NORTH DAKOTA BRIDGE INSPECTION PROCEDURES

Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges and Pontis Bridge Inspection Manual

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

BISMARCK, NORTH DAKOTA

INTERIM DIRECTOR

Grant Levi

Bridge Division

Terrence R. Udland

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Item Number - NBI - Pontis Identification

INTRODUCTION

The Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridge, hereafter referred to as the Guide, has been revised several times in the past. This latest edition revised the Guide to provide more thorough and detailed guidance in evaluating and coding specific bridge data. Several items collected previously have been deleted while new items have been added for an improved and more comprehensive data base. Some items in the Guide have also been expanded to provide more definitive and explicit explanations and instructions for coding. For example, the Appraisal section has specific criteria provided which shall be used by inspectors in the evaluation of all bridges. Further, basic definitions applicable to the instructions in the Guide are provided. The changes are based on comments received on the previous Guide and were developed through a joint State-Federal Task Force. This revised Guide should be thoroughly reviewed by each individual involved with the National Bridge Inspection Program. The NBIS and Pontis manuals have been combined now that the Pontis database is the only Bridge Database that the NDDOT currently maintains.

This Guide, which has been endorsed by the AASHTO Subcommittee for Bridges and Structures, has been prepared for use by the states in recording and coding the data elements that will comprise the National Bridge Inventory data base. By having a complete and thorough inventory, an accurate report can be made to the Congress on the number and state of the nation's bridges, arranged in a manner that would best suit needs for future legislation. The Guide also provides the data necessary for the Federal Highway Administration (FHWA) to produce Defense Bridge and Federal Emergency Management Agency (FEMA) reports.

The coded items in this Guide are considered to be an integral part of the data base that can be used to meet several federal reporting requirements as well as part of the states' needs. A complete, thorough, accurate and compatible data base is the foundation of an effective bridge management system and will require collection of additional items over those contained in this Guide. Reports submitted in connection with the Highway Bridge Replacement and Rehabilitation Program and the National Bridge Inspection Program also are related to this Guide. Obviously, it is intended that present data and future reports be developed using the Pontis Inventory data base.

The AASHTO Manual for Bridge Evaluation (called MBE in this Guide) discusses the various items of information that are to be recorded as part of original bridge reports. That manual and the Bridge Inspector's Reference Manual(BIRM), with supplements, discuss inspection procedures and the preparation of detailed reports about the structure components. These reports will be the basis for recording values for many of the data elements shown in the Guide, particularly those having to do with the condition or the appraisal ratings.

Some bridge owners are collecting bridge condition ratings for items included in this Guide (Items 58-Deck, 59-Superstructure, 60-Substructure, and 62-Culvert) using the American Association of Highway and Transportation Officials' (AASHTO) Guide for

Commonly Recognized (CoRe) Structural Elements. CoRe element inspection ratings provide detailed condition assessments that can serve as input into a comprehensive bridge management system (BMS). The FHWA has provided bridge owners with a computer program for translating bridge condition data in the CoRe element format to National Bridge Inventory (NBI) condition ratings for the purpose of NBI data submittal to FHWA. The purpose of the program is to permit bridge inspectors to record condition information in a format that satisfies both BMS and NBI data collection requirements.

The SI&A sheet is intended to be a tabulation of the pertinent elements of information about an individual structure. Its use is optional, subject to the statements in the preceding paragraph of this Introduction. It is important to note that the SI&A sheet is not an inspection form but merely a summary sheet of bridge data required by the FHWA to effectively monitor and manage a national bridge program.

Each state is encouraged to use the codes and instructions in this Guide. However, its direct use is optional; each state may use its own code scheme provided that the data is directly translatable into the Guide format. When data are requested by FHWA, the format will be based on the codes and instructions in the Guide. A state choosing to use its own codes shall provide for translation or conversion of its own codes into those used in the Guide. In other words, the states are responsible for having the capability to obtain, store and report certain information about bridges whether or not this Guide or the SI&A sheet is used. Any requests by FHWA for submittal of these data will be based on the definitions, explanations and codes supplied in the Guide, the AASHTO Bridge Manual, the Bridge Inspector's Training Manual/90, plus supplements.

The values provided in the tables or otherwise listed in this Guide are for rating purposes only. Current design standards must be used for structure design or rehabilitation. All possible combinations of actual site characteristics are not provided in this Guide. If a special situation not listed in the Guide is encountered, the evaluation criteria closest to the actual site situation should be used.

Item numbers that have been deleted are available for state use.

The implementation of this Guide may require some restructuring of an agency's data base and support software. If so, it is suggested that the agency consider the additional enhancements that would be necessary to eventually support a bridge management system.

Items 1 through 116 are required by the NBI, while Items in the 200's are used by the North Dakota DOT. Items written in normal script are from the FHWA Recording and Coding Guide, while items written in italics, are comments written by the Bridge Division, NDDOT.

The NDDOT has transitioned to Pontis as the sole source of information for the state's bridge inventory. At this time the Deck (Item 58), Superstructure (Item 59), Substructure (Item 60), and Culvert (Item 62) will continue to be coded and manually entered into Pontis based on the descriptions included in this manual.

Definition of Terms

The definitions of terms used in the Guide are provided below.

(a) Bridge. The National Bridge Inspection Standards published in the Code of Federal Regulations (23 CFR 650.3) give the following definition:

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 undercopings 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. * (6.1 meters)

(b) Culvert. A structure designed hydraulically to take advantage of submergence to increase hydraulic capacity. Culverts, as distinguished from bridges, are usually covered with embankment and are composed of structural material around the entire perimeter, although some are supported on spread footings with the stream bed serving as the bottom of the culvert. Culverts may qualify to be considered "bridge" length.

(c) Inventory Route. The route for which the applicable inventory data is to be recorded. The inventory route may be on the structure or under the structure. Generally inventories along a route are made from west to east and south to north.

(d) National Bridge Inventory (NBI). The aggregation of structure inventory and appraisal data collected to fulfill the requirements of the National Bridge Inspection Standards. Each state shall prepare and maintain an inventory of all bridges subject to the NBIS.

(e) National Bridge Inventory (NBI) Record. Data which as been coded according to the Guide for each structure carrying highway traffic or each inventory route which goes under a structure. These data are furnished and stored in a compact alphanumeric format on magnetic tapes or disks suitable for electronic data processing.

(f) National Bridge Inspection Standards (NBIS). Federal regulations establishing requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a state bridge inventory. The NBIS apply to all structures defined as bridges located on all public roads.

(g) Public Road. Any road under the jurisdiction of and maintained by a public authority and open to public travel.

(h) Structure Inventory and Appraisal (SI&A) Sheet. The graphic representation of the data recorded and stored for each NBI record in accordance with this Guide.

(i) Strategic Highway Corridor Network (STRAHNET). A system of highways which are strategically important to the defense of the United States. It includes the interstate highways and 15,667 miles (25,215 kilometers) of other non-interstate highways. The Military Traffic Management Command Report SE 89-4b-27, Strategic Highway Corridor Network**,** January 1991, contains additional information on STRAHNET.

(j) Strahnet Connectors are roads that connect military installations and ports of embarkation to the STRAHNET. The connector routes represent about 1,890 miles (3,042 kilometers) of roads that complement STRAHNET.

(k) Indian Reservation Road (IRR). A public road that is located within or provides access to an Indian reservation as described in Title 23, U.S.C., Sec. 101. The terminus of a road providing access to an Indian reservation or other Indian land is defined as the point at which the road intersects with a road functionally classified as a collector or higher classification (outside the reservation boundary) in both urban and rural areas. In the case of access from a interstate highway, the terminus is the first interchange outside the reservation.

(l) Land Management Highway System (LMHS). Consists of adjoining state and local public roads that provide major public access to Bureau of Land Management administered public lands, resources, and facilities.

(m) Forest Highway (FH). A road, under the jurisdiction of, and maintained by, a public authority and open to public travel; wholly or partly within, or adjacent to, and serving the National Forest System (NFS) and which is necessary for the protection, administration, and utilization of the NFS and the use and development of its resources. (23 CFR 660).

(n) Forest Service Development Road. A forest road wholly under the jurisdiction of the Forest Service, which may be "open to public travel." Bridges on Forest Service Development Roads which are "open to public travel" are subject to the NBIS.

(o) Base Highway Network. The Base Highway Network includes the through lane (mainline) portions of the NHS, rural/urban principal arterial system and rural minor arterial system. Ramps, frontage roads and other roadways are not included in the Base Network.

(p) Highway Performance Monitoring System. The Highway Performance Monitoring System (HPMS) is a database of universe and sample data that describes the nation's public road mileage. The data are annually updated and submitted to FHWA by the State Highway Agencies, Puerto Rico and the District of Columbia. The universe data provides some basic characteristics of all public road mileage while the sample of the arterial and collector systems allows for assessment of the condition, performance, usage and additional characteristics of the nation's major highway systems.

(q) Conversion of Numerical Data. Throughout this Guide the following conversion factors are used:

Convert
- foot to meter multiply by 0.3048
- mile to kilometer multiply by 1.609
- English ton to metric ton multiply by 0.9

(r) Rounding and Truncating of Numerical Data. All numeral values in this Guide, except as specifically noted, will follow standard rounding criteria, that is, 5 and above will be rounded up to the next higher unit and 4 and below will be rounded down to the next lower unit. This is applicable to all decimal roundings. **In certain items where rounding may cause a safety hazard for clearance, the numeric measurements will be truncated at the appropriate decimal place.** This means that a fractional portion less than a whole unit will be dropped to the lower whole number, for example 2.88 would be truncated to 2.8 when using tenth of a meter accuracy.

(s) Commonly Recognized (CoRe) Structural Elements. A group of structural elements endorsed by AASHTO as a means of providing a uniform basis for data collection for any bridge management system, to enable the sharing of data between States, and to allow for a uniform translation of data to NBI Items 58, 59, 60, and 62.

PURPOSE OF BRIDGE INSPECTION

To provide for the safety of the traveling public who use the state's bridges.

To develop the on-site bridge inspection and appraisal and to provide the data necessary to calculate the Sufficiency Rating (SR) for a given structure.

The Sufficiency Ratings of structures are an integral part of the Department of Transportation's structure replacement and rehabilitation program for the long and short range. The data on the SI&A sheet must therefore be accurately maintained through the field inspections.

The Sufficiency Rating uses the computer data base developed through the Bridge Inspection program. The Sufficiency Rating computer program considers the data items, the inter-relationship of these items, and assigns a numerical sufficiency rating to each structure.

BRIDGE INSPECTION TRAINING AIDS

Manuals - following is a list of manuals used as guides for bridge inspection.

FHWA Bridge Inspectors Training Manual 90

FHWA Bridge Inspectors Reference Manual (BIRM)

Bridge Inspection Guide for Fracture Critical Bridges and Bridges with Special Features - NDDOT

Bridge Inspection Guide for Underwater Inspection - NDDOT

Comprehensive Bridge Safety Inspection Training Course

DISCLAIMER

This guide is not meant to replace instructions or to modify items in the Training Aids listed above.

SCOPE OF WORK

The work shall consist of the on-site inspection and recording of structure related items for bridges on:

State Highway System
Urban Highway System
County On-System
County Off-System

INSPECTION REQUIREMENTS BY SYSTEM

State System -	ALL REINFORCED BOX CULVERTS, except for cattle passes.
	ALL METAL PIPE CULVERTS having a nominal diameter of eight (8) feet or more
	BRIDGES AND MULTIPLE PIPE where the total span length is twenty (20) feet or greater.
County and Urban System -	ALL BRIDGES AND MULTIPLE PIPE installations whose total span length is twenty (20) feet or greater.
Transporter Erector Route(s) -	ALL BRIDGES AND CULVERTS having a span length of five (5) feet or greater.

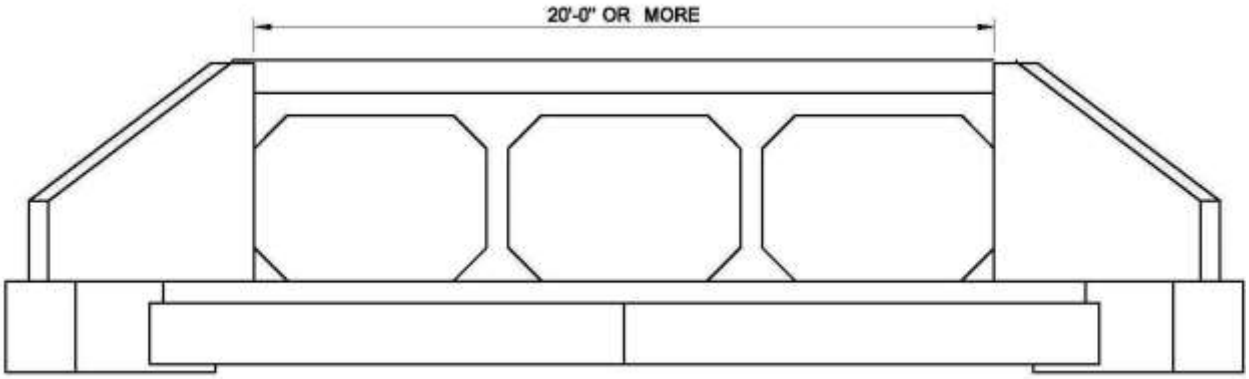
DEFINITIONS

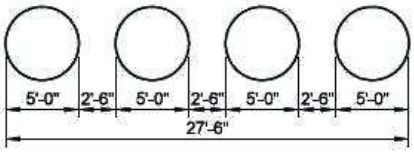
MAJOR AND MINOR STRUCTURES - *As defined by the Bridge Division for inspection purposes.*

MAJOR STRUCTURES

Bridges 20 feet or more in span length measured along the centerline from inside of abutments including piers.

Reinforced Concrete Box Culverts 20 feet or more in span length as measured parallel to roadway centerline and between inside faces of exterior walls:
Multiple Pipe are considered to be one structure when the clear distance between openings is equal to or less than half the smaller contiguous opening. The length of multiple pipe installations is measured parallel to the roadway centerline and between inside faces of the exterior pipe

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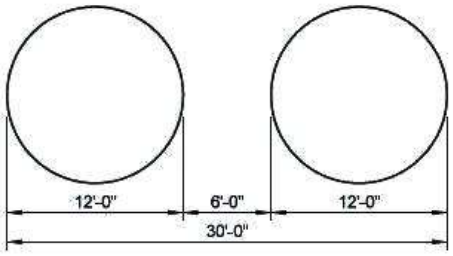
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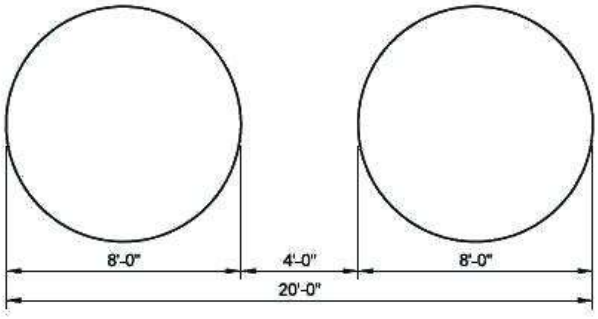
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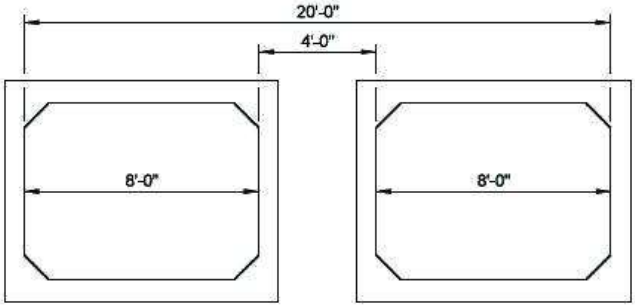
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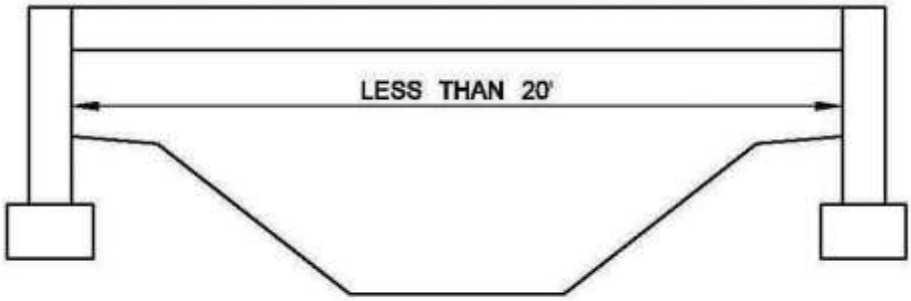
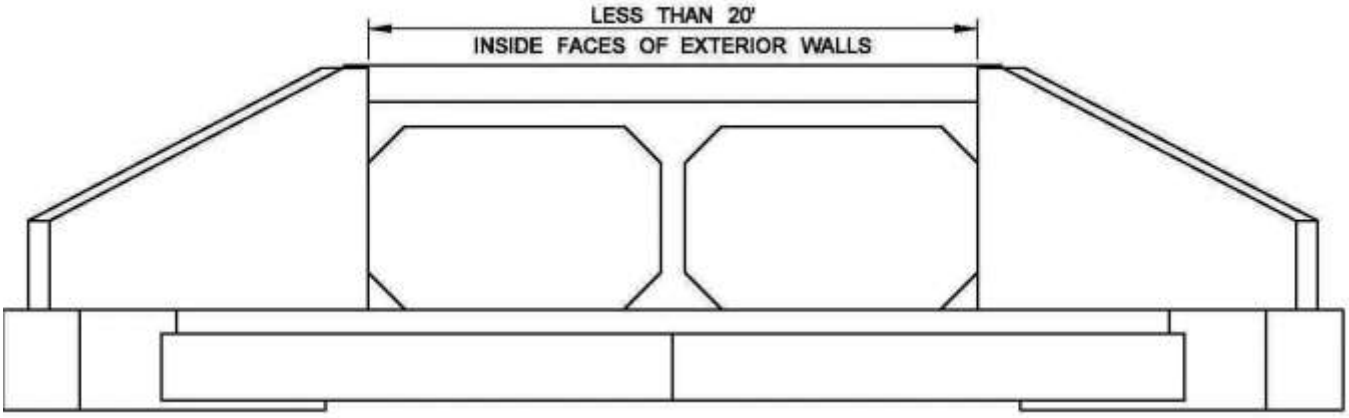
MINOR STRUCTURES

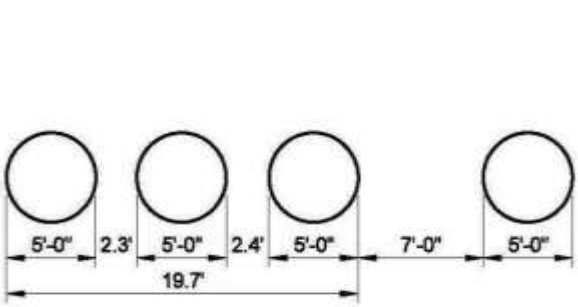
Bridges with less than 20 feet in span length measured along the centerline from inside face of abutments including piers.



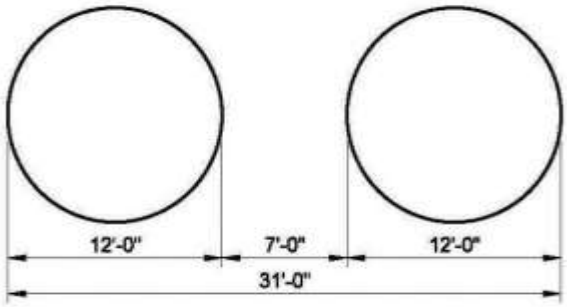
All Reinforced Concrete Box Culverts having less than 20 feet in span length measured parallel to centerline of roadway from between inside faces of exterior walls.



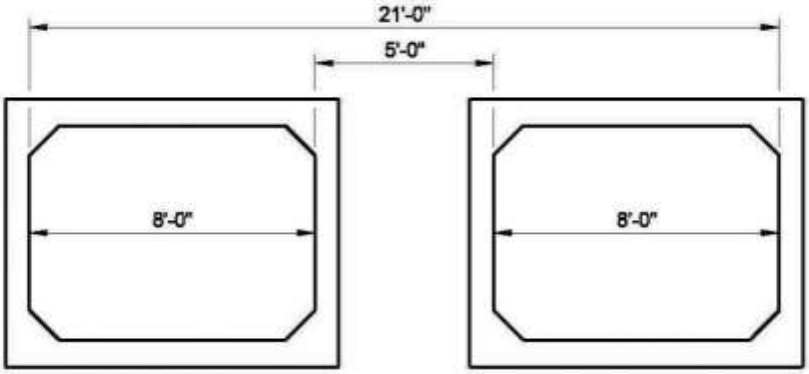
Multiple Pipe installations less than 20 feet in span length.



MINOR TWO STRUCTURES



MINOR TWO STRUCTURES



Two Minor Structures

Pedestrian Walkways - all pedestrian structures over or under highways carrying vehicular traffic are included in inventory. If on DOT Right-of-Way but not carrying traffic, NDDOT treats as minor structure but has on inventory.

SPP MEASUREMENT LOG

All steel pipe are to have internal measurements that are to be taken at Intervals throughout the pipe.

Locations should be marked by paint spots that can aid in future identification. Bolt heads may be spray painted for location points.

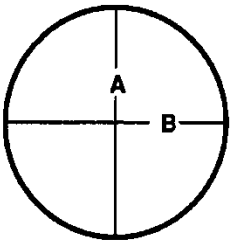
SPP MEASUREMENT LOG
Department of Transportation, Bridge
SFN 52137 (8-99)

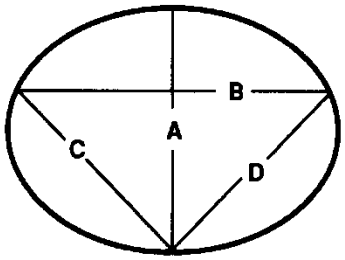
Structure Number	
Barrel Number	Barrel Length

Measurements to be taken in direction of inventory, south to north and west to east. If more than one pipe, the first pipe of the inventory direction shall be number one and second number two, etc.

Use one sheet per pipe.

Location Number	Distance From Inlet Of Pipe





YEAR	LOCATION	DIMENSIONS				
		A	B	C	D	E

ON-SITE PHOTOGRAPHY

Minimum Coverage Views required - as follows:

Approaches and guard rails including connection to bridge rail
Bridge end view of deck railing
Side views showing waterway channel and bridge side
Views of the Problem Areas (Alert Codes)
Pin assemblies

Processing and copies - by inspectors and district offices:

Digital camera
Bridge site inspection photography
Arrange 2 to 4 to a sheet and label
Distribution of print copies

Counties: 2 (or 1) copies of each print

1 printed copy for district files if needed*
1 printed copy sent to counties\cities
1 electronic copy entered into filenet

State: 1 copies of each print if needed*

1 printed copy for district files if needed*
1 electronic copy entered into filenet

Use photo log SFN 9627 (Revised 10-91) on site at the time each view is photographed.

Captions are for the purposes of picture identity. Include the following information on the captions:

Bridge number as shown on SI&A sheet
Date of photo unless printed on photo
Direction of photo (looking N, upstream, etc.)
Brief narrative illustrating what photo is showing and location if a close-up and the location is not obvious.

CODING INSTRUCTIONS - GENERAL

General coding instructions which provide for the identifiable format are as follows Electronic forms are available for field or office use. Instructions are included later in this manual):

Legibility

*The SI&A sheets should be marked up with a **Red** ball point pen providing easily read characters. Each character should be clearly printed in capital letters or numerals in a single coding block.*

Character Coding Conversions

To avoid data entry errors, special care should be used with certain characters such as 1 and I, 5 and S, 0 (zero) and Ø (the letter) and 2 and Z.

Coding Examples

| *0* | *The number zero* | *1* | *The number one*

| *Ø* | *The letter "O"* | *I* | *The letter "I"*

| 2 | *The number two* | 5 | *The number five*

| *Z* | *The letter "Z"* | *S* | *The letter "S"*

Be especially sure to always use the extra line through the letters Ø and Z.

Definitions

Right Justify - Coded entries ending at the right side of the coding columns provided.

Left Justify - Coded entries starting at the left side of the coding columns provided.

All items shall be coded right justified with leading zeros unless otherwise noted. If entered into the electronic forms, the justification will be automatic.

| *0* | *0* | *0* | *7* | *9* |

Right Justified

County Built Bridges Not Bid to Contract through NDDOT

If the inspector(s) come across a structure that has been built by the county (includes new and reconstructed), is 20' or greater in total span length, and has not been bid through the DOT, the Bridge Division needs a set of plans and shop drawings, These plans and shop drawings are required to load rate the structure, Pontis element quantities and for scour analysis.

BRIDGE INSPECTION EQUIPMENT LIST

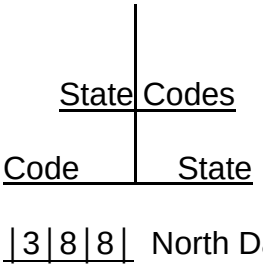
Following is a list of equipment each team should have for inspection.

