of the element. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

31	Timber Deck	Units - SF

This element defines a bridge deck constructed of timber. The deck may be longitudinally or transversely laminated or of planks. The deck may have an overlay or may be constructed with runners of metal or timber. The quantity should equal the deck's curb to curb width times the length.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Timber deck area with repairs, plates, or replaced timbers.
3. Timber deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Timber deck area with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

32	Fiber Reinforced Polymer (FRP) – Deck	Units - SF

This element defines a bridge deck constructed of fiber reinforced polymer. The quantity should equal the deck's curb to curb width times the length.

1. Defects are superficial. Cracking or delamination of layers may be present.
2. FRP Deck area with repairs, patches, or plated.
3. FRP Deck area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. FRP Deck area with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

35 Concrete Deck Soffit — Units - SF

This element defines the bottom (or undersurface) and edge of a concrete deck and is to be included with concrete deck elements 12, 20, and 26. It is extremely valuable when an asphalt overlay exists on the top surface of the deck. The purpose of the element is to identify decks that may have a reduced structural capacity through visual inspections of the deck soffit. Element 35 does not apply if steel stay-in-place forms are present on the soffit. To be consistent with the deck quantity, the deck soffit quantity should equal the deck's curb-to-curb width times the length.

Delaminations on concrete soffits over roadways may pose a danger to traffic below the bridge. In this situation, a repair should be recommended to correct the condition.

1. The undersurface of the deck is not showing signs of distress. There may be rust stains from rebar chairs, spalls without exposed rebar, or cracks with efflorescence.
2. Deck soffit area with repairs or patches.

3. Deck soffit area showing signs of reduced structural capacity. Typical indications include areas with heavy to severe rust staining from deck reinforcement; Spalling with corroded rebar indicating active corrosion; Cracks that are full depth, severe, or leaking water.

36 Deck Rebar Cover Flag — Units - SF

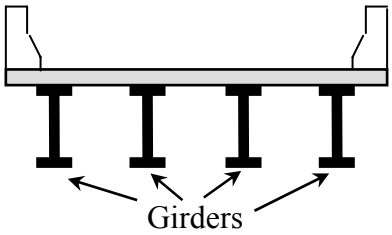
This does not apply to deck spalling with exposed rebar. This element is used to identify the top surface of bridge decks with concrete cover less than 1 inch and having rebar exposed. This condition results from either lack of cover during construction or general rutting that has exposed rebar. Deck patching is often difficult at these locations. This flag will determine method of deck rehabilitation. Report square foot of visible deficiency in CS2.

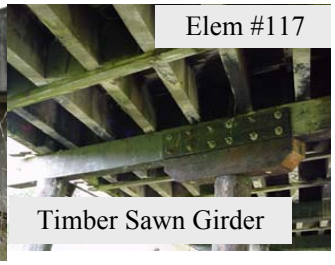
1. Deck top surface area with adequate concrete cover.
2. Concrete deck area with visible lack of cover due to construction or general rutting that has exposed rebar.

4.2 Superstructure

Girders

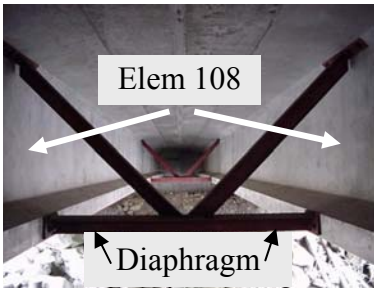
A girder is defined as any longitudinal structural member (single web or box section) that directly supports the bridge deck. A girder type bridge will typically have two or more girders. Girders may be constructed of the following typical materials: Rolled, welded, bolted (riveted), steel sections; Post tensioned, prestressed or reinforced concrete sections; or Timber sections.





Diaphragms

Diaphragms are structural members used to tie adjoining girders together to improve the strength and rigidity of the girder and to distribute forces in the lateral direction. There is no BMS element defined for a diaphragm. If a diaphragm has advanced deterioration, it should be noted in the BMS comments of the accompanying girder.



Pedestrian Bridges

The same BMS elements used for bridges that carry vehicular traffic can be used for pedestrian bridges. **Do not use the BMS sidewalk elements (#260 through #266) for pedestrian bridges.**

Slab Bridges

Slab bridges can have precast segments or cast in place concrete. The bridge in the picture is a cast in place concrete slab and will have a deck element for the deterioration of the top surface. Structural deficiencies of the slab bottom and edge are documented in BMS element #38 “Concrete Slab”.

38	Concrete Slab	Units - SF

This element defines a concrete slab bridge and edge that has been constructed with uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The slab quantity should equal the slab’s curb-to-curb width times the length.

49	Concrete Hollow Slab	Units - SF

This element defines a concrete slab bridge and edge that has been constructed with sono-tubes and uncoated reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. This type of bridge was typically built in the 50’s and 60’s on the state highway system. The slab quantity should equal the slab’s curb-to-curb width times the length.

50	Prestressed Concrete Slab	Units - SF

This element defines a concrete slab bridge that has been constructed with prestressed concrete and uncoated steel reinforcement. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The slab quantity should equal the slab’s curb-to-curb width times the length.

51	Prestressed Concrete Slab w/Coated Bars	Units - SF

This element defines a concrete slab bridge that has been constructed with prestressed concrete and coated steel reinforcement (epoxy, etc.). This element may be solid or have built in voids. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The slab quantity should equal the slab’s curb-to-curb width times the length.

52 Concrete Slab w/Coated Bars — Units - SF

This element defines a concrete slab bridge and edge that has been constructed with coated (epoxy, etc.) reinforcement. This element may or may not contain a hollow core. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The slab quantity should equal the slab's curb-to-curb width times the length.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Concrete slab area with repairs or patches.
3. Concrete slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Concrete slab area with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

54 Timber Slab — Units - SF

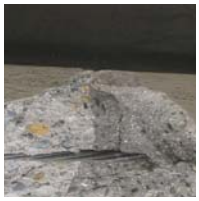
This element defines a slab that is constructed of timber. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The slab quantity should equal the slab's curb-to-curb width times the length.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Slab area with repairs, plates or replaced timbers.
3. Slab area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Slab area with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

89 Prestressed Concrete Girder W/Coated Strands — Units - LF

This element defines a girder constructed of precast prestressed concrete and epoxy coated strand that supports the bridge deck. The element quantity should equal the sum of each girder length. The total element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

90 Steel Rolled Girder — Units - LF

This element defines a girder unit of structural steel that has an integral web and flanges and was fabricated in a steel mill by the rolling process. This element may have bolted, riveted or welded cover plates. This element directly supports the bridge deck and is part of a two or more longitudinal girder system. The element quantity should equal the length of each girder multiplied by the number of girders.

91 Steel Riveted Girder — Units - LF

This element defines a girder unit of structural steel that directly support the bridge deck. This element has a web and flanges that are connected with rivets. This element is part of a two or more longitudinal girder system. The element quantity should equal the length of each girder multiplied by the number of girders.

92 Steel Welded Girder — Units - LF

This element defines a girder unit of structural steel that directly support the bridge deck. This element has a web and flanges that are connected with welds. This element is part of a two or more longitudinal girder system. The element quantity should equal the sum of each girder length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder span length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

96 Concrete Encased Steel Girder — Units - LF

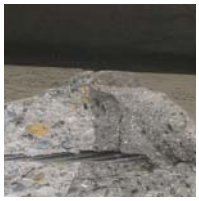
This element defines a steel girder that is encased in concrete. The element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking.
2. Girder span length with repairs or patches.
3. Girder span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), concrete delaminations or spalls in a tension zone.
4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

97 Prestressed Concrete Trapezoidal Girder — Units - LF

This element defines a prestressed concrete box girder. Post-tensioning and span field splices may or may not be present. The element quantity should equal the sum of each girder length. The total element quantity will equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

98 Pontoon Hatch/Bulkhead — Units - EA

This element defines a steel deck or bulkhead hatch access. Deck hatches are accessed from the exterior of a pontoon and bulkhead hatches provide access between cells. The condition evaluation of a hatch includes, but is not limited to the ability of a hatch to provide a watertight structural seal. The performance of the hatches are critical to the design buoyancy of the pontoon structure during extreme events. The total element quantity should equal the total number of hatch and bulkheads on a bridge.

1. Defects are superficial and are insignificant to performance of the hatch. Insignificant amounts of water enter a cell when a deck hatch is opened.
2. Number of hatch/bulkheads with repairs such as: replaced seals, repaired hold-down dogs or locks.
3. Number of hatch/bulkheads with structural defects. The defects do not threaten performance of the hatch.
4. Number of hatch/bulkheads with damage that threatens performance during an extreme event. All pontoon cells, element 99, threatened by the damaged port are to be coded CS4.

99	Concrete Floating Pontoon	Units - Cell

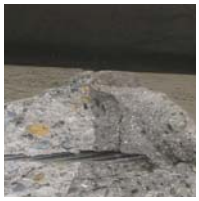
This element is defined by the bottom, sides, and interior cell walls of a concrete floating pontoon. Pontoon element condition will include the top where elevated decks exist on the pontoon. Note: Deck elements will apply for the entire length of the pontoon structure. The structural condition evaluation of the pontoon includes, but is not limited to, the concrete, post-tensioning, exterior hatches, and connections between pontoons. Maintenance pumping records are applied to assess the risk of flooding a cell and/or pontoon. The total element quantity should equal the total number of pontoon cells for the bridge.

1. Defects are superficial and are insignificant to structural capacity or buoyancy. Insignificant amounts of water may be present due to condensation or when a deck hatch is opened. If the total quantity is in CS1, then the NBI Substructure Condition rating (FHWA Item 060) shall be a 7 or 8.
2. Number of pontoon cells with concrete repairs, patches or injected cracks. If one pontoon cell is in CS2, then the NBI Substructure Condition rating (FHWA Item 060) shall be a maximum of 6.
3. Number of pontoon cells structural defects. The defects do not threaten structural capacity or buoyancy of the cell. Water is present in the cell and remains unchanged from year to year and pumping is not required.
4. Number of pontoon cells with structural damage that threatens structural capacity or buoyancy of the cell, pontoon or bridge. Water is accumulating in a cell from a known or unknown source and requires pumping. A cell with visually leaking cracks. If one pontoon cell is in CS4, then the NBI Substructure Condition rating (FHWA Item 060) shall be a maximum of 4. See Bridge Inspection Report, Element 99 BMS notes for pontoon cell criteria that justifies an NBI Substructure Condition rating (FHWA Item 060) of 3.

100 Post Tensioned Concrete Segmental Box Girder — Units - LF

This element defines a post-tensioned concrete box girder constructed using the segmental precast process. The quantity should equal the total length of segmental box girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.



4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

102 Steel Box Girder — Units - LF

This element defines a box girder unit constructed with structural steel. This element directly supports the bridge deck. The element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Girder span length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Girder span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

103	Prestressed Concrete Super Girder	Units - LF

This element defines a prestressed WSDOT type W83G, WF83G, W95G, or WF95G girder. Girders may or may not be post-tensioned. The element quantity should equal the total length of each girder multiplied by the number of girders.

104	Post Tension Concrete Box Girder	Units - LF

This element defines a box girder unit constructed of post-tensioned, cast in place concrete. The element quantity should equal the length of each girder multiplied by the number of girders.

105	Concrete Box Girder	Units - LF

This element defines a box girder superstructure unit constructed with cast in place reinforced concrete. The element quantity should equal the total length of box girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

107 Steel Open Girder — Units - LF

This element defines an open girder unit that is constructed of structural steel. An open or "through" girder is part of a two girder system with stringer and floor beam elements that support a bridge deck. Open girders are located on the outside of the bridge. The bridge deck and any sidewalks are contained between the open girders. Bridges with open girders were generally built prior to 1950 and usually have built up riveted steel members. The element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel open girder span length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Steel open girder span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel open girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

108 Prestressed Concrete Bulb-T Girder — Units - LF

This element defines a precast prestressed concrete Bulb-T girder unit. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The element quantity should equal the length of each girder multiplied by the number of girders.

109 Prestressed Concrete Multiple Web Girder Units — Units - LF

This element defines a precast prestressed concrete girder that has more than one web. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The element quantity should equal the length of each girder unit. The total element quantity should equal the length of each girder unit multiplied by the number of girders.

110 Concrete Girder — Units - LF

This element defines a girder (including T-Beams) constructed of non-prestressed reinforced concrete. The element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

111 Timber Glue-Lam Girder — Units - LF

This element defines a girder unit constructed of glue-lam timber. This element directly supports the bridge deck. The element quantity should equal the length of each girder multiplied by the number of girders.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Glue-Lam girder span length with repairs, patches, or plated.
3. Glue-Lam girder span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. These areas are typically marked with a YELLOW TAG by inspectors.
4. Glue-Lam girder span length with damage in significant locations or quantity and has reduced the structural capacity of the girder or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. These areas are typically marked with a RED TAG by inspectors.

113 Steel Stringer — Units - LF

This element defines a stringer constructed of structural steel that supports the deck in a stringer-floor beam system. A stringer is connected to a floor beam and directly supports a bridge deck. A steel stringer and floor beam combination is commonly used in steel truss and steel open girder bridges. The element quantity should equal the length of each stringer multiplied by the number of stringers.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Stringer span length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Stringer span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Stringer span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

114 Concrete Multiple Web Girder Unit — Units - LF

This element defines a girder constructed of non-prestressed reinforced precast concrete. Structural deficiencies of the edge and bottom surface are addressed in the condition states. The element quantity should equal the length of each unit multiplied by the number of units. Check the NBIS main span type.

115 Prestressed Concrete Girder — Units - LF

This element defines a girder constructed of precast prestressed concrete that supports the bridge deck. The element quantity should equal the sum of each girder length. The element quantity should equal the length of each girder multiplied by the number of girders.

116 Concrete Stringer — Units - LF

This element defines a stringer constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. The element quantity should equal the length of each stringer multiplied by the number of stringers. See Steel Stringers and Floor Beams for a more general description.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Girder length affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Girder length affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Girder span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

117 Timber Sawn Girder — Units - LF

This element defines a girder constructed of sawn timber that supports the bridge deck. The element quantity should equal the length of each girder multiplied by the number of girders.

118 Timber Stringer — Units - LF

This element defines a stringer constructed of timber that supports the bridge deck. The element quantity should equal the length of each stringer multiplied by the number of stringers. See Steel Stringers, Element 113, for a more general description.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Girder or stringer span length with repairs or plates.
3. Girder or stringer span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Girder or stringer span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

119 Concrete Truss — Units - LF

This element defines all members in a truss that is constructed of concrete. There is only one concrete truss on the state highway system. The truss quantity should equal the sum of each concrete truss length, which is two times the truss span length.

1. Truss panel length with superficial defects that have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Truss panel length with repairs or patches.
3. Truss panel length affected with structural defects. The defects do not significantly affect structural capacity. Defects do not warrant analysis, but may require repairs. Length of truss with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Length of truss affected with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

126 Steel Thru Truss — Units - LF

This element includes all structural steel truss members. Code this element for through and pony trusses only. The truss quantity should equal the sum of each truss length, which is two times the truss span length.