1. *16 ft. to 20 ft. extension ladder*
2. *Graduated telescoping sounding rod - 10 ft.*
3. *10' pocket tape*
4. *Chipping hammer (geologist type)*
5. *2 inch putty knife*
6. *Inspection mirror on 3' extension arm - 4" to 6" mirror*
7. *Scriber*
8. *Vernier calipers*
9. *Plumb bob and line*
10. *Carpenter's level - 4'*
11. *100' tape*
12. *Camera*
13. *Screwdriver*
14. *Plier*
15. *Protractor*
16. *Flashlight or Miner's helmet with light*
17. *Pocket knife*
18. *Wire Brush*
19. *Ice pick*
20. *Clipboard*
21. *10X loupe or magnifying glass*
22. *Box with lock for inspection equipment*
23. *Chest waders*
24. *Thermometer*
25. *Life vests (if needed)*
26. *7x35 binoculars*
27. *Boat with oars (if needed)*

IDENTIFICATION CODE

STATE CODE (ITEM 1 IN THE OLD NBIS)	**3 DIGITS**

The first two digits are the Federal Information Processing Standards (FIPS) code for states and the third digit is the FHWA region code. *While the following numbers represent the NBI coding, Pontis allows selection from a drop-down menu that contains the actual state names.*



Code	State	Code	State
014	Alabama	**308**	**Montana**
020	Alaska	317	Nebraska
049	Arizona	329	Nevada
056	Arkansas	331	New Hampshire
069	California	342	New Jersey
088	Colorado	356	New Mexico
091	Connecticut	362	New York
103	Delaware	374	North Carolina
113	District of Columbia	**388**	**North Dakota**
124	Florida	395	Ohio
134	Georgia	406	Oklahoma
159	Hawaii	410	Oregon
160	Idaho	423	Pennsylvania
175	Illinois	441	Rhode Island
185	Indiana	454	South Carolina
197	Iowa	**468**	**South Dakota**
207	Kansas	474	Tennessee
214	Kentucky	486	Texas
226	Louisiana	498	Utah
231	Maine	501	Vermont
243	Maryland	513	Virginia
251	Massachusetts	530	Washington
265	Michigan	543	West Virginia
275	**Minnesota**	555	Wisconsin
284	Mississippi	568	Wyoming
297	Missouri	721	Puerto Rico

ND Department of Transportation District (Item 2) — 2 Digits

The highway district in which the bridge is located is represented by a 2-digit code. Existing district numbers are shown below: *The following numbers represent the NBI coding, Pontis allows selection from a drop-down menu that contains the actual District names.*

Code	*District*
61	*Bismarck*
62	*Valley City*
63	*Devils Lake*
64	*Minot*
65	*Dickinson*
66	*Grand Forks*
67	*Williston*
68	*Fargo*

County (Parish) (Item 3) — 3 Digits

Counties are identified using the Federal Information Processing Standards (FIPS) codes given in the current version of the Census of Population and Housing - Geographic Identification Code Scheme. *While the following numbers represent the NBI coding, Pontis allows selection from a drop-down menu that contains the actual County names.*

NORTH DAKOTA COUNTIES

CODE	COUNTY	CO. NO.	CODE	COUNTY	CO. NO.	CODE	COUNTY	CO. NO.
001	Adams County	1	037	Grant County	18	073	Ransom County	37
003	Barnes County	2	039	Griggs County	19	075	Renville County	38
005	Benson County	3	041	Hettinger County	20	077	Richland County	39
007	Billings County	4	043	Kidder County	21	079	Rolette County	40
009	Bottineau County	5	045	LaMoure County	22	081	Sargent County	41
011	Bowman County	6	047	Logan County	23	083	Sheridan County	42
013	Burke County	7	049	McHenry County	24	085	Sioux County	43
015	Burleigh County	8	051	McIntosh County	25	087	Slope County	44
017	Cass County	9	053	McKenzie County	26	089	Stark County	45
019	Cavalier County	10	055	McLean County	27	091	Steele County	46
021	Dickey County	11	057	Mercer County	28	093	Stutsman County	47
023	Divide County	12	059	Morton County	29	095	Towner County	48
025	Dunn County	13	061	Mountrail County	30	097	Traill County	49
027	Eddy County	14	063	Nelson County	31	099	Walsh County	50
029	Emmons County	15	065	Oliver County	32	101	Ward County	51
031	Foster County	16	067	Pembina County	33	103	Wells County	52
033	Golden Valley	17	069	Pierce County	34	105	Williams County	53
035	Grand Forks	18	071	Ramsey County	35			

City/Town Code (Item 4) **5 Digits**

Cities, towns, townships, villages, and other census-designated places are identified using the Federal Information Processing Standards (FIPS) codes given in the current version of the Census of Population and Housing - Geographic Identification Code Scheme. If there is no FIPS place code, then code all zeros. *While the following numbers represent the NBI coding, Pontis allows selection from a drop-down menu that contains the actual city or township names.*

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
ROADWAY INFORMATION AND DATA EVALUATION SYSTEM
CITY NAMES, NUMBERS, PLACE CODES

CITY	CODE
Abercrombie	100
Adams	340
Alamo	940
Alexander	1180
Alice	1420
Almont	1700
Alsen	1740
Ambrose	1860
Amenia	1940
Amidon	2060
Anamoose	2220
Aneta	2380
Antler	2660
Ardoch	2860
Argusville	3020
Arnegard	3220
Arthur	3300
Ashley	3540
Ayr	4020
Balfour	4460
Balta	4580
Bantry	4740
Barney	4940
Bathgate	5260
Beach	5420
Belfield	5820
Benedict	5980
Bergen	6180
Berlin	6300
Berthold	6460
Beulah	6660

CITY	CODE
Binford	7020
Bisbee	7180
Bismarck	7200
Bottineau	8460
Bowbells	8500
Bowdon	8580
Bowman	8700
Braddock	8900
Briarwood	9320
Brinsmade	9460
Brocket	9700
Buchanan	10060
Bucyrus	10300
Buffalo	10420
Burlington	10940
Butte	11180
Buxton	11340
Calio	11580
Calvin	11700
Cando	11860
Canton	12060
Carpio	12260
Carrington	12340
Carson	12460
Casselton	12700
Cathay	12820
Cavalier	12940
Cayuga	13020
Center	13180
Christine	14100
Churchs Ferry	14140

CITY	CODE
Cleveland	14660
Clifford	14740
Cogswell	15100
Coleharbor	15140
Colfax	15180
Columbus	15460
Conway	15820
Cooperstown	15900
Courtenay	16380
Crary	16580
Crosby	16940
Crystal	17060
Davenport	18180
Dawson	18260
Dazey	18340
Deering	18620
Des Lacs	19300
Devils Lake	19420
Dickey	19580
Dickinson	19620
Dodge	19820
Donnybrook	19900
Douglas	20020
Drake	20300
Drayton	20340
Dunn Center	20940
Dunseith	21020
Dwight	21220
Edgeley	22140
Edinburg	22260
Edmore	22340
Egeland	22540
Elgin	23020
Ellendale	23220
Elliott	23340
Emerado	24060
Enderlin	24260
Epping	24540
Esmond	24780
Fairdale	25180
Fairmount	25300
Fargo	25700
Fessenden	26180

CITY	CODE
Fingal	26380
Finley	26420
Flasher	26660
Flaxton	26700
Forbes	26980
Fordville	27060
Forest River	27100
Forman	27260
Fort Ransom	27580
Fort Yates	27860
Fortuna	27820
Fredonia	28380
Frontier	28720
Fullerton	28780
Gackle	28860
Galesburg	28980
Gardena	29180
Gardner	29220
Garrison	29460
Gascoyne	29540
Gilby	30180
Gladstone	30460
Glen Ullin	30860
Glenburn	30580
Glenfield	30660
Golden Valley	31180
Golva	31420
Goodrich	31500
Grace City	31740
Grafton	31820
Grand Forks	32060
Grandin	32300
Grano	32580
Granville	32660
Great Bend	32900
Grenora	33500
Gwinner	34020
Hague	34180
Halliday	34340
Hamberg	34460
Hamilton	34620
Hampden	34860
Hankinson	34900

CITY	CODE
Hannaford	35020
Hannah	35060
Hansboro	35140
Harvey	35900
Harwood	35940
Hatton	36100
Havana	36140
Haynes	36540
Hazelton	36700
Hazen	36780
Hebron	36860
Hettinger	37700
Hillsboro	38100
Hoople	38780
Hope	38860
Horace	38900
Hove Mobile Park	38980
Hunter	39460
Hurdsfield	39580
Inkster	39980
Jamestown	40580
Jud	41180
Karlsruhe	41380
Kathryn	41500
Kenmare	42020
Kensal	42180
Kief	42660
Killdeer	42700
Kindred	42780
Knox	43260
Kramer	43500
Kulm	43580
Lakota	44300
LaMoure	44540
Landa	44700
Langdon	44780
Lankin	44860
Lansford	44900
Larimore	45020
Larson	45220
Lawton	45300
Leal	45460
Leeds	45580

CITY	CODE
Lehr	45740
Leith	45860
Leonard	45980
Lidgerwood	46460
Lignite	46540
Lincoln	46640
Linton	46980
Lisbon	47100
Litchville	47140
Loma	47660
Loraine	48020
Ludden	48460
Luverne	48580
Maddock	49620
Makoti	49820
Mandan	49900
Mantador	50380
Manvel	50420
Mapleton	50580
Marion	50780
Marmarth	50860
Martin	51060
Max	51380
Maxbass	51420
Mayville	51500
McClusky	49020
McHenry	49260
McVille	49580
Medina	51860
Medora	51900
Mercer	52340
Michigan City	52740
Milnor	52940
Milton	53020
Minnewaukan	53220
Minot	53380
Minto	53540
Mohall	53780
Monango	53820
Montpelier	53980
Mooreton	54220
Mott	54620
Mountain	54740

CITY	CODE
Munich	55020
Mylo	55220
Napoleon	55420
Neche	55620
Nekoma	55740
New England	56180
New Leipzig	56420
New Rockford	56620
New Salem	56700
New Town	56740
Newburg	56020
Niagara	56780
Nome	57180
Noonan	57220
North River	58120
Northwood	58300
Oakes	58740
Oberon	59020
Oriska	59660
Osnabrock	60100
Overly	60380
Oxbow	60480
Page	60500
Palermo	60620
Park River	60900
Parshall	60940
Pekin	61460
Pembina	61580
Perth	61780
Petersburg	61860
Pettibone	62060
Pick City	62260
Pillsbury	62540
Pingree	62620
Pisek	62780
Plaza	62980
Portal	63740
Portland	63900
Powers Lake	64140
Prairie Rose	64320
Ray	65580
Reeder	65900
Regan	65980

CITY	CODE
Regent	66020
Reile's Acres	66040
Reynolds	66260
Rhame	66300
Richardton	66500
Riverdale	66980
Robinson	67180
Rocklake	67500
Rogers	67620
Rolette	67780
Rolla	67820
Ross	68540
Rugby	68860
Ruso	69140
Rutland	69340
Ryder	69460
Sanborn	70380
Sarles	70780
Sawyer	70980
Scranton	71500
Selfridge	71660
Sentinel Butte	71780
Sharon	71940
Sheldon	72180
Sherwood	72540
Sheyenne	72580
Sibley	72820
Solen	73820
Souris	74020
South Heart	74185
Spiritwood Lake	74740
Springbrook	74780
St. John	69980
St. Thomas	70260
Stanley	75380
Stanton	75420
Starkweather	75580
Steele	75780
Strasburg	76500
Streeter	76620
Surrey	77180
Sykeston	77660
Tappen	77980

CITY	CODE
Taylor	78180
Thompson	78660
Tioga	78940
Tolley	79140
Tolna	79180
Tower City	79340
Towner	79420
Turtle Lake	79940
Tuttle	80140
Underwood	80660
Upham	80860
Valley City	81180
Velva	81620
Venturia	81700
Verona	81900
Voltaire	82380
Wahpeton	82660
Walcott	82780
Wales	82940
Walhalla	82980

CITY	CODE
Warwick	83580
Washburn	83700
Watford City	83860
West Fargo	84780
Westhope	85020
White Earth	85540
Wildrose	86020
Williston	86220
Willow	86380
Wilton	86580
Wimbledon	86620
Wing	86780
Wishek	87020
Wolford	87180
Woodworth	87580
Wyndmere	87740
York	87860
Zap	88140
Zeeland	88180

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
	38001 Adams County	
05700		Beisigl
10300		Bucyrus city
10340		Bucyrus
13100		Cedar
13270		Central Adams UT
13500		Chandler
14620		Clermont
18100		Darling Springs
20700		Duck Creek
21495		East Adams UT
30340		Gilstrap
36540		Haynes city
37700		Hettinger city
37740		Hettinger
38420		Holden UT
45895		Lemmon UT
46500		Lightning Creek
49780		Maine
59620		Orange
65900		Reeder city
65940		Reeder
71380		Scott
74140		South Fork
78220		Taylor Butte
85380		Whetstone
87140		Wolf Butte
	38003 Barnes County	
01780		Alta
02300		Anderson
03580		Ashtabula
04340		Baldwin
07100		Binghampton
09420		Brimer
17300		Cuba
18340		Dazey city
18380		Dazey
21820		Eckelson
22460		Edna
23500		Ellsbury
26380		Fingal city
30060		Getchell
32340		Grand Prairie
33020		Green
33380		Greenland
37180		Hemen
38300		Hobart
41500		Kathryn city
43980		Lake Town
45460		Leal city
47140		Litchville city
50340		Mansfield
50900		Marsh
51700		Meadow Lake
53340		Minnie Lake
55820		Nelson
57140		Noltimier
57180		Nome city
57420		Norma
58780		Oakhill
59660		Oriska city
59700		Oriska
62460		Pierce
62540		Pillsbury city
64020		Potter
65380		Raritan
67620		Rogers city
67660		Rogers
68140		Rosebud
70380		Sanborn city
72820		Sibley city
72940		Sibley Trail
73500		Skandia
74900		Spring Creek
75100		Springvale
76020		Stewart
77300		Svea
78700		Thordenskjold
79340		Tower City city
80980		Uxbridge
81080		Valley
81180		Valley City city
84220		Weimer

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
86620		Wimbledon city
	38005 Benson County	
00980		Albert
03180		Arne
03860		Aurora
05620		Beaver
09460		Brinsmade city
09740		Broe
11260		Butte Valley
21620		East Fork
22780		Eldon
24780		Esmond city
24820		Esmond
27750		Fort Totten UT
37660		Hesper
39860		Impark
40180		Iowa
40220		Irvine
40260		Isabel
43260		Knox city
43300		Knox
43900		LakeIbsen
44420		Lallie
44425		Lallie North UT
45580		Leeds city
45620		Leeds
47620		Lohnes
48980		McClellan
49620		Maddock city
53060		Minco
53220		Minnewaukan city
53580		Mission
57580		Normania
58180		North Viking
59020		Oberon city
59060		Oberon
63200		Pleasant Lake
66660		Rich Valley
66820		Riggin
67300		Rock
74380		South Viking

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
80380		Twin Lake
80420		Twin Tree
83580		Warwick city
83620		Warwick
84540		West Antelope
84620		West Bay
87420		Wood Lake
87860		York city
87900		York
	38007 Billings County	
51900		Medora city
57710		North Billings UT
74070		South Billings UT
	38009 Bottineau County	
02100		Amity
02660		Antler city
02700		Antler
06020		Bentinck
07540		Blaine
08460		Bottineau city
09060		Brander
13060		Cecil
13780		Chatfield
15980		Cordelia
17540		CutBank
17780		Dalen
22620		Eidsvold
23780		Elms
23980		Elysian
29180		Gardena city
35220		Haram
36060		Hastings
38380		Hoffman
38540		Homen
41300		Kane
43500		Kramer city
44700		Landa city
44900		Lansford city
44940		Lansford

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
46260		Lewis
48060		Lordsburg
51420		Maxbass city
54900		Mount Rose
55940		Newborg
56020		Newburg city
58700		Oak Creek
58860		OakValley
60180		Ostby
60380		Overly city
61180		Peabody
62300		Pickering
66100		Renville
66540		Richburg
67740		Roland
71060		Scandia
71340		Scotia
71820		Sergius
72500		Sherman
74020		Souris city
75500		Starbuck
76260		Stone Creek
77740		Tacoma
83980		Wayne
84340		Wellington
85020		Westhope city
85260		Wheaton
85420		Whitby
85860		Whitteron
86380		Willow City city
86500		Willow Vale
	38011 Bowman County	
00540		Adelaide
02140		Amor
08700		Bowman city
08740		Bowman
08820		Boyesen
10380		Buena Vista
26540		Fischbein
29540		Gascoyne city
29580		Gascoyne
29740		Gem
31300		Goldfield
31940		Grainbelt
32460		Grand River
34260		Haley
35780		Hart UT
43700		Ladd
44740		Langberg
50740		Marion
53140		Minnehaha
55580		Nebo
66300		Rhame city
66340		Rhame
71500		Scranton city
71540		Scranton
75460		Star
76140		Stillwater
77060		Sunny Slope
77900		Talbot
84650		West Bowman UT
85780		Whiting
	38013 Burke County	
05380		Battleview
08500		Bowbells city
08540		Bowbells
12500		Carter
14300		Clayton
14500		Cleary
15460		Columbus city
15500		Colville
17740		Dale
19660		Dimond
25940		Fay
26700		Flaxton city
26940		Foothills
27460		Forthun
29380		Garness
35540		Harmonious
41280		Kandiyohi
41660		Keller
44020		Lakeview

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
45220		Larson city
45420		Leaf Mountain
46540		Lignite city
48420		Lucy
53180		Minnesota
57715		North Burke UT
58140		North Star
63740		Portal city
63780		Portal
64140		Powers Lake city
66580		Richland
68340		Roseland
72740		Short Creek
73900		Soo
78780		Thorson
81020		Vale
81500		Vanville
83420		Ward
	38015 Burleigh County	
02780		Apple Creek
07200		Bismarck city
08780		Boyd
11045		Burnt Creek Riverview UT
11940		Canfield
14060		Christiania
14380		ClearLake
16860		Crofte
16900		Cromwell
20540		Driscoll
21860		Ecklund
24940		Estherville
26860		Florence Lake
28100		Francis
30100		Ghylin
30140		Gibbs
30900		Glenview
32740		GrassLake
35670		Harriet Lien
36460		Hay Creek
36660		Hazel Grove
46640		Lincoln city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
46710		Lincoln Fort Rice UT
47500		Logan
47860		Long Lake
48620		Lyman UT
49380		McKenzie
52220		Menoken
53620		Missouri
54460		Morton
55540		Naughton
60580		Painted Woods
62160		Phoenix UT
65980		Regan city
66635		Richmond
67420		Rock Hill
71220		Schrunk
72900		Sibley Butte
75820		Steiber
75940		Sterling
77780		Taft
78300		Telfer
78580		Thelma
79820		Trygg
85980		Wild Rose
86540		Wilson
86580		Wilton city
86780		Wing city
86820		Wing
	38017 Cass County	
00500		Addison
01420		Alice city
01940		Amenia city
01980		Amenia
03020		Argusville city
03300		Arthur city
03340		Arthur
04020		Ayr city
04060		Ayr
04900		Barnes
50900		Bell
06260		Berlin
09320		Briarwood city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
10420		Buffalo city
10460		Buffalo
12700		Casselton city
12740		Casselton
14780		Clifton
16100		Cornell
18180		Davenport city
18220		Davenport
20220		Dows
21100		Durbin
22860		Eldred
24140		Empire
24260		Enderlin city
24660		Erie
25020		Everest
25700		Fargo city
25740		Fargo
28720		Frontier city
29220		Gardner city
29260		Gardner
30260		Gill
32300		Grandin city
33820		Gunkel
35580		Harmony
35940		Harwood city
35980		Harwood
37900		Highland
38060		Hill
38900		Horace city
39140		Howes
39460		Hunter city
39500		Hunter
42780		Kindred city
42980		Kinyon
43780		Jake
45980		Leonard city
46020		Leonard
50540		Maple River
50580		Mapleton city
50620		Mapleton
57020		Noble
57620		Normanna
58120		North River city
60480		Oxbow city
60500		Page city
60540		Page
63100		Pleasant
63580		Pontiac
64320		Prairie Rose city
65620		Raymond
65860		Reed
66040		Reile's Acres city
66460		Rich
67260		Rochester
69020		Rush River
75340		Stanley
79300		Tower
79340		Tower City city
82740		Walburg
83500		Warren
83940		Watson
84780		West Fargo city
85220		Wheatland
86980		Wiser
	38019 Cavalier County	
01660		Alma
01740		Alsen city
04660		Banner
06940		Billings
09900		Bruce
11460		Byron
11580		Calio city
11700		Calvin city
17580		Cypress
20460		Dresden
21460		Easby
21500		East Alma
22980		Elgin
28540		Fremont
30780		Glenila
31620		Gordon
33580		Grey
35060		Hannah city
35860		Harvey

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
36420		Hay
37220		Henderson
38820		Hope
38980		Hove Mobile Park city
39660		Huron
44780		Langdon city
44820		Langdon
46940		Linden
47380		Loam
47660		Loma city
50100		Manilla
53020		Milton city
53500		Minto
54060		Montrose
54500		Moscow
54820		Mount Carmel
55020		Munich city
55740		Nekoma city
55780		Nekoma
58020		North Loma
58060		North Olga
59980		Osford
60100		Osnabrock city
60140		Osnabrock
61740		Perry
70780		Sarles city
71620		Seivert
74100		South Dresden
74300		South Olga
76380		Storlie
79540		Trier
82940		Wales city
83820		Waterloo
85060		West Hope
	38021 Dickey County	
00300		Ada
01020		Albertha
01060		Albion
05500		Bear Creek
14540		Clement
19700		Divide
22740		Elden
23220		Ellendale city
23260		Ellendale
23540		Elm
26980		Forbes city
28780		Fullerton city
29900		German
32500		Grand Valley
34500		Hamburg
39220		Hudson
40540		James River Valley
42300		Kent
42340		Kentner
42500		Keystone
48140		Lorraine
48260		Lovell
48460		Ludden city
50500		Maple
53820		Monango city
58220		Northwest
58740		Oakes city
63820		Port Emma
63860		Porter
63980		Potsdam
66940		Riverdale
75140		Spring Valley
81100		Valley
81460		Van Meter
85700		Whitestone
87620		Wright
87940		Yorktown
87980		Young
	380423 Divide County	
01300		Alexandria
01860		Ambrose city
01900		Ambrose
07900		Blooming Prairie
07940		Blooming Valley
08340		Border
10780		Burg
14900		Clinton

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
15020		Coalfield
16940		Crosby city
17940		Daneville
19500		DeWitt
23140		Elkhorn
26140		Fertile Valley
26340		Fillmore
27820		Fortuna city
28220		Frazier
28340		Frederick
29420		Garnet
31580		Gooseneck
36300		Hawkeye
36500		Hayland
46740		Lincoln Valley
47780		Long Creek
52260		Mentor
57220		Noonan city
60700		Palmer
63340		Plumer
73420		Sioux Trail
73700		Smoky Butte
76300		Stoneview
79660		Troy
80260		Twin Butte
80900		Upland
84660		Westby
87660		Writing Rock
	38025 Dunn County	
19820		Dodge city
20940		Dunn Center city
27330		Fort Berthold UT
34340		Halliday city
34350		Halliday UT
42700		Killdeer city
42705		Killdeer UT
74105		South Dunn UT
	38027 Eddy County	
11140		Bush
13820		Cherry Lake
15420		Columbia
15540		Colvin
21980		Eddy
28420		Freeborn
29700		Gates
32020		Grandfield
38180		Hillsdale
44100		Lake Washington
55100		Munster
56620		New Rockford city
56660		New Rockford
60740		Paradise
63220		Pleasant Prairie
68180		Rosefield
72140		Sheldon
72580		Sheyenne city
77140		Superior
78860		Tiffany
	38029 Emmons	
08900		Braddock city
10140		Buchanan Valley
11780		Campbell
34180		Hague city
36700		Hazelton city
36740		Hazelton
46650		Lincoln
46980		Linton city
57725		Northeast Emmons UT
57730		North Emmons UT
74120		South Emmons UT
76500		Strasburg city
78340		Tell
84668		West Emmons UT
	38031 Foster County	
07140		Birtsell
08420		Bordulac
10020		Bucephalia
12340		Carrington city
12380		Carrington
21700		Eastman

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
24900		Estabrook
26820		Florance
30660		Glenfield city
30700		Glenfield
31740		Grace City city
36260		Haven
45180		Larrabee
47900		Longview
49260		McHenry city
49300		McHenry
49500		McKinnon
52100		Melville
57380		Nordmore
67900		Rolling Prairie
68300		Rose Hill
87700		Wyard
	38033 Golden Valley County	
05420		Beach city
05460		Beach
10660		Bullion
18900		Delhi
21665		East Golden Valley UT
23100		Elk Creek
23860		Elmwood
29340		Garner
31420		Golva city
37340		Henry
47700		LoneTree
57865		North Golden Valley UT
61340		Pearl
69580		Saddle Butte
71740		Sentinel
71780		Sentinel Butte city
74180		South Golden Valley UT
	38035 Grand Forks County	
00820		Agnes
01620		Allendale
02020		Americus
03420		Arvilla
03940		Avon

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
06100		Bentru
07860		Blooming
09300		Brenna
13860		Chester
23180		Elkmount
23700		Elm Grove
24060		Emerado city
25260		Fairfield
25540		Falconer
26020		Ferry
30180		Gilby city
30220		Gilby
31700		Grace
32060		Grand Forks city
32100		Grand Forks
36940		Hegton
39980		Inkster city
40020		Inkster
40940		Johnstown
44060		Lakeville
45020		Larimore city
45060		Larimore
46180		Levant
46820		Lind
47580		Logan Center
48100		Loretta
50420		Manvel city
51980		Mekinock
52620		Michigan
54300		Moraine
56780		Niagara city
56820		Niagara
58300		Northwood city
58340		Northwood
58900		Oakville
63300		Pleasant View
63380		Plymouth
66260		Reynolds city
69540		Rye
76420		Strabane
78660		Thompson city
80060		Turtle River
80740		Union

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
83140		Walle
83740		Washington
85140		Wheatfield
	38037 Grant County	
12460		Carson city
21670		East Grant UT
23020		Elgin city
23580		Elm
26580		Fisher
28300		Freda
39060		Howe
45140		Lark
45820		Leipzig
45860		Leith city
53300		Minnie
56420		New Leipzig city
60300		Otter Creek
64580		Pretty Rock
65140		Raleigh
67340		Rock
85000		West Grant UT
86900		Winona
	38039 Griggs County	
00420		Addie
04540		Ball Hill
05180		Bartley
07020		Binford city
09660		Broadview
09940		Bryan
14340		Clearfield
15900		Cooperstown city
15940		Cooperstown
20060		Dover
33260		Greenfield
35020		Hannaford city
37100		Helena
42820		Kingsley
45900		Lenora
48820		Mabel
62580		Pilot Mound
67980		Romness
68460		Rosendal
77340		Sverdrup
80580		Tyrol
83660		Washburn
86300		Willow
	38041 Hettinger County	
00220		Acme
01100		Alden
03460		Ashby
04220		Baer
05680		Beery
07380		Black Butte
09580		Brittian
11820		Campbell
11980		Cannon Ball
12780		Castle Rock
13980		Chilton
14220		Clark
25780		Farina
36220		Havelock
37940		Highland
39940		Indian Creek
42100		Kennedy
42420		Kern
43620		Kunze
49660		Madison
52540		Merrill
54620		Mott city
54660		Mott
56180		New England city
56220		New England
59100		Odessa
66020		Regent city
66740		Rifle
69820		St. Croix
73860		Solon
75860		Steiner
76740		Strehlow
78460		Tepee Butte
82620		Wagendorf

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
83060		Walker
	38043 Kidder County	
01580		Allen
03700		Atwood
04300		Baker
10180		Buckeye
10740		Bunker
13900		Chestina
14420		Clear Lake
17020		Crown Hill
17220		Crystal Springs
18260		Dawson city
25100		Excelsior
28620		Frettim
31780		Graf
36580		Haynes
42580		Kickapoo
44180		Lake Williams
50260		Manning
52420		Merkel
58260		Northwest
61220		Peace
61980		Petersville
62060		Pettibone city
62100		Pettibone
63140		Pleasant Hill
64940		Quinby
66220		Rexine
67180		Robinson city
67220		Robinson
72860		Sibley
74190		South Kidder UT
75780		Steele city
76060		Stewart
77940		Tanner
77980		Tappen city
78020		Tappen
80140		Tuttle city
80180		Tuttle
81140		Valley

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
81820		Vernon
83100		Wallace
84260		Weiser
84980		Westford
86100		Williams
87460		Woodlawn
	38045 LaMoure County	
00660		Adrian
04180		Badger
06300		Berlin city
07420		Black Loam
07980		Bluebird
18420		Dean
19580		Dickey city
22140		Edgeley city
30420		Gladstone
30540		Glen
30820		Glenmore
31100		Golden Glen
32420		Grand Rapids
32540		Grandview
33460		Greenville
37300		Henrietta
41180		Jud city
42140		Kennison
43580		Kulm city
44540		LaMoure city
47180		Litchville
50780		Marion city
52860		Mikkelson
57300		Nora
57340		Norden
60420		Ovid
61380		Pearl Lake
63500		Pomona View
64220		Prairie
65260		Raney
65540		Ray
68060		Roscoe
69220		Russell
69420		Ryan

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
70660		Saratoga
72460		Sheridan
77380		Swede
81900		Verona city
83380		Wano
86340		Willowbank
	38047 Logan County	
9980		Bryant
19740		Dixon
21675		East Logan UT
26500		Finn
28380		Fredonia city
28860		Gackle city
30620		Glendale
33940		Gutschmidt
34060		Haag
40620		Janke
45740		Lehr city
55420		Napoleon city
65700		Red Lake
71580		Sealy
75540		Starkey
85065		West Logan UT
	38049 McHenry County	
02220		Anamoose city
02260		Anamoose
04460		Balfour city
04500		Balfour
04740		Bantry city
04780		Bantry
06180		Bergen city
06580		Berwick
07300		Bjornson
09860		Brown
16260		Cottonwood Lake
18540		Deep River
18620		Deering city
18660		Deering
19020		Denbigh
20300		Drake city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
21679		East McHenry UT
22580		Egg Creek
25620		Falsen
30300		Gilmore
32660		Granville city
32700		Granville
33700		Grilley
37260		Hendrickson
41380		Karlsruhe city
41420		Karlsruhe
42660		Kief city
43460		Kottke Valley
43820		Lake George
43860		Lake Hester
44660		Land
45380		Layton
45500		Lebanon
47260		Little Deep
51660		Meadow
54980		Mouse River
56540		Newport
57500		Normal
57727		Northeast McHenry UT
58100		North Prairie
58660		Norwich
59180		Odin
59300		Olivia
64420		Pratt
66780		Riga
68310		Rose Hill
68660		Round Lake
70340		Saline
71180		Schiller
75020		Spring Grove
76700		Strege
79420		Towner city
80860		Upham city
81620		Velva city
81660		Velva
82220		Villard
82380		Voltaire city
82420		Voltaire
82580		Wagar

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
86420		Willow Creek
	38051 McIntosh County	
03540		Ashley city
21683		East McIntosh UT
45740		Lehr city
58265		Northwest McIntosh UT
67940		Roloff
74505		Southwest McIntosh UT
81700		Venturia city
87020		Wishek city
88180		Zeeland city
	380153 McKenzie County	
01140		Alex
01180		Alexander city
02600		Antelope Creek
03220		Arnegard city
03260		Arnegard
08020		Blue Butte
13290		Central McKenzie UT
13540		Charbon
21687		East McKenzie UT
23060		Elk
23820		Elm Tree
27332		Fort Berthold UT
31900		Grail
36340		Hawkeye
41580		Keene
58045		North McKenzie UT
63420		Poe
65220		Randolph
65500		Rawson city
67140		Riverview
73380		Sioux
74110		Southeast McKenzie UT
74510		Southwest McKenzie UT
80460		Twin Valley
83860		Watford City city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
85900		Wilbur
87820		Yellowstone
	38055 McLean County	
02180		Amundsville
02340		Andrews
03820		Aurena
05980		Benedict city
07500		Blackwater
08060		Blue Hill
11180		Butte city
11220		Butte
11420		Byersville
15140		Coleharbor city
16700		Cremerville
18580		Deepwater
19860		Dogden
19980		Douglas
21690		East McLean UT
27334		Fort Berthold UT
29460		Garrison city
29660		Gate
32940		Greatstone
38940		Horseshoe Valley
44220		Lake Williams
47820		Longfellow
47940		Loquemont
49180		McGinnis
49860		Malcolm
51380		Max city
51820		Medicine Hill
52340		Mercer city
52380		Mercer
57720		North Central McLean UT
60260		Otis
66980		Riverdale city
68260		Roseglen
68420		Rosemont
69140		Ruso city
70060		St.Mary
73780		Snow
74200		South McLean UT

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
79940		Turtle Lake city
79980		Turtle Lake
80660		Underwood city
80670		Underwood UT
82060		Victoria
83700		Washburn city
85070		West McLean UT
86580		Wilton city
86940		Wise
	38057 Mercer County	
06660		Beulah city
21710		East Mercer UT
27336		Fort Berthold UT
31180		Golden Valley city
36780		Hazen city
62260		Pick City city
75420		Stanton city
85075		West Mercer UT
88140		Zap city
	380159 Morton County	
01700		Almont city
12080		Captain's Landing
21720		East Morton UT
26660		Flasher city
30860		Glen Ullin city
36860		Hebron city
49900		Mandan city
49920		Mandan UT
56700		New Salem city
85080		West Morton UT
	38061 Mountrail County	
01380		Alger
03900		Austin
04700		Banner
06700		Bicker
06800		Big Bend
09780		Brookbank

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
10860		Burke
14460		Clearwater
16220		Cottonwood
16540		Crane Creek
16980		Crowfoot
18460		Debing
22500		Egan
26060		Fertile
39180		Howie
39740		Idaho
40500		James Hill
42620		Kickapoo
43220		Knife River
46340		Liberty
48220		Lostwood
48340		Lowland
48860		McAlmond
49140		McGahan
50180		Manitou
53700		Model
54860		Mountrail
55300		Myrtle
56740		New Town city
58820		Oakland
59940		Osborn
60060		Osloe
60620		Palermo city
60660		Palermo
60940		Parshall city
60980		Parshall
62980		Plaza city
63020		Plaza
64100		Powers
64180		Powers Lake
64900		Purcell
65420		Rat Lake
65740		Redmond
68540		Ross city
68580		Ross
72220		Shell
73020		Sidonia
73060		Sikes
73980		Sorkness

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
74515		Southwest Mountrail UT
74860		Spring Coulee
75380		Stanley city
75740		Stave
81420		VanHook
84020		Wayzetta
85085		West Mountrail lUT
85540		White Earth city
85580		White Earth
	38063 Nelson County	
00580		Adler
02380		Aneta city
06220		Bergen
13260		Central
14180		Clara
17660		Dahlen
18300		Dayton
19780		Dodds
24500		Enterprise
26220		Field
27020		Forde
34780		Hamlin
39820		Illinois
44300		Lakota city
44340		Lakota
45540		Lee
46140		Leval
49580		McVille city
52140		Melvin
52640		Michigan
52740		Michigan City city
55460		Nash
55860		Nesheim
59580		Ora
59900		Osago
61460		Pekin city
61860		Petersburg city
61900		Petersburg
68820		Rubin
68900		Rugh
70820		Sarnia

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
79180		Tolna city
83340		Wamduska
86140		Williams
	38065 Oliver County	
13180		Center city
21730		East Oliver UT
85110		West Oliver UT
	38067 Pembina County	
00700		Advance
00900		Akra
05260		Bathgate city
05300		Bathgate
05580		Beaulieu
12060		Canton City city
12180		Carlisle
12940		Cavalier city
12980		Cavalier
17060		Crystal city
17100		Crystal
20340		Drayton city
20380		Drayton
23900		Elora
25980		Felson
29140		Gardar
34620		Hamilton city
34660		Hamilton
41020		Joliette
44580		La Moure
46660		Lincoln
47460		Lodema
52780		Midland
54740		Mountain city
55620		Neche city
55660		Neche
60820		Park
61580		Pembina city
61620		Pembina
70020		St. Joseph
70260		St. Thomas city
70300		St. Thomas

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
78620		Thingvalla
82980		Walhalla city
83020		Walhalla
	38069 Pierce County	
01220		Alexander
02620		Antelope Lake
04580		Balta city
04620		Balta
13300		Central Pierce UT
23300		Elling
23940		Elverum
34140		Hagel
40700		Jefferson
52580		Meyer
55900		Ness
58080		North Pierce UT
66060		Reno Valley
68860		Rugby city
68980		Rush Lake
74305		South Pierce UT
79220		Torgerson
79780		Truman
80100		Tuscarora
85460		White
87180		Wolford city
	38071 Ramsey County	
05140		Bartlett
09700		Brocket city
12900		Cato
13380		Chain Lakes
14140		Churchs Ferry city
16340		Coulee
16580		Crary city
16660		Creel
18740		DeGroat
19420		Devils Lake city
20620		Dry Lake
22340		Edmore city
25660		Fancher
28580		Freshwater
32260		Grand Harbor
34820		Hammer
34860		Hampden city
35300		Harding
38020		Highland Center
43100		Klingstrup
45300		Lawton city
45340		Lawton
46620		Lillehoff
53260		Minnewaukan
54420		Morris
55980		Newbre
56380		Newland
56980		Nixon
57260		Noonan
57780		Northfield
59140		Odessa
59460		Ontario
60340		Overland
61500		Pelican
63680		Poplar Grove
64740		Prospect
68780		Royal
74280		South Minnewaukan
75580		Starkweather city
75980		Stevens
76860		Sullivan
79580		Triumph
84180		Webster
	38073 Ransom County	
01460		Aliceton
01540		Alleghany
04420		Bale
06820		Big Bend
12580		Casey
15060		Coburn
23340		Elliott city
23380		Elliott
24260		Enderlin city
27580		Fort Ransom city
27620		Fort Ransom

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
33180		Greene
35180		Hanson
40300		Island Park
40340		Isley
46380		Liberty
47100		Lisbon city
54180		Moore
57900		Northland
60460		Owego
64500		Preston
68380		Rosemeade
70460		Sandoun
71460		Scoville
72180		Sheldon city
72300		Shenford
74940		Springer
77540		Sydna
79860		Tuller
	38075 Renville County	
09100		Brandon
11620		Callahan
14260		Clay
15380		Colquhoun
22100		Eden Valley
24460		Ensign
25140		Fairbanks
30580		Glenburn city
32580		Grano city
32780		Grassland
33740		Grover
34580		Hamerly
34700		Hamlet
39620		Hurley
40380		Ivanhoe
47420		Lockwood
48020		Loraine city
49460		McKinney
53780		Mohall city
55180		Muskego
62900		Plain
64460		Prescott

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
64820		Prosperity
67380		Rockford
68020		Roosevelt
72540		Sherwood city
75180		Stafford
79140		Tolley city
81300		Van Buren
85500		White Ash
	38077 Richland County	
00100		Abercrombie city
00140		Abercrombie
02540		Antelope
04940		Barney city
04980		Barney
05060		Barrie
05860		Belford
09020		Brandenburg
09340		Brightwood
13220		Center
14100		Christine city
15180		Colfax city
15220		Colfax
17980		Danton
19380		Devillo
19540		Dexter
20740		Duerr
21220		Dwight city
21260		Dwight
21300		Eagle
23620		Elma
25300		Fairmount city
25340		Fairmount
28500		Freeman
29060		Garborg
32620		Grant
32900		Great Bend city
33140		Greendale
34900		Hankinson city
37140		Helendale
38660		Homestead
39700		Ibsen

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
44500		LaMars
46420		Liberty Grove
46460		Lidgerwood city
50380		Mantador city
54220		Mooreton city
54260		Mooreton
54340		Moran
55340		Nansen
72620		Sheyenne
76940		Summit
82140		Viking
82660		Wahpeton city
82780		Walcott city
82820		Walcott
82900		Waldo
84700		West End
87740		Wyndmere city
87780		Wyndmere
	38079 Rollette County	
21020		Dunseith city
21750		East Rolette UT
43340		Kohlmeier
51260		Maryville
55220		Mylo city
58125		North Rolette UT
67780		Rolette city
67820		Rolla city
69980		St.John city
72260		Shell Valley
74320		South Rolette UT
74340		South Valley
80010		Turtle Mountain UT
	38081 Sargent County	
08620		Bowen
08980		Brampton
13020		Cayuga city
15100		Cogswell city
19180		Denver
20820		Dunbar
27260		Forman city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
27300		Forman
34020		Gwinner city
34300		Hall
35420		Harlem
36140		Havana city
37500		Herman
40460		Jackson
42860		Kingston
50660		Marboe
52940		Milnor city
52980		Milnor
65340		Ransom
69340		Rutland city
69380		Rutland
70740		Sargent
72780		Shuman
74460		Southwest
78140		Taylor
78500		Tewaukon
81780		Verner
82340		Vivian
84100		Weber
85740		Whitestone Hill
86060		Willey
	38083 Sheridan County	
06340		Berlin
08300		Boone
13310		Central Sheridan UT
19100		Denhoff
22220		Edgemont
25420		Fairview
31500		Goodrich city
31540		Goodrich
37980		Highland
38500		Holmes
46700		Lincoln Dale
49020		McClusky city
49060		McClusky
51060		Martin city
51100		Martin
51350		Mauch

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
56260		New Germantown
58130		North Sheridan UT
62180		Pickard
64715		Prophets
68470		Rosenfield
74330		South Sheridan UT
76540		Strassburg
	38085 Sioux County	
27860		Fort Yates city
27870		Fort Yates UT
52300		Menz
58135		North Sioux UT
71660		Selfridge city
73820		Solen city
74520		Southwest Sioux UT
	38087 Slope County	
02060		Amidon city
10220		Bucklin
12420		Carroll
12620		Cash
13140		Cedar Creek
13410		Chalky Butte UT
15740		Connor
16620		Crawford
18520		Deep Creek UT
20140		Dovre
24760		E-Six UT
35620		Harper
39300		Hughes
39420		Hume
50860		Marmarth city
53100		Mineral Springs
54140		Moord
54700		Mound
58275		Northwest Slope UT
61260		Peaceful Valley
65060		Rainy Butte
66620		Richland Center
70420		Sand Creek
72100		Sheets
73580		Slope Center
77100		Sunshine
85125		West Slope UT
85620		White Lake
87340		Woodberry
	38091 Steele County	
05660		Beaver Creek
09620		Broadlawn
12220		Carpenter
15340		Colgate
21740		Easton
22060		Edendale
24340		Enger
26420		Finley city
26460		Finley
28140		Franklin
31140		Golden Lake
33420		Greenview
38860		Hope city
39340		Hugo
48580		Luverne city
52020		Melrose
56060		Newburgh
64660		Primrose
67100		Riverside
71940		Sharon city
71980		Sharon
72420		Sherbrooke
84940		Westfield
86460		Willow Lake
	38093 Stutsman County	
01260		Alexander
03500		Ashland
07740		Bloom
07780		Bloomenfield
10060		Buchanan city
10100		Buchanan
13660		Chase Lake UT
13940		Chicago

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
14660		Cleveland city
15700		Conklin
16020		Corinne
16140		Corwin
16380		Courtenay city
16420		Courtenay
17460		Cusator
18700		Deer Lake
21140		Durham
22420		Edmunds
22940		Eldridge
26740		Flint
28700		Fried
29860		Gerber
29940		Germania
30380		Glacier
32860		Gray
33660		Griffin
37820		Hidden
38620		Homer
40100		Iosco
40580		Jamestown city
40780		Jim River Valley
42180		Kensal city
42220		Kensal
45940		Lenton
47060		Lippert
48300		Lowery
48740		Lyon
50300		Manns
51020		Marstonmoor
51860		Medina city
52820		Midway
53980		Montpelier city
54020		Montpelier
54100		Moon Lake
56100		Newbury
57060		Nogosek
58280		Northwest Stutsman UT
60780		Paris
61940		Peterson
62620		Pingree city
62660		Pingree
62740		Pipestem Valley
62940		Plainview
68100		Rose
68740		Round Top
70180		St.Paul
71860		Severn
71900		Sharlow
73340		Sinclair
74700		Spiritwood
74740		Spiritwood Lake city
76180		Stirton
76620		Streeter city
76660		Streeter
76780		Strong
77620		Sydney
81260		Valley Spring
82540		Wadsworth
83260		Walters
84300		Weld
86700		Windsor
86740		Winfield
87380		Woodbury
87580		Woodworth city
88060		Ypsilanti
	38095 Towner County	
03100		Armourdale
03660		Atkins
06620		Bethel
07180		Bisbee city
11860		Cando city
11900		Cando
15860		Coolin
16820		Crocus
18140		Dash
22540		Egeland city
30020		Gerrard
31980		Grainfield
35140		Hansboro city
39100		Howell
44980		Lansing
51580		Maza city

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
51620		Maza
53900		Monroe
54940		Mount View
56140		New City
59380		Olson
61140		Paulson
61780		Perth city
62420		Picton
67500		Rock Lake city
67540		Rock Lake
70780		Sarles city
72980		Sidney
73660		Smith
73940		Sorenson
74980		Springfield
78260		Teddy
80340		Twin Hill
82020		Victor
82300		Virginia
88220		Zion
	38097 Traill County	
05940		Belmont
07060		Bingham
07660		Blanchard
07820		Bloomfield
08140		Bohnsack
11340		Buxton city
11380		Buxton
11540		Caledonia
14740		Clifford city
22820		Eldorado
23740		ElmRiver
24740		Ervin
28980		Galesburg city
29020		Galesburg
29300		Garfield
32300		Grandin city
33340		Greenfield
36100		Hatton city
37460		Herberg
38100		Hillsboro city
38140		Hillsboro
41860		Kelso
46860		Lindaas
51500		Mayville city
51540		Mayville
54380		Morgan
57540		Norman
58540		Norway
63900		Portland city
66260		Reynolds city
68500		Roseville
75700		Stavanger
82180		Viking
87100		Wold
	38099 Walsh County	
00260		Acton
00340		Adams city
00380		Adams
02860		Ardoch city
02900		Ardoch
14700		Cleveland
15820		Conway city
19460		Dewey
20900		Dundee
22020		Eden
22260		Edinburg city
25180		Fairdale city
25860		Farmington
26100		Fertile
27060		Fordville city
27100		Forest River city
27140		Forest River
30940		Glenwood
31060		Golden
31820		Grafton city
31860		Grafton
35740		Harriston
38780		Hoople city
42260		Kensington
42900		Kinloss
44620		Lampton

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
44860		Lankin city
45260		Latona
51140		Martin
51780		Medford
53540		Minto city
58380		Norton
58980		Oakwood
59540		Ops
60900		Park River city
61820		Perth
62780		Pisek city
64270		Prairie Centre
64860		Pulaski
68940		Rushford
69620		St. Andrews
70940		Sauter
72380		Shepherd
73220		Silvesta
78820		Tiber
81860		Vernon
81980		Vesta
83180		Walsh Centre
83220		Walshville
	38101 Ward County	
00740		Afton
02420		Anna
04140		Baden
06460		Berthold city
06500		Berthold
09380		Brillian
10940		Burlington city
10980		Burlington
11100		Burt
11740		Cameron
12100		Carbondale
12260		Carpio city
12300		Carpio
19140		Denmark
19300		Des Lacs city
19340		Des Lacs
19900		Donnybrook city
20020		Douglas city
23660		Elmdale
24980		Eureka
25060		Evergreen
28020		Foxholm
28460		Freedom
29620		Gasman
32980		Greely
33100		Greenbush
35700		Harrison
37860		Hiddenwood
38260		Hilton
40140		Iota Flat
42020		Kenmare city
42060		Kenmare
43020		Kirkelie
47020		Linton
48500		Lund
49420		McKinley
49820		Makoti city
49940		Mandan
50700		Margaret
51220		Maryland
51460		Mayland
53380		Minot city
55700		Nedrose
56500		Newman
56580		New Prairie
59740		Orlien
61060		Passport
65820		Ree
66420		Rice Lake
67860		Rolling Green
69060		Rushville
69460		Ryder city
69500		Ryder
70100		St. Marys
70860		Sauk Prairie
70980		Sawyer city
71020		Sawyer
72075		Shealy
74580		Spencer
75060		Spring Lake

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
76980		Sundre
77180		Surrey city
77220		Surrey
78100		Tatman
79100		Tolgen
79260		Torning
81380		Vang
83780		Waterford
86180		Willis
	38103 Wells County	
06380		Berlin
06980		Bilodeau
08580		Bowdon city
09260		Bremen
10700		Bull Moose
12820		Cathay city
12860		Cathay
13740		Chaseley
17140		Crystal Lake
18860		Delger
25500		Fairville
26180		Fessenden city
27900		Forward
28060		Fram
29980		Germantown
34100		Haaland
34460		Hamberg city
34540		Hamburg
35900		Harvey city
36380		Hawksnest
37060		Heimdal
38220		Hillsdale
39580		Hurdsfield city
40820		Johnson
48660		Lynn
50060		Manfred
58580		Norway Lake
60020		Oshkosh
63620		Pony Gulch
64700		Progress
69100		Rusland

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
69660		St. Anna
73140		Silver Lake
74080		South Cottonwood
74540		Speedwell
77660		Sykeston city
77700		Sykeston
81060		Valhalla
84380		Wells
84740		Western
85100		West Norway
85120		West Ontario
87540		Woodward
	38105 Williams County	
00940		Alamo city
03620		Athens
05020		Barr Butte
06860		Big Meadow
06900		Big Stone
07460		Blacktail
08100		Blue Ridge
08260		Bonetraill
09820		Brooklyn
10540		Buford
10620		Bull Butte
13460		Champion
14860		Climax
16440		Cow Creek UT
20580		Dry Fork
20660		Dublin
21660		East Fork
23420		Ellisville
24540		Epping city
24580		Equality
25900		Farmvale
31260		Golden Valley
31460		Good Luck
33500		Grenora city
33540		Grenora
35340		Hardscrabble
36620		Hazel
36900		Hebron

CODE (MCDS)	COUNTY	CITY/TOWNSHIP
38340		Hofflund
41260		Judson
46900		Lindahl
50980		Marshall
53660		Missouri Ridge
53940		Mont
55920		Nesson Valley UT
56300		New Home
59260		Oliver
59860		Orthell
62140		Pherrin UT
63260		Pleasant Valley
65020		Rainbow
65580		Ray city
67460		Rock Island
68700		Round Prairie
70900		Sauk Valley
71300		Scorio
74115		Southeast Williams UT
74260		South Meadow
74780		Springbrook city
74820		Springbrook
76340		Stony Creek
76460		Strandahl
78940		Tioga city
78980		Tioga
79500		Trenton
79740		Truax
80220		Twelve Mile
80620		Tyrone
82100		View
84580		West Bank
85340		Wheelock
86020		Wildrose city
86220		Williston city
86260		Williston
86860		Winner

North Dakota American Indian Reservations

Census Code	FIPS Code	Name	State	County
151	27340	Fort Berthold Reservation	North Dakota	Dunn
				McKenzie
				McLean
				Mercer
				Mountrail
				Ward
175	27780	Fort Totten Reservation	North Dakota	Benson
				Eddy
				Nelson
				Ramsey
502	73460	Sisseton Reservation	North Dakota	Richland
				Sargent
525	75300	Standing Rock Reservation	North Dakota	Sioux
563	80020	Turtle Mountain Reservation	North Dakota	Rolette

Inventory Route (Item 5) **9 Digits**

The inventory route is a 9-digit code composed of five segments. *While the following numbers represent the NBI coding, Pontis allows selection from a drop-down menu that contains the actual coding in written terms.*

Segment	Description	Pontis Description	Length
5A	Record Type	Position/Prefix	1 Digit
5B	Route Signing Prefix	Kind Hwy (Rt Prefix)	1 Digit
5C	Designated Level of Service	Desig. Lvl Service	1 Digit
5D	Route Number	Rte #	5 Digits
5E	Directional Suffix	Suffix	1 Digit

Segment 5A - Record Type - **Position/Prefix**

Code the Route on the structure in Pontis in the Inventory/Roads Tab.

"On" signifies that the inventory route is carried "on" the structure. Each bridge structure carrying highway traffic must have a record identified with a type code = 1 (numeric). All of the NBI data items must be coded, unless specifically excepted, with respect to the structure and the inventory route "on" it.

"Under" signifies that the route that goes "under" the structure. If an inventory route beneath the structure is on a federal-aid system, is a defense route or is otherwise important, a record must be coded to identify it. The type code must be 2 or an alphabetic letter A through Z. Code 2 for a single route under and Code A, B, C, D, etc., consecutively for multiple routes under the same structure. Defense routes shall be listed first. When this item is coded 2 or A through Z, only the following items must be coded: Items 1, 3-11, 16, 17, 19, 20, 26-30, 42, 43, 47-49, 100-104, 109 and 110. All other items may remain blank.

"B" sheets are only required for bridges with no "traffic on" in Pontis. The under roadway information is coded under the Inventory/Roads tab.

It cannot be overemphasized that all route-oriented data must agree with the coding as to whether the inventory route is "on" or "under" the structure.

There are situations of a route "under" a structure, where the structure does not carry a highway, but may carry a railroad, pedestrian traffic, or even a building. These are coded the same as any other "under" record and the "on" record shall be coded in the .

Kind Hwy (Rt Prefix)

The following numbers represent the NBI coding, Pontis allows selection for item Kind Hwy (Rt Prefix) from a drop-down menu that contains the actual coding in written terms.

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

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

Designated Level of Service

The following numbers represent the NBI coding, Pontis allows selection for item Designated Level of Service from a drop-down menu that contains the actual coding in written terms

Code	Description
0	None of the below
1	Mainline
2	Alternate
3	Bypass
4	Spur
6	Business
7	Ramp
8	Service road

Rte #

Code the route number of the inventory route using the dropdown menu. *Pontis allows input for item Rte # as a right justified 5 digit number.*

If concurrent routes are of the same hierarchy level, denoted by the route signing prefix, the lowest numbered route shall be coded. Code 00000 for bridges on roads without route numbers.

COUNTY (FAS) ON-SYSTEM, COUNTY OFF-SYSTEM

The coding of Item 5 the Rte. # provides the method for distinguishing route on which the structure is located.

On-System - The first position is a zero (Do not leave blank), and the second through fifth positions are the county FAS route number.

Off-System - The first through the fifth positions are all zeros (Do not leave blank).

Suffix 1 Digit

Pontis allows input for item Suffix from the dropdown box. The allowable codes are shown below.

Code	Description
0	Not applicable
1	North
2	East
3	South
4	West
	Unknown

***NOTE**: Codes 1 through 4 are only applicable to divided highways in ND.*

Features Intersected (Item 6) 25 Digits

This item contains a description of the features intersected by the structure and a critical facility indicator. There are 25 digits divided into two segments. *While the following numbers represent the NBI coding format, Pontis allows input directly into an information box.*

Segment	Description	Length
6A	Features Intersected	24 digits
6B	Critical Facility Indicator	1 digit

*Item **Feature Intersected** is input directly into the information box on the Inventory ID Admin Tab in Pontis.*

*Item **Critical Facilities** in input via a dropdown box on the Inventory/Roads Tab .and will be coded by Central Office.*

The information to be recorded for this item in the first 24 digits shall be the name or names of the features intersected by the structure. When one of the features intersected is another highway, the signed number or name of the highway shall appear first (leftmost) in the field. The names of any other features shall follow, separated by a semicolon or a comma. Parentheses shall be used to provide a second identification of the same feature. Abbreviations may be used when necessary, but an effort shall be made to keep them meaningful. The data in this segment shall be left justified in the first 24 positions.

A structure on a designated defense highway considered to be a critical facility which is defined in FAPG, 23 CFR 666, shall be identified by the dropdown item **Critical Facilities**. A non-critical facility shall be coded accordingly.

Most small streams have local names. If local name designation is in common use and it is available, the designation shall be included.

1st	***L***	***I***	***T***	***T***	***L***	***E***		***H***	***E***	***A***	***R***	***T***		***R***	***I***	***V***	***E***	***R***						

1st	***C***	***O***	***T***	***T***	***O***	***N***	***W***	***O***	***O***	***D***		***C***	***R***	***E***	***E***	***K***								

Facility Carried by Structure (Item 7) **18 Digits**

The facility being carried by this structure shall be recorded and coded. In all situations this item describes the use "on" the structure. *While the following numbers represent the NBI coding format, Pontis allows input directly into an information box.* This item shall be left justified

C	&	O		R	A	I	L	R	O	A	D	

Structures carrying roads on Indian Reservations must be identified in **Facility Carried.** They are designated as IRR (Indian Reservation Roads) and will also show which reservation they are located on. IRR entries will be made by Bridge Division.

IRRFB	Fort Berthold Indian Reservation
IRRFT	Fort Totten Indian Reservation
IRRSR	Standing Rock Indian Reservation
IRRSW	Sisseton - Wahpeton Indian Reservation
IRRTM	Turtle Mountain Indian Reservation

Structure Number (Item 8)	**17 Digits**

When recording and coding for this item and following items, any structure or structures with a closed median should be considered as one structure, not two.

The structure number must be unique for each bridge within the State, and once established should preferably never change for the life of the bridge. If it is essential that a structure number(s) must be changed, then a complete cross reference of corresponding "old" and "new" numbers must be provided to the FHWA Bridge Division. The cross reference shall include both a computer tape and a printed listing in the FHWA required format.

In Pontis, there is only one bridge with multiple roadway records this eliminates the "B" structures from our inventory (other than a railroad or pedestrian walkway over a highway)

One of the major problems with NBI structure numbers has been the shifting of numbers left or right in the 17 spaces provided. Therefore, it is recommended that all 17 digits be filled and that there be no blank spaces.

EXAMPLES FOR NORTH DAKOTA CODINGS FOLLOW:

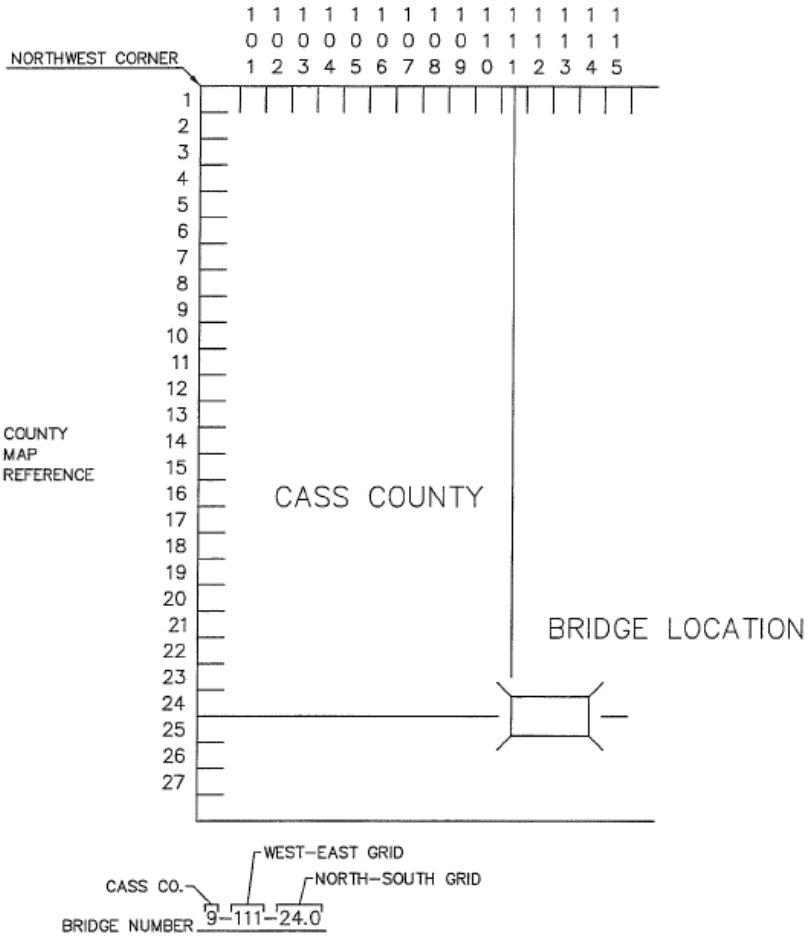
NBI STRUCTURE NUMBERS

Various coding arrangements are used for structures on the several highway systems.

COUNTY BRIDGE NUMBERING SCHEME

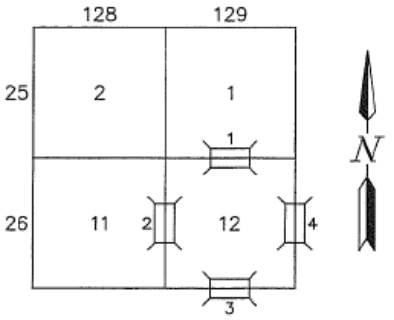
The county bridge numbers are derived from a coordinate system which is unique to each county.