131 Steel Deck Truss — Units - LF

This element includes all truss members of a structural steel deck truss. The top and bottom chords are included in this element. The truss quantity should equal the sum of each truss length, which is two times the truss span length.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Truss panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Truss panel length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

135 Timber Truss — Units - LF

This element defines a truss constructed of timber members. The truss quantity should equal the sum of each truss length, which is two times the truss span length.

1. Truss panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Truss panel length with repairs or plates.
3. Truss panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Truss panel length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

139 Timber Arch — Units - LF

This element includes all members of an arch constructed of Timber. The element quantity should equal the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Arch panel length with repairs or plates.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Arch panel length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

141 Steel Arch — Units - LF

This element includes only the arch constructed of structural steel. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The element quantity should equal the length measured from one arch support to the other.

142 Steel Tied Arch — Units - LF

This element includes all members of a tied arch constructed of structural steel. The bottom and top chords are included in this element. The element quantity should equal the length measured from one arch support to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element.
2. Arch panel length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Arch panel length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

143 Steel Suspender — Units - EA

This element defines a steel suspender used in a suspension bridge. The quantity should equal the total number of suspenders.

1. Number of suspenders with defects that are superficial and have no effect on the structural capacity of the element.
2. Number of suspenders with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of suspenders with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of suspenders with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

144 Concrete Arch — Units - LF

This element only defines the arch (open/closed spandrel, bowstring, etc.) and is constructed of non-prestressed reinforced concrete. When coding NBI, pier caps, cross beams, and any other coded substructure elements within the arch span are considered superstructure elements. The element quantity should equal the length measured from one arch foundation to the other.

1. Arch panel length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Arch panel length with repairs or patches.
3. Arch panel length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Arch with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Arch panel length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

145 Earth Filled Concrete Arch — Units - LF

This element defines an earth filled (Luten) arch constructed of reinforced concrete. The element quantity should equal the length measured from one arch foundation to the other. If there is a concrete deck constructed on the fill, BMS element 14 applies. If there is an ACP wearing surface, BMS element 800 or 801 applies.

1. Arch span length with defects that are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Arch span length with repairs or patches.
3. Arch span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Arch with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Arch span length affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

146	Suspension – Main Cable	Units - EA

This element defines a main steel cable used to support the superstructure in a suspension bridge.

147	Suspension – Suspender Cable	Units - EA

This element defines a suspender steel cable that connects the bridge superstructure to the main suspension cable.

1. Number of cables or anchors with no defects in the cable or anchor and the protective coating system is functioning properly. New replacement cables are coded in this condition state.
2. Number of cables or anchors with defects that are insignificant and do not effect the capacity of the cable. The protective coating system is showing signs of failure, and surface or freckled rust may exist with no significant loss of section.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable, but are within acceptable design limits. Corrosion section loss is present. Single wire failures of the cable may exist, but no closer than 30 feet apart.
4. Number of cables or anchors with defects that have significantly affected the capacity. Two or more broken wires, or equivalent section loss due to other defects, are within 30 feet.

148 Floating Bridge – Anchor Cable — Units - EA

This element defines a steel anchor cable used in a floating bridge. The condition of a floating pontoon anchor cable is evaluated during underwater inspections performed by divers and remotely operated vehicles. Condition evaluation is based on cable protection system, breakage of wires within the cable and the condition of the cable anchor. The total element quantity should equal the number of floating pontoon anchor cables attached to the bridge.

1. Number of cables or anchors with no defects in the cable or anchor and the galvanized protection system is functioning properly. New replacement cables are coded in this condition state. (Corresponds to NBI substructure rating of 7 or 8)
2. Number of cables or anchors with defects that are insignificant and do not effect the capacity of the cable. The galvanized protection system is showing signs of failure, and surface or freckled rust may exist with no significant loss of section. If any portion of the cable or anchor is CS2, then the NBI Substructure Condition rating (FHWA Item 060) shall be a maximum of 6.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable, but are within acceptable design limits. Corrosion section loss is present. Single wire failures of the cable may exist due to corrosion or hydrogen embrittlement, but no closer than 30 feet apart.
4. Number of cables or anchors with defects that have significantly affected the capacity. Two or more broken wires, or equivalent section loss due to other defects, are within 30 feet. If any portion of the cable or anchor is CS4, then the NBI Substructure Condition rating (FHWA Item 060) shall be a maximum of 4. If two or more adjacent cables (on the same side or opposite sides of the pontoon) or more than four cables on the structure are CS4, then the NBI Substructure Condition rating (FHWA Item 060) shall be 3.

149 Cable Stayed Bridge – Cable — Units - EA

This element defines a steel cable used to support the superstructure in a cable stayed bridge.

1. There are no defects in the cable or anchor and the protective coating system is functioning properly. New replacement cables are coded in this condition state.
2. Number of cables or anchors with defects that are insignificant and do not effect the capacity of the cable. The protective coating system is showing signs of failure, and surface or freckled rust may exist with no significant loss of section.
3. Number of cables or anchors with defects that are beginning to affect the capacity of the cable, but are within acceptable design limits. Corrosion section loss is present. Single wire failures of the cable may exist, but no closer than 30 feet apart.
4. Number of cables or anchors with defects that have affected the capacity. Two or more broken wires, or equivalent section loss due to other defects, are within 30 feet.

150 Concrete Column on Spandrel Arch — Units - EA

This element defines the column supports on a spandrel arch bridge. The element quantity is the number of columns supported by the arch.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Number of columns with repairs or patches.
3. Number of columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Element with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Number of columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

152 Steel Floor Beam — Units - LF

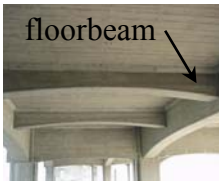
This element defines a floor beam constructed of structural steel that supports stringers in a stringer-floor beam system. Floor beams are load carrying elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders or to the bottom chord of a truss bridge. The element quantity should equal the length of each floor beam multiplied by the number of floor beams.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Floorbeam span length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Floorbeam span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Floorbeam span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

154 Prestressed Concrete Floor Beam — Units - LF

This element defines a floor beam constructed of prestressed concrete that supports the bridge deck in a stringer-floor beam system. The element quantity should equal the length of each floor beam multiplied by the number of floor beams.

155 Concrete Floor Beam — Units - LF



This element defines a floor beam constructed of reinforced concrete that supports the bridge deck in a stringer-floor beam system. Floor beams are load carry elements located transversely to the general bridge alignment. Floor beams transmit the loads from the deck and/or stringers to the outside open girders. The element quantity should equal the length of each floor beam multiplied by the number of floor beams.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Floorbeam span length with repairs or patches.
3. Floorbeam length affected by structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.

4. Floorbeam span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

156 Timber Floor Beam — Units - LF

This element defines a stringer constructed of timber that supports the bridge deck. The element quantity should equal the length of each floor beam multiplied by the number of floor beams. See Steel Floorbeam, Element 152, for a more general description.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Floorbeam span length with repairs or plates.
3. Floorbeam span length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Floorbeam span length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1 ½ shell thickness are marked with a RED TAG.

160 Steel Column on Spandrel Arch — Units - EA

This element defines the column supports on a spandrel arch bridge. The element quantity is the number of columns supported by the arch.

161 Steel Hanger — Units - EA

This element defines the hanger portion of a pin and hanger usually on a steel girder. Truss "hanger" members are not included in this element. The quantity should equal the total number of steel hangers on the bridge. Generally there will be two hangers at each location.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of steel columns or hangers with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of steel columns or hangers with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of steel columns or hangers with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

162 Steel Pin **Units - EA**

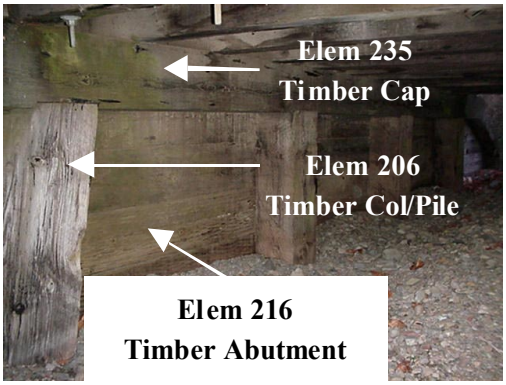
This element defines a structural pin used in any connection joint in a girder or truss. The quantity should equal the total number of pins on the bridge. Zero force and construction pins are not included in the quantity. Pins in bearing elements are not included unless they have uplift loadings.

1. Number of pins and associated connection plates are in good condition. **Visual Inspection:** There may be minor rust or shallow surface deformations on the exposed pin surfaces. Minor amounts of rust powder or paint damage may be present suggesting minor pin rotation in place. No pack rust is present between associated connection plates. There is no noise associated with the pin connection. **Ultrasonic Testing (UT):** Transducer can be applied to both ends of pin allowing a complete scan of pin grip surfaces, there are strong shoulder and end reflections, and there are no UT indications. **UT indications are defined as pips in the grip area that are three times larger (3:1) than the background noise when the GAIN is adjusted to produce a 90 percent - 100 percent reflection height for the far shoulder.**
2. Number of pins and associated connection plates have defects that do not affect the strength or serviceability of the bridge. **Visual Inspection:** Corrosion with pitting or laminar rust may be present. Minor abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates, but is not judged to put a jacking force between the pin nuts. The connection may have some rust powder and/or make noise under loading. **Ultrasonic Testing (UT):** For pins UT inspected from both ends, there may be non-coincident indications between 10% and 20% of the far shoulder reflection height. There may be loss in shoulder or back reflections which can be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS2, even if they have no indications or have indications less than 10 percent of the far shoulder reflection height.
3. Number of pins and associated connection plates have defects that may affect the strength or serviceability of the bridge. **Visual Inspection:** Significant corrosion may be present, suggesting that pin is “frozen” in place. Significant abnormalities may be observed in alignment, pin wear, or deck joint movement. Pack rust may be present between connection plates that place a jacking force between the pin nuts. The connection may have significant amounts of rust powder and/or make noise under loading. **Ultrasonic Testing (UT):** For pins UT inspected from both ends, there may be coincident indications (of any size) or non-coincident indications greater than 20 percent of the far shoulder reflection height. There may be loss in shoulder or back reflections that cannot be explained by pin end conditions (dents, holes, corrosion). Pins that can be UT inspected from one end only are considered CS3 if there are indications greater than 10 percent of the far shoulder reflection height.
4. Number of pins and associated connection plates have defects that are judged to affect the strength or serviceability of the bridge. **Visual Inspection:** There may be “frozen” pins designed for free rotation as part of normal bridge movement. Pack rust may be present between connection plates that are causing distortion/displacement of plates or pins.

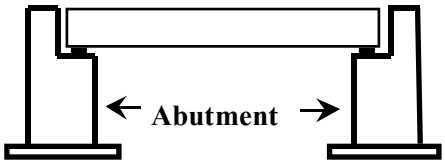
4.3 Substructure

Abutments

An abutment is a substructure unit located at the end of a bridge that retains fill and typically supports the superstructure. In BMS, the type of material used in the abutment wall defines the abutment. If the abutment has piles or columns or caps with a back wall then code the abutment type the same as back wall material type and include the quantity of piles or columns or caps with any others in the bridge.



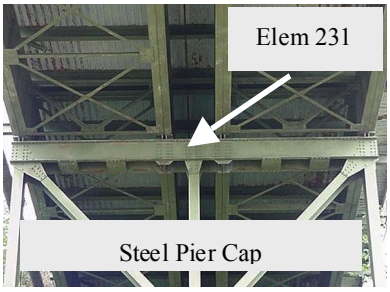
If the abutment has integral wing walls then include their length (max. 20 feet each) in the total abutment length. If a retaining wall is being used for the abutment and the wall extends beyond the bridge then use the bridge's out to out width value plus 40 feet for the total abutment length.

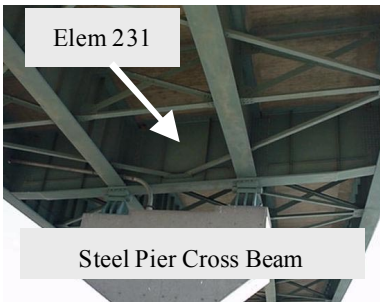


Pier Cap/Cross Beam

A pier cap is an element that is attached to the top of a pier and is used to support the superstructure of a bridge. A pier cross beam is generally attached to the girders and is used to distribute the loads from the girders to the pier.

One BMS element is used to define either a cap or cross beam constructed of the same material.

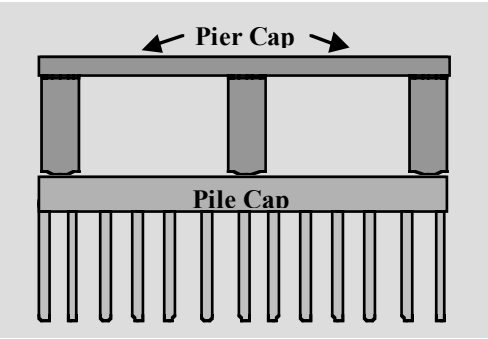




Pile Cap

A pile cap is located on top of a group of piles and provides support for columns above it. The pile cap secures the position of each of the piles in the group.

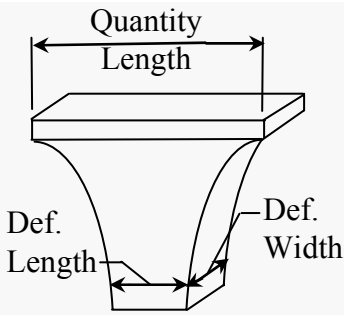
The pile cap provides a way to receive and distribute the superstructure loads into the substructure.

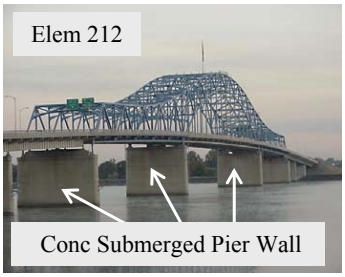


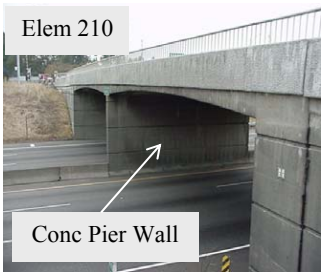
Pier Wall Definition

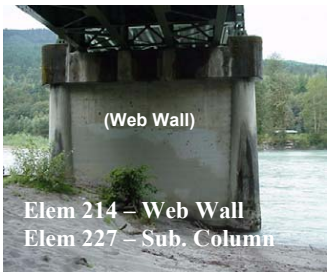
A pier wall is a substructure pier element.

In BMS, a pier can be defined as: a pier wall if the length (transverse direction) is ***3 times greater than the width*** (longitudinal direction) at the bottom; and the wall extends full height from the foundation to the superstructure. If the pier does not meet these two criteria, then the element would be coded as a column or other pier.



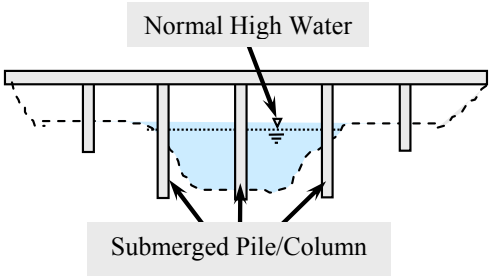






Submerged Element Definition (Pile, Column, Pier Wall, Pile Cap/Footing)

A Submerged element in BMS is defined as a substructure element located within the normal high water banks of a waterway channel. The substructure element may be only wet during high water flows. Repair or replacement of these elements may have special construction requirements as outlined in the environmental permits.



202	Steel Pile/Column	Units - EA

This element defines a column or pile extension constructed of structural steel visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of pile/columns with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

204	Prestressed Concrete Pile/Column	Units - EA

This element defines a column or pile extension that is constructed of prestressed concrete visible for inspection.

205	Concrete Pile/Column	Units - EA

This element defines a column or pile extension that is constructed of reinforced concrete visible for inspection. Usually, WSDOT concrete piles are designed and constructed inside a sacrificial steel pipe.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Number of pile/columns that has been repaired or patched.
3. Number of pile/columns has structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Element with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

206	Timber Pile/Column	Units - EA

This element defines a column or pile extension constructed of timber visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of pile/columns with repairs, plates, or splices.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

207	Concrete Pile/Column w/Steel Jacket	Units - EA

This element defines a column or pile extension that is constructed of reinforced concrete and has been seismically retrofitted with a steel jacket visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of pile/columns with repairs.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member.

208	Concrete Pile/Column w/Composite Wrap	Units - EA

This element defines a column or pile extension that is constructed of reinforced concrete and has been seismically retrofitted with composite wrap visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, superficial cracking or debonding.
2. Number of composite wrapped Pile/Columns with repairs.
3. Number of composite wrapped Pile/Columns with structural defects. The defects do not significantly affect structural capacity of the wrap or pile/column. Deficiencies do not warrant analysis, but may require repairs.
4. Number of composite wrapped Pile /Columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

209	Submerged Concrete Pile/Column w/Steel Jacket	Units - EA

This element defines a submerged column or pile extension that is constructed of reinforced concrete and has been seismically retrofitted with a steel jacket visible for inspection.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of steel jacketed Pile/Columns with repairs.
3. Number of steel jacketed Pile/Columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of steel jacketed Pile/Columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

210	Concrete Pier Wall	Units - LF

This element defines a pier wall constructed of reinforced concrete. The element quantity should equal the length at the top of the wall.

211	Other Pier Wall	Units - LF

This element defines a pier wall that is constructed of a non-standard material (rock and mortar) or non-standard construction.

212	Concrete Submerged Pier Wall	Units - LF

This element defines a submerged pier wall constructed of reinforced concrete. The element quantity should equal the length at the top of the wall.

213 Other Submerged Pier Wall — Units - LF

This element defines a submerged pier wall that is constructed of a non-standard material (rock and mortar) or non-standard construction.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Length of pier wall with repairs.
3. Length of pier wall with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Length of pier wall with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

214 Concrete Web Wall between Columns — Units - LF

This element defines a secondary concrete wall constructed between pier columns. This element includes railroad crash barriers. The element quantity should equal the length at the top of the wall.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Web wall length with repairs.
3. Web wall length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Web wall length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

215 Concrete Abutment — Units - LF

This element defines an abutment constructed of reinforced concrete.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Abutment length with repairs.
3. Abutment length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Abutment length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

216 Timber Abutment — Units - LF

This element defines an abutment constructed of timber is to include the members that retain the backfill behind the abutment. Normally, the abutment pier cap defects are recorded in the timber pier cap element 235, and the pile defects are recorded in the timber pile element 206.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Entire length of abutment if repairs exist.
3. Entire length of abutment if structural defects exist, but the defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Entire length of abutment if damage in significant locations or quantity and has reduced the structural capacity of the abutment. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the abutment. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

217 Other Abutment — Units - LF

This element defines an abutment constructed of non-standard material (rock and mortar) or non-standard construction.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Abutment length with repairs
3. Abutment length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Abutment length with damage in significant locations or quantity and has reduced the structural capacity of the abutment. Structural analysis is warranted or has determined repairs are essential to restore the full abutment capacity.

218 Steel Abutment — Units - LF

This element defines an abutment constructed of structural steel.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of abutment with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Steel span length of abutment with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of abutment affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

219 Concrete Cantilevered Span Abutment — Units - LF

This element defines an abutment for a bridge (bridge) span that is cantilevered from the first or last pier. These bridges do not have a true abutment like other bridges. The "Cantilever Span Abutment" element was created to keep this abutment type separate from the typical abutment elements. The default notation assumes the pavement seat (abutment 1) is Pier 1; the cantilever span is Span 1; the first pier is Pier 2.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Abutment length with repairs or patched.
3. Abutment length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Abutment length with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

220 Concrete Submerged Pile Cap/Footing — Units - EA

This element defines a reinforced concrete pile cap or footing that is visible for inspection. The pile cap or footing may be always or seasonally covered by water. The exposure may be intentional or caused by scour.

221 Concrete Pile Cap/Footing — Units - EA

This element defines a reinforced concrete pile cap or footing that is visible for inspection. The exposure may be intentional or caused by erosion.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Number of pile cap/footings with repairs.
3. Number of pile cap/footings with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Number of pile cap/footings with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

222 Timber Sill/Footing — Units - LF

This element defines a sill, footing, or pile cap constructed of timber. This element directly supports substructure elements.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Total length of sill/footing if repairs exist.
3. Total length of sill/footing if structural defects exist, but the defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Total length of sill/footing where damage exists in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½ shell thickness are marked with a RED TAG.

225	Steel Submerged Pile/Column	Units - EA

This element defines a pile extension or column that is constructed of steel and is visible for inspection. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Number of pile/columns with repairs.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

226	Prestressed Concrete Submerged Pile/Column	Units - EA

This element defines a submerged pile extension or column that is constructed of prestressed concrete and is visible for inspection.. The exposure may be intentional or caused by scour.

227	Concrete Submerged Pile/Column	Units - EA

This element defines a submerged column or pile extension that is constructed of reinforced concrete and is visible for inspection. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Number of pile/columns with repairs.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

228 Timber Submerged Pile/Column — Units - EA

This element defines a pile or column that is constructed of timber and is visible for inspection. The exposure may be intentional or caused by scour.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Number of pile/columns with repairs, plates, or splices.
3. Number of pile/columns with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Number of pile/columns with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

231 Steel Pier Cap/Crossbeam — Units - LF

This element defines a pier cap or crossbeam that is constructed of structural steel.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Steel span length of pier cap/crossbeam with repairs.
3. Steel span length of pier cap/crossbeam with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth).
4. Steel span length of pier cap/crossbeam with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

233 Prestressed Concrete Pier Cap/Crossbeam — Units - LF

This element defines a pier cap or crossbeam that is constructed of prestressed concrete and directly supports the superstructure. This element may be attached to a submerged or non-submerged substructure element.

234 Concrete Pier Cap/Crossbeam — Units - LF

This element defines a pier cap or crossbeam that is constructed of reinforced concrete and directly supports the superstructure. Integral pier caps with girders framed directly into the crossbeam are also included in element 234. This element may be attached to a submerged or non-submerged substructure element.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Length of pier cap/crossbeam affected by repair or patch. Capacity repairs such as a strand splicing should record girder span length.
3. Length of pier cap/crossbeam affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Length of pier cap/crossbeam affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

235 Timber Pier Cap — Units - LF

This element defines a pier cap that is constructed of timber and directly supports the superstructure.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of pier cap with repairs, plates, or splices.
3. Length of pier cap with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Length of pier cap with damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Typically, locations in a load path with less than a 1 ½ shell thickness are marked with a RED TAG.

4.4 Culverts

240	Metal Culvert	Units - LF

This element defines a metal (steel, aluminum, etc.) culvert including arches, round or elliptical pipes, etc.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be corrosion, erosion, scour, distortion, or roadway settlement.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Length of culvert affected by damage in significant locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Major deterioration, distortion, deflection, roadway settlement, or misalignment of the barrel may be in visible.

241	Concrete Culvert	Units - LF

This element defines all precast and cast-in-place (conventional or prestressed) concrete arch, pipe and box culverts.

1. Defects are superficial and have no effect on the structural capacity of the element. There may be discoloration, efflorescence, and/or superficial cracking, spalls or delaminations.
2. Length of culvert with repair or patch.
3. Length of culvert affected by defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Girder with defects such as: delaminations, spalls, structural cracking, exposed or corroded reinforcing or strands.
4. Length of culvert affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the culvert. Major deterioration, distortion, deflection, roadway settlement, or misalignment of the barrel may be in visible.

242 Timber Culvert — Units - LF

This element defines all timber box culverts.

1. Defects are superficial and have no effect on the structural capacity of the element. Decay, insect infestation, cracks, splits, or checks may exist.
2. Length of culvert that has been replaced, repaired, patched, or plated.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Typically, locations in a load path with a 1½″ to 3″ shell thickness are marked with a YELLOW TAG.
4. Length of culvert affected by damage in significant locations or quantity and has reduced the structural capacity of the element or the bridge. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Major deterioration, distortion, deflection, roadway settlement, or misalignment of the barrel may be in visible. Typically, locations in a load path with less than a 1½″ shell thickness are marked with a RED TAG.

243 Other Culvert — Units - LF

This element defines all culverts not included under steel, concrete, or timber culvert elements. It may include masonry or combinations of other materials.

1. Defects are superficial and have no effect on the structural capacity of the culvert.
2. Length of culvert with repairs.
3. Length of culvert with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Length of culvert affected by damage in significant locations or quantity and has reduced the structural capacity of the culvert. Structural analysis is warranted or has determined repairs are essential to restore the structural capacity of the culvert. Major deterioration, distortion, deflection, roadway settlement, or misalignment of the barrel may be in visible.

4.5 Tunnels

250 Tunnel – Concrete Lined **Units - SF**

This is an element used to identify concrete lined tunnels. Use the CoRe elements to record the elements that exist inside the tunnel.

251 Tunnel – Timber Lined **Units - SF**

This is an element used to identify timber-lined tunnels. Use the CoRe elements to record the elements that exist inside the tunnel.

252 Tunnel – Unlined **Units - SF**

This is an element to identify unlined tunnels. Use the CoRe elements to record the elements that exist inside the tunnel.

1. Defects are superficial and have no effect on the structural capacity of the tunnel.
2. Tunnel area with repairs or patches.
3. Tunnel area with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Tunnel area affected by damage in significant locations or quantity and has reduced the structural capacity of the tunnel (or tunnel liner). Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

253 Tunnel Tile **Units - SF**

This is an element to identify tunnel tile.

1. Tile is bonded with no cracks, chips, or blemishes. Tile may be dirty but reflectivity is enhanced during regular tunnel washing operations.
2. Tile area that has been repaired.
3. Tile area that is bonded, but cracked and may have efflorescence or small amounts of section loss. Tile may be blemished from impact or other causes resulting in major loss of reflectivity.
4. Tile area with delaminations based on soundings, is completely missing, or has major section loss warranting replacement.

4.6 Sidewalk and Supports

A sidewalk is an element that provides pedestrian access across a bridge. A sidewalk is supported by a bridge deck and/or by sidewalk brackets that consist of several types of materials. The purpose of the sidewalk BMS is to record the structural integrity of the support system and sidewalk. Identify these elements in BMS if the sidewalk width is greater than or equal to 3 feet.

However, there are exceptions that must be accommodated. When there is a true sidewalk on a bridge as determined by the design, approach sidewalks, and location, it is appropriate to enter a sidewalk element in the BMS. Timber sidewalks, for example, may be narrow and have a support system. These exceptions should include a sidewalk BMS element. Please make a specific note explaining the reasoning for including the sidewalk element.

If a rail retrofit or a wide curb has been determined to NOT be a sidewalk, then Bridge Rail elements will be used to document defects.

260	Steel Open Grid Sidewalk and Supports	Units - SF

This element defines a sidewalk constructed of steel grids that are open and unfilled. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length.

261	Steel Concrete Filled Grid Sidewalk and Supports	Units - SF

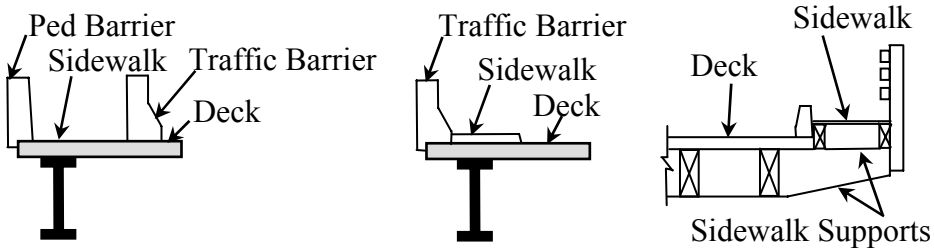
This element defines a sidewalk constructed of steel grids that have been filled with concrete. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length.

262	Corrugated/Orthotropic Sidewalk and Supports	Units - SF

This element defines a sidewalk constructed of corrugated metal filled with Portland cement concrete or asphaltic concrete or an orthotropic steel deck. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length.

264 Timber Sidewalk and Supports — Units - SF

This element defines a sidewalk constructed of timber. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length.



266 Concrete Sidewalk and Supports — Units - SF

This element defines a sidewalk constructed of reinforced concrete. The concrete sidewalk may be supported by the roadway deck, bracing, diaphragms, or sidewalk stringers. The total quantity should equal the width of the sidewalk times its length.

267 Fiber Reinforced Polymer (FRP) Sidewalk and Supports — Units - SF

This element defines a sidewalk constructed of fiber-reinforced polymer. This element also includes the members used to provide support like stringers and braces. The total quantity should equal the width of the sidewalk times its length.

1. Defects are superficial and have no effect on the structural capacity of the sidewalk or supports.
2. Sidewalk area (or support projected area) with repairs or patches
3. Sidewalk area (or support projected area) with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Sidewalk area (or support projected area) affected by damage in significant locations or quantity and has reduced the structural capacity of the sidewalk support. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4.7 Bearings

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependant (or supported) structure only.

310	Elastomeric Bearing	Units - EA

This element defines a bridge bearing that is constructed primarily of elastomers, with or without fabric or metal reinforcement.

311	Moveable Bearing (Roller, Sliding, etc.)	Units - EA

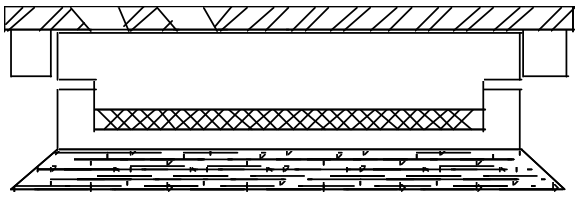
This element defines those bridge bearings that provide for both deflection and longitudinal movement by means of roller, rocker or sliding mechanisms.

312	Concealed Bearing or Bearing System	Units - EA

This element defines those bridge bearings and/or bearing seats that are accessible with tools or equipment and therefore are not open for detailed inspection.

313 Fixed Bearing — Units - EA

This element defines those bridge bearings that provide for rotation only.