These identifying numbers are made up of the two digit county number first, then a mile number read to the right (east) from the northwest corner of the county, then a mile number read down (south) from the northwest corner of the county.

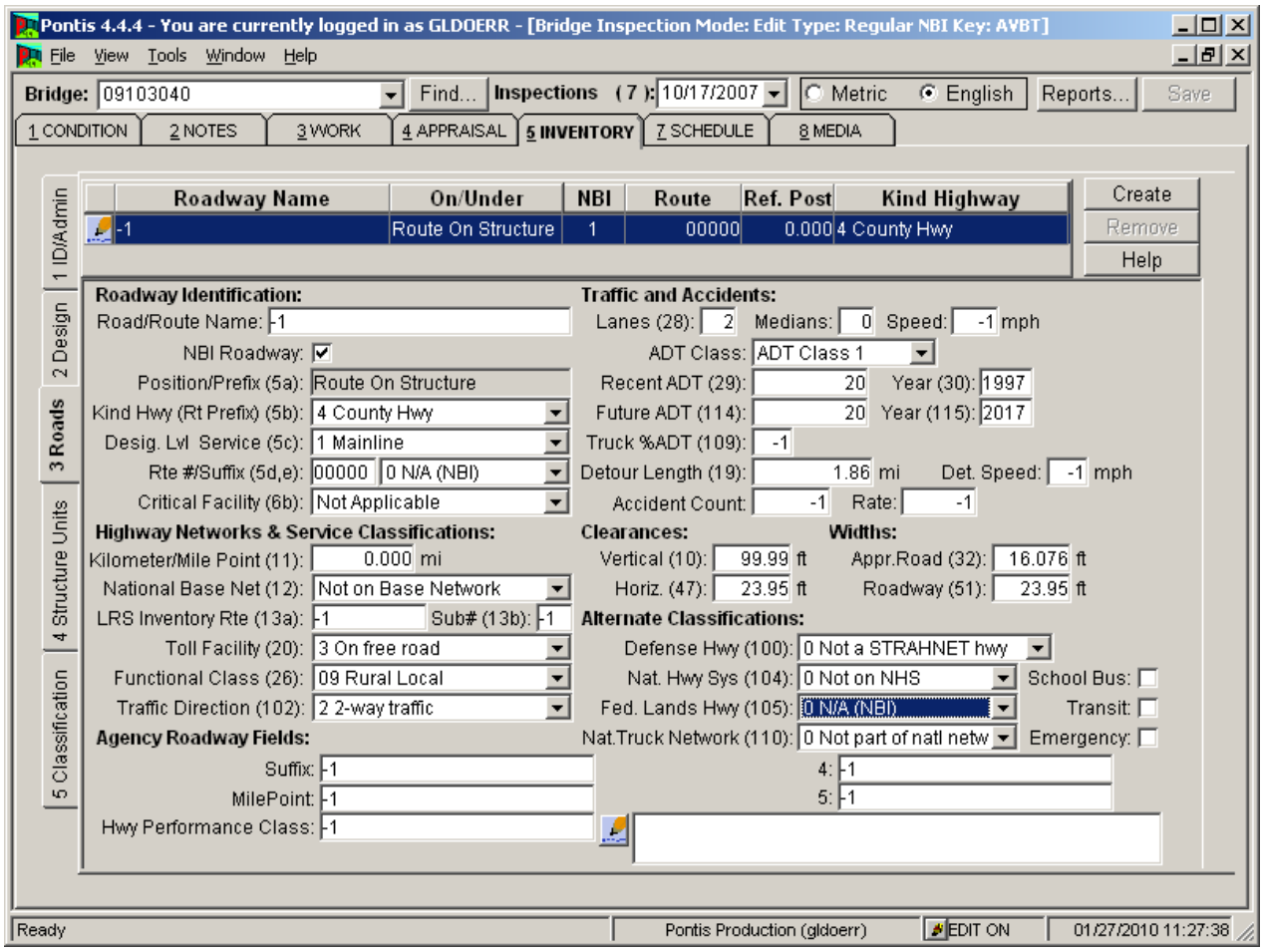


STRUCTURES ON SECTION LINE WILL BE CODED AS SHOWN IN THE EXAMPLE AT RIGHT;

STR. NO. 1 129–25.0
STR. NO. 2 128–26.0
STR. NO. 3 129–26.0
STR. NO. 4 129–26.1



Pontis Input Screen



The bridge number is right justified ~~in the coding blocks~~. This means that the last digit of the bridge number is to be located in the right hand block of the line provided for the bridge number. A leading zero is to be entered preceding the first digit of bridges in county No. 1 through 9 inclusive.

Bridge No. 9-111-24.0 is entered as follows:

			0	9	1	1	1	2	4	0
			10							17

Bridge No. 29-111-24.0 would be entered thus:

			2	*9*	*1*	*1*	*1*	*2*	*4*	*0*
			10							*17*

Note that no hyphens or decimals have been included in the coding of the NBI Structure Number. The computer will add these during printing. The Pontis item Agency Structure ID will contain the hyphens and decimals in the number.

STATE SYSTEM

The bridge numbering system uses the Common Data Reference System. The highway number and mile point are used for identification. Bridge numbers are determined by the district or Planning Division and are recorded in the Bridge Listing or SI&A Sheet.

The bridge number is left justified on the coding line. Only numbers are included in the NBI Structure number. Hyphens and decimals are coded in the Agency Structure ID In Pontis. Locations of each digit, hyphen, decimal and letter has a meaning in producing the resulting printout. Highway number must occupy first four digits. Mile point must occupy digits six through twelve. Use leading zeros as necessary.

SINGLE STRUCTURE - 2 Lane Roadway

Highway No. 81 Mile point 173.992

0	0	8	1	-	1	7	3	.	9	9	2
1			4		6						12

LOCATION CODES

	X		

15

Special coding entries are required to indicate the location of a structure not on the mainline and the location of a structure.

These coding entries are:

Code	*Item*
L	*Left roadway or left side*
R	*Right roadway or right side*
N	*On right of way, but not on the mainline roadway*
M	*In median*
S	*Left service road*
T	*Right service road*

SERVICE ROAD STRUCTURES

Highway 2 Mile point 1.337 Left Service Road

0	*0*	*0*	*2*	*-*	*0*	*0*	*1*	*.*	*3*	*3*	*7*			*S*		

1 *12* *15*

Exception: On four lane highways block 15 will be occupied by "L" or "R" and the service road designation will be inserted in block "16".

***NOTE**: Block 13 and 14 will be blank on all bridges except County FAS and Off System.*

MULTI-STRUCTURES - 4 LANE

Bridge numbers are coded as above with the additional designation left or right roadways. This provided by adding a letter "L" or "R" in Block 15 to show left or right roadway.

Designates Right Roadway

0	*0*	*2*	*9*	*-*	*0*	*2*	*3*	*.*	*5*	*1*	*0*			*R*		

1 *12* *15*

Designates Right Service
Road - Right Roadway

0	0	2	9	-	0	2	3	.	5	1	0			R	T	
1														15	16	

Block #16 will designate Service Roads in this case.

UNDERPASS

			X
			17

In Pontis, the roadway under a structure is coded in the roadway field. No "B" structure is required unless there is no roadway on the structure. In this case, the bridge number is entered Left justified as before with a "B" in block 17. The "B" identifies the data as relating to the underpass as follows:

Indicates Underpass

0	0	2	9	-	0	2	3	.	5	1	0					B
1											12					17

An underpass on a left lane service road is as follows:

Service Road
Left lane

Underpass

0	0	2	9	-	0	2	3	.	5	1	0			L	S	B
1											12			15	16	17

STRUCTURE IN AN URBAN AREA AND STATE PARKS

These structures are under the jurisdiction of the municipalities but are inspected by State forces. The identifying numbers are in the "Bridge Listing" and contain no hyphens and decimals. In NBI Structure coding for these structures, the coding is left justified with four leading zeros, city designated code, followed by the bridge number. Hyphens and decimals are not coded. Single digit bridge numbers must have one leading zero.

City Designated Code
(For use in Bridge Number)

Code	*City*
BISM	*Bismarck*
DKSN	*Dickinson*
FRGO	*Fargo*
FRSP	*Ft. Ransom State Park*
GF	*Grand Forks*
GRAF	*Grafton*
JMTN	*Jamestown*
MAN	*Mandan*
MNOT	*Minot*
TRSP	*Turtle River State Park*
VC	*Valley City*
WF	*West Fargo*

Example:

City (Jamestown) *Bridge No. (3)*

0	*0*	*0*	*0*	*J*	*M*	*T*	*N*	*0*	*3*
1				*5*					*10*

Location (Item 9)	**25 Digits**

This item will contain a narrative description of the bridge location. It is recommended that the location be keyed to a distinguishable feature on an official Department of Transportation map. Examples are: road junctions street names and topographical features. This entry is left justified without trailing zeros.

Distances will be rounded to nearest mile except when structures located close together require greater accuracy.

Use geographical references - city, county lines, highway junctions. The highway references are to be system designation:

Interstate	*I)*
US Routes	*US) Not SR or SH*
ND Routes	*ND)*

Abbreviate only when necessary to fit the 25 digit limit.

Preferred entries are:

1	*0*		*E*	*A*	*S*	*T*		*O*	*F*		*L*	*I*	*S*	*B*	*O*	*N*									
5		*S*	*O*	*U*	*T*	*H*		*O*	*F*		*I*	*-*	*9*	*4*											

Inventory Route, Minimum Vertical Clearance (Item 10) **(XX feet XX inches)**	**4 Digits**

Code the minimum vertical clearance over the Inventory Route. The underclearance will be coded in Pontis over each individual roadway under the structure. The minimum clearances for a 10 foot width of the pavement or traveled part of the roadway where the clearance is the greatest shall be recorded and coded in feet and tenths. For structures having multiple openings, clearances for each opening shall be recorded, but only the greatest of the minimum clearances for the two or more openings shall be coded regardless of the direction of travel. This would be the practical maximum clearance. When no restriction exists, code "9999".

~~If~~ Whenever any construction has been done beneath the structure that will affect the clearance, fill out a Vertical Clearance form SFN17387 or SFN17388.

Example: *Code*

Clearance *19'-7"*

1	*9*	*.*	*5*	*8*

Unlimited

9	9	.	9	9

***Note**: Clearances are measured with respect to the Inventory Route. Through truss bridges which carry the Inventory Route will have a clearance coded in this field. Bridges which have the Inventory Route passing under will have a clearance coded in this field on the Inventory/Roads Tab in Pontis*

The Pontis data for the under structure is coded in the roadway field so no "B" bridge will be required.

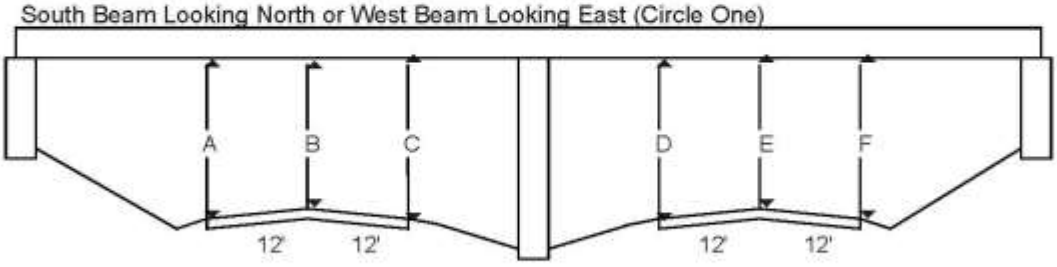
VERTICAL CLEARANCE -- 4-LANE HIGHWAYS

North Dakota Department of Transportation, Bridge
SFN 17388 (Rev. 10-2011)

Structure Number
Date
Inspector

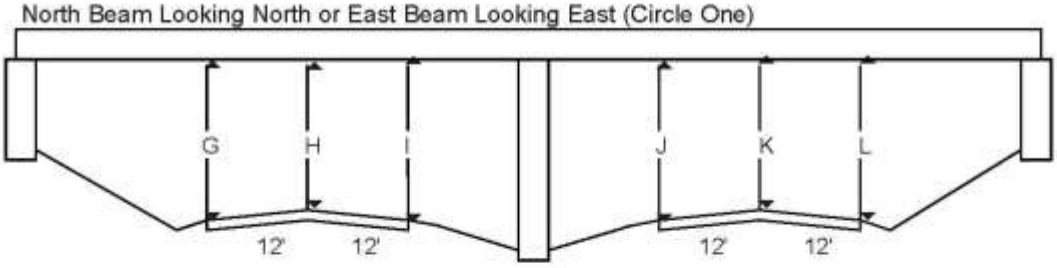
Make Sure to Include the Lowest Beam Clearance For Both Directions of Travel

South Beam Looking North or West Beam Looking East (Circle One)



A	B	C	D	E	F

North Beam Looking North or East Beam Looking East (Circle One)



G	H	I	J	K	L

Item 10 - Inventory Route, Minimum Vertical Clearance (XX feet XX inches)

Code the minimum vertical clearance over the inventory route identified in item 5, whether the route is "on" the structure or "under" the structure. The minimum clearance for a 10-foot width of pavement or traveled part of the roadway where the clearance is the greatest shall be recorded and coded in feet and inches. For structures that have multiple openings, clearances for each opening shall be recorded, but only the greatest of the minimum clearance for the two or more openings shall be coded regardless of the direction of travel.

Item 10

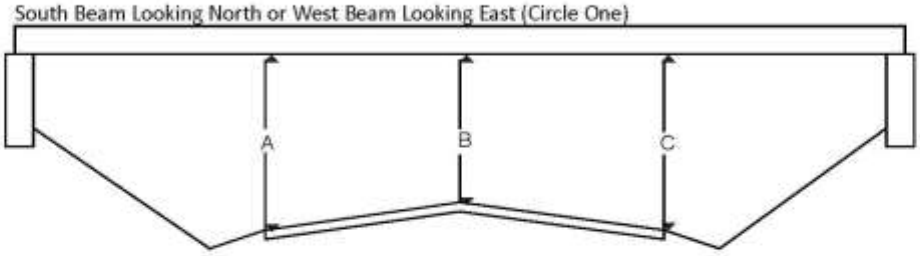
VERTICAL CLEARANCE - SINGLE SPAN

North Dakota Department of Transportation, Bridge
SFN 17387 (Rev. 10-2011)

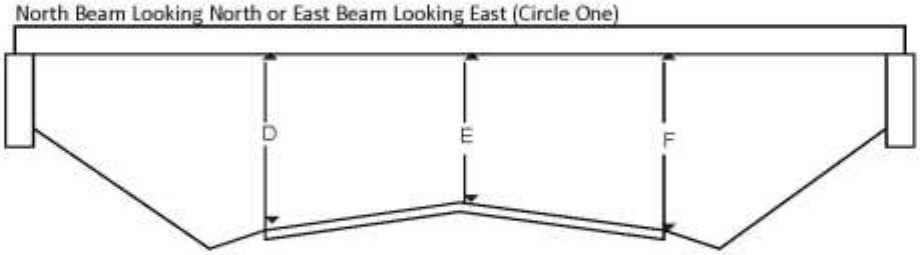
Structure Number
Date
Inspector

Make Sure to Include the Lowest Beam Clearance

South Beam Looking North or West Beam Looking East (Circle One)



North Beam Looking North or East Beam Looking East (Circle One)



A	B	C	D	E	F

Item 10 - Inventory Route, Minimum Vertical Clearance (XX feet XX inches)

Code the minimum vertical clearance over the inventory route identified in item 5, whether the route is "on" the structure or "under" the structure. The minimum clearance for a 10-foot width of pavement or traveled part of the roadway where the clearance is the greatest shall be recorded and coded in feet and inches. For structures that have multiple openings, clearances for each opening shall be recorded, but only the greatest of the minimum clearance for the two or more openings shall be coded regardless of the direction of travel.

Item 10

VERTICAL CLEARANCE OF THRU TRUSS BRIDGES

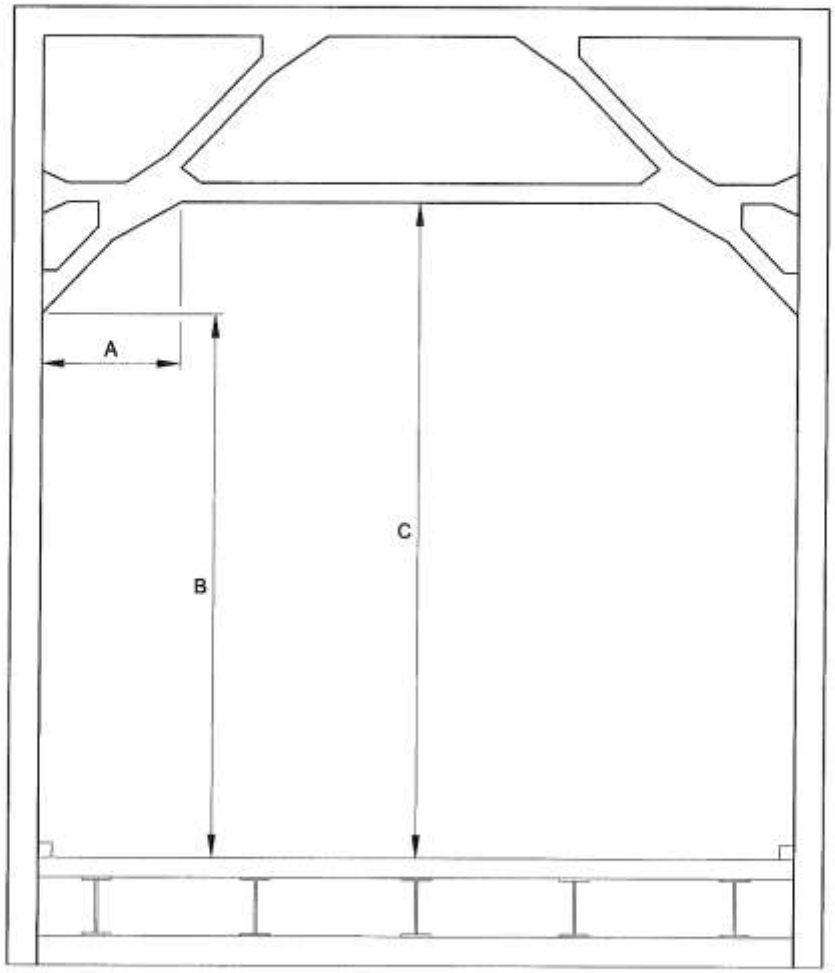
North Dakota Department of Transportation, Bridge Division

Structure Number _____

Date _____

Inspector _____

Make Sure to Include the Lowest Clearance For Both Directions of Travel. It may not be at the End of the Bridge



	A	B	C
North or East End	_____	_____	_____
South or West End	_____	_____	_____

1/29/2013

Mile Point (Item 11) — 6 Digits

If a mile point location reference system is being used in the State, code a 6 digit number to represent the mile point to thousandths of a mile. The mile point shall reference the center of the structure in the direction of increasing mileage of the Inventory Route.

Code all zeros if a mile point location cannot be determined or is not appropriate. If the mile point location of the structure is at the beginning of the route mileage, code with a nominal value of 000.001 rather than 000.000.

NOTE: Mile Point shall coincide with the reference point found in RIMS. This number normally coincides with the last 6 digits of the bridge number but may not because of route measure changes or relocation of highways that causes a change in the reference points.

National Base Net (Item 12) — 1 Digit

Data entry to be made by Bridge Division

This item is to be coded for all records in the inventory. The National Base Network includes the through lane (mainline) portions of the NHS, rural/urban principal arterial system and rural minor arterial system of the State highway system. Ramps, frontage roads and other roadways are not included in the Base Network. For the inventory route identified in Inventory Route, indicate whether the inventory route is on the National Base Network or not on that network. Use one of the following codes represented in a Pontis dropdown menu.

Code	Description
0	Inventory Route is not on the Base Network
1	Inventory Route is on the Base Network

LRS Inventory Route, Subroute Number (Item 13) — 12 Digits

Data entry will be made by Bridge Division.

If the National Base Net has been coded as on the Base Network, the information to be recorded for this item is inventory route for the State's linear referencing system (LRS). If the National Base Net has been coded 0, this entire item should be left blank. This item is a 12-digit code composed of 2 segments.

Segment	Description	Length
13A	LRS Inventory Route	10 digits
13B	Subroute Number	2 digits

The LRS inventory route and subroute numbers to be reported in this item must correspond to the LRS inventory route and subroute numbers reported by the State for the HPMS. The LRS inventory route number is coded in the ten positions of segment 13A, right justified and zero filled. The subroute number, if it exists, is coded in the two positions of segment 13B, right justified and zero filled.

The LRS inventory route number can be alphanumeric, but must not contain blanks. The LRS inventory route number is not necessarily the same as that posted along the roadway, but is a number used to uniquely identify a route within at least a county and perhaps throughout the State.

The subroute number is a number that uniquely identifies portions of an inventory route sections where duplicate kilometerpoints occur. These subroute numbers, if they exist, are identified in the State's HPMS-LRS records. If there is no subroute number, code 00 in this segment.

EXAMPLES:

Inventory Route 2775, Subroute Number 0 — Code

0	*0*	*0*	*0*	*0*	*0*	*2*	*7*	*7*	*5*	*0*	*0*

Inventory Route 2775, Subroute Number 3 — Code

0	0	0	0	0	0	2	7	7	5	0	3

Latitude (Item 16) **5 Digits**

Data entry will be made by Bridge Division.

For bridges on defense highways, record and code the latitude of each in degrees, minutes, seconds and tenths of seconds. The point of the coordinate in North Dakota is the center of the bridge. If the bridge is not a defense highway, a code of all zeros but it is preferable to code the latitude if available.

Example: Latitude

48°54’ 18.2”

Code

4	8	5	4	1	8	.	2

Longitude (Item 17) **6 Digits**

Data entry will be made by Bridge Division.

For bridges on defense highways, record and code the longitude of each in degrees, minutes, seconds and tenths of seconds. A leading zero shall be coded where needed. The point of the coordinate may be the beginning of the bridge in the direction of the inventory or any other point the state has chosen to use. If the bridge is not on a defense highway, a code of all zeros is acceptable, but it is preferable to code the longitude if available.

Example Long

97°39’36.5”

Code

0	9	7	3	9	3	6	.	5

Bypass, Detour Length (XX Miles) (Item 19) 2 Digits

If a ground level bypass is available at the structure site for the inventory route, record and code the detour length as 00.

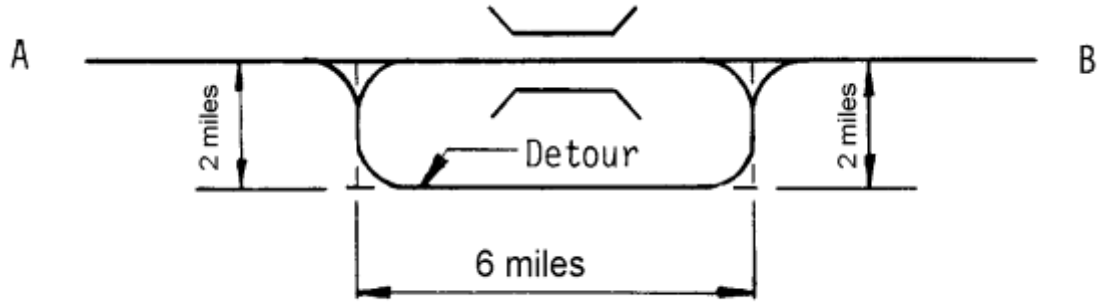
If the bridge is one of twin bridges and is not at an interchange, code 01 where the other twin bridge can be used as a temporary bypass with a reasonable amount of crossover grading. In other cases, indicate that actual length to the nearest mile of the detour length. The detour length should represent the total additional travel for a vehicle which would result from closing of the bridge. The factor to consider when determining if a bypass is available at the site is the potential for moving vehicles, including military vehicles, around the structure. This is particularly true when the structure is in an interchange. For instance, a bypass likely would be available in the case of diamond interchanges, interchanges where there are service roads available or other interchanges where the positioning and layout of the ramps is such that they could be used without difficulty to get around the structure. Code "99" for 99 miles or more.

Ground level detours at interchanges on divided highways only; all other need detour mileage.

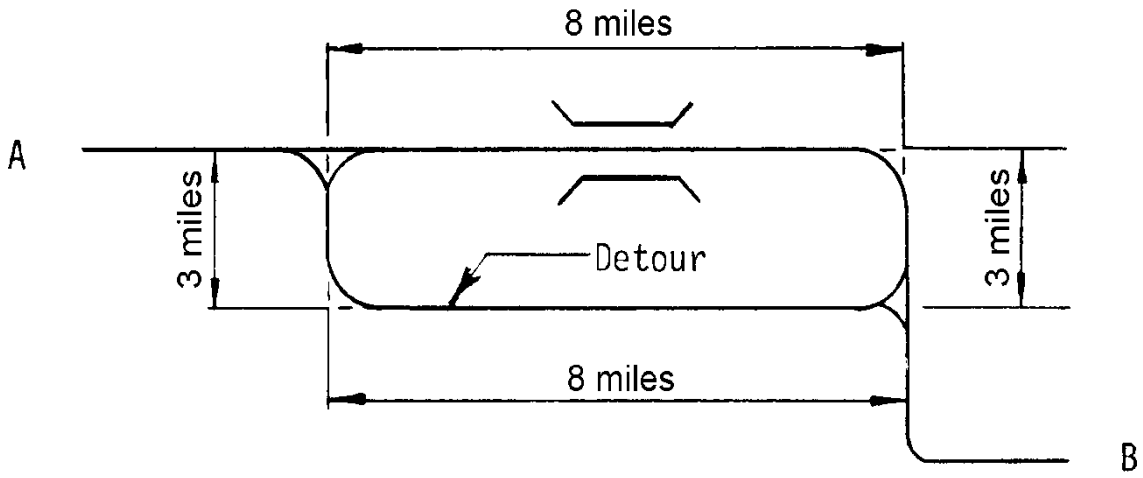
The detour route will be established following allowable criteria determined by the governing authority. (Some authorities will not allow a designated detour over a road or bridge of lesser "quality".) *Generally, in North Dakota the detour should be the same quality road.*

Examples:

Code	Item
00	Diamond interchange, structure bypassable
08	Cloverleaf, not bypassable; 8 mile detour
99	Structure over river, 121 mile detour
00	Structure over highway, no interchange, bypassable at ground level
99	Structure on dead end road
01	*Farm yard approaches*
00	*Field approaches*



Bypass, Detour Length A to B = 4 miles



Bypass, Detour Length A to B = 0 miles

Toll (Item 20) — 1 Digit

The toll status of the structure is indicated by this item. Interstate toll segments under Secretarial Agreement (Section 105 of 1978 Federal Aid Highway Act) shall be identified separately. Use one of the following codes: *While the following numbers represent the NBI coding format, Pontis allows selection directly from a dropdown box.*

Code	Description
1	Toll bridge. Tolls are paid specifically to use the structure.
2	On toll road. The structure carries a toll road; that is, tolls are paid to use the facility, which includes both the highway and the structure. *This includes bridges in parks that require an entrance fee.*
3	On free road. The structure is toll free and carries a toll free highway.
4	On Interstate toll segment under Secretarial Agreement. Structure functions as a part of the toll segment.
5	Toll bridge is a segment under Secretarial Agreement. Structure is separate agreement from highway segment.

Maintenance Responsibility (Item 21) — 2 Digits

The actual name(s) of the agency(s) responsible for the maintenance of the structure shall be recorded on the inspection form. The codes below shall be used to represent the type of agency that has primary responsibility for maintaining the structure. If more than one agency has equal maintenance responsibility, code one agency in the hierarchy of state, federal, county, city, railroad and other private. *While the following numbers represent the NBI coding format, Pontis allows selection directly from a dropdown box.*

Code	Description
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	Local Park, Forest or Reservation Agency
21	Other State Agencies
25	Other Local Agencies
26	Private (other than railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
60	Other Federal Agencies (not listed below)
62	Bureau of Indian Affairs
64	U.S. Forest Service
66	National Park Service
68	Bureau of Land Management
69	Bureau of Reclamation
70	Military Reservation/Corps of Engineers
80	Unknown

Owner (Item 22) — 2 Digits

The actual name(s) of the owner(s) of the bridge shall be recorded on the inspection form. The codes used in Item 21 - Maintenance Responsibility shall be used to represent the type of agency that is the primary owner of the structure. If more than one agency has equal ownership, code one agency in the hierarchy of state, federal, county, city, railroad and other private. *While the numbers represent the NBI coding format, Pontis allows selection directly from a dropdown box.*
Note: Use code list same as Maintenance Responsibility.