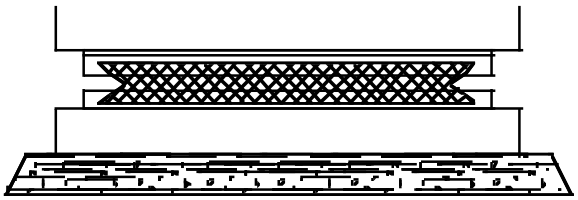
314 – Pot Bearing

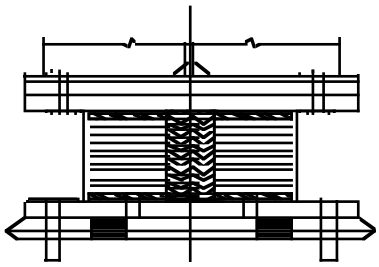
314 Pot Bearing — Units - EA

This element defines those high load bearings with a confined elastomer. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.

315 Disc Bearing — Units - EA

This element defines a high load bearing with a hard plastic disc. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.





316 Isolation Bearing — Units - EA

This element defines a bearing that is laminated and is a sandwich of neoprene and steel plates. The bearing contains a lead core that is primarily used for seismic loads. The isolation bearing is used to protect structures against earthquake damage.

1. Defects are superficial and have no effect on the superstructure movements or safe transfer of load to the substructure. Shear deformation, displacement, or cracking of grout pad may be present. Top and bottom surfaces may not be parallel.
2. Number of bearings with a repair
3. Number of bearings with structural defects. The defects are not detrimental to the superstructure or the safe transfer of load to the substructure. Deficiencies do not warrant analysis, but may require repairs.
4. Number of bearings with defects that are detrimental to the superstructure or the safe transfer of load to the substructure. Loss of minimum bearing area may be imminent. Structural analysis is warranted or has determined bearing repairs are essential to restore the safe movement or transfer of load to the substructure.

321 Concrete Roadway Approach Slab — Units - SF

This element defines a structural concrete slab supported at the bridge abutment and the roadway pavement. This element is essentially a concrete deck element that documents the surface conditions of the approach slab. The element quantity is the total area of both concrete approach slabs attached to the bridge. Do not include asphalt shoulder if present.

1. Defects are superficial. The slab surface do not have spalls/delaminations or previous repairs. The deck surfaces may have cracks or rock pockets. Wear and rutting may expose aggregate or reinforcing.
2. Slab area with repairs or patches. Do not include the rare case rutting filled with patching material.
3. Slab area with spalling.
4. If the results of delamination testing on the approach slab are available, record the delaminated area CS4.

322 Roadway Profile — Units - EA

This element flags a problem with the roadway profile from the pavement seat to a maximum distance of 50 feet away from a structure. The approaching roadway profile should be a smooth transition for cars and trucks on or off the structure. Vehicles should remain steady and not rock from side to side or up and down. Oil staining on the road is a good indicator there may be a problem. Notes should describe the nature of the problem or the solution, if one can be identified. Total quantity is the number of roadway profiles on and off of the bridge. Head to head traffic has two and traffic divided by a median would generally have four. Code the number of profiles in the condition state that best indicates the severity of the problem.

1. The roadway profile grade is smooth even though wheel bouncing may exist from small patches, potholes, or rutted edges.
2. Paving operations have repaired the grade with tapered asphalt patching that may or may not extend on to the approach slab or bridge deck.
3. The roadway profile grade has less than 1 inch height change over a distance of 40 feet. Minor movement of the vehicles may exist and there is not a significant increase in load to the structure.
4. The roadway profile grade has more than 1 inch height change over a distance of 40 feet. The profile deviation is noticeable to vehicles and there may be an increase in load to the structure.

4.8 Bridge Rail

Bridge rail BMS elements are to be entered for each type of rail. For example, if there is W-beam or Thrie beam guardrail mounted on the concrete bridge rail, then the length of each metal and concrete element should be entered. If the original concrete bridge rail has aluminum rail installed on top (with or without a rail retrofit), enter that quantity into the appropriate BMS element as well. In the element notes, describe what type of metal bridge or pedestrian rail has been entered.

330 Metal Bridge Railing **Units - LF**

This element defines all types and shapes of metal bridge railing aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each bridge rail.

331 Concrete Bridge Railing **Units - LF**

This element defines all types and shapes of reinforced concrete bridge railing. The quantity should equal the total length measured along each bridge rail.

332 Timber Bridge Railing **Units - LF**

This element defines all types and shapes of timber railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each bridge rail.

333 Other Bridge Railing **Units - LF**

This element defines all types and shapes of bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each bridge rail.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Bridge rail length with a repair.
3. Bridge rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Bridge rail length with damage in significant locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4.9 Pedestrian Rail

A pedestrian rail will typically be on the outside of a sidewalk and protected from traffic by a Bridge Rail.

340	**Metal Pedestrian Rail**	**Units - LF**

This element defines all types and shapes of metal pedestrian bridge railing including steel (excluding weathering steel), aluminum, metal beam, rolled shapes, etc. The quantity should equal the total length measured along each pedestrian rail.

341	**Concrete Pedestrian Rail**	**Units - LF**

This element defines all types and shapes of reinforced concrete pedestrian bridge railing. The quantity should equal the total length measured along each pedestrian rail.

342	**Timber Pedestrian Rail**	**Units - LF**

This element defines all types and shapes of timber pedestrian bridge railing. All elements of this rail (except connectors) must be timber. The quantity should equal the total length measured along each pedestrian rail.

343	**Other Pedestrian Rail**	**Units - LF**

This element defines all types and shapes of pedestrian bridge railing except those defined as METAL, CONCRETE or TIMBER. This element will include cable rails, and combinations of materials. The quantity should equal the total length measured along each pedestrian rail.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Pedestrian rail length with a repair.
3. Pedestrian rail length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs. Structural deficiencies are not limited to impact damage, cracks, broken bolts, or measurable section loss due to corrosion (note the location and depth), decay, or spalling.
4. Pedestrian rail length with damage in significant locations or quantity and has reduced the structural capacity of the rail. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element.

4.10 Smart Flags

355 Damaged Bolts or Rivets **Units - EA**

This smart flag is used to identify superstructure steel elements that have broken or missing bolts and/or rivets. Report one unit for each occurrence in the corresponding condition state.

1. Number of damaged (or missing) bolt or rivet in secondary member(s).
2. Number of damaged (or missing) bolt or rivet has been replaced.
3. Number of damaged (or missing) bolt or rivet in a primary member(s).

356 Steel Cracking **Units - EA**

This smart flag is used to identify superstructure steel elements with cracks. Report one unit for each occurrence (or crack) in the corresponding condition state. If fatigue damage exists, which may warrant analysis of the element or the serviceability of the element is uncertain, contact a BPO supervisor immediately.

1. Number of steel cracks, of any length, in a secondary member(s).
2. Number of steel cracks within a load path that have been repaired or arrested. The bridge may still be prone to fatigue.
3. Number of steel cracks within a load path that are not arrested and less than 1 inch. Any cracks (typically cope cracks) must be repaired according to BPO specified procedures.
4. Number of steel cracks within a load path that are not arrested and 1 inch or greater in length. Any cracks (typically cope cracks) must be repaired according to BPO specified procedures.

357 Pack Rust **Units - EA**

The primary purpose of this smart flag is to quantify steel connections where rust expansion is visually deflecting steel plates and should be addressed when the bridge is painted. Structural impacts to rust pack overstressing are recorded in the steel elements. The total quantity is the number of existing pack rust locations identified by the inspector.

1. **Approximate** number of locations where visible pack rust exists and is less than ¼ inch thick.
2. Number of locations where pack rust is more than ¼ inch thick.

360 Bridge Movement — Units - EA

The primary purpose of this smart flag is to identify structural movement that is causing significant distress to the bridge. Movements may be horizontal, vertical, or rotational. Evidence of movement should be documented (photo) in such a way that future measurements can determine if the structure is still moving or has stabilized.

1. The entire bridge appears to have stabilized due to repairs or recent history of measurements. Tilt meters, piezometer tubes, or monitoring system show no movement in the past two years.
2. Bridge elements are moving but do not cause a significant problem for the bridge. Bearings may be approaching design limits. Substructure elements may be moving.
3. Bridge movement is at or beyond design limits. Investigation and repair analysis of the bridge is warranted.

361 Scour — Units - EA

This smart flag is used to identify foundation scour for bridges crossing waterways as observed during inspections. Its primary purpose is to identify bridge piers or abutments that are experiencing scour and to provide some measure of the magnitude of that scour.

1. Number of pier/abutment foundations where no Scour exists, or the scour has been repaired and is functioning as designed.
2. Number of pier/abutment foundations where scour is superficial and has no effect on the foundation structural capacity. No exposed spread footings. Minimum pile embedment is greater than 10’. The substructure code is not affected by scour. Monitor scour condition.
3. Number of pier/abutment foundations where scour exists. The scour does not significantly affect the foundation structural capacity. Scour does not warrant analysis, but may require repairs. If left unchecked, could adversely impact the foundation structural capacity. Top of spread footings may be exposed. Minimum pile embedment is between 5’ and 10’. The NBI substructure code (676) of 4 (poor condition) would be appropriate if the scour had undermined the foundation to the point the load carrying capacity of the pier or abutment had been reduced, or it was potentially unstable. Reanalysis of the scour code may be warranted. Repairs to the bridge may be warranted.
4. Number of pier/abutment foundations with scour damage in significant locations or quantity and has reduced the foundation structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the pier. Undermining of spread footings or foundation material is occurring. Minimum pile embedment is less than 5’. NBI scour code should be coded 2 or less. If local failure of the foundation or substructure element were possible, NBI substructure code should be a 3 (serious condition). Directly comment that the substructure rating is based on the pile embedment length. Evaluate and comment on any riprap or other scour countermeasures that are in place. Make a recommendation to evaluate the pile for lateral stability. Document the scour condition thoroughly. Repairs to the bridge are necessary.

362 Impact Damage — Units - EA

This is a smart flag used to identify damage caused by impact from traffic or other causes such as flood debris. A maximum of 1 unit can be coded in each condition state.

1. Impact damage has occurred. None of the prestressed system is exposed. Repair, patching, or heat straightening is not required.
2. Impact damage has been repaired or patched. Any damage to a prestressed system has been repaired and patched. Steel elements have been repaired and painted.
3. Impact damage has occurred. Any prestressed system exposure is due to a traffic impact, but is not impaired. Patching concrete or heat straightening of steel is needed.
4. Impact damage has occurred and strength of the member is impaired. Analysis is warranted to ascertain if the member can be repaired or needs to be replaced.

366 Undercrossing – Safety Inspection — Units - EA

This is a smart flag for safety checks of Railroad and other non-vehicular undercrossings. No other core elements are needed.

1. Report the entire bridge in condition state one (EA).

367 Movable Bridge — Units - EA

This is a smart flag to identify movable bridges. BMS elements will be used in addition to this smart flag.

1. A Movable bridge with elements that do not require repair (EA).
2. A Movable bridge with elements that require repair (EA).

368 Seismic Pier Crossbeam Bolster — Units - EA

This element identifies concrete piers with seismic structural improvements.

1. Number of piers with a crossbeam bolster.

369 Seismic Pier Infill Wall — Units - EA

This element identifies concrete piers with seismic structural improvements.

1. Number of piers with a seismic pier infill wall.

4.11 Seismic Restrainers

Earthquake restrainers have been installed on WSDOT bridges since the 1980's. The typical longitudinal restrainer uses epoxy coated Dywidag bars with a designed gap maintained by double nuts. An earlier system using springs to maintain the required restrainer gap was used until the early 1990's when it was discontinued as being ineffective. Gap measurements are required during an inspection if visual inspection or loose double nuts indicate the gaps are not uniform.

370	**Seismic – Longitudinal Restrainer**	**Units - EA**

This element is used to identify longitudinal seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependant (or supported) structure only. The quantity should equal the total number of longitudinal restrainers on the bridge.

371	**Seismic – Transverse Restrainer**	**Units - EA**

This element is used to identify transverse seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependant (or supported) structure only. The quantity should equal the total number of transverse restrainers on the bridge.

372	**Seismic – Link/Pin Restrainer**	**Units - EA**

This element is used to identify link/pin seismic restrainers. When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependant (or supported) structure only. The quantity should equal the total number of link/pin restrainers on the bridge.

1. Restrainer is in good condition and will function as designed. Anchor plate nuts have been checked and are in good condition.
2. Number of restrainers with misaligned seismic-longitudinal restrainer rods. Anchor plate nuts that are tight, but that have epoxy running down their bolts or are of varying lengths. The gap between adjacent longitudinal restrainers varies between ¼ inch and ¾ inch. Short transverse pipe restrainer length. Measure the depth of the diaphragm hole to the restrainer. Take a picture of the hole and tape measure.
3. Number of restrainers with improper anchor plate installation. Loose or inadequately bonded anchor nuts. A repair is warranted if over 25% of the anchor nuts have more than 2 inches of bolt thread exposed below the nut. Restrainer gap variation in a series of longitudinal seismic restrainers is greater than ¾ inches (measure and add the two gap distances on both sides of each restrainer in making your comparisons). Loose double nuts. Specify the replacement of the double nuts with (new) nuts having (with) setscrews and the resetting of the restrainer gaps according to the design tables. The inspector shall specify the required gaps, according to the bridge plans, in the repair.

373 Seismic – Catcher Block **Units - EA**

This element is used to identify a catcher block attached to a pier or abutment installed as part of a seismic retrofit. The quantity should equal the total number of catcher blocks on the bridge.

1. Number of catcher blocks in good condition.
2. Number of catcher blocks with deficiencies that need correction.

375 Cathodic Protection **Units - EA**

This is a smart flag used to identify a cathodic protection system used on a bridge. The quantity should equal the total number of cathodic protection systems on the bridge.

1. Code 1 if the cathodic protection system is functioning as designed.
2. Code 1 if the cathodic system is no longer functioning as designed.

376 Concrete Deck Delamination Testing **Units - SF**

This is a smart flag used to identify the results of concrete deck delamination testing. For Washington State bridges, the BMS engineer will provide the area of condition states and 376 notes for this element.

1. Deck area with no delaminations
2. For bridges with an ACP overlay, this is the area of concrete patching before an overlay was constructed. No action required by the inspector.
3. Deck area with concrete spalling measured in the Materials Lab Deck Delamination Test.
4. Deck area with concrete delamination measured in a Materials Lab Deck Delamination Test. This area should be recorded in the Concrete Deck CS4 (or Deck and Concrete Overlay CS4).

380 Unknown Pier Foundations **Units - EA**

This smart flag is used to identify the number of submerged unknown pier foundations on a bridge. The unknown status is based on nonexistent foundation plans for the pier. This is information only and no action is required of the inspector for this Smart Flag.

1. The number of submerged unknown pier foundations.

4.12 Expansion Joint BMS

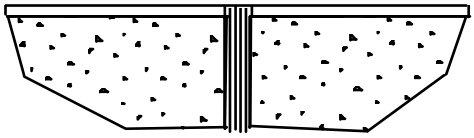
The expansion joint condition states are designed to track the criteria associated with joint structural failure such as spalling, patches, and other structural problems. A spall within 1′ - 0″ of a joint system should be considered a joint spall and not included with the deck spalling. Spalls next to the joint are a joint deficiency rather than deck deterioration.

Missing or defective joint glands are not considered structural joint failures in the joint condition states. Some joints are designed to pass water and many joints leak within days of installation. If the joint seal leakage is causing structural problems with elements below the joint, this should be noted in the report and a repair should be recommended. A smart flag or element may be used to track this deterioration in the future, but it is not included in the joint condition states at this time.

If any portion of a joint falls into a lower condition state, code the entire length of the joint in the lower condition state. Joints with structural defects are coded in CS2. Joints that require replacement are tracked in CS3. In general, joints in Condition State 3 will be programmed for rehabilitation or replacement.

When the entire joint is replaced with a new joint system, change the BMS element to the new joint type. Do not use more than one BMS element for a joint location, unless the structure has been widened and there are two joint systems present. Joint notes should reference specific joints by pier or span number.

When an in-span hinge separates two structures, the joint, bearing, and seismic restrainers at the hinge will be documented in the dependant (or supported) structure only.

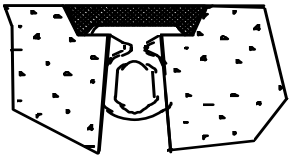


402 Hot Poured and/or Premolded Joint Filler Units - LF

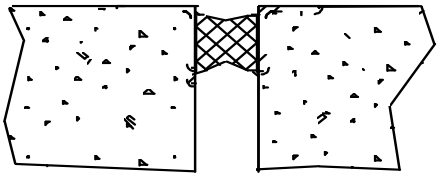
This element defines a joint in the concrete deck that has been filled with a poured rubber or hot applied asphalt or has been constructed with premolded joint filler. Use this element as default for open joints. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound.
2. Skewed joint length at each location with “D” spalls or patches are present in the header or in the deck within one foot of either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

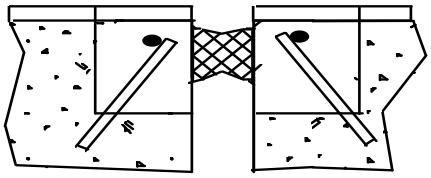
   For truss bridges, joint length at each floorbeam should be coded CS3 where water is corroding the top flange and/or connections. A repair to reseal the joints is required.



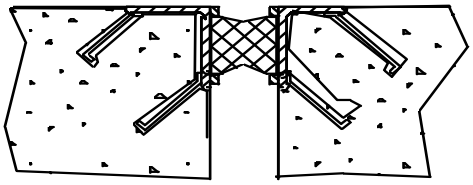
403 – Poured Rubber and Bulb-T



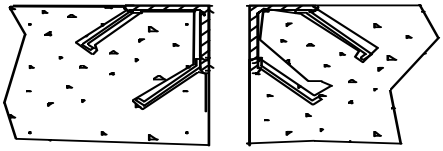
404 – Compression Seal/Concrete Header



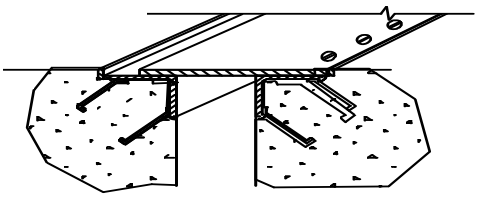
405 – Compression Seal/Polymer Header



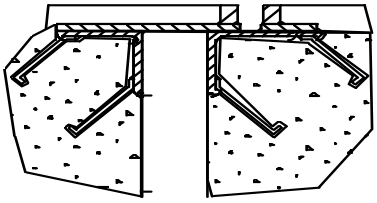
406 – Compression Seal/Steel Header



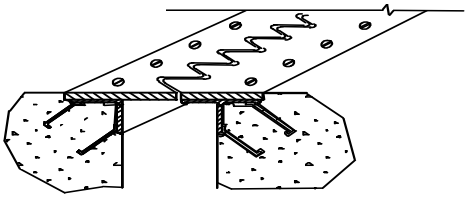
407 – Steel Angle Header



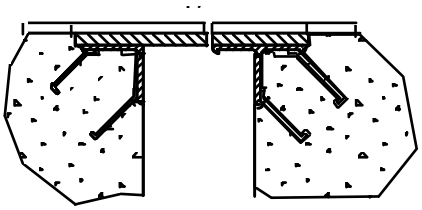
408 – Steel Sliding Plate



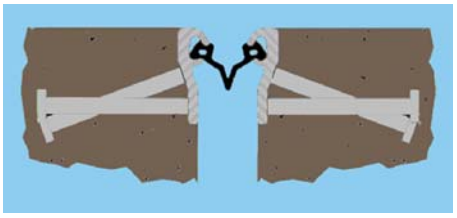
409 – Steel Sliding Plate w/Raised Bars



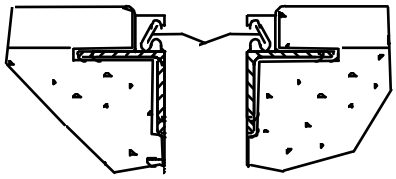
410 – Steel Fingers



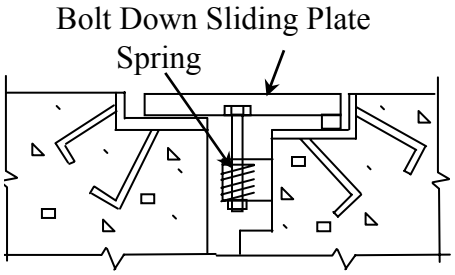
411 – Steel Fingers w/Raised Bars



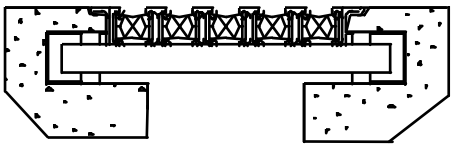
412 – Strip Seal-Anchored



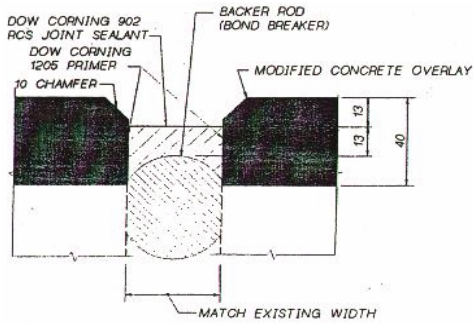
413 – Strip Seal-Welded



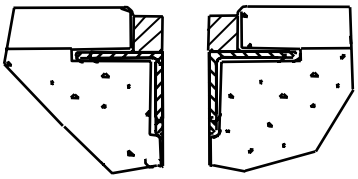
414 – Bolt Down Sliding Plate with Springs



416 – Assembly Joint Seal (Modular)



417 – Silicone Rubber Joint Filler



419 – Steel Angle w/Raised Bars

403 Poured Rubber and Bulb-T **Units - LF**

This element defines a joint filled with a pourable sealant and a Bulb-T preformed seal. The quantity should equal the length measured along the expansion joint.

404 Compression Seal/Concrete Header **Units - LF**

This element defines a joint with concrete headers formed during the original construction of the bridge. The joint is filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.

405 Compression Seal/Polymer Header **Units - LF**

This element defines those joints that have been rehabilitated with a polymer header and filled with a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.

406 Compression Seal/Steel Header **Units - LF**

This element defines a joint with steel angle plate headers that have a pre-formed compression type seal. The quantity should equal the length measured along the expansion joint.

407 Steel Angle Header **Units - LF**

This element defines an open joint with steel angle plate headers. The quantity should equal the length measured along the expansion joint.

408 Steel Sliding Plate **Units - LF**

This element defines a joint with steel sliding plates. The quantity should equal the length measured along the expansion joint.

409 Steel Sliding Plate w/Raised Bars **Units - LF**

This element defines a joint with steel sliding plates and steel raised bars welded to the plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.

410 Steel Fingers **Units - LF**

This element defines a joint with open steel fingers. The quantity should equal the length measured along the expansion joint.

411 Steel Fingers w/Raised Bars **Units - LF**

This element defines a joint with bars or plates welded to the steel finger plates to accommodate an overlay. The quantity should equal the length measured along the expansion joint.

412 Strip Seal – Anchored **Units - LF**

This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is anchored into the concrete deck or header. The quantity should equal the length measured along the expansion joint..

413 Strip Seal – Welded Units - LF

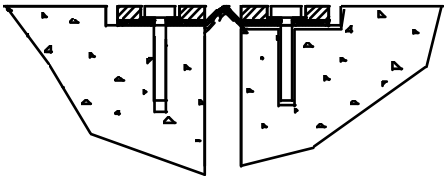
This element defines an expansion joint that uses a neoprene type waterproof gland with steel extrusion or other system to anchor the gland. The steel extrusion is welded to a pre existing steel expansion joint. The quantity should equal the length measured along the expansion joint.

414 Bolt Down - Sliding Plate w/springs Units - LF

This element defines a bolted sliding plate expansion joint that uses steel springs. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



415 Bolt Down Panel – Molded Rubber Units - LF

This element defines an expansion joint that uses a waterproof gland that is held in place by molded rubber panels that are attached with bolts. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound. Molded Rubber panels are secure and have no defects.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint. Some of the bolts may be broken but they represent less than 10 percent of the total for that panel.
3. Skewed joint length at each location where more than 10 percent of the bolts in a panel are missing, loose, or broken. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal

416 Assembly Joint Seal (Modular) Units - LF

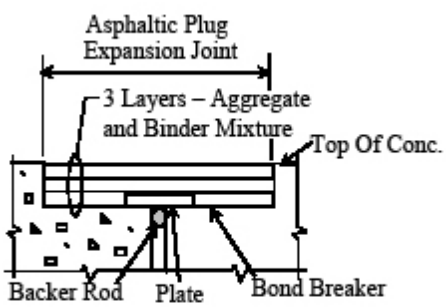
This element defines a large movement joint that has an assembly mechanism with multiple neoprene type waterproof glands. The quantity should equal the length measured along the expansion joint.

417 Silicone Rubber Joint Filler Units - LF

This element defines an expansion joint that has been repaired with a single or two component rubber joint filler. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.



418 – Asphalt Plug

418 Asphalt Plug Units - LF

This element defines an expansion joint that has been replaced with an asphalt plug system. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound.
2. Skewed joint length at each location with rutting in the joint is minor. "D" spalls or patches are present in the joint, or in deck adjacent to joint.
3. Skewed joint length at each location where the asphalt material in the joint has significant rutting, bulging or is missing. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

419 Steel Angle w/Raised Bars — Units - LF

This element defines a joint with steel angles and steel raised bars welded to the angles to accommodate an overlay. The quantity should equal the length measured along the expansion joint.

1. The expansion joint is functioning as designed. Joint may not be perfect with signs of leakage. The adjacent deck or header is sound.
2. Skewed joint length at each location with "D" spalls or patches present in the header or in the deck within one foot either side of the joint.
3. Skewed joint length at each location where the deck or headers must be rebuilt to maintain a reliable roadway surface or to maintain seal placement. As a guideline, more than 25 percent of the joint length has spalls or patches in the deck or headers adjacent to the seal.

   Steel Materials: Steel components are banging, cracked, loose, broken, or missing. Steel sections that have been removed and/or replaced with something else (usually concrete patching) should be CS3.

420 Joint Paved Over Flag — Units - LF

This element typically identifies steel joint systems that have been paved over with an HMA overlay and is causing a problem. When this flag is used, a cost for joint work will be included in the next paving contract to correct the problem. Since the joint can not be inspected, the joint element condition states should remain unchanged (and so noted). The Total quantity will be the sum total length of all joint systems on the bridge.

1. Skewed joint length at each location that is paved over, but rehabilitation is not required.
2. Skewed joint length at each location that requires rehabilitation. A photo is helpful to determine the type of rehabilitation.

4.13 Movable Bridges

501	Movable Bridge Steel Tower	Units - LF

This element defines the structural steel columns and members used to support a counter weight of a vertical lift span. The total quantity is the total of the supporting column lengths.

1. Defects are superficial and have no effect on the structural capacity of the element.
2. Tower column length with repairs such as: bolts or rivets have been replaced; cracks that have been drilled or plated.
3. Tower column length with structural defects. The defects do not significantly affect structural capacity. Deficiencies do not warrant analysis, but may require repairs.
4. Tower column length affected by damage in significant locations or quantity and has reduced the structural capacity of the column or the tower. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Structural deficiencies are not limited to impact damage, corrosion, a crack in primary load path member or in the attachment welded to primary member. Retain the quantity of the element reported in CS4 if the element is repainted but not repaired.

4.14 Other Bridge Elements

705	Bridge Luminaire Pole and Base	Units - EA

This element is defined by a light pole and anchor system attached to a bridge. It does not include the mast arm or other types of lights that may be attached to the bridge. The condition states describe the structural condition of the pole, anchor bolts, and support. Region maintenance may need to be contacted prior to inspection in order to remove bolt covers or otherwise provide access for inspection. The total element quantity should equal the number of luminaire poles attached to the bridge.

1. There are no significant structural defects in the pole or support, and the grout pad is solid. Poles or supports that have been replaced are coded in this condition state.
2. Number of poles where structural inspection requires special equipment to access.
3. Number of poles with structural defects. The defects do not significantly affect the structural capacity.
4. Number of poles affected by damage in significant locations or quantity and has reduced structural capacity. Structural analysis is warranted or has determined repairs are essential to restore the full capacity of the element. Visual inspection indicates a base plate that is not supported by leveling nuts.

WSDOT categorizes overlays in to two different types. The first type, ACP and Thin Overlay, is a deck protection system intended to prolong the life of the deck and wearing surface. The second type, Concrete Overlay, is intended to rehabilitate the deck and provide a new deck wearing surface.

ACP Overlays (BMS 800) can generally be identified in the field; the membrane below it cannot (BMS 801). Thin overlays may be identified in the field if the system has failed and chunks are missing. Deterioration of the ACP and thin overlays is not generally associated with the deterioration of the deck. The ACP may be replaced several times without exposing the concrete deck. Therefore, the condition states for the deck and overlay elements are independent and **DIFFERENT**. Spalls and delaminations are repaired (patched) on WSDOT bridges before placing the overlay. If the area of patching is known, this should be noted and recorded in the Deck element as CS2. If a new BST has been applied to an ACP surface, then the overlay element CS2 and CS3 are equal to zero.

800	**Asphalt Concrete (AC) Overlay**	**Units - SF**

This element defines an Asphalt Concrete (AC) bridge deck overlay, with or without a Bituminous Surface Treatment (BST). The quantity should equal the overlay's width times the length.

801	**Asphalt Concrete (AC) Overlay with Waterproofing Membrane**	**Units - SF**

This element defines an asphaltic concrete with waterproofing membrane bridge deck overlay. The quantity should equal the overlay's width times the length.

802	**Thin Polymer Overlay**	**Units - SF**

This defines a thin polymer bridge deck overlay that is less than or equal to 0.5 inches in thickness (i.e., epoxy, methyl-methacrylate, etc.). The quantity should equal the overlay's width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. Total area of overlay patches.
3. Total area of overlay spalls or potholes. Thin Polymer Overlays (802) may have visible delaminations and should be considered as spalls and coded in CS3.