Functional Classification of Inventory Route (Item 26) 2 Digits

For the inventory route, code the functional classification using one of the following codes:
While the following numbers represent the NBI coding format, Pontis allows selection directly from a dropdown box.

Code	Description
	Rural
01	Rural Principal Arterial - Interstate
02	Rural Principal Arterial - Other
06	Rural Minor Arterial
07	Rural Major Collector
08	Rural Minor Collector
09	Rural Local
	Urban
11	Urban Principal Arterial - Interstate
12	Urban Principal Arterial - Other Freeways or Expressways
14	Urban Other Principal Arterial
16	Urban Minor Arterial
17	Urban Collector
19	Urban Local

The bridge shall be coded rural if not inside a designated urban area. The urban designation shall be determined by the bridge location and not the character of the roadway.

Year Built (Item 27) — 4 Digits

Record and code the year of construction for the structure. Code all four digits of the years in which construction of the structure was completed. If the year built is unknown, provide a best estimate. *While the following numbers represent the NBI coding format, Pontis allows input directly into an information box.* See Year Reconstructed.(Item 106)

Examples:

Construction completed — 1956

Code

| *1* | 9 | 5 | 6 |

1892

Code

| *1* | 8 | 9 | 2 |

If superstructure is replaced or if superstructure and some substructure is replaced - code as new structure under Year Built.

Lanes On and Under the Structure (Item 28) — 4 Digits

Record and code the number of lanes being carried by the structure and being crossed over by the structure.

Description	Length
Lanes on the structure	2 digits

Pontis allows for an input of the roadway under the structure. This item allows for multiple under routes so each direction can be accounted for in the coding. Under route is coded in Inventory/Roads tab

Lanes under the structure	2 digits

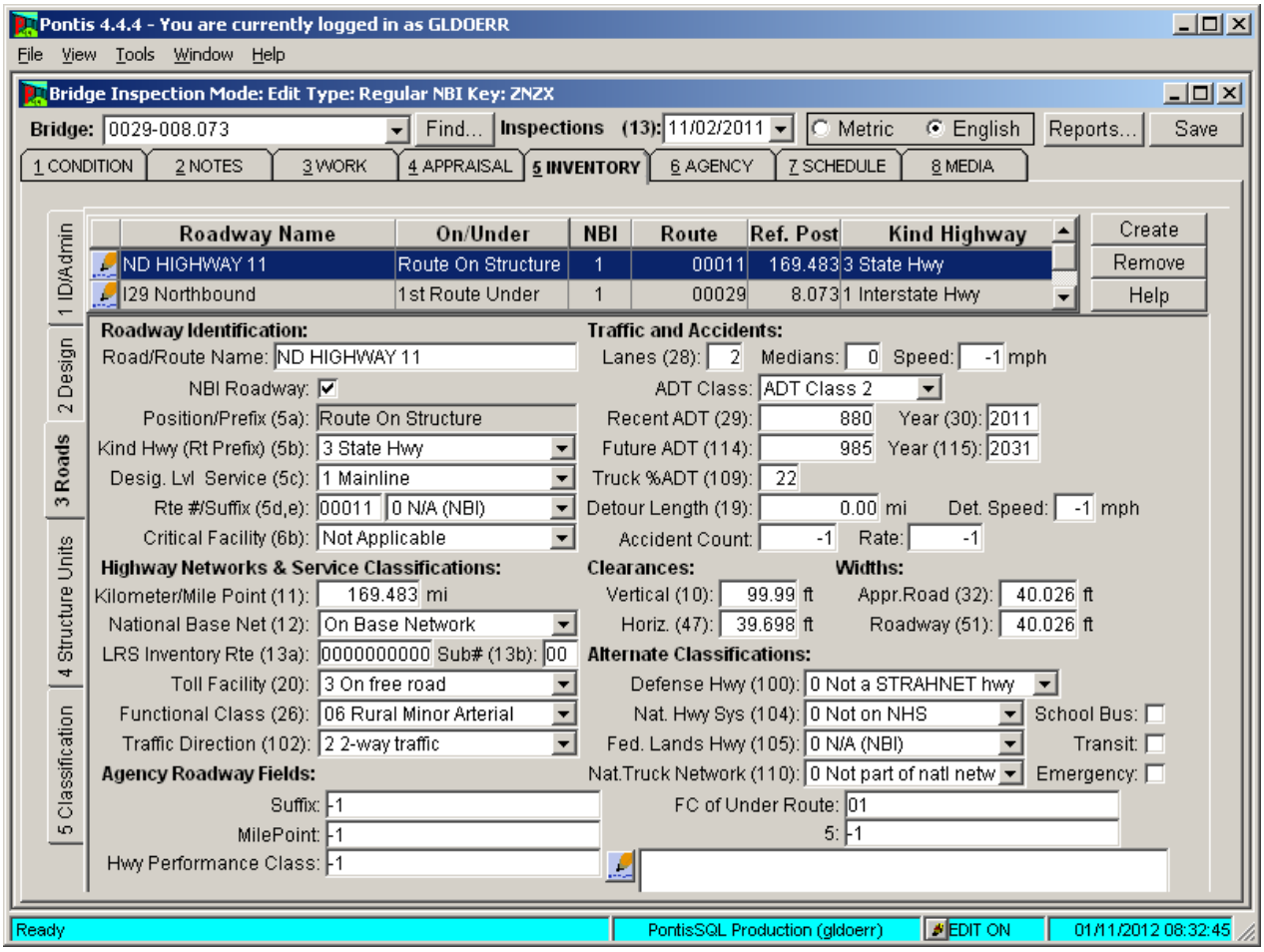
Include all lanes carrying highway traffic (i.e., cars, trucks, buses) which are striped or otherwise operated as a full width traffic lane for the entire length of the structure or under the structure by the owning/maintaining authority. This shall include any full width merge lanes and ramp lanes, and shall be independent of directionality of usage (i.e., a one lane bridge carrying two directional traffic is still considered to carry only one lane on the structure).

When the inventory route is "under" the bridge the coding of 2 or A through Z), the number of lanes can be coded for all routes in the Roads Tab.

When the inventory route is "under" the structure, the obstruction over the inventory route may be other than a highway bridge (railroad, pedestrian, pipeline, etc.). Code 00 for these cases if there are no highway lanes on the obstructing structure.

Double deck bridges may be coded as one or two structures as noted in the examples below. Either method is acceptable; however, all related data must be compatible with the method selected.

***NOTE**: Curb to curb widths less than 16' are considered one lane.*



Average Daily Traffic (Item 29)	6 Digits

One hundred (100) ADT or over will be coded by Bridge Division.

While the following information represents the NBI coding format, Pontis allows selection input directly into an information box.
Code up to a 6 digit number that shows the average daily traffic volume for the inventory route identified. Insert the ADT in the Roads Tab. The ADT coded should be the most recent ADT counts available. Included in this item are the trucks referred to in Truck % ADT (Item 109).

The ADT must be compatible with the other items coded for the bridge. For example, parallel bridges with an open median are coded as follows: if Lanes On and Under the Structure and Bridge Roadway Width, Curb to Curb are coded for each bridge separately, then the ADT must be coded for each bridge separately (not the total ADT for the route).

ADT = 5 Two or no tracks, no appreciable grade raise, little use apparent

ADT = 10 Two tracks, no appreciable grade raise, some continual use apparent

ADT = 20 Two tracks, grade raise apparent, gravel surface, continual single vehicle use

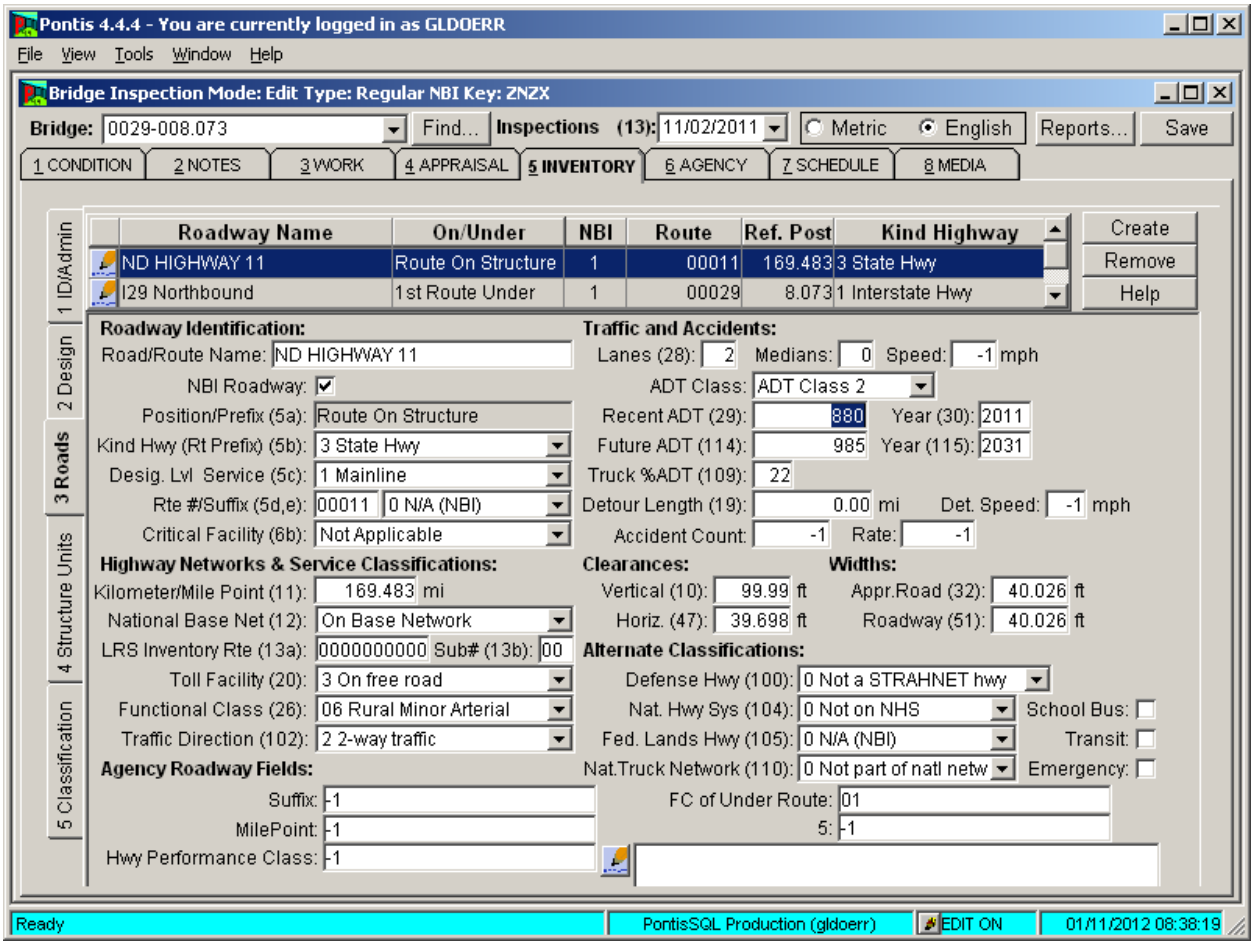
ADT = 50-100 Well graded and maintained, good gravel or paved surface, tracks indicate that 2 vehicle operation is normal

Year of Average Daily Traffic (Item 30)	4 Digits

Record the year represented by the ADT in Year (30) in the *Pontis Inventory/Roads tab)*. Code the four digits of the year so recorded.

This item will be automatically updated when the data is uploaded electronically. Initial coding will be by Bridge Division from plans or other means.

Pontis Input Screen



Design Load (Item 31) **1 Digit**

Data entry will be made by Bridge Division.

Use the dropdown menu to indicate the live load for which the structure was designed. The numerical value of the railroad loading should be recorded on the form. Classify any other loading, when feasible, using the nearest equivalent of the loadings given below.

Code	Design Load
1	H 10
2	H 15
3	HS 15
4	H 20
5	HS 20
6	HS 20+Mod
7	Pedestrian
8	Railroad
9	HS 25
0	Unknown
A	HL93
B	Greater than HL93
C	Other

Approach Roadway Width (XXX feet) (Item 32) — 3 Digits

Code, to the nearest foot, a 5 digit number that represents the normal width of the usable roadway approaching the structure measured to three decimal places. Usable roadway width will include the width of traffic lanes and the widths of shoulders where shoulders are defined as follows:

> Shoulders must be constructed and normally maintained flush with the adjacent traffic lane and must be structurally adequate for all weather and traffic conditions consistent with the facility carried.

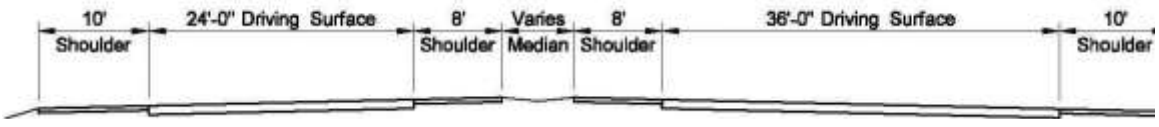
Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not to be considered a shoulder for this item.

For structures with medians of any type and double decked structures, this item should be coded as the sum of the usable roadway widths for the approach roadways (i.e., all median widths which do not qualify as shoulders should not be included in this dimension). When there is a variation between the approaches at either end of the structure, record and code the most restrictive of the approach conditions.

Example:

Item Widths					*Code*
Left Shoulder	*Left Roadway*	*Median*	*Right Roadway*	*Right Shoulder*	
4.0	*-*	*-*	*16*	*6.0*	|0|2|6|.|0|0|0|
6.0	*-*	*-*	*36*	*12.0*	|0|5|4||.|0|0|0|
12.0	*48.67*	*30*	*48*	*12.0*	|1|5|0||.|6|7|0|
10.0	*24.5*	*16*	*36*	*10.0*	|0|9|6||.|5|0|0|

The last example above represents the coding method for a structure in which most restrictive approach has the cross section shown below. *Culverts on divided highways, use the entire width, less the median width.*

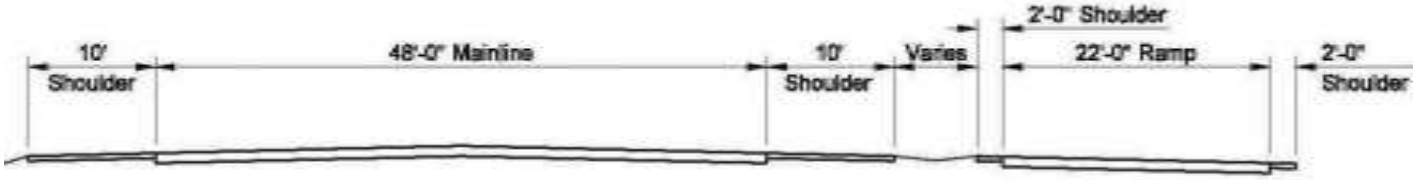


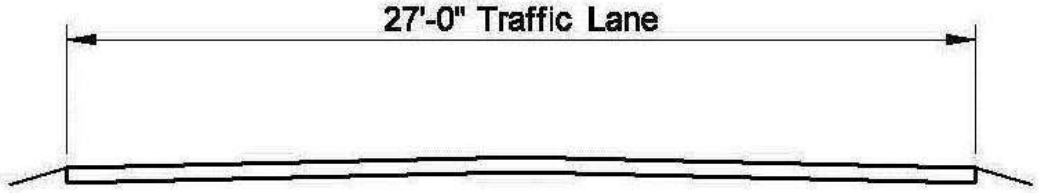
Regardless of whether the median is open or closed, the data coded must be compatible with the other related route and bridge data (i.e., if Bridge Roadway Width, Curb to Curb is for traffic in one direction only, then Lanes, Recent ADT, Approach Road, etc., must be for traffic in one direction only).

If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width. The total approach roadway width for the example below is 94 feet.

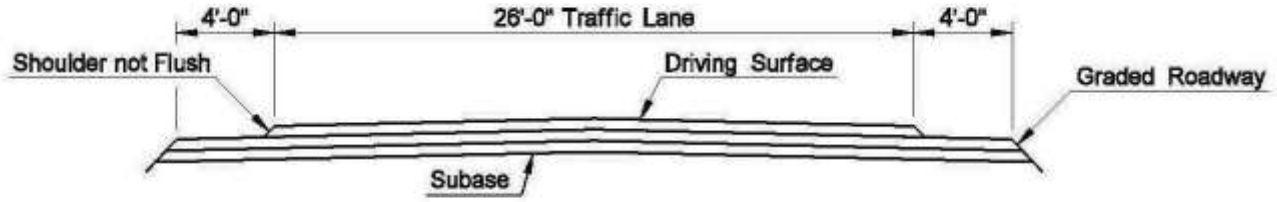
Use total of both roadways for on and under routes for a single structure. Twin structures will be separated.

If the shoulder drops more than 1" per foot, <u>do not</u> include the shoulder.





Shoulder not structurally consistent with roadway
APPROACH ROADWAY WIDTH |0|2|7|



APPROACH ROADWAY WIDTH |0|3|4|

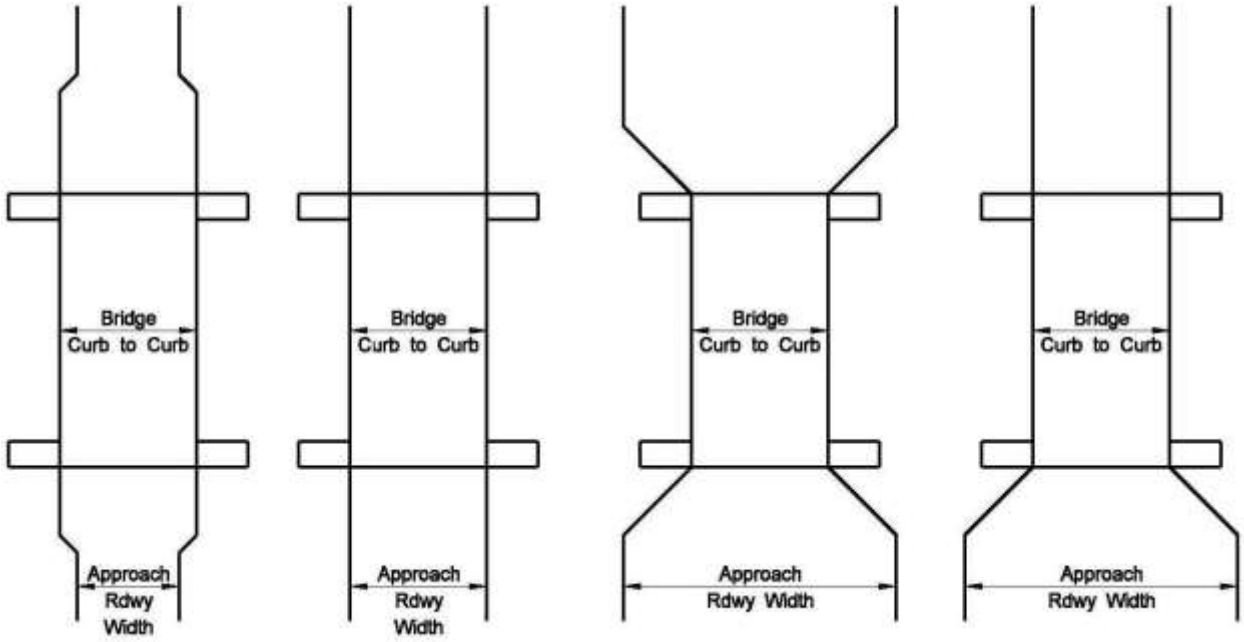
County Highways

Graded - Measure distance from grass to grass.
Ungraded - Measure distance from out to out of wheel tracks.

State Highways

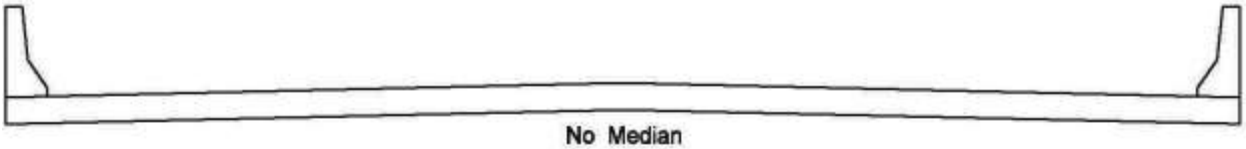
If there's grass growing on the paved shoulders, use judgment as to safety conditions.

This item is included in the calculation of sufficiency rating. It is therefore important that it be measured and coded accurately. The widest dimension should be coded where the condition varies from one end of a structure to the other. The dimension to be coded includes the shoulder of the approach roadway. It is noted that the definition of a shoulder includes the requirement that it be structurally able to support the loads using the road in all weather conditions. If this is not the case only the parts capable of supporting these loads shall be measured and coded. Pontis input is in the Inventory/Roads tab.



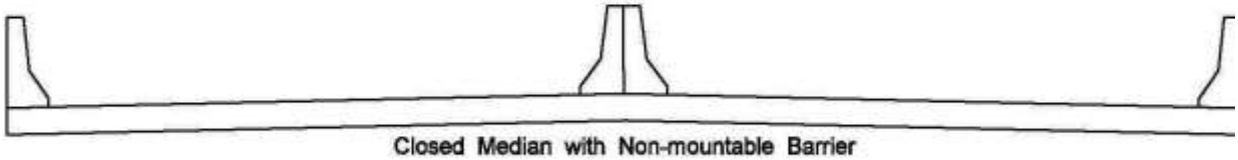
Bridge Median (Item 33)	1 Digit

Indicate in the Pontis dropdown menu on the Inventory/Design tab if the Bridge Median is non-existent, opened or closed. The median is closed when the area between the two roadways at the structure is bridged over and is capable of supporting traffic. All bridges that carry either one way traffic or two way traffic separated only by a centerline will be coded “0 No median”.

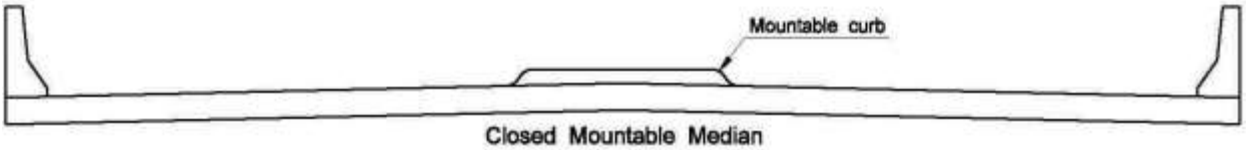


No Median

Open Median



Closed Median with Non-mountable Barrier



Closed Mountable Median

***Note**: Code "1 Open Median" for divided highway over culverts.*

Skew (XX degrees) (Item 34) **2 Digits**

The skew angle is the angle between the centerline of a pier and a line normal to the roadway centerline. When plans are available, the skew angle can be taken directly from the plans. If no plans are available, the angle is to be field measured if possible. Record the skew angle to the nearest degree. If the skew angle is 0°, it should be so coded. When the structure is on a curve or if the skew varies from some other reason, the average skew should be recorded, if reasonable. Otherwise, record a "99" to indicate a major variation in skews of substructure units. A 2 digit number should be coded in a drop down menu in the Inventory/Design tab

Structure Flared (Item 35) **1 Digit**

Code this item in the Pontis inventory/Design tab dropdown to indicate if the structure is flared (i.e., the width of the structure varies). Generally, such variances will result from ramps converging with or diverging from the through lanes on the structure, but there may be other causes. Minor flares at ends of structures should be ignored.

Options

1	Yes, flared
0	No flare
	Unknown (NBI)
P	Not applicable

Traffic Safety Features (Item 36) — 4 Digits

Bridge inspection shall include the recording of information on the following traffic safety features so that the evaluation of their adequacy can be made.

(A) Bridge railings: Some factors that affect the proper functioning of bridge railing are height, material, strength and geometric features. Railings must be capable of smoothly redirecting an impacting vehicle. Bridge railings should be evaluated using the AASHTO Standard Specifications for Highway Bridges as a guide for establishing a currently acceptable standard.

(B) Transitions: The transition from approach guardrail to bridge railing requires that the approach guardrail be firmly attached to the bridge railing. It also requires that the approach guardrail be gradually stiffened as it comes closer to the bridge railing. The ends of curbs and safety walks need to be gradually tapered out or shielded.

(C) Approach guardrail: The structural adequacy and compatibility of an approach guardrail with transition designs should be determined. Rarely does the need for a barrier stop at the end of a bridge. Thus, an approach guardrail with adequate length and structural qualities to shield motorists from the hazards at the bridge site needs to be installed. In addition to being capable of safely redirecting an impacting vehicle, the approach guardrail must also facilitate a transition to the bridge railing that will not cause snagging or pocketing of an impacting vehicle. Acceptable guardrail design suggestions are contained in the AASHTO Guide for Selecting, Locating and Designing Traffic Barriers.

(D) Approach guardrail ends: As with guardrail ends in general, the ends of approach guardrail to bridges should be flared, buried, made breakaway or shielded. Design treatment of guardrail ends is given in the AASHTO Guide for Selecting, Locating and Designing Traffic Barriers.

The data collected shall apply only to the route on the bridge.

Collision damage or deterioration of the elements are not considered when coding this item. Traffic safety features is a 4 digit code composed of four segments.

The reporting of these features shall be as follows:

Code	Item (Bridge rail, Transition, Approach Guardrail, Approach Rail Ends)
0	Substandard - Inspected feature does not meet currently acceptable standards.* Code "0" for a condition where guardrail is required and none is provided.
1	Meets Standards - Inspected feature meets currently acceptable standards.* Code "1" for a condition where guardrail is not required.
N	Not applicable.

* Until a national set of standards is approved, it shall be the responsibility of the inspecting authority to determine what are acceptable standards and what are not.

On the following pages are a series of standards that are the only acceptable standards for North Dakota bridges at the present time. Use the flow chart standards to determine coding. Pontis input is a drop down menu in the Appraisal/Other Rating tab

NBI Item	*Feature*
36A	*Bridge Railing*
36B	*Transitions*
36C	*Approach Guardrail*
36D	*Approach Guardrail Terminal*

FOR REINFORCED CONCRETE BOX CULVERTS.

Box culverts are coded in one of the following ways:

Code	*Item*
|N|N|0|0|	*No guardrail and culvert ends are within safety zone.*

| N | N | 1 | 1 | *Culvert ends are within the safety zone and adequate guardrail is provided. Culvert ends are not within the safety zone and therefore, no guardrail is required.*

Culverts do not have bridge rail or transitions therefore 36A and 36B are always coded "N".

Where culvert parapets constitute a restriction, further measurements are coded in Roadway in the Inventory/Roads Tab and Deck Width in Inventory/Design Tab

Bridge Division Commentary

This item is to be field verified, recoded as necessary, as a part of the inspection/report process. The following flow charts and detail standards can be used to code Item 36.

*Timber railings and curbs **do not** meet currently acceptable standards, except for Glu-Lam Wood Bridge Rail.*

Insert flow chart here 2 pages 72-73
Insert jersey barrier here one page 74
Insert T 101 rail here one page 75
Insert T6 rail here one page 76
Insert Double Beam Retrofit 2 paes 77-78.

	General Guardrail Details
D764-01	Beam Guardrail - General Details
	Terminal Details
D764-02	Modified Eccentric Loader Terminal
D764-02A	Diaphragm, Buffered End Section, Strut & Yolk Details
D764-02B	ET - 2000 - LET Terminal Assembly
D764-02C	Flared Energy Absorbing Terminal For Steel Breakaway System
D764-02D	Sequential Kinking Terminal
D764-02H	Slotted Rail Terminal 6 Post System
	Transitions
D764-03	W-Beam Transition To Concrete Jersey Barrier With Approach Curb
D764-03A	Thrie Beam to W-Beam Transition and Connection to Double Box Beam Retrofit
D764-03B	W-Beam Guardrail With Approaches Near Bridge For Low Volume Low Speed Roadways
D764-05	W-Beam Guardrail At Bridge End With In Place Safety Shape
	Guardrail At Bridge Ends Standards
D764-05A	Guardrail At Bridge Ends 30 mph Design Speed
D764-06	Guardrail at Bridge Ends 40 mph Design Speed
D764-06A	Guardrail At Bridge Ends 45 mph Design Speed
D764-07	Guardrail at Bridge Ends 50 mph Design Speed
D764-07A	Guardrail at Bridge Ends 55 mph Design Speed
D764-08	Guardrail at Bridge Ends 60 mph Design Speed
D764-08A	Guardrail at Bridge Ends 65 mph Design Speed
D764-09	Guardrail at Bridge Ends 70 mph Design Speed
D764-09A	Guardrail at Bridge Ends 75 mph Design Speed
D764-09B	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 30 MPH Design Speed
D764-10	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 40 MPH Design Speed
D764-10A	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 45 MPH Design Speed

D764-11	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 50 MPH Design Speed
D764-11A	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 55 MPH Design Speed
D764-12	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 60 MPH Design Speed
D764-12A	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 65 MPH Design Speed
D764-13	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 70 MPH Design Speed
D764-13A	Typical Grading at Bridge Ends With Flared W-Beam Gdrl 75 MPH Design Speed

Historical Significance (Item 37) **1 Digit**

Data entry will be made by Bridge Division.