Concrete Overlay elements are difficult to discern in the field and are identified in special provisions or Plans. When constructing modified concrete overlays, the material removed by the deck preparation (spalls and delams) is replaced with the overlay material. WSDOT considers this construction deck rehabilitation; or in other words, the concrete overlay and deck are monolithic. Therefore, CS2 and CS3 for the deck and concrete overlay will be the **SAME**. All defects noted in the concrete overlay (SF) apply to the deck. It is not uncommon to have the overlay break up when there is a problem in the deck below it.

803	**Modified Concrete Overlay**	**Units - SF**

This defines a rigid modified concrete bridge deck overlay that is normally 1.5 inches or greater in thickness (i.e. Latex (LMC), Microsilica (MMC), Fly Ash (FMC) etc.). The quantity should equal the overlay's width times the length.

804	**Polyester Concrete Overlay**	**Units - SF**

This defines a rigid polyester concrete bridge deck overlay that is normally 0.75 inches in thickness. The quantity should equal the overlay's width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have hairline cracks or rock pockets.
2. Concrete overlay area with repairs or patches. Do not include the rare cases of rutting that has been filled with patching material.
3. Concrete overlay area with spalling.
4. If the results of deck delamination testing are available from Element 376, include the delaminated area in this CS4.

4.15 Bridge Deck Overlays

805 AC Over a Polymer Overlay **Units - SF**

This defines an asphaltic concrete applied over a thin polymer bridge deck overlay (i.e., epoxy, methyl-methacyrlate, etc.). The quantity should equal the overlay's width times the length.

1. Defects are superficial. The deck surfaces have no spalls/delaminations or previous repairs. The deck surfaces may have cracking.
2. ACP overlay area with patches.
3. ACP overlay area with spalls or potholes.

806 BST on Concrete (Chip Seal) **Units - SF**

This defines a Bituminous Surface Treatment (BST), or commonly known as a chip seal, mistakenly applied directly on a concrete deck. This severely limits the inspection of the deck. **Code the area of BST covering the concrete deck in CS1.**

4.16 Protective Coatings

WSDOT inspectors must not change paint elements for state bridges. Inspectors will be notified with a sticky note if the bridge has been repainted.

Steel Paint Area

The steel paint area is equal to the surface area of the steel members in the bridge. An estimate of the steel paint area may be made if bridge plans are not available but the steel tonnage is known. The following table provides an approximate conversion factor:

Bridge Type	Square Feet Per Ton
Rolled or Plate Girder	110
Truss	160

901 Red Lead Alkyd Paint System **Units - SF**

This paint protection system is a 3-coat alkyd system incorporating lead based paint. Use this paint element as a default if the paint was installed prior to 1991.

902 Inorganic Zinc/Vinyl Paint System **Units - SF**

This paint protection system consists of an inorganic zinc silicate shop applied primer system and a vinyl is paint applied after erection, cleaning, and spot priming.

903 Inorganic Zinc/Urethane Paint System **Units - SF**

This paint protection system consists of a inorganic zinc silicate shop applied primer system and an epoxy, aliphatic urethane paint system applied after erection, cleaning, and spot priming. This paint system is used on new WSDOT steel bridges.

904 Organic Zinc/Urethane Paint System — Units - SF

This paint protection system is a 3-coat system incorporating an organic zinc primer, an epoxy second coat and a moisture cured urethane topcoat. Use this paint element as a default if the paint was installed after 1991.

905 Coal Tar Epoxy Paint System — Units - SF

This paint protection system incorporates a coal tar epoxy based product.

1. The paint system is sound and functioning as intended to protect the metal surface.
2. Paint system area with chalking, peeling, curling or showing other early evidence of paint system distress, but there is no exposure of metal.

3. Paint system area that is no longer effective. The metal substrate is exposed.

906 Metalizing — Units - SF

This protection system consists of a sprayed coating of zinc or zinc/aluminum.

907 Galvanizing — Units - SF

This protection system consists of zinc applied to steel in a variety of spray-on methods.

908 Epoxy Paint for Weathering Steel — Units - SF

This protection system consists of a clear epoxy coating applied to weathering steel to prevent excessive corrosion.

1. Protection system area that is sound and functioning as intended to protect the metal surface.
2. Protection system area with corrosion of the substrate metal.

909 Zinc Primer — Units - SF

This paint protection system consists of a zinc silicate shop applied primer system.

1. The paint system is sound and functioning as intended to protect the metal surface.
2. Protection system area with chalking, peeling, curling or showing other early evidence of paint system distress, but there is no exposure of metal.

3. Protection system area that is no longer effective. The metal substrate is exposed.

910 Weathering Steel Patina — Units - SF

This protection system consists of a chemical compound formed on the surface of weathering steel elements and is called the patina. When exposed to the atmosphere, weathering steel develops a patina, which seals and protects the steel from further corrosion. This oxide film is actually an intended layer of surface rust, which protects the member from further corrosion and loss of material thickness. The patina acts like a paint system to protect the steel. The color is an indicator of the condition of the patina may vary from orange to dark brown or purple-brown.

1. Weathering steel color is yellow orange to light brown. Some areas may not have rust. Patina has a dusty to granular texture.

2 Weathering steel area that is chocolate brown or purple brown in color (boldly exposed) and in good condition. The patina is tightly adhered, capable of withstanding hammering or vigorous wire brushing. The patina system is sound and functioning to protect the metal surface.

3. Weathering steel area that is black in color indicating non-protective patina. Area that remains damp for long periods of time due to rain, condensation, leaky joints, traffic spray or other source of moisture. Area where debris has accumulated on a horizontal surface and the steel is continuously wet. Area with a texture of large granules (greater than ⅛″ diameter); flaking (greater than ¼″ diameter) or laminar rusting in thin sheets.

Chapter 5 Bridge Analysis

5.01 General

The National Bridge Inspection Standards (NBIS) require a load rating be calculated for each bridge. This chapter defines the requirements/condition changes for revising the load rating of a structure (FHWA Item 88). For references regarding the load rating calculations, see Washington State Department of Transportation Bridge Design Manual, Chapter 13, AASHTO Manual for Condition Evaluation of Bridges and the 1989 AASHTO Guide Specifications for Strength Evaluation of Existing Steel and Concrete Bridges.

The National Bridge Inspection Standards (NBIS) also requires a scour evaluation be completed for each bridge over water. See FHWA HEC 18 Evaluating Scour at Bridges.

The load rating calculations and scour evaluations are a permanent part of the bridge file and are to be updated when the condition of the bridge changes. **All load rating calculations shall be stamped, signed, and dated by a registered professional engineer.**

The sufficiency rating (SR) section of this chapter defines structurally deficient SD and functionally obsolete bridges. The SR is calculated by the Washington State Department of Transportation Bridge Preservation Office for all NBIS eligible structures.

5. Load Rating

5.02 Bridge Load Rating Revision Criteria

WSBIS element WB76, item 88, Revise (change this to "review") Rating should be coded as "Y" when one of the one or more of the following items apply:

1. The Superstructure and X-beams/ Floor-beams Elements' State condition changes from either State 1 and State 2 to State 3, or from State 3 to State 4.
2. The approach condition (NBI Element 681) code is 3. One option is to call for a high priority repair to provide a smooth transition at the approaches to the superstructure.
3. The deck has potholes on the surface or at the joints. An option is to call for a high priority repair to patch the potholes in the deck or at the joints.
4. The thickness of the overlay has increased.
5. The railing is replaced with a heavier traffic barrier.
6. New utilities such as water main or sewer line have been installed on the structure.
7. The number of striped lanes has increased on 2 line superstructure members such as trusses or 2-line girder bridge, and box girder bridges.

Add a catch-all statement to cover general conditions

When a deficiency is observed in the field such as rot pockets in timber or section loss in a steel member, the inspector should provide the following items to assist in providing accurate rating factors:

1. The description shell thickness shall state whether the thickness is all around the member or on one side, where possible, location, and approximate size length.
2. Section loss in steel members should include, if possible, the effective section thickness, location of the section loss and length.

It is of great benefit to provide as accurate information as possible instead of estimates. Posting or restricting a bridge is greatly dependent on this information.

5. Scour Evaluation

5.03 Scour Evaluation

All bridges crossing waterways are required by the NBIS to have a scour evaluation. A scour evaluation is done to identify the susceptibility of erosion of streambed material and the degree of foundation element stability. The evaluation should include as-built foundation details, current condition of the foundation, stream bed cross section profile, and stream flow rates. Scour evaluations are site specific and additional information may be required to do an accurate analysis.

As the bridge foundation condition changes and/or the stream bed characteristics change, the scour criticality will have to be reanalyzed. Upon determining a bridge is scour critical, the agency needs to develop a plan of action to monitor, mitigate, or close the bridge. In particular, monitoring the structural performance of the bridge, as necessary, during and after flood events. For additional information, contact the WSDOT Bridge Scour Engineer or the Bridge Engineer for Local Agencies.

A. Determining Susceptibility to Scour

(Add links to Fed info somewhere this section)

Each bridge's susceptibility to scour damage must be determined to be either:

1. Stable for calculated scour conditions (scour code 8, 7, 5, 4).
2. Scour critical (scour code 3, 2, 1, 0).
3. Scour risk cannot be determined due to unknown foundations (scour code U).
4. Tidal water that has not been evaluated for scour, but considered low risk (scour code T).

The results of the scour analysis is to be recorded in scour (WB76 - 80) on the WSBIS Inventory Coding Form. Upon completion of all scour evaluation, there should not be any bridges with a code "6." The completed scour evaluations, information required to do the evaluation, and the best mitigation option for this bridge are to be incorporated into the permanent bridge file for the bridge.

See FHWA HEC 18 Evaluating Scour at Bridges.

B. Action Plans for Scour Critical Bridges

For each bridge that has been determined to be scour critical, a written plan of action shall be developed to identify the appropriate measures necessary to make the bridge less vulnerable to damage or failure due to scour. A plan of action has three primary components:

1. Development and implementation of a monitoring program.
2. Timely installation of temporary scour countermeasures (e.g., riprap).
3. Schedule construction of appropriate permanent scour countermeasure.

Each action plan should address each of these components and explain why the preferred actions were chosen.

Monitoring

It is very important that all scour critical bridges be monitored during and after flood events. The action plan should include specific instructions to bridge inspectors or maintenance workers on what to look for, at what locations, and methods of inspection to use. Guidance should also be included as to when a bridge should be closed to traffic. Agencies should also develop and inform appropriate personnel of bridge closure procedures. The intensity of the monitoring effort is related to the risk of scour hazard, as determined from the scour evaluation. Some of the items to consider when developing the monitoring plan include:

- Amount of existing rotational movement or settlement of substructure units
- Degree of streambed degradation, aggradation, or lateral movement
- Recommended procedures and equipment for taking measurements of streambed elevations (rods, probes, weights, portable sonic equipment, etc.)
- Instructions for inspecting existing countermeasures such as riprap, dikes, barbs, mats, etc.
- Guidance on maximum permissible scour depths, flood flows, water surface elevations, etc. beyond which the bridge should be closed to traffic
- Instructions for checking the operation of fixed scour monitoring devices
- Reporting procedures for conditions that warrant bridge closure. Establish the chain of command with authority to close bridges.
- Forms and procedures for documenting inspection results and instructions regarding follow-up actions when necessary

Temporary Countermeasures

Temporary countermeasures provide a degree of protection for scour critical bridges. They may prevent damage for most flows, but are sacrificial, low-cost treatments that help insure the safety of a bridge during flood events. Use of such measures may postpone the need to close a bridge during high flows. Temporary countermeasures, such as riprap, should not be viewed as an alternative to monitoring, but rather as a supplement.

Permanent Countermeasures

Permanent countermeasures are engineered to make a bridge safe from damage due to scour. A variety of methods exist including channel improvements, structural strengthening or underpinning, drop structures, relief bridges or constructing additional spans. These types of fixes would eliminate the bridge from being “scour critical,” but are more costly. Agencies prioritize permanent countermeasures to address the most critical needs as funds permit.

C. Recording Bridge Scour Information

The completed bridge scour evaluation shall include the resulting WB76 - 80 scour code, the information required to do the evaluations, and the written action plan to mitigate scour risk. The evaluation is to be incorporated into the permanent bridge file for the bridge. Any changes to bridge inventory data should be accomplished promptly after the evaluation, or field review, are complete. Monitoring information or schedule should be communicated to all affected parties.

WSBIS data fields that relate to bridge hydraulics and/or scour are:

- WB76-62 Waterway Adequacy Appraisal
- WB76-76 Substructure Condition
- WB76-77 Channel Protection
- WB76-79 Pier/Abutment Protection
- WB76-80 Scour
- WB76-83 Pier Protection
- WB78-32 Water Type
- WB78-33 Flood Plain Intrusion
- WB78-34 Flood Control
- WB78-35 Scour History
- WB78-36 Streambed Material Type
- WB78-37 Substructure Stability
- WB78-38 Waterway Obstruction
- WB78-39 Streambed Stability
- WB78-40 Streambed Anabranch
- WB78-41 Piers in Water

5. Sufficiency Rating

5.06 Bridge Sufficiency Rating

The sufficiency rating (SR) is the basis for establishing eligibility and priority for replacement or rehabilitation of bridges with Federal Highway Bridge Replacement and Rehabilitation Program (HBRRP) funds. The sufficiency rating is a numeric value which indicates a bridge's relative ability to serve its intended purpose. The value ranges from 100 to 0. The sufficiency rating is the summation of four calculated values: Structural Adequacy and Safety, Serviceability and Functional Obsolescence, Essentiality for Public Use, and Special Reductions. The sufficiency rating is generated automatically in WSBIS other bridge management software. There are two types of deficient bridges — structurally deficient (SD) and functionally obsolete (FO). A structurally deficient bridge, as defined by the FHWA, is one whose condition or design has impacted its ability to adequately carry its intended traffic loads. A functionally obsolete bridge is one in which the deck geometry, load carrying capacity, clearance, or approach roadway alignment has reduced its ability to adequately meet the traffic needs below accepted design standards. Those bridges meeting the criteria for both SD and FO are only considered SD, the structural deficiency overrides the functional obsolescence and the bridge will be considered in the SD classification.

In general, the lower the sufficiency rating, the higher the priority for rehabilitation or replacement. To qualify for replacement, a bridge must have a sufficiency rating of less than 50.0 and be structurally deficient or functionally obsolete. To be eligible for rehabilitation, a bridge must have a SR of 80.0 or less and be structurally deficient or functionally obsolete. The bridges must be greater than ten years old.

(Leave supporting info and charts in)

6. Special Reports

Chapter 6 Special Reports — Damage and Repairs

6.01 General

The purpose of this chapter is to provide consistent procedures for reporting and following up on damage and repair of bridges. Recommendations for repair resulting from bridge inspections range from preventive maintenance that will preserve the life of the structure from more rapid deterioration, to routine repairs that correct minor problems, to critical repairs that must be undertaken immediately to restore service or safeguard the public. The ability to identify and track bridge repair needs and to follow the status of repairs is a vital element of a quality bridge management program. Bridge program managers rely on accurate, timely information provided by concise reports and thorough procedures. The following sections outline both the reports to use and procedures to follow for various types of damage and maintenance needs.

6.02 Critical Damage - Bridge Repair Report

When a bridge inspection identifies a significant structural problem requiring an emergency load restriction, lane closure, bridge closure, or if a bridge has failed, a Critical Damage - Bridge Repair Report (CDBRR) must be completed (see flowchart Figure 6.02-A). The purpose of this report is to provide added visibility and attention to these critical repair recommendations and to ensure all recommendations are acted upon quickly and diligently. Each bridge owner is required to establish a tracking system for each CDBRR, showing dates, actions taken, and current status of bridge. This follow-up system provides bridge managers with an oversight tool to aid in the resolution of all identified critical deficiencies.

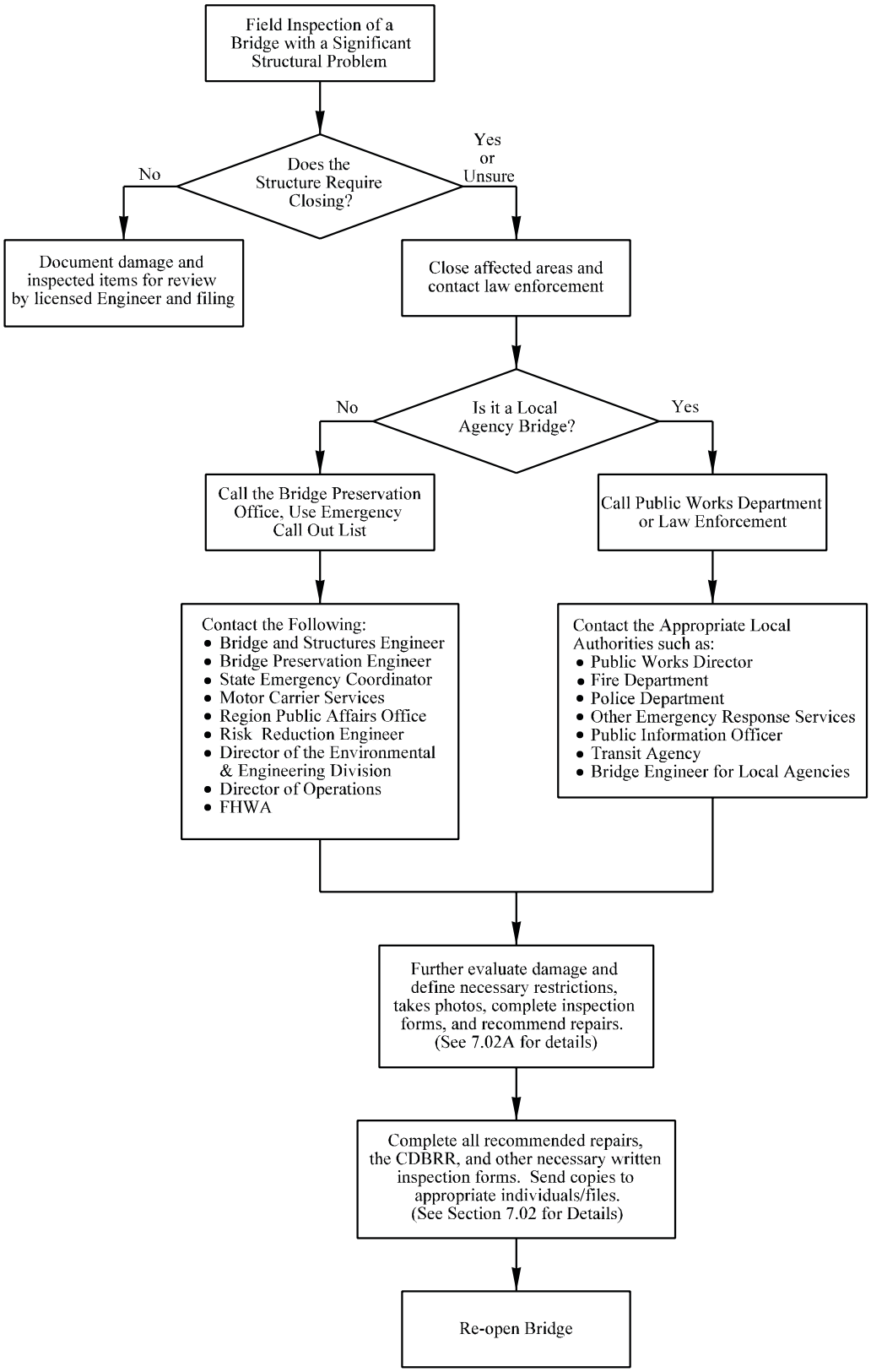
The Federal Highway Administration (FHWA) Division Office will periodically review the reports and the tracking system to verify the needed repairs were promptly reported and the recommended repairs were completed within a reasonable period of time. FHWA may also conduct field checks to verify that critical repair work was accomplished.

The following describes the criteria and procedures for completing a CDBRR. This report can be filled out electronically or filled out manually on a preprinted form (see Figure 6.02-B).

A Critical Damage - Bridge Repair Report **must** be completed when:

- A bridge fails, or
- An inspection results in temporary lane or bridge closure due to structural problems, or
- An inspection results in the temporary load posting of the bridge until repairs can be accomplished.

The Bridge Preservation Engineer (for State bridges) or the WSDOT Local Agency Bridge Engineer for (for Local Agency bridges) is to be notified by phone or e mail within one working day of identifying the problem. Any time the recommended repairs cannot be accomplished immediately, the Washington State Bridge Inventory System (WSBIS) Inventory Coding Form should be updated and submitted to ensure that the data accurately reflects the bridge's current condition and status.



Field Inspection Procedure
Figure 7.02-A

Initiating Repair Report and Follow-up Procedures

Once the deficiencies have been identified, complete the post-inspection/pre-repair portions of the CDBRR (see Figure 6.02-B).

Include the following information:

- Describe Deficiency (Describe the extent of the deficiency, apparent probable cause, and any actions taken to safeguard the traveling public until the recommended repairs can be made.)
- Describe Recommended Repair (Indicate the repairs required to correct the deficiencies noted.)

File a copy of the original CDBRR in the bridge file, send a copy of the report to the Bridge Preservation Engineer (for State bridges), or the WSDOT Local Agency Bridge Engineer (for local agency bridges), and enter this information in the follow-up tracking system, all within three (3) days after identifying the critical damage. The Bridge Preservation Engineer or the WSDOT Local Agency Bridge Engineer will then forward a copy of this report to the FHWA Division Bridge Engineer.

After Completing Repairs

Within one month after completion of the recommended repairs, the post repair portion of the CDBRR is to be completed and submitted.

The following fields should be filled in on the report:

- Describe Work Done (Describe what repair work was done to correct the problem; attach any appropriate photos.)
- Date of Completion (Date when the actual repairs were complete and restrictions were removed.)

The Bridge Manager who completes the CDBRR may be relying on reports and photos from those who have actually done the work. This is understandable and justified, recognizing that those who actually perform the work may not be the same person responsible for the bridge inspection and reporting. The purpose of the CDBRR is to provide accountability, as well as accurate, timely information, hence the requirement for submission of the report upon immediate completion of the work. However, it is still good practice to have trained bridge inspectors field verify that all the repairs are complete and satisfactory. This follow-up verification inspection is to be conducted within six months of completion of the required work.

File a copy of the updated report in the bridge file, send a copy to the Bridge Preservation Engineer (for State bridges), or the WSDOT Local Agency Bridge Engineer (for Local Agency bridges), and update the follow-up tracking system. The Bridge Preservation Engineer or the WSDOT Local Agency Bridge Engineer will then forward a copy of this report to the FHWA Division Bridge Engineer. Update and resubmit the WSBIS data as necessary.

A blank copy of the CDBRR can be found at the end of this chapter.

Washington State Department of Transportation

Critical Damage - Bridge Repair Report

Agency Name	Charge Code	Bridge Name
Clark County		CCRR Undercross - Old Hwy 99

Structure Identifier	Bridge Number	Bridge Location (Longitude/Latitude)
08523200	20141	Lat. 45º 39’ 51” ; Long 122º 39’ 53”

Inspector (Print Name)	Inspector’s ID Number	Inspection Date
Arlen Clark	B1176	January 4, 1999

Describe Deficiency

Portions of lower 3/4” cover plate were gouged out from the bottom of the steel girder near the third point of the railroad bridge.

At this time the bridge is closed until the effects of the damage can be assessed.

Photos sent January 6, 1999.

Describe Recommended Repair

Undetermined at this time. Plans of the existing bridge are being shipped from Burlington Northern RR.

May either remove and replace the damaged steel, or span over the damaged steel with additional steel. The latter method will reduce road clearance even more.

Anticipated Date of Completion	Submitted By (Print Name)	Date Submitted
January 20, 1999	Arlen Clark	January 6, 1999

Describe Work Done

Because of the existence of 20” of concrete on the floor of the bridge, a single layer of steel could not be replaced. Half of the rivets could not be reached.

We spanned the damaged area, on the outer half of the flange, with 8’ of 3/4” thick steel. An 8” width was placed on the top half of the flange with a 10” width of steel placed on the lower portion. All rivets on the outside of the flange were replaced with bolts along the length of the new steel.

Photos sent January 15, 1999.

Date of Completion	Submitted By (Print Name)	Date
January 15, 1999	Arlen Clark	January 16, 1999

DOT Form 140-151 EF
6/98

Critical Damage - Bridge Repair Report
Figure 7.02-B

6.03 Routine Bridge Repairs

When a bridge inspection identifies a routine structural or non-structural deficiency, i.e., any deficiency that is not identified in Section 6.02, "Critical Damage - Bridge Repair Report," a repair note describing the deficiency and recommended repair should be written in the bridge inspection report.

These repair notes should include:

- Priority for the repair
- Date when the repair was first noted
- Accurate description of the repair required
- Proper identification of repair location
- Photograph(s) of the damaged area

The priority of the required repair establishes the urgency at which the repair shall take place. The priority may evolve into a more urgent priority if repairs are not completed.

The Washington State Department of Transportation (WSDOT) has established the following priority system. The WSDOT priority system is presented here as an example of a priority system and to provide local agencies with an explanation of the priority codes used by WSDOT Bridge Inspectors on high cost bridge inspection reports or other local agency bridge inspections performed by WSDOT bridge inspectors.

Priority 1

A Priority 1 repair describes a deficiency to a primary bridge element that could cause a major impact to the bridge such as load restrictions. This type of deficiency may lead to more extensive and costly structural repairs if not completed as soon as possible.

Priority 1 is the highest priority assigned to a routine type repair which left uncompleted, could turn into an urgent or emergency repair during next inspection.

These repairs are top priority to ensure:

- Public Safety
- Reliability of the Transportation System
- Protection of Public Investments
- Maintenance of Legal Federal Mandates

On occasion, the inspection frequency (WB76 - 32) may need adjustment to ensure that conditions since the previous inspection have not deteriorated to urgent or emergency status, that safety of the traveling public has not become compromised, and that inspectors may verify that repairs have been done in a timely manner. Additionally, the Rating Revision flag (WB76 - 88) may require a "Y" to reexamine the bridge for load carrying capability.

WB76 - 32 < 12	Inspection Frequency
WB76 - 88 = Y	Revise Rating
WB76 - 89 = Y	Repair Flag

Priority 2

A Priority 2 repair describes a minor to moderate deficiency to a primary bridge element or a major deficiency to a secondary bridge element. This type of deficiency would not cause major impact to the level of service of the bridge or compromise safety. But, this type of deficiency may lead to more extensive and costly structural repairs if not completed in a relatively timely manner.

Priority 2 is different from Priority 1 in that a Priority 2 deficiency does not immediately jeopardize:

- Public Safety
- Reliable Transportation System
- Protection of Public Investments
- Maintenance of Legal Federal Mandates

A Priority 2 repair would not generally be cause for a reduction in inspection frequency or a reexamination of a bridge's load rating.

WB76 - 89 = Y	Repair Flag

Priority 3

A Priority 3 repair is generally a minor nonstructural or "Housekeeping" type of repair that could evolve into a higher priority if not corrected.

WB76 - 89 = Y	Repair Flag

Priority 4

A Priority 4 indicates there is a situation on the bridge that requires no immediate repair action, except for careful monitoring of affected elements. A Priority 4 could change to a Priority 1 or 2 depending on time or conditions that allow the element's performance to worsen. The inspection frequency may be adjusted so that inspectors will be sure to closely watch the condition of the element. It is important to provide sufficient information at each inspection to identify changes in condition or to verify that there has been no change in condition. In some cases, it may be advisable to provide information for future inspection teams to be able to determine when repair action does become necessary.

WB76 - 89 = Y	Repair Flag
WB76 - 32 = __	Inspection Frequency (Decreased due to the nature or severity of the condition and the potential for becoming a higher priority repair.)

Priority V — Vertical Clearance

This indicates that the bridge has restrictive overhead clearance for vehicular traffic and that no signing or improper signing is in place. Vertical clearance signs are required for measured clearances less than 15′-3″ and WSDOT policy is to post at a height 3" less than measured. Measured clearances less than 14′-0″ require advanced restrictive height warning signs.

Priority S — Scour Repair

This indicates that the bridge site needs to be evaluated for scour mitigation. A description of the condition of concern must be provided in the inspection notes. Repair actions to correct the condition should be included in the repair description. The State scour engineer or the agency's hydraulic engineer will review and may revise the recommended repair and will change the "S" to a priority 1, 2, 4, or may deactivate the repair altogether after careful review of the bridge site. A note by the hydraulic expert should be added to the inspection report detailing their findings.

Engineering scour mitigation requires the engineer to work closely with ¬environmental agencies to develop the best corrective action plan for all.

Erosion caused by runoff from the bridge is not considered a scour repair.

Priority L — Load Rating

This indicates that the bridge has questionable load ratings or that the ratings are not indicative of the bridge's actual performance.

The Revise Rating flag should be turned on if any of the following has occurred:

1. NBI Superstructure condition code (WB76 - 71) drops below a "6" and every time it drops after that.
2. NBI Approach Roadway code (WB76 - 81) drops to a "3". This indicates that the bridge is experiencing more impact.
3. The thickness of ACP or overlay increases.
4. The traffic barriers are replaced with a heavier barrier.

WB76 - 88 = Y Revise Rating

Priority R — Railroad Repair

WSDOT conducts limited scope (non-structural and non-mandated) "safety" inspections of railroad owned bridges that cross over state-owned highways. The typical "safety" inspection frequency is 72 months. The Priority R repair indicates that a railroad owned bridge crossing over a public highway has a condition that could pose a hazard to the motoring public, such as ballast falling onto the roadway. The repair description should include some indication of the relative urgency of the recommended repair. The inspecting highway agency (WSDOT or local agency) must ensure that all such repair recommendations are communicated to the appropriate department/individual at the correct railroad. For higher priority conditions, consider reducing the inspection frequency.

WB76 - 89 = N Repair Flag
WB76 - 32 = ___ Inspection Frequency

Priority U — Utility Repair

This indicates that there is a deficiency with a utility (not owned by the bridge owner) mounted to the bridge. The inspecting highway agency (WSDOT or local agency) should ensure that all such repair recommendations are communicated to the appropriate department/individual at the correct utility. If the deficiency poses a safety risk to the traveling public or to bridge inspection and maintenance crews, or

if the deficiency is creating a problem for the structural integrity of the bridge, then the repair recommendations must be communicated to the appropriate department/ individual at the correct utility.