The historical significance of a bridge involves a variety of characteristics: the bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge might be associated with a historical property or area; or historical significance could be derived from the fact the bridge was associated with significant events or circumstances. *Pontis input is a drop down menu in the Inventory/Classification Tab.*

Code	Description
1	Bridge is on the National Register of Historic Places.
2	Bridge is eligible for the National Register of Historic Places.
3	Bridge is possibly eligible for the National Register of Historic Places (requires further investigation before determination can be made) or bridge is on a State of local historic register.
4	Historical significance is not determinable at this time.
5	Bridge is not eligible for the National Register of Historic Places.

Navigation Control (Item 38) — 1 Digit

Data entry will be made by Bridge Division.

Indicate for this item whether or not navigation control (a bridge permit) is required. Use one of the following codes: *Pontis input is a drop down menu in the Appraisal/Other Rating Tab*

Code	Description
NA	Not applicable, no waterway
0	Permit Not Required - No navigation control on waterway
1	Bridge Permit Required - Navigation control on waterway

Waterways requiring permits are, the Red River of the North between Grand Forks and the Canadian border, and the Missouri River.

Navigation Vertical Clearance (XXX Feet) (Item 39) — 3 Digits

Data entry will be made by Bridge Division.

If Navigation Control Exists has been coded *Permit Required,* record in feet the minimum vertical clearance imposed at the site as measured above a datum that is specified on a navigation permit issued by a control agency. The measurement shall be coded as a number to the nearest thousandths of a foot. This measurement will show the clearance that is allowable for navigational purposes. In the case of a swing or bascule bridge, the vertical clearance shall be measured with the bridge in the closed position (i.e., open to vehicular traffic). The vertical clearance of a vertical lift bridge shall be measured with the bridge in the raised or open position. Also, Minimum Navigation Vertical Clearance Vertical Lift Bridge shall be coded to provide clearance in a closed position. If Navigation Control Exists has been coded NA or Permit Not Required, codeNav Vertical Clr as 0 to indicate not applicable. Pontis input is an information box in the Appraisal/Other Rating Tab

Navigation Horizontal Clearance (XXXX Feet) (Item 40) 4 Digits

Data entry will be made by Bridge Division.

If Navigation Control Exists has been coded “Permit Required”, record for this item the minimum horizontal clearance in feet. This measurement should be that shown on the navigation permit and may be less than the structure allows. If a navigation permit is required but not available, use the minimum horizontal clearance between fenders, if any, or the clear distance between piers or bents. The measurement shall be coded as a number to the nearest thousandths of a foot. Code 0 if Navigation Control Exists is coded “NA or Permit Not Required”.

Pontis input is an information box in the Appraisal/Other Rating Tab

Structure Open, Posted or Closed to Traffic (Item 41) 1 Digit

This item **"Open/Posted/Closed"** provides information about the actual operational status of a structure. The field review could show that a structure is posted, but Posting, may indicate that posting is not required. This is possible and acceptable coding since Posting 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:
Pontis input is a dropdown box in the Appraisal/Other Rating Tab

Inspection of closed bridges is not necessary, but verification of closure is required.

Date of verification shall be noted in the Notes*.*

Code	Description
A	Open, no restriction (code Open if No Posting Required in Posting (item 70) even if there is a posting sign on site
B	Open, posting recommended but not legally implemented (all signs not in place) *Structure must be posted at both ends and Posting must indicate that Posting is Required.*
D	Open, would be posted or closed except for temporary shoring, etc., to allow for unrestricted traffic
E	Open, temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation
G	New structure not yet open to traffic
K	Bridge closed to all traffic
P	Posted for load (may include other restrictions)
R	Posted for other load-capacity restriction (speed, number of vehicles on bridge, etc.)

NOTE: If the structure is posted "Posting in Tons", and one of the signs is down or if the operating rating is less than 36 tons and the structure is not posted, then Open/Posted/Closed shall be coded "B" and a comment shall be made in Notes.

Open/Posted/Closed continued.

For new structures, Bridge Division codes a "G" prior to the bridge being opened. If the structure is open to traffic, change the code to "A" or another appropriate code.

Temporary Structures

The owner may replace a structure with a temporary structure and request the old structure be kept on file. The file will be kept for five (5) years, at that time it will be removed, unless the temporary structure meets the requirements for a major structure. This structure will then be coded and will replace the previous structure.

Closed Structures

These structures will be on file for five (5) years after closure. After five years Bridge Division works with Local Government to remove these structures from the inventory. If the owner requests the structure be left on the inventory, the owner must repair the structure to put it back into service.

Type Service (Item 42) — 2 Digits

The type of service on the bridge and under the bridge is indicated by a 2 digit code composed of two segments. *Pontis input is a dropdown box in the Inventory/ID/Admin Tab.*

Segment	Description	Length
42A	Type of service on bridge	1 digit
42B	Type of service under bridge	1 digit

The first digit indicates the type of service "on" the bridge and shall be coded using one of the following codes:

Code	Description	|X| | (1st digit)
1	Highway	
2	Railroad	
3	Pedestrian exclusively	
4	Highway-railroad	
5	Highway-pedestrian	
6	Overpass structure at an interchange or second level of a multi-level interchange	
7	Third level (Interchange)	
8	Fourth level (Interchange)	
9	Building or plaza	
0	Other	

The second digit indicates the type of service "under" the bridge and shall be coded using one of the following codes:

\| \|X\| (2nd digit)

Code	Description
1	Highway, with or without pedestrian
2	Railroad
3	Pedestrian exclusively
4	Highway-railroad
5	Waterway
6	Highway-waterway
7	Railroad-waterway
8	Highway-waterway-railroad
9	Relief for waterway
0	Other

Structure Type, Main (Item 43) — 3 Digits

Record the structure in the Pontis dropdown in the Inventory/Design tab and indicate the type of structure for the main span(s).

Description

Kind of material and/or design
Type of design and/or construction

The first dropdown indicates the kind of material and/or design and shall be coded using one of the following codes:

	Description Code
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestress concrete
6	Prestress concrete continuous
7	Timber
8	Masonry
9	Aluminum, Wrought Iron or Cast Iron
0	Other

The second dropdown codes the predominant type of design and/or type of construction and shall be coded one of the following:

	Description Code
01	Slab
02	Stringer/Multi-beam or girder
03	Girder and Floorbeam System
04	Tee Beam
05	Box Beam or Girders - Multiple
06	Box Beam or Girders - Single or Spread
07	Frame
08	Orthotropic
09	Truss - Deck
10	Truss - Thru
11	Arch - Deck
12	Arch - Thru

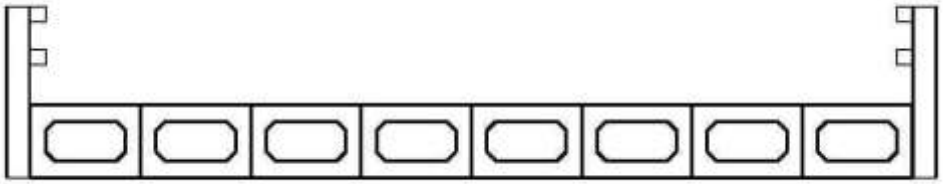
	Description Code
13	Suspension
14	Stayed Girder
15	Movable - Lift
16	Movable - Bascule
17	Movable - Swing
18	Tunnel
19	Culvert
20*	Mixed Types
21	Segmental Box Girder
22	Channel Beam
00	Other

* Applicable only to Approach Spans (Item 44)

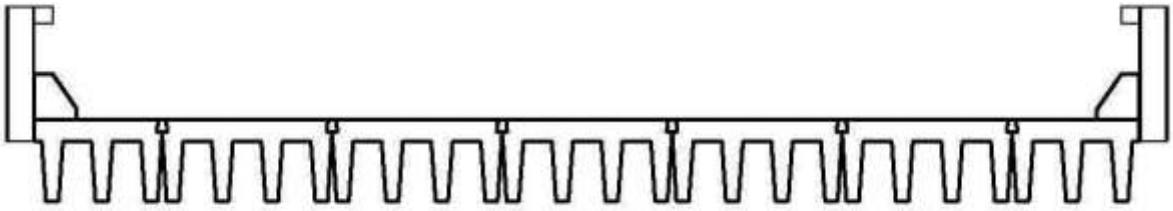
Note: *Codes 08, 11, 13, 14, 15, 16, 17, 18, and 21 are not applicable to North Dakota.*

Examples:	*Code*
Timber Laminated Deck	*7 0 1*
Timber Stringer	*7 0 2*
Reinforced Concrete Box Culvert	*1 1 9*
Steel Stringer	*3 0 2*
Continuous Concrete Multiple Box Girders	*2 0 5*
Simple Span Concrete Slab	*1 0 1*
Prestressed Concrete I-Beam Continuous	*6 0 2*
Adjacent Concrete Box Beam	*1 0 5*
Concrete Channel Beam	*1 2 2*
Structural Plate Pipe	*3 1 9*

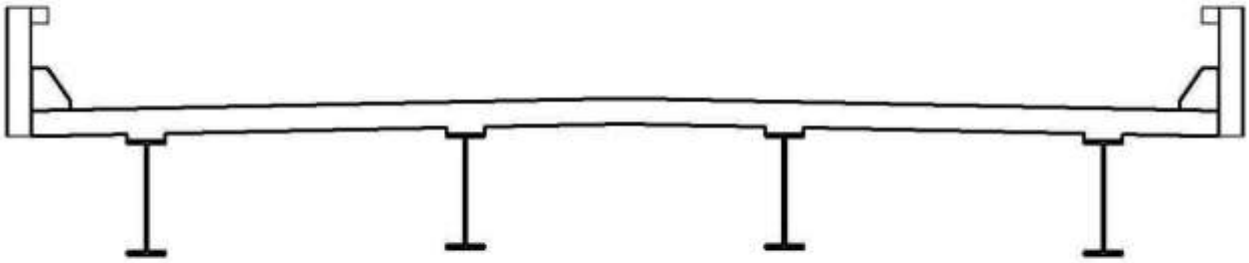
On the following pages are examples of some common structures.



Adjacent Concrete Box Beam coded as *|5|0|5|*
**** No Deck ****

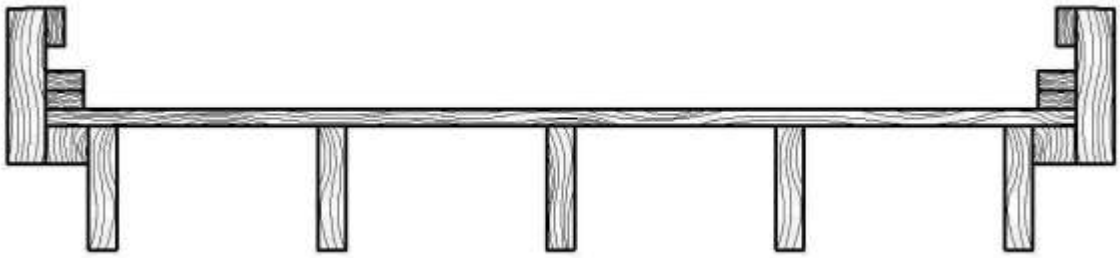


Quad-Tee Beam coded as *|5|0|4|*
**** No Deck ****



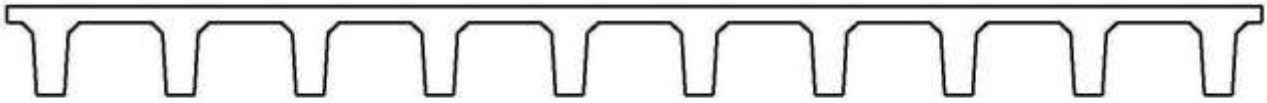
Steel Girder coded as *|3|0|2|*

Steel Girder Continuous coded as *|4|0|2|*

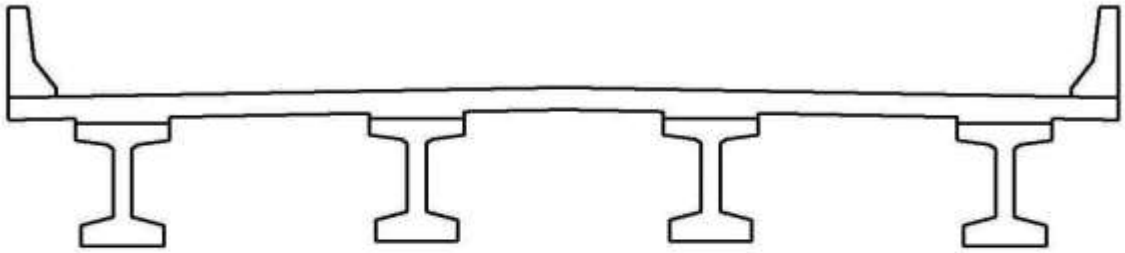


Timber Beam coded as *|7|0|2|* ****

Channel Beam coded as *|1|2|2|* **
**** No Deck ****

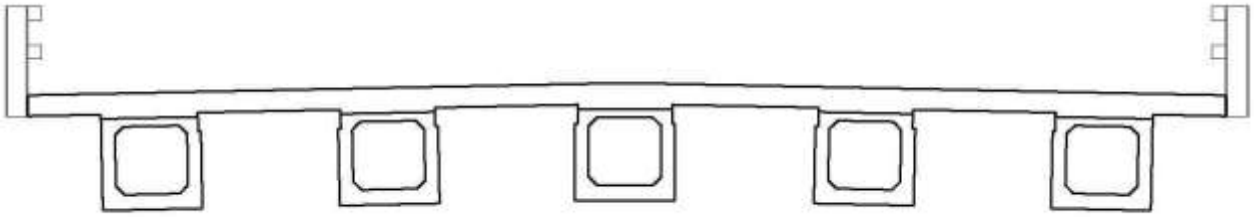


Concrete Tee Beam coded as *|1|0|4|*
Concrete Tee Beam Continuous coded as *|2|0|4|*



Prestressed Concrete I-Beam coded as *|5|0|2|*

Prestressed Concrete I-Beam Continuous coded as *|6|0|2|*



Prestressed Spread Box Beam coded as *|5|0|6|*

Prestressed Spread Box Beam Continuous coded as *|6|0|6|*

Structure Type, Approach Spans (Item 44) — 3 Digits

Record the structure in the Pontis Inventory/Design Tab dropdown in the Inventory/Design tab and indicate the type of structure for the Approach Span(s). The codes are the same as for Structure Type Main. Pontis will not let you code these items if Number of Approach Spans is set to 0. Use Mixed Type when no one type of design and/or construction is predominant for Approach Spans. If the kind of material Approach Span Material is varied, code the most predominant

Description

Kind of material and/or design
Type of design and/or construction

Examples:

Approach Span

Simple prestress concrete I-beam

Continuous concrete T-beam

Continuous deck truss

Timber material - varied stringer sizes

Mixed timber and steel stringers
(predominantly steel)*

** Additional description in REMARKS or a supplementary sketch by the on-site inspector is warranted when the structure type is mixed or is otherwise unusual. Details are necessary for Bridge Division computation of inventory and operating loads.*

Bridge Division Commentary

Bridges may have a different type of structure in the approach spans than in the main spans. This must be accurately inspected and appraised. This may control the Bridge Division's computation for load ratings.

Number of Spans in Main Unit (Item 45)	3 Digits

Record the number in the input box in the Inventory/Design Tab. This item will include all spans of most bridges, the major unit only of a sizeable structure, or a unit of material or design different from that of the approach spans.

Number of Approach Spans (Item 46)	4 Digits

Record the number of spans in the approach spans to the major bridge in the input box in the Inventory/Design Tab, or the number of spans of material different from that of the major bridge.

Total Horizontal Clearance (XX.X feet) (Item 47)	3 Digits

The total horizontal clearance for the route identified in Inventory Route information should be measured and recorded to supply information that meets reporting requirements of FAPG, 23 CFR 666. The clearance should be the available clearance measured between the most restrictive features; curbs, rails, walls or other structural features limiting the roadway (surface and shoulders). The measurement should be recorded and input in the input box in the Inventory/Roads Tab.

The purpose of this item is to give the available clearance for the movement of wide loads. This clearance has been identified in three ways; use the most applicable:

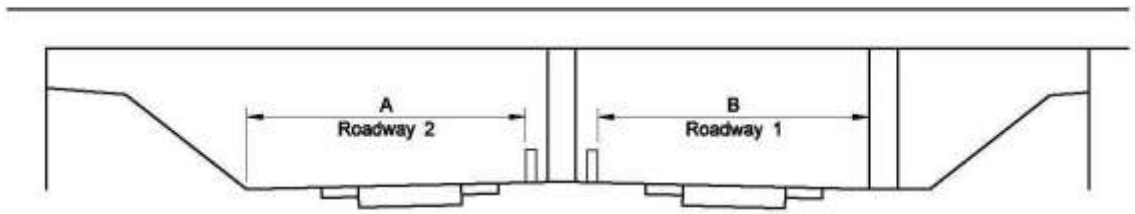
1. Roadway surface and shoulders - when there is no restrictions.
2. Clear distance between restrictions of the inventory route either "on" or "under" the structure.
3. Include flush or mountable medians (Bridge Median coded closed median w/o barriers) but not raised medians (closed median w/barriers). For a raised or nonmountable median record, the greater the restricted widths in either direction, not both directions.

Bridge Division Commentary

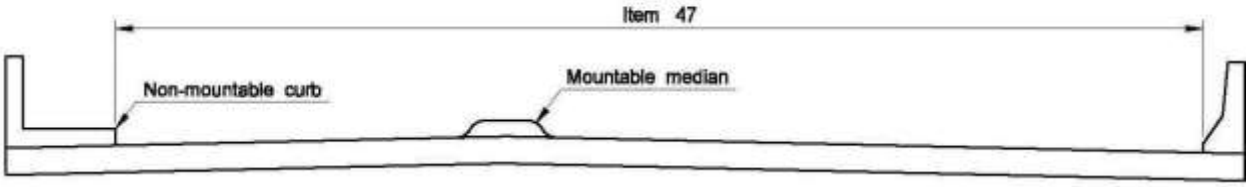
This measurement represents the most restrictive clearance between bridge rails or truss members. If no rails are present, use the deck width dimension found in Deck Width.

Horizontal underclearances should be coded in the Inventory/Roads Tab in the appropriate Route Under page. The example below shows a first route under and second route under. Each should have the clearances coded in appropriate pages.

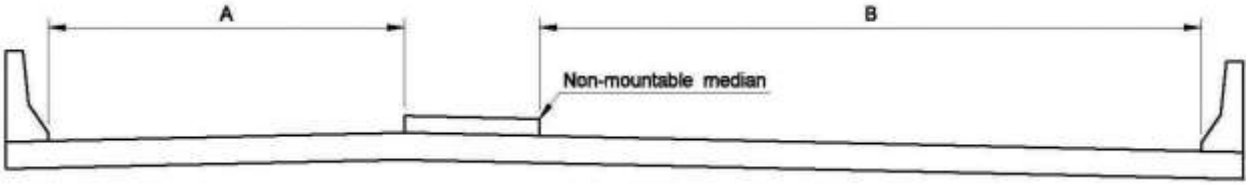
Examples:



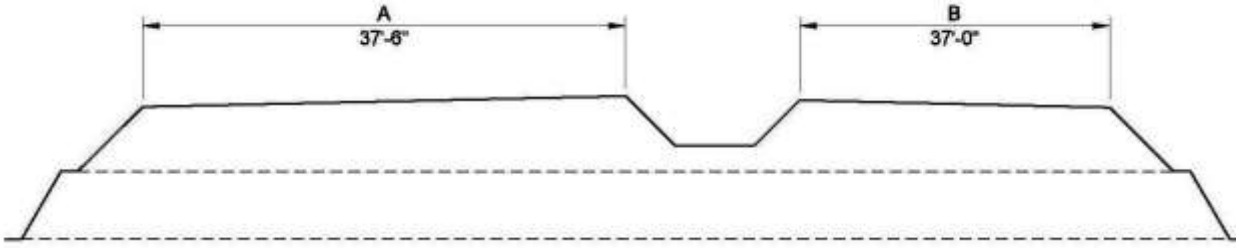
Looking up station (north or east), Roadway 1 is "first route under", code B as horizontal clearance for first route under. Code A as horizontal clearance in "second route under."



No Median or Flush or Mountable Median



If B > A, Code Horizontal Clearance = B



Horizontal Clearance for culverts under both roadways
If A > B code Horizontal Clearance = A

Maximum Span Length (feet) (Item 48)	4 Digits

The length of the maximum span shall be recorded. It shall be noted whether the measurement is center to center or clear open distance between piers, bents or abutments. The measurement shall be along centerline of bridge. This item can be coded to one thousandths of a foot.

*This measurement shall be clear open distance between piers, bents or abutments. Culvert spans must be coded. This item **determines the eligibility** of the structure for Federal Aid Funding. FHWA states that a single span structure shall be measured at 20' clear span. Over 20' round to 21', over 21' round to nearest foot. A span of **19.99' is not 20'**, code as 19.99'.*

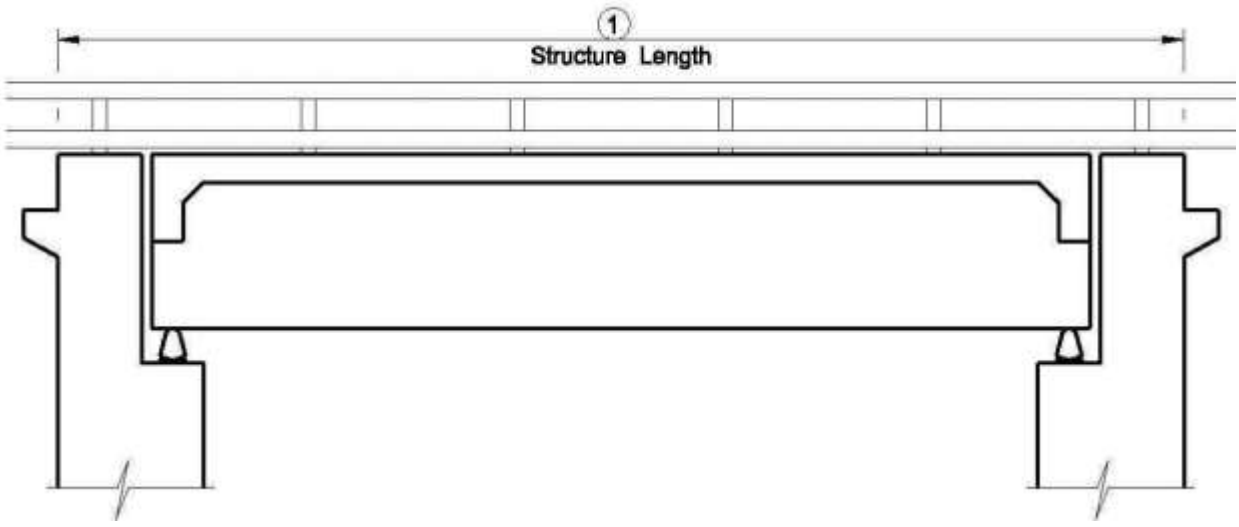
Pontis input is an input box in the Inventory/Design Tab that can be coded to the thousandths of a foot.

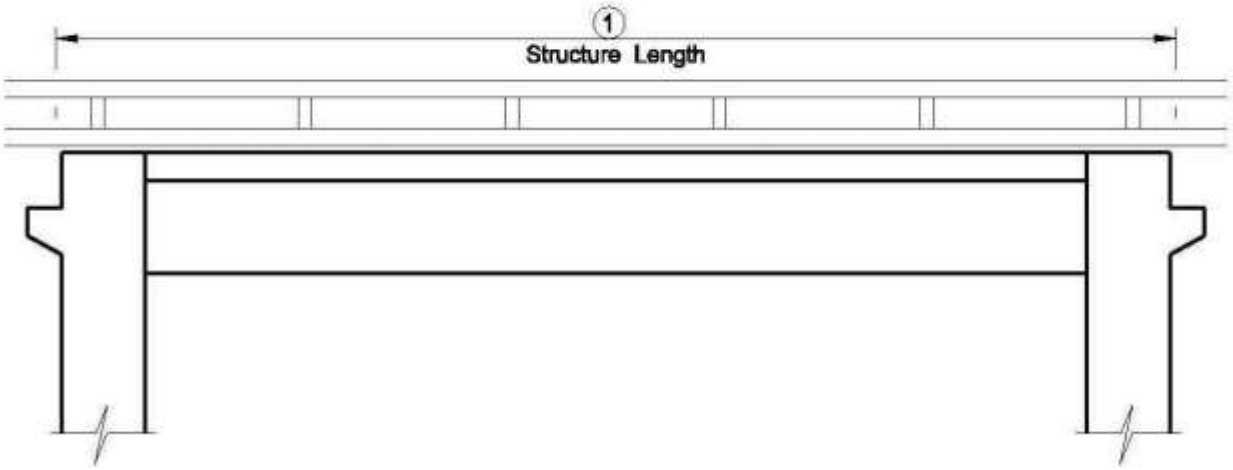
Item 49 - Structure Length (XXXXXX feet)	6 Digits

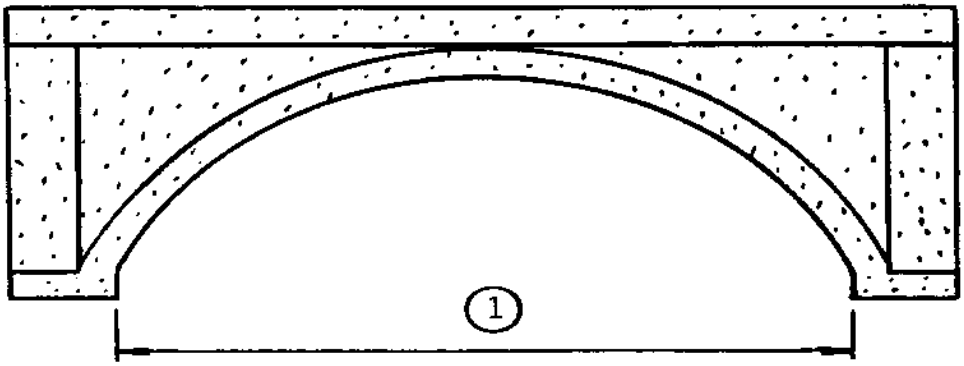
Record and code the number to represent the length of the structure to one thousandths of a foot. This shall be the length of roadway which is supported on the bridge structure. The length should be measured face to face of backwalls or abutments.

Culvert lengths should be measured along the centerline of roadway regardless of their depth below grade. Measurement should be made between inside faces of exterior walls.