Priority J — Roadway Repair

This indicates that there is a non-bridge related deficiency in the roadway approach to a bridge.

Priority N — Notes – Non-Structural

The notes that would be entered under this priority would identify information that was missing or in error. This information is, for the most case, provided by WSDOT inspectors for Local Agency use.

WB76 - 89 = N Repair Flag

6.04 Maintenance - Bridge Repair Report

The repair notes from the inspection reports for WSDOT owned bridges are entered into the "Bridge Repair List" (a State document), which can be viewed on the homepage of the WSDOT website. This list is updated twice a year. WSDOT maintenance crews review the list and schedule the work to complete the bridge repairs. When a repair is completed, the maintenance crew sends a "Maintenance - Bridge Repair Report" (MBRR), DOT Form 542-506, to the Bridge Manager. The MBRR documents the completed repair. The MBRR is typically submitted electronically via the WSDOT website, but may be sent in via mail. If submitted electronically, the program inserts a "maintenance date" for that repair into the database. If mailed, the Bridge Manager will enter the "maintenance date" in the database. This will automatically remove the repair from the printed "Bridge Repair List," however, the repair will still appear in the Bridge Inspection Report (BIR). The MBRR of the completed repair will be kept in the appropriate Bridge Letter file; thus maintaining a history of all repairs associated with a particular bridge. The MBRR is a State document, but it is recommended that Local Agencies utilize this report if they do not have a bridge repair documentation process in place.

During the next inspection of the bridge, the completed repairs, once verified by the inspectors, shall be noted as such on the BIR by addition of a "verified date". The repairs that have been verified will not show up again on the printed BIR. Note: Both verified and unverified repairs will continue to appear on the BIR when viewed in the Bridge laptop 98 program.

A blank copy of the Maintenance - Bridge Repair Report, including an example of a Local Agency version, can be found at the end of this chapter.

Forms

Critical Damage - Bridge Repair Report

Maintenance - Bridge Repair Report

Local Agency – Sample Bridge Repair Form

Washington State Department of Transportation

Critical Damage Bridge Repair Report

Agency Name		Bridge Name
Structure Identifier	Bridge Number	Bridge Location

Inspector's Initials	Inspector's ID Number	Inspection Date

Describe Deficiency

Describe Recommended Repair

Date Work To Be Finished By	Submitted By	Date Submitted

Describe Work Done

Date Work Finished	Submitted By	Date

DOT Form 140-151 EF
Revised 11/2001

Washington State Department of Transportation

Maintenance - Bridge Repair Report

To: _____
(Bridge Preservation or Agency Engineer)

From: _____ Region or Agency **Completed Repair Date:** _____

Bridge Number	Bridge Name		Structure ID (SID)
Mile Post	Location (C.S.)	Did Bridge and Structures Provide the Repair Details? ☐ Yes ☐ No	Repair Photos ☐ Yes ☐ No

Completed Repairs

☐ Contract Number _____ Project Engineer Office _____

☐ Bridge Maintenance

☐ Regional Maintenance - Superintendent's Office _____

Origin of Repairs

☐ From the Bridge Repair List Repair Number _____ Priority _____ Dated _____

☐ From ☐ Memorandum ☐ Econ-O-Gram ☐ Letter ☐ Other (Phone, E-mail, etc.) Dated _____ From _____

☐ From Report by Consultant _____ Dated _____

☐ From an Emergency Caused By ☐ Natural Disaster ☐ Vehicle Damage ☐ Other _____

☐ Load Restrictions Due to the Damage _____

Types of Materials Used - Suppliers

Repair Remarks and Details

Form Completed By _____ Date _____

For Bridge Owner Use Only

☐ Taken Out of the Bridge Repair List Date _____ Initials _____
☐ Note Added to the Last Inspection Report Date _____ Initials _____
☐ Bridge Restriction Removed After Repair Date _____ Initials _____

DOT Form 542-506 EF
Revised 12/01

KITTITAS COUNTY
DEPARTMENT OF PUBLIC WORKS

Paul D. Bennett, P.E., Director

BRIDGE REPAIR FORM

BRIDGE NAME **BRIDGE NUMBER**

BRIDGE LOCATION

DEFICIENCY

RECOMMENDED REPAIR

SUBMITTED BY: _____

DATE: _____

DESCRIBE WORK COMPLETED _____

_____

_____

_____

_____

_____

DATE WORK FINISHED: _____ **SUBMITTED BY:** _____

VERIFIED BY _____ **DATE:** _____

411 North Ruby Street, Suite 1
Ellensburg, WA 98926

TEL (509) 962-7523
FAX (509) 962-7663

7. Short Span Bridges

7.01 General

Short span bridges have an opening of 20 feet or less. This is measured along the center of the roadway between undercopings of abutments, spring lines of arches, or extreme ends of openings for multiple boxes. Short span bridges may also include multiple pipes, but the clear distance between openings must be less than half of the smaller contiguous opening.

Short span bridges are not eligible for federal replacement funding, nor are they generally reported in the National Bridge Inventory (NBI). However, certain short span bridges located on the STRAHNET (defense highways), must be inspected, inventoried, and reported to the NBI. Bridges meeting one of the following criteria must be inspected and reported:

1. Curb-to-curb deck width less than one-fourth of the approach roadway width, or
2. Minimum vertical clearance less than 18 feet, or
3. Operating rating less than an HS-10 loading.

Even for those short span bridges which are not required to be reported to the NBI, there remains concern about their deterioration and performance. Therefore, it is recommended that agencies inspect short span bridges. The frequency of the inspections for these bridges will be at the discretion of the inspection agency.

7.02 Criteria

In addition to the required inspection of STRAHNET short span bridges, short span inspections are recommended for the following short span bridges provided the depth of fill (if present) is less than half the span opening and:

- Timber with a span from 4 feet through 20 feet (Appendix A and B).
- Single span concrete or steel with a span from 6 feet through 20 feet (Appendix A and B).
- Multiple span with a total length from 8 feet through 20 feet (Appendix C).
- Steel corrugated pipes with an opening greater than 8 feet.
- Multiple pipes with out to out dimension from 10 feet to 20 feet (See Chapter 3 - Figure WB73-40B for span length stance definitions).

The previous criteria is presented as a guideline and is not intended to replace sound engineering judgment. When in doubt, a conservative approach should be taken.

A. Short Span Bridges Inspected

If the short span bridge is inspected, agencies should follow these guidelines on reporting:

1. Fill in all applicable fields, but in particular all fatal fields (see Chapter 2) listed on the Washington State Bridge Inventory System (WSBIS) Inventory coding form. The bridge number should be unique for short span bridges.
2. Take deck and elevation photographs (label and date).
3. Fill out the Bridge Scour Evaluation form (if applicable).
4. Complete a Bridge Inspection Report.
5. Determine the frequency of inspection needed. Suggested maximum frequency is 72 months. Recommended frequencies are as follows:
   a) 12 months -Timber with red/yellow tags, any other material in poor condition needing monitoring, Scour issues, load posting etc.
   b) 24 months - All other timber structures, Any other material that has elements in CS3
   c) 48 months - Steel or concrete structures in good condition
   d) 72 months -Concrete structures in good condition
6. Submit the data through normal procedures.

B. Short Span Bridges Not Inspected

If the short span bridge is not inspected, the following are some guidelines to follow:

1. WSDOT Inspectors should note the milepost, type of bridge, features carried, features intercepted, take elevation and deck photographs, and notify maintenance personnel that future inspections of the bridge are their responsibility.
2. Local Agency Inspectors need to determine whether any future inspection of the bridge is necessary and coordinate with their maintenance personnel.

7.03 Inspections

The inspection procedures for the short span bridges are the same as the National Bridge Inspection Standards (NBIS) bridges (see Chapter 3).

An underwater inspection is performed on short span bridges with structural elements underwater. If the inspector is unable to assess the condition of the elements either visually or by probing, a diver must conduct the underwater inspection. This inspection determines the structural condition and adequacy of the short span bridges underwater elements.

7.04 Bridge Files

The minimum information maintained in the bridge file includes:

1. Inventory data, including location maps.
2. Completed inspection forms.
3. A sketch of the bridge showing dimensions and depth of fill (barrel length should be taken as one pass distance, regardless of the number of barrels).
4. Deck and elevation photographs (labeled and dated).
5. Scour Evaluation Form (if applicable).
6. Correspondence.

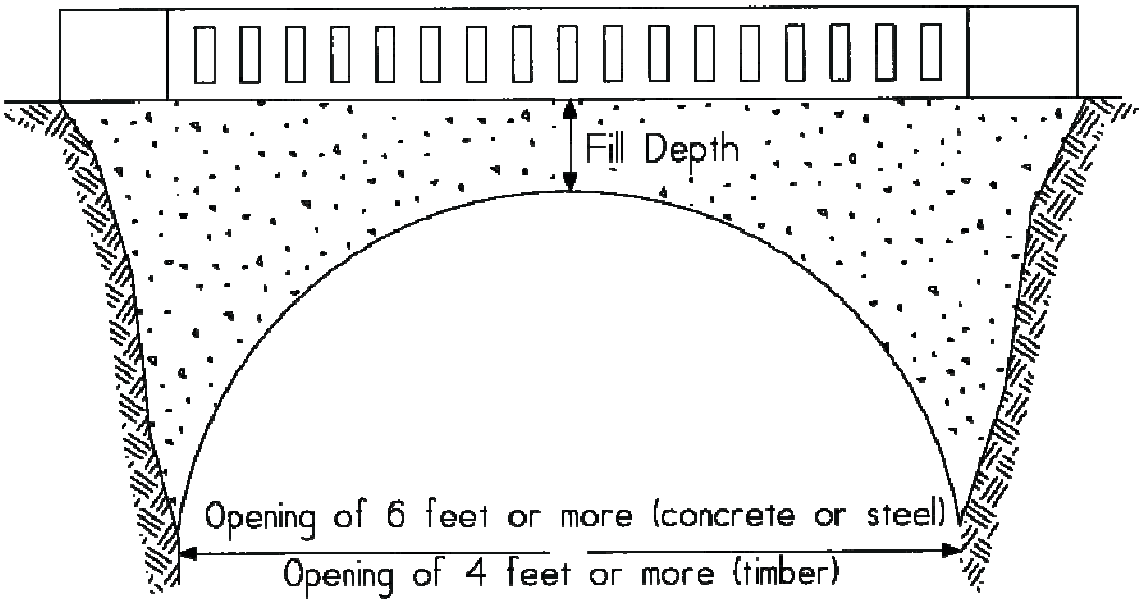
7.05 Reporting

Following the inspection procedures used on NBIS bridges insures uniformity of reporting. State-owned bridges are added to the WSDOT Bridge List while local agency bridges are added to their own local inventories.

After the bridges are inspected, the procedures for creating and updating the WSBIS inventory are followed.

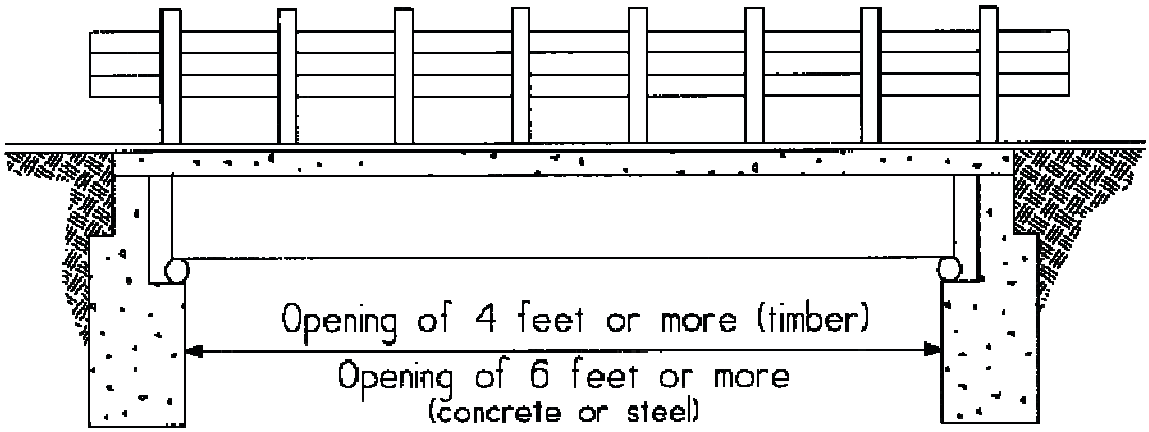
Short Span Inspections are recommended and performed by WSDOT Bridge Preservation Office when the following criteria are met:

1. Depth of fill must be less than D/2 (where D = Maximum opening distance).
2. CONCRETE Structures: Opening of 6 feet or more.
   STEEL Structures: Opening of 6 feet or more.
   TIMBER Structures: Opening of 4 feet or more.



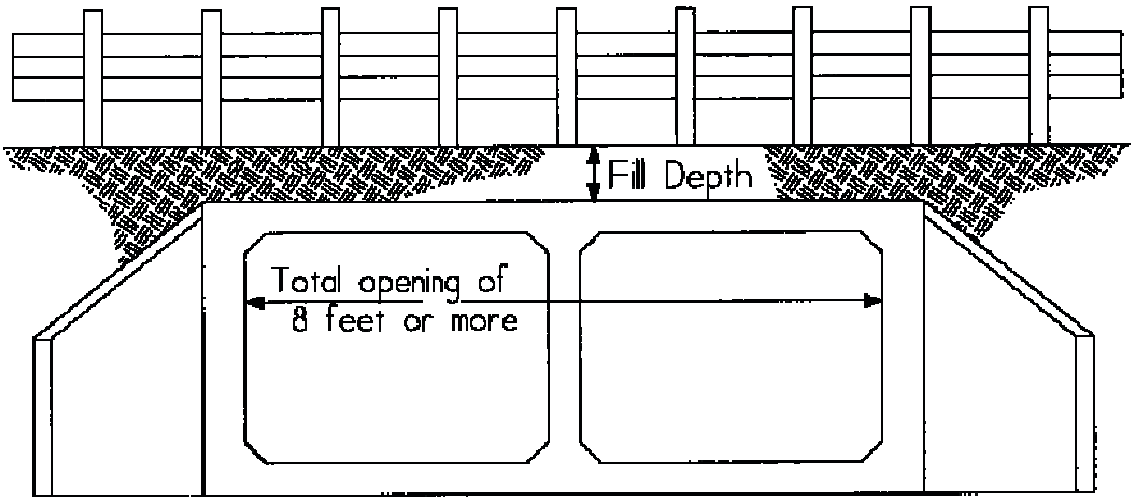
Short Span Inspections are recommended and performed by WSDOT Bridge Preservation Office when the following criteria are met:

1. CONCRETE Structures: Opening of 6 feet or more.
   STEEL Structures: Opening of 6 feet or more.
   TIMBER Structures: Opening of 4 feet or more.



Shot Span Inspections are recommended and performed by WSDOT Bridge Preservation Office when the following criteria are met:

1. Depth of fill must be less the D/2 (where D = total opening).
2. Total Opening of 8 feet or more.



Miscellaneous