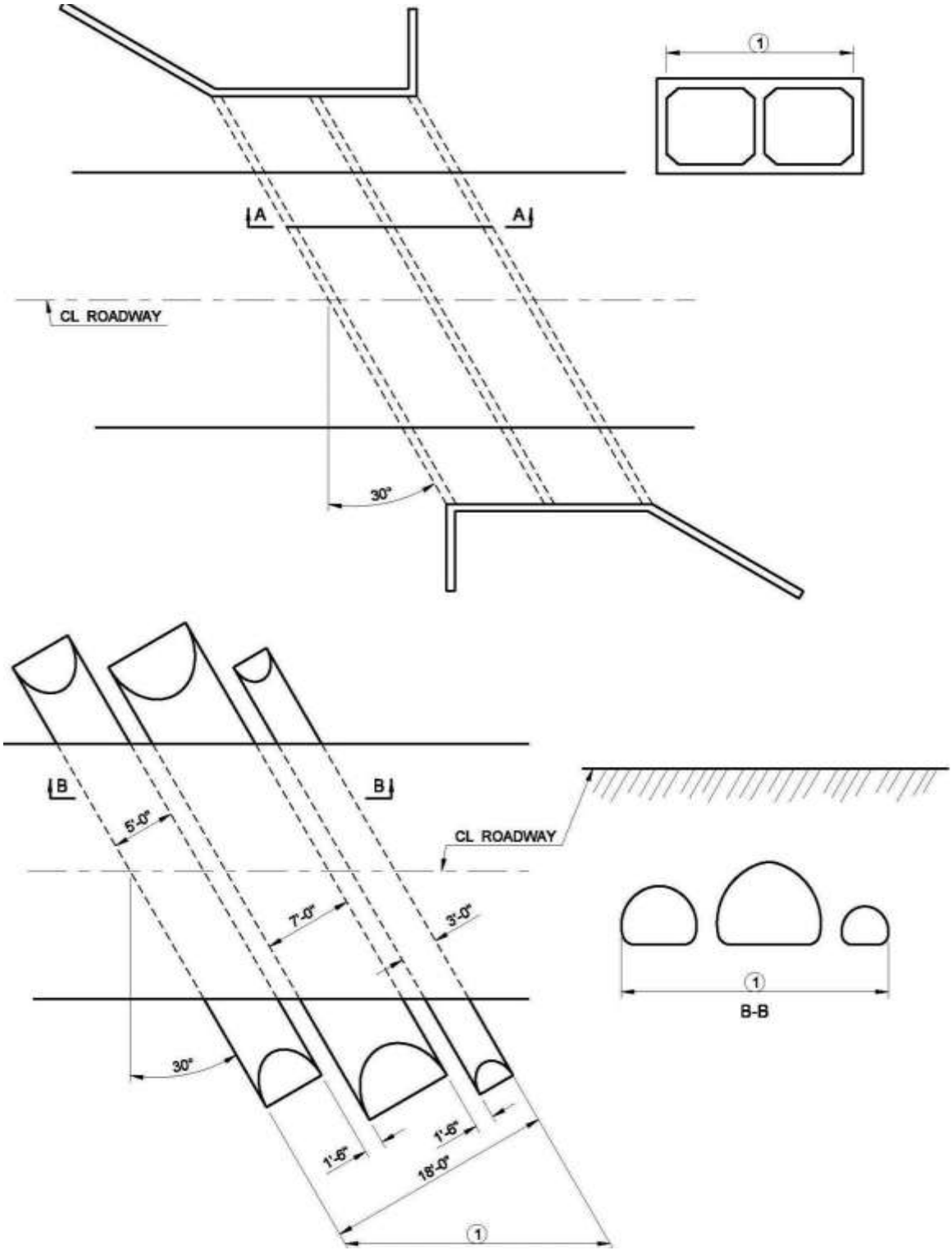
Pontis input is an input box in the Inventory/Design Tab that can be coded to the thousandths of a foot.







Structure Length = 1



Item 49 - Structure Length = $\frac{18}{\text{COS } 30^{o}}$ = 20.78'

Curb or Sidewalk Widths (Item 50) — 6 Digits

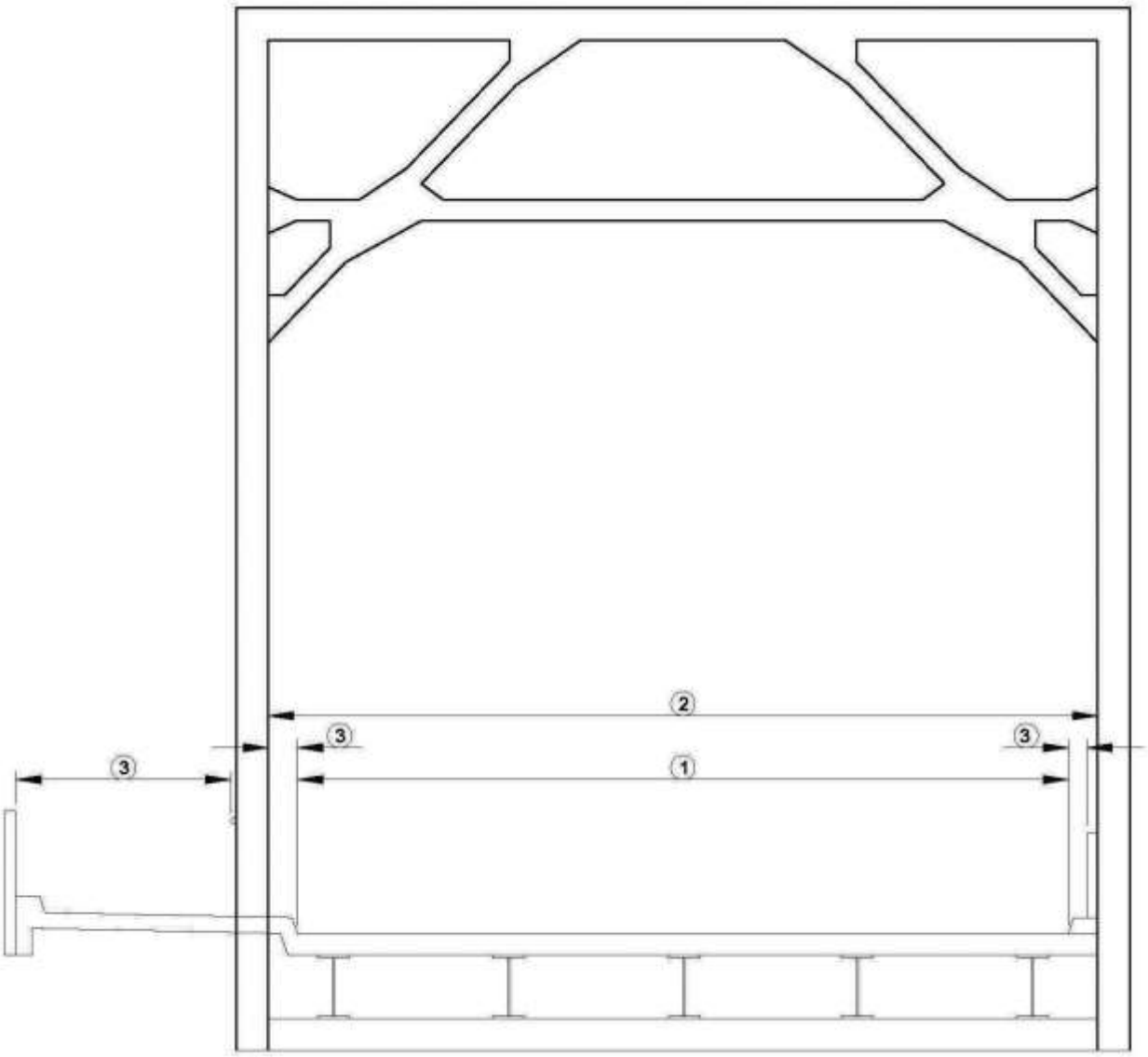
Record numbers to represent the widths of the left and right curb or sidewalks in the Inventory/Design Tab. "Left" and "Right" should be determined on the basis of direction of inventory.

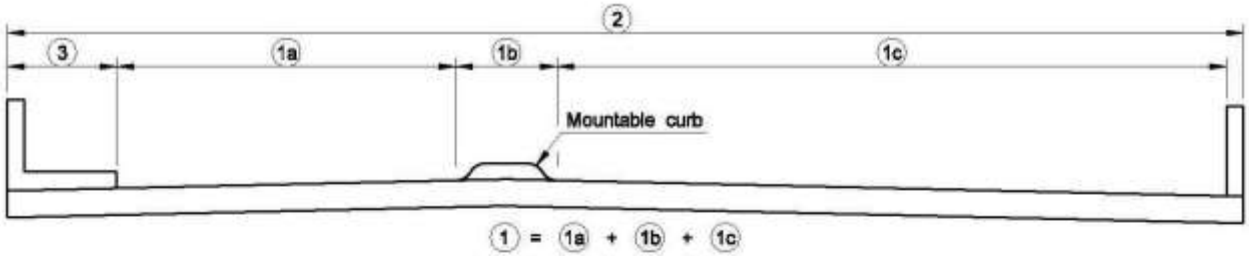
Jersey Barriers or similar types are not considered curbs.

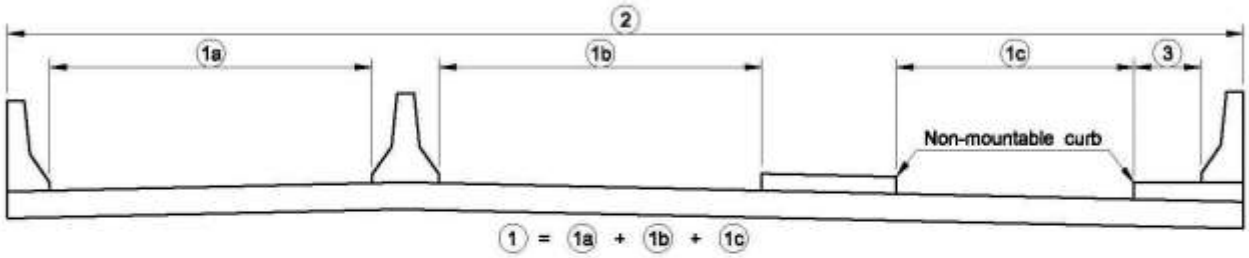
For county structures, left and right are determined by the following, for direction of traffic:

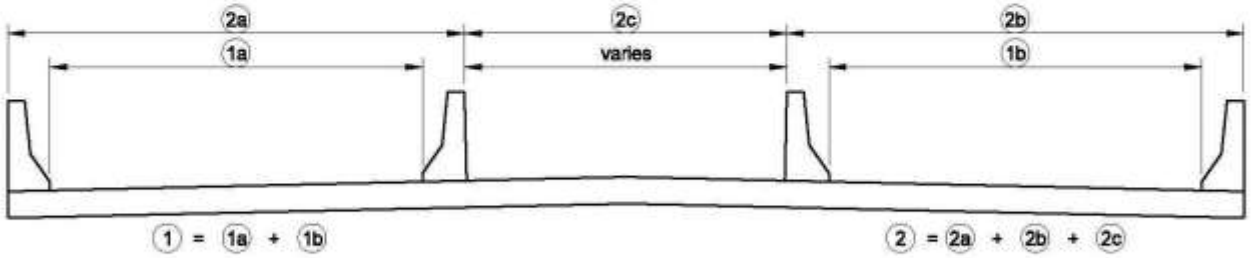
South to North - the west curb is left; the east curb is right
West to East - the north curb is left; the south curb is right

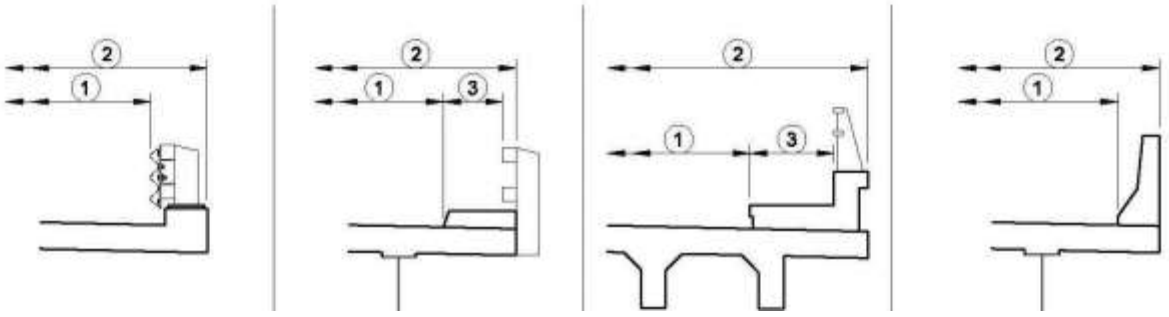
1 Bridge Roadway Width,
Curb-to-Curb
2 Deck Width, Out-to-Out
3 Curb or Sidewalk Width











1 Bridge Roadway width, Curb-to-Curb
2 Deck Width, Out-to-Out
3 Curb or Sidewalk Width

Bridge Roadway Widths – Curb to Curb (Item 51) — 4 Digits

The information to be recorded is the most restrictive minimum distance between curbs or rails on the structure roadway. For the structures with closed medians and usually for double decked structures, coded data will be the sum of the most restrictive minimum distances for all roadways carried by the structure*. The data recorded for this item must be compatible with other related route and bridge data (i.e., Sum of Lanes under, ADT, Approach Roadway Width, etc.). The measurement should be exclusive of flared areas for ramps. The number should be used to represent the distance to the nearest tenth of a foot (with assumed decimal points). See examples on pages 99 and 100.

Where traffic runs directly on the top slab (or wearing surface) of the culvert type structure, e.g., a R/C box without fill, code the actual roadway width (curb to curb or rail to rail). This will also apply where the fill is minimal and headwalls or parapets affect the flow of traffic.

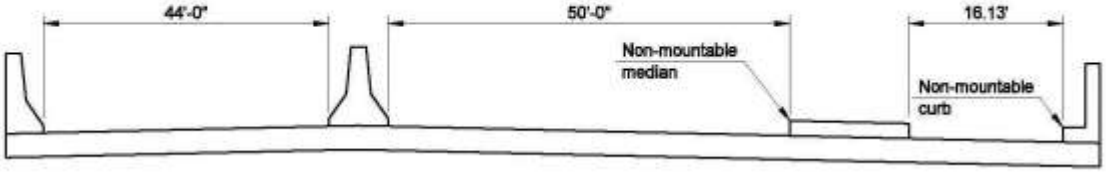
Where the roadway is on fill carried across a structure and the headwalls or parapets do not affect the flow of traffic, code 0000. This is considered proper inasmuch as a filled section simply maintains the roadway cross section.

* Raised or non-mountable medians, open medians and barrier widths are to be excluded from the summation along with barrier protected bicycles and equestrian lanes.

NOTE: *Curbs or medians 6" in height or less and with non-vertical faces are considered to be mountable.*

Examples:		Code
Bridge Roadway Width	36.00' wide	|0|3|6|0|
	66.37' wide	|0|6|6|4|
	110.13' wide	|1|1|0|1|

The last example above would be the coded value for the deck section shown below.



Deck Width, Out to Out (XXX.X feet) (Item 52) 4 Digits

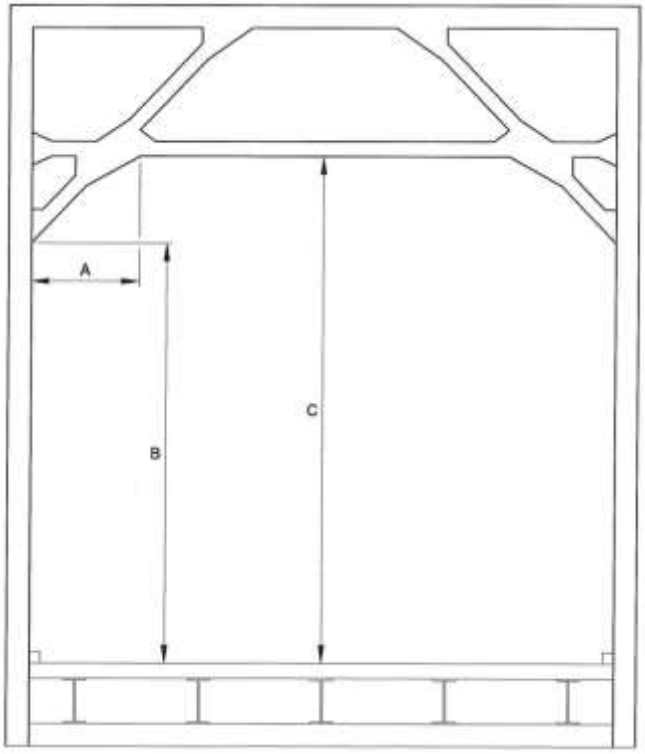
Record a number to show the out to out width in the window in Deck Width under the Inventory/Design tab. If the structure is a through structure, the number to be coded will represent the lateral clearance between superstructure members. The measurement should be exclusive of flared areas for ramps. See examples on pages 99 and 100.

Where traffic runs directly on the top slab (or wearing surface) of the culvert, e.g., a R/C box without fill, code the actual width (out to out). This will also apply where the fill is minimal and the culvert headwalls affect the flow of traffic.

Where the roadway is on a fill carried across a pipe or box culvert and the culvert headwalls do not affect the flow of traffic, code 0000. This is considered proper inasmuch as a filled section over a culvert simply maintains the roadway cross section.

Minimum Vertical Clearance Over Bridge Roadway
(XX.XXX feet) (Item 53) **4 Digits**

The information to be recorded for this item is the actual minimum vertical clearance over the bridge roadway, including shoulders to any superstructure restriction measured to the thousandth of a foot. When no superstructure restriction exists above the bridge roadway, code 9999. When a restriction is 100 feet or greater, code 9912.



Example:

Record distance from roadway to the lowest restriction.

Minimum Vertical Underclearance (Description and XX.XXX feet) (Item 54)	5 Digits

Using a dropdown menu from the Appraisal/Other Ratings tab, record the under Reference and the minimum vertical clearance from the roadway or railroad track beneath the structure to the underside of the superstructure. (When both a railroad and highway are under the structure, code the most critical dimension.)

Description
Reference feature
Minimum Vertical Underclearance

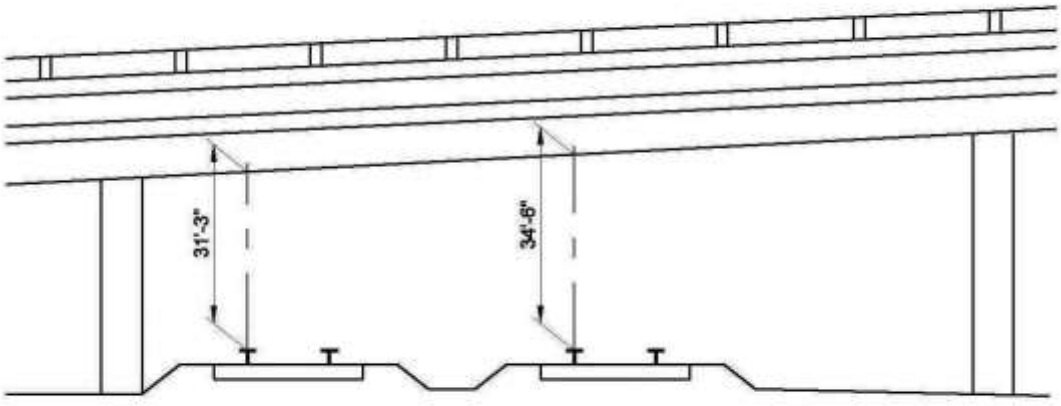
Using one of the descriptions below, use the dropdown menu to identify the reference feature from which the clearance measurement is taken:

	Description
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad

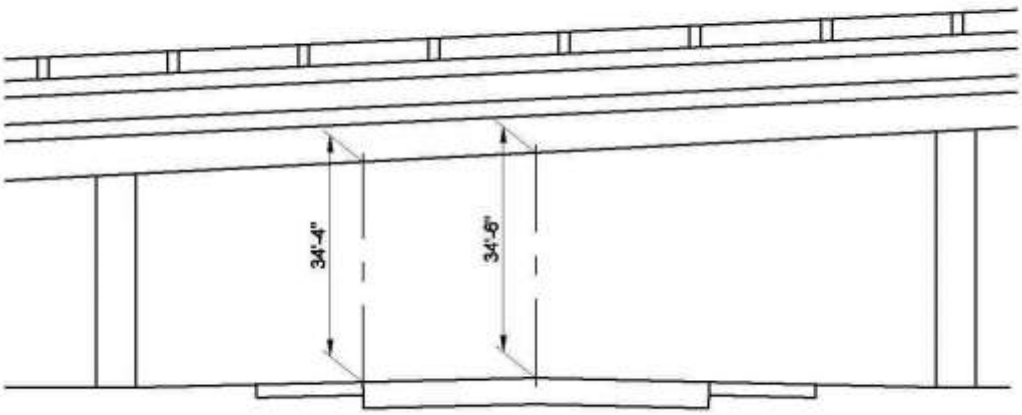
In the Under Clearance box, enter the number to represent the minimum vertical clearance from that feature to the structure. If the feature is not a highway or railroad, code the minimum vertical clearance 0.

Examples:

River beneath structure Code = N Feature not a highway or railroad



Railroad 31'-3" beneath structure



Highway 34'-4" beneath structure

Pontis 4.4.4 - You are currently logged in as GLDOERR

File View Tools Window Help

Bridge Inspection Mode: Edit Type: Regular NBI Key: UJZZ

Bridge: 0029-163.699 Find... Inspections (14): 08/18/2011 Metric English Reports... Save

1 CONDITION | 2 NOTES | 3 WORK | 4 APPRAISAL | 5 INVENTORY | 6 AGENCY | 7 SCHEDULE | 8 MEDIA

1 Other Ratings | 2 Load Ratings

Structure Appraisal:

Open/Posted/Closed (41):	A Open, no restriction
Approach Alignment (72):	7 Above Min Criteria
Bridge Railings (36a):	0 Substandard
Transitions (36b):	1 Meets Standards
Approach Guardrail (36c):	1 Meets Standards
Appr Guardrail Ends (36d):	1 Meets Standards
Pier Protection (111):	Unknown (NBI)
Scour Critical (113):	N Not Over Waterway

NBI Appraisal Ratings - calculated:

Structural Eval (67):	7 Above Min Criteria
Deck Geometry (68):	7 Above Min Criteria
Underclearances (69):	5 Above Tolerable
SD / FO Status:	Not Deficient
Sufficiency Rating:	99.0
Health Index:	97.6

Minimum Vertical Clearances:

Over Structure (53):	99.900 ft
Under (Reference) (54a):	H Hwy beneath struct
Under Clearance (54b):	16.142 ft

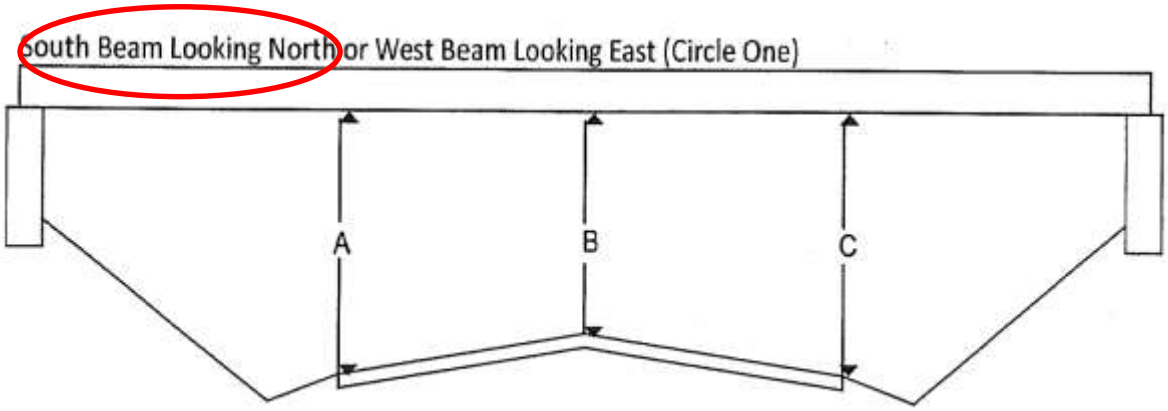
Minimum Lateral Underclearance:

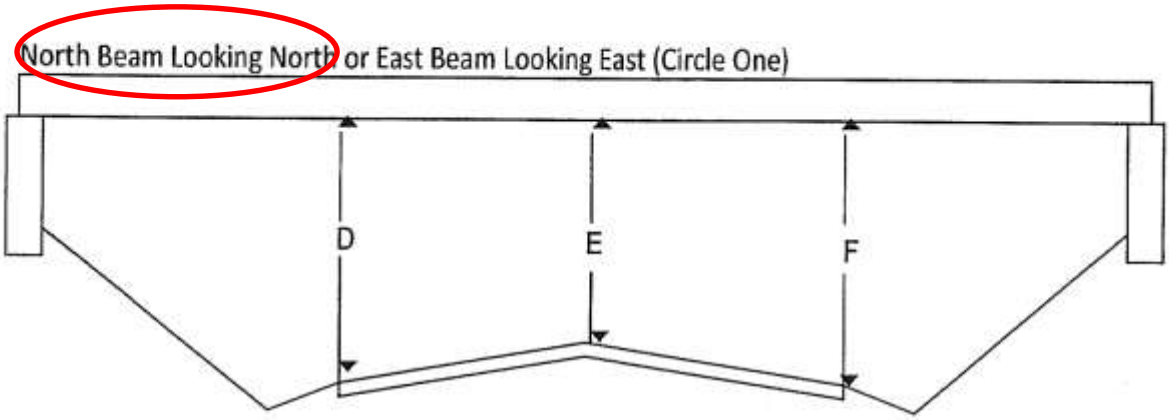
Reference Feature (55a):	H Hwy beneath struct
Right Side (55b):	16.076 ft
Left Side (56):	38.714 ft

Navigation Data:

Navigation Control Exists (38):	NA-no waterway
Nav Vertical Clr (39):	0 ft
Nav Horizontal Clr (40):	0.000 ft
Min Vert Lift Clr (116):	-1 ft

Ready

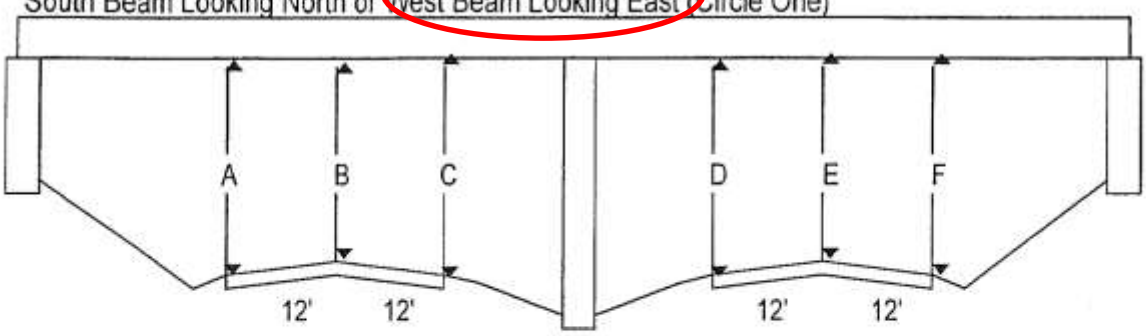




A	B	C	D	E	F
16’-5”	16’-6”	16’-4”	16’-4”	16’-5”	16’-3”

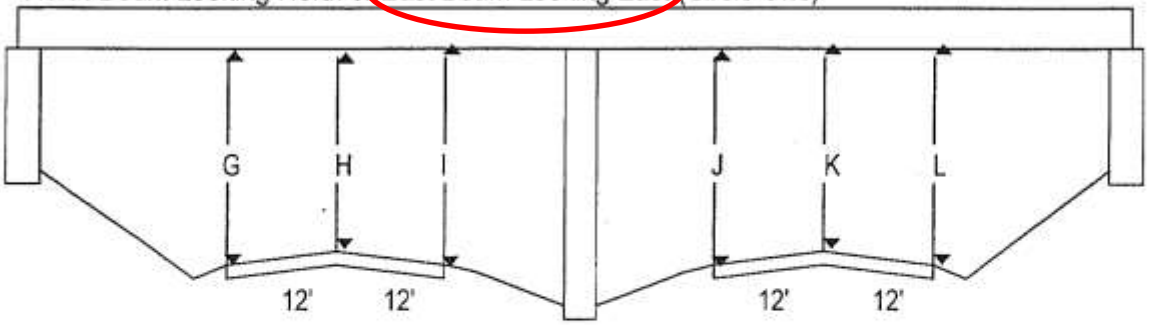
Code Minimum Vertical Underclearance = 16.25’

South Beam Looking North or West Beam Looking East (Circle One)



A	B	C	D	E	F
16'-8	16'-8"	16'-9"	16'-11"	16'-9"	16'-10"

North Beam Looking North or East Beam Looking East (Circle One)



G	H	I	J	K	L
16'-9"	16'-9"	16'-11"	17'-0"	16'-10"	16'-10"

Code Minimum Vertical Underclearance = 16.25'

Minimum Lateral Underclearance on Right (Description and XX.XXX feet) (Item 55)	**4 Digits**

Using a input box from the Appraisal/Other Ratings tab, record and code the minimum lateral underclearance on the right to the nearest one thousandth of a foot. When both a railroad and highway are under the structure, code the most critical dimension.

Description

Reference Feature
Minimum Lateral Underclearance dimension

Using one of the descriptions below, use the dropdown menu to identify the reference feature from which the clearance measurement is taken:

	Description
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad

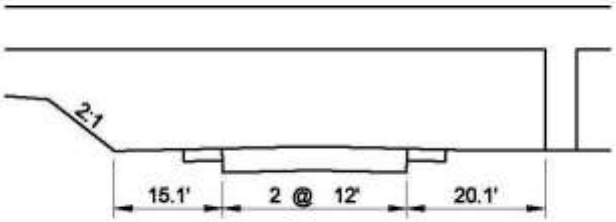
In the Right Side box, enter the number to represent the minimum lateral clearance from that feature to the structure on the right side of the feature. If the feature is not a highway or railroad, code the minimum vertical clearance 0.

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 (W-Beam guardrail is not a rigid barrier), or to the toe of slope steeper than 3 to 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 dual highway, this would mean the outside clearances of both roadways should be measured and the smaller distance recorded and coded.

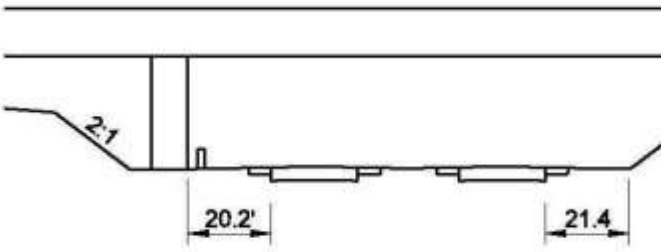
If two related features are below the bridge, measure both and record the lesser of the two. An explanation should be written as to what was recorded. If the feature beneath the structure is not a railroad or highway, code -1 to indicate not applicable.

The presence of ramps 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.

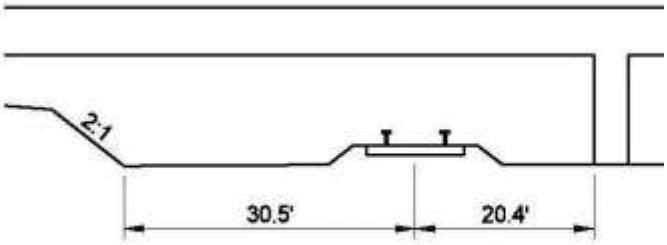
Examples:



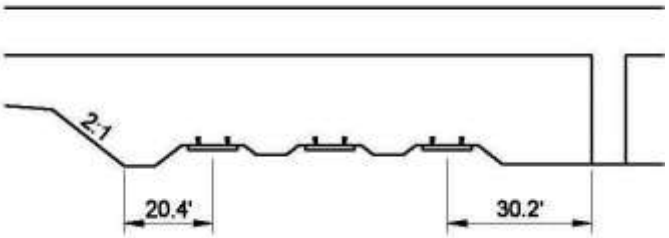
Single 2-way Highway Code
Underclearance Rt = 20.1



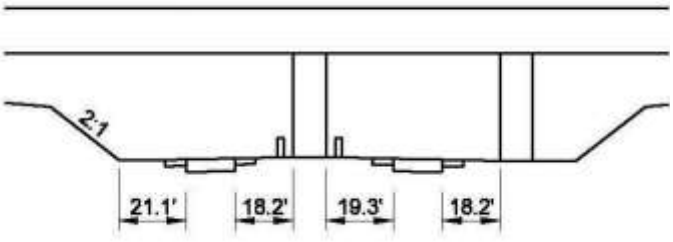
Multi-Hwy Under Code
Underclearance Rt = 20.2



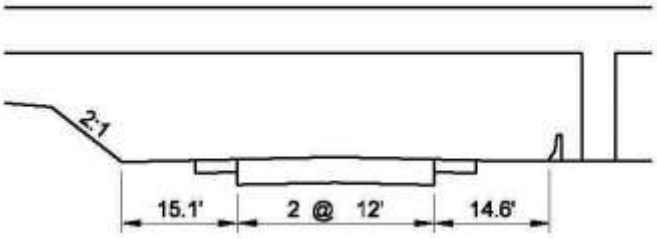
Single RR under Code
Underclearance Rt = 20.4’



Multi-RR Under Code
Underclearance Rt = 20.4



Dual RR under Code
Underclearance Rt = 18.2



Single 2-way highway Code
Underclearance Rt = 14.1

Minimum Lateral Underclearance on Left (Item 56) 3 Digits
(for divided highways, one-way streets and ramps) (XX.X feet)

(not applicable to railroad)

Using a input box from the Appraisal/Other Ratings tab, record and code the minimum lateral underclearance on the left to the nearest one thousandth of a foot. 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 3 to 1. Refer to examples on page 109 under Minimum Lateral Underclearance on Right.

In the case of a dual highway, the median side clearance 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 99.8 feet, code 998. Code 000 to indicate not applicable.

Deck, Superstructure, Substructure, Channel and Channel Protection and Culverts
(Items 58, 59, 60, 61, 62 - Indicate the Condition Ratings

In order to promote uniformity between bridge inspectors, these guidelines will be used to rate and code Deck, Superstructure, Substructure, Channel and Channel Protection and Culverts (Items 58, 59, 60, 61 and 62.)

The use of the Pontis Elements and the FHWA Translator is an acceptable alternative to using these rating guidelines but NDDOT only uses the translator as a check and not to override these guidelines.

Conditions ratings are used to describe the existing, in-place bridge as compared to the as-built condition. Evaluation is for the materials related, physical condition of the deck, superstructure and substructure components of a bridge. The condition evaluation of channels and channel protection and culverts is also included. Condition codes are properly used when they provide an overall characterization of the general condition of the entire component being rated. Conversely, they are improperly used if they attempt to describe localized or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition code must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated.

The load-carrying capacity will not be used in evaluating condition items. The fact that a bridge was designed for less than current legal loads and may be posted shall have no influence upon condition ratings.

Portions of bridges that are being supported or strengthened by temporary members will be rated based on their actual condition; that is, the temporary members are not considered in the rating of the item. (See Temporary Structure Designation (Item 103) for the definition of a temporary bridge.)

Completed bridges not yet opened to traffic, if rated, shall be coded as if open to traffic.

The following general condition ratings shall be used as a guide in evaluating the Deck, Superstructure, Substructure, Channel and Channel Protection and Culverts:

Code	Description
N	**NOT APPLICABLE**
9	**EXCELLENT CONDITION**
8	**VERY GOOD CONDITION** - no problems noted.
7	**GOOD CONDITION** - some minor problems.
6	**SATISFACTORY CONDITION** - structural elements show some minor deterioration.
5	**FAIR CONDITION** - all primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4	**POOR CONDITION** - advanced section loss, deterioration, spalling or scour.
3	**SERIOUS CONDITION** - loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	**CRITICAL CONDITION** - advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	**IMMINENT FAILURE CONDITION** - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	**FAILED CONDITION** - out of service - beyond corrective action.

Deck (Item 58) 1 Digit

This item describes the overall condition rating of the Deck. Rate and code the condition in accordance with the above general condition ratings. **Code N for all culverts, adjacent box beams, channel beams, quad, triple or double T beams.**

Concrete decks should be inspected for cracking, scaling, spalling, leaching, chloride contamination, potholing, delamination and full or partial depth failures. Steel grid decks should be inspected for broken welds, broken grids, section loss and growth of filled grids from corrosion. Timber decks should be inspected for splitting, crushing, fastener failure and deterioration from rot.

The condition of the wearing surface/protective system, joints, expansion devices, curbs, sidewalks, parapets, fascias, bridge rail and scuppers **shall not** be considered in the overall deck evaluation. However, their condition should be addressed in the individual elements and notes in the inspection form.

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

On the following pages are supplemental condition ratings and comments for concrete, timber and steel grid decks. These are to be used in conjunction with the general condition ratings.

CONCRETE DECK CONDITION RATINGS

Bridge Division Comments

9 *New condition.*

8 *Like new condition - no repairs necessary; hairline or shrinkage cracks not in critical areas.*

7 *Good condition - minor cracks, < 2% delaminations.*

6 *Minor cracks that could be sealed, < 2% spalls or sum of all deteriorated and/or contaminated deck concrete < 20%.*

5 *Moderate cracking. < 5% spalls or sum of all deteriorated and or contaminated deck concrete 20% to 40%.*

4 *Advanced cracking. > 5% spalls or sum of all deteriorated and/or contaminated deck concrete 40% to 60%.*

3 *> 5% spalls or sum of all deteriorated and/or contaminated deck concrete > 60%.*

2 *Exposed and badly deteriorated reinforcing steel. Any hazardous condition of the deck which is not easily repairable. Deck structural capacity grossly inadequate.*

1 *Evident structural distress with loss of load-carrying capacity. Holes in deck - danger of other sections of deck failing.*

0 *Deck has failed completely; repairable by replacement only.*

TIMBER DECK CONDITION RATING

Bridge Division Comments

9 *Excellent Condition - No noticeable or noteworthy deficiencies which affect the condition of the deck.*

8 *Very Good Condition - No crushing, rotting or splitting. Tightly secured to beam system.*

7 *Good Condition - Minor checking or splitting with a few loose planks.*

6 *Some planks checked or split but sound. Some loose planks. Fire damage limited to surface scorching with no measurable section loss. Some wet areas noted.*

5 *Numerous (30-40%) planks checked, split, rotted or crushed. Many planks are loose. Fire damage limited to surface charring with minor, measurable section loss. Some planks are in need of replacement.*

4 *Over 40% of the planks are rotted, crushed, or split. Fire damage with significant section loss which may reduce the load carrying capacity of the member. Many of the planks are in need of replacement.*

3 *Severe signs of structural distress are visible. Extensive plank damage evident with reduced deck load carrying capacity.*

2 *Advanced deterioration with partial deck failure. May be necessary to close bridge until corrective action is taken.*

1 *Bridge is closed. Corrective action may put back into light service.*

0 *Bridge closed. Deck replacement necessary.*

STEEL GRID DECK CONDITION RATING

Bridge Division Comments

9 *Excellent Condition - No noticeable or noteworthy deficiencies which affects the condition of the deck.*

8 *Very Good Condition - Tightly secured to beam system with no rust.*

7 *Good Condition - Loose at some locations with minor rusting. A few cracked welds and/or broken grids.*

6 *Moderate rusting evident, with indications of initial section loss. Loose at many locations. Some cracked welds and/or broken grids.*

5 *Considerable rusting with some areas of minor section loss. Loose at numerous locations. Numerous cracked welds and/or broken grids.*

4 *Heavy rusting, resulting in considerable section loss and some holes through deck. Many welds cracked and/or grids broken.*

3 *Severe signs of structural distress are visible. Repair plates missing with some panel replacement necessary.*

2 *Many holes through deck.*

1 *Bridge closed. Corrective action may put back in light service.*

0 *Closed Bridge. Deck replacement necessary.*

Superstructure (Item 59) 1 Digit

This item describes the physical condition of all structural members. Rate and code the condition in accordance with the previously described general condition ratings. Code N for all culverts.

The structural members should be inspected for signs of distress which may include cracking, deterioration, section loss, and malfunction and misalignment of bearings.

The condition of bearings, joints, paint system, etc. shall not be included in this rating, except in extreme situations, but should be addressed in the notes 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.

Fracture critical components should receive careful attention because failure could lead to collapse of a span or the bridge.

On the following pages are supplemental condition ratings and comments for timber, reinforced concrete, prestressed concrete and steel superstructures. These are to be used in conjunction with the general condition ratings.

TIMBER SUPERSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 *Excellent Condition*

8 *Very good condition - No noteworthy deficiencies which affect the condition of the superstructure.*

7 *Good condition - Minor decay, cracking, or splitting of beams or stringers at non-critical location.*

6 *Satisfactory condition - Some decay, cracking, or splitting, of beams or stringers. Fire damage limited to surface scorching with no measurable section loss.*

5 *Fair condition - Moderate decay, cracking, splitting or minor crushing of beams or stringers. Fire damage limited to surface charring with minor, measurable section loss.*

4 *Poor condition - Extensive decay, cracking, splitting, crushing of beams or stringers, or significant fire damage. Diminished load carrying capacity of members is evident.*

3 *Serious condition - Severe decay, cracking, splitting, crushing of beams or stringers, or major fire damage. Load carrying capacity is substantially reduced. Local failure may be evident.*

2 *Critical condition - Beam defects noted in condition 3 have resulted in significant local failures. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.*

1 *"Imminent" failure condition - Bridge closed. Corrective action may put back in light service.*

0 *Failed condition - Bridge closed. Replacement necessary.*

STEEL SUPERSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 Excellent Condition

8 Very Good Condition - No noticeable or noteworthy deficiencies which affect the condition of the super structure.

7 Good Condition - Some rust may be evident without any section loss.

6 Satisfactory Condition - Rusting evident but with minor section loss (minor pitting, scaling or flaking) in critical areas.

5 Fair Condition - Minor section loss in critical areas. Fatigue or out-of-plane distortion cracks may be present in non-critical areas. Hinges may be showing minor corrosion problems.

4 Poor Condition - Significant (measurable) section loss in critical areas. Fatigue or out-of-plane distortion cracks may be present in critical areas. Hinges may be frozen from corrosion. Load carrying capacity of structural members affected.

3 Serious Condition - Severe section loss or cracking in a critical area. Minor failures may have occurred. Significant weakening of primary members evident.

2 Critical Condition - Severe section loss in many areas with holes rusted through at numerous locations in critical areas.

1 "Imminent" Failure Condition - Bridge closed. Corrective action may put back in light service.

0 Failed Condition - Bridge closed. Replacement necessary.

REINFORCED CONCRETE SUPERSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 Excellent Condition

8 Very Good Condition - No noteworthy deficiencies which affect the structural capacity of members.

7 Good Condition - Some minor problems. Non-structural hairline cracks without disintegration may be evident. Load carrying capacity of structural members unaffected.

6 Satisfactory Condition - Structural members show some minor deterioration or collision damage. Hairline structural cracks or spalls may be present with evidence of efflorescence. Minor water saturation marks. Generally reinforcing steel unaffected.

5 Fair Condition - Structural members are generally sound (structural capacity unaffected) but may have evidence of deterioration or disintegration. Numerous hairline structural cracks or spalls may be present with minor section loss of reinforcing steel possible.

4 Poor Condition - Extensive disintegration. Measurable structural cracks or large spall areas. Corroded reinforcing steel evident with measurable section loss. Structural capacity of some structural members may be diminished.

3 Serious Condition - Severe deterioration and/or disintegration of primary concrete members. Large structural cracks may be evident. Reinforcing steel exposed with advanced stages of corrosion. Local failures or loss of bond possible.

2 Critical Condition - Advanced deterioration of primary structural elements. Concrete disintegration around reinforcing steel with loss of bond. Some reinforcing steel may be ineffective due to corrosion or loss of bond. Numerous large structural cracks may be present. Localized failures of bearing areas may exist. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.

1 "Imminent" Failure Condition - Bridge is closed to traffic. Major deterioration or section loss present on primary structural elements, obvious vertical or horizontal movement is affecting the structure's stability. Corrective action may put back in light service.

0 Failed Condition - Bridge is closed; out of service. Beyond corrective action; replacement necessary.

PRESTRESSED CONCRETE SUPERSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 Excellent Condition

8 Very Good Condition - No problems noted.

7 Good Condition - Non-structural cracks less than 0.015" in width may be evident. No rust stains apparent.

6 Satisfactory Condition - Minor concrete damage or deterioration. Non-structural cracks over 0.015". Isolated and minor exposure of mild steel reinforcement may be present.

5 Fair Condition - Isolated and minor exposure of prestressing strands may be present. Structural cracks with little or no rust staining. Primary members sound, but may be cracked or spalled.

4 Poor Condition - Moderate damage or deterioration to concrete portions of the member exposing reinforcing bars or prestressing strands. Possible bond loss. Structural cracks with medium to heavy rust staining may be present. May be loss of camber.

3 Serious Condition - Severe damage to concrete and reinforcing elements of the member. Severed prestressing strand(s), or strand(s) are visibly deformed. Major or total loss of concrete section in bottom flange. Major loss of concrete section in the web, but not occurring at the same location as concrete section loss in the bottom flange. Horizontal misalignment to member or negative camber. Unless closely monitored it may be necessary to restrict or close the bridge until corrective action is taken.

2 Critical Condition - Critical damage to concrete and reinforcing elements of the member. This damage may consist of one or more of the following:

- *Cracks extend across the bottom flange or in the web directly above the bottom flange damage that are not closed below the surface damage. (This indicates that the prestressing strands have exceeded yield strength.)*
- *An abrupt lateral offset as measured along the bottom flange or lateral distortion of exposed prestressing strands. (This also indicates that the prestressing strands have exceeded yield strength.)*
- *Loss of prestress force to the extent that calculations show that repair cannot be made.*
- *Excessive vertical misalignment.*

PRESTRESSED CONCRETE SUPERSTRUCTURE CONDITION RATINGS Continued

- *Longitudinal cracks at the interface, of the web and the top flange that are not substantially closed below the surface damage. (This indicates permanent deformation of stirrups.)*

1 *"Imminent" Failure Condition - Critical damage requiring the replacement of a member. Bridge is closed to traffic and installation of temporary false work to safeguard the public and the bridge should be taken at the time of the inspection.*

0 *Failed Condition - Bridge closed and out of service.*

Substructure (Item 60) — 1 Digit

This item describes the 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 N for all culverts.

All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage and corrosion. The rating given by Scour Critical Bridges (Item 113), may have a significant effect on Substructure if scour has substantially affected the overall condition of the structure.

The substructure condition rating shall be made independent of the Deck and Superstructure.

Integral-abutment wingwalls 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. For structures where the substructure and superstructure are integral, the substructure shall be considered as the portion below the superstructure.

Following are supplemental condition ratings and comments for timber, concrete and steel substructures. These are to be used in conjunction with the general condition ratings.

TIMBER SUBSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 *Excellent Condition - No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.*

8 *Very Good Condition - Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.*

7 *Good Condition - Insignificant decay, cracking or splitting of timber. Minor scour may have occurred.*

6 *Satisfactory Condition - Some initial decay, cracking or splitting of timber. Fire damage limited to surface scorching of timber with no measurable section loss. Shallow, local scouring may have occurred near foundation.*

5 *Fair Condition - Moderate decay, cracking or splitting of timber; a few secondary members may need replacement. Fire damage limited to surface charring of timber with minor, measurable section loss. Some exposure of timber piles as a result of erosion, reducing penetration. Scour may be progressive and/or is becoming more prominent with a possibility of exposing top of footing, but no misalignment or settlement noted.*

4 *Poor Condition - Substantial decay, cracking, splitting or crushing of primary timber members, requiring some replacement. Fire damage with significant section loss of timber which may reduce the load carrying capacity of the member. Extensive exposure of timber piles as a result of erosion, reducing the penetration and affecting the stability of the unit. Extensive scouring or undermining of footing affecting the stability of the unit and requiring corrective action.*

3 *Serious Condition - Major fire damage to timber which will substantially reduce the load carrying capacity of the member. Bearing areas seriously deteriorated with considerable loss of bearing. Severe scouring or undermining of footings affecting the stability of the unit. Settlement of the substructure may have occurred. Shoring considered necessary to maintain the safety and alignment of the structure.*

2 *Critical Condition - Primary members crushed or split and ineffective. Scour is sufficient that substructure is near state of collapse. Pier has settled.*

1 *"Imminent" Failure Condition - Bridge closed. Corrective action may put back in light service.*

0 *Failed Condition - Bridge closed. Replacement necessary.*

STEEL SUBSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 Excellent Condition - No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.

8 Very Good Condition - Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.

7 Good Condition - Some rusting of steel without measurable section loss. Minor scouring may have occurred.

6 Satisfactory Condition - Corrosion of steel section, but no measurable section loss. Shallow, local scouring may have occurred near foundation.

5 Fair Condition - Measurable but minor section loss in steel members. Scour may be progressive and/or is becoming more prominent with a possibility of exposing top of footing, but no misalignment or settlement noted.

4 Poor Condition - Extensive section loss in steel members Extensive exposure of piles as a result of erosion, reducing the penetration and affecting the stability of the unit. Extensive scouring or undermining of footing affecting the stability of the unit and requiring corrective action.

3 Serious Condition - Severe section loss in critical stress areas. Bearing areas seriously deteriorated with considerable loss of bearing. Severe scouring or undermining of footings affecting the stability of the unit. Settlement of the substructure may have occurred. Shoring considered necessary to maintain the safety and alignment of the structure.

2 Critical Condition - Structure steel members have critical section loss with holes in the web and/or knife-edged flanges typical. Scour is sufficient that substructure in near state of collapse Pier has settled.

1 "Imminent" Failure Condition - Bridge closed. Corrective action may put back in light service.

0 Failed Condition - Bridge closed. Replacement necessary.

CONCRETE SUBSTRUCTURE CONDITION RATINGS

Bridge Division Comments

9 Excellent Condition - No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.

8 Very Good Condition - Shrinkage cracks, light scaling or insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.

7 Good Condition - Minor cracking with possible leaching or spalls on concrete or masonry unit with no detrimental effect on bearing area. Leakage of expansion devices have initiated minor cracking. Minor scouring may have occurred.

6 Satisfactory Condition - Minor deterioration or disintegration, spalls, cracking and leaching on concrete or masonry units with little or no loss of bearing area. Shallow, local scouring may have occurred near foundation.

5 Fair Condition - Concrete or masonry units may exhibit some section loss with exposed reinforcing steel possible. Scour may be progressive and/or is becoming more prominent with a possibility of exposing top of footing, but no misalignment or settlement noted.

4 Poor Condition - Structural cracks and advanced deterioration in concrete and/or masonry units. Extensive scouring or undermining of footing affecting the stability of the unit and requiring corrective action.

3 Serious Condition - Severe disintegration of concrete. Generally, reinforcing steel exposed with advanced stages of corrosion. Bearing areas seriously deteriorated with considerable loss of bearing. Severe scouring or undermining of footings affecting the stability of the unit. Settlement of the substructure may have occurred. Shoring considered necessary to maintain the safety and alignment of the structure.

2 Critical Condition - Concrete cap is soft and spalling with reinforcing steel exposed with no bond to the concrete. Top of concrete cap is split or concrete column has undergone shear failure. Scour is sufficient that substructure is near state of collapse. Pier has settled.

1 "Imminent" Failure Condition - Bridge closed. Corrective action may put back in light service.

0 Failed Condition - Bridge closed. Replacement necessary.

Channel and Channel Protection (Item 61) 1 Digit

This item describes the physical conditions associated with the flow of water through 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 or footings, 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.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

Code	Description
N	Not applicable. Use when bridge is not over a waterway.
9	There are no noticeable or noteworthy deficiencies which affect the condition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor stream bed movement evident. Debris is restricting the waterway slightly.
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel. Minor scour.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the waterway. Advanced scour.
3	Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the waterway to now threaten the bridge and/or approach roadway. Scour has seriously affected primary structural components.
2	The waterway has changed to the extent the bridge is near a state of collapse. Scour may have removed substructure support.

Channel and Channel Protection – Item 61 (continued)

1	Bridge closed because of channel failure. Corrective action may put back in light service.
0	Bridge closed because of channel failure. Replacement necessary.

Culvert and Retaining Walls (Item 62) — 1 Digit

Culvert and Retaining Walls evaluate the alignment, settlement, joints, structural condition, scour and other items associated with culverts. The rating code is intended to be an overall condition evaluation of the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. For a detailed discussion regarding the inspection and rating of culverts, consult Report No. FHWA-IP-86-2, Culvert Inspection Manual, July 1986.

Deck (Item 58), Superstructure (Item – 59) and Substructure (Item 60) shall be coded N for all culverts.

Bridge Division Comments

This entry in the SI&A sheet is used for condition/appraisal entries for:

Reinforced Concrete Box Culverts
Pipe Culvert Installations
Retaining Walls when the wall is not part of a structure.

Rate and code the condition in accordance with the previously described general condition ratings and the following descriptive codes:

Code	Description
N	Not applicable. Use if structure is not a culvert.
9	No deficiencies.
8	No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused by drift.
7	Shrinkage cracks, light scaling and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
6	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
5	Moderate to major deterioration or disintegration, extensive cracking and leaching or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
4	Large spalls, heavy scalling, wide cracks, considerable efflorescence or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
3	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culverts. Severe scour or erosion at curtain walls, wingwalls or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion or deep pitting with scattered perforations.
2	Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.

Culverts – Item 62 (continued)

1	Bridge closed. Corrective action may put back in light service.
0	Bridge closed. Replacement necessary.

Method Used to Determine Operating Rating (Item 63) — 1 Digits

Data entry will be made by Bridge Division

Use one of the codes below to indicate which load rating method was used to determine the Operating Rating (Item 64) for this structure.

Code	Description
0	Field Evaluation and documented engineering judgment.
1	Load Factor (LF)
2	Allowable Stress (AS)
3	Load and Resistance Factor (LRFR)
4	Load Testing
5	No rating analysis or evaluation performed
6	Load Factor (LF) rating reported by rating (RF) method using MD18 loading.
7	Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading.
8	Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL-93 loadings.

Code 0 is to be used when the load rating is determined by field evaluation and documented engineering judgment, typically done when plans are not available or in cases of severe deterioration. Field evaluation and engineering judgment ratings must be documented.

Code 5 is to be used when the bridge has not been load rated or load rating documentation does not exist.

Operating Rating (Item 64) — 3 Digits

Data entry will be made by Bridge Division.

Get clarification on this item

This capacity rating, referred to as the operating rating, will result in the absolute maximum permissible load level to which the structure may be subjected for the vehicle type used in the rating. Code the operating rating as a 3-digit code composed of segments.

Segment	Description	Length
64A	Type of loading	1 digit
64B	Gross load in tons	2 digits

It should be emphasized that for HS loading, the total weight in tons of the entire vehicle should be coded; that is, HS20 shall be coded 236 even though the HS20 lane loading controls and is used to determine the rating. Likewise, HS10 shall be coded 218.

Even though any of the AASHTO loads or other special state loads may be used to calculate the operating rating, it shall be submitted to the National Bridge Inventory in an equivalent HS loading.

The required reporting of an equivalent HS loading may be phased in over a five-year period. Therefore, all National Bridge Inventory updates in 1993 shall report the operating and inventory ratings in an equivalent HS loading regardless of the loading used to calculate the ratings. The following type of loadings will be acceptable until 1993.

Code	Description	|X| | |
1	H Loading	
2	HS Loading	
3	Alternate Interstate Loading	
4	Type 3 Unit	
5	Type 3-S2 Unit	
6	Type 3-3 Unit	
7	Railroad Loading	
8	Pedestrian or Special Loading	
9	Gross Load Only	

The AASHTO Manual for Maintenance Inspection of Bridges permits the calculation of the inventory and operating ratings by either the working stress or load factor method. The most recent revision includes load rating of bridges using the Load and Resistance Factor Design (LRFD) methodology for all bridges designed with LRFD. The use of the different methods for calculating the load ratings has produced non-uniform evaluations nationwide for these ratings and for the overall Structural Evaluation - Item 67. The use of uniform and benchmark data is very important in bridge program administration at the federal level. However, requiring all load capacity ratings to be calculated by only one method on an immediate basis is not practical. Therefore, either method is acceptable for submittal of the inventory and operating ratings to the National Bridge Inventory for the immediate future.

If the bridge is closed and/or will not carry any live load, the second and third digits shall be coded 00.

The use or presence of a temporary bridge requires special consideration in coding. In such cases, since there is no permanent bridge, Items 64 and 66 should be coded as 200 or 900 even though the temporary structure is rated for as much as full legal load. The 200 code shall be used when converting to HS equivalents. Until that time, a 900 code is acceptable.

A bridge shored up or repaired on a temporary basis is considered a temporary bridge and the inventory and operating rating should be coded as if the temporary shoring were not in place. See Temporary Structure Designation - Item 103 for definition of a temporary bridge.

The second and third digits will give the gross loading in tons, except pedestrian and railroad loading.

| | X | X |

Code	*Loading*
200	*If the bridge is closed and/or will not carry any live load, code the second and third digits "00".*
780	*For railroad loading only, the second and third digits will give Cooper Class or equivalent, if known, otherwise code "700".*
800	*Code pedestrian loading as "800".*
200	*The use or presence of a temporary bridge requires special consideration in coding. In such cases, since there is no permanent bridge, Items 64 and 66 should be coded as "200" even though the temporary structure is rated for as much as full legal load.*

Examples:	*Code*
HS30	*|2|5|4|*
Temporary bridge	*|2|0|0|*
Shored-up bridge	*|2|0|3| **
Structure under sufficient fill that live load is insignificant (according to AASHTO)	*|2|9|9|*

** load capacity without shoring.*

Method Used to Determine Inventory Rating (Item 65) — 1 Digit

Data entry will be made by Bridge Division

Use one of the codes below to indicate which load rating method was used to determine the Inventory Rating (Item 66) for this structure.

Code	Description
0	Field Evaluation and documented engineering judgment.
1	Load Factor (LF)
2	Allowable Stress (AS)
3	Load and Resistance Factor (LRFR)
4	Load Testing
5	No rating analysis or evaluation performed
6	Load Factor (LF) rating reported by rating (RF) method using MD18 loading.
7	Allowable Stress (AS) rating reported by rating factor (RF) method using MS18 loading.
8	Load and Resistance Factor (LRFR) rating reported by rating factor (RF) method using HL-93 loadings.

Code 0 is to be used when the load rating is determined by field evaluation and documented engineering judgment, typically done when plans are not available or in cases of severe deterioration. Field evaluation and engineering judgment ratings must be documented.

Code 5 is to be used when the bridge has not been load rated or load rating documentation does not exist.

Item 66 - Inventory Rating — 3 Digits

Inventory load ratings are calculated and coded by the Bridge Division.

Get clarification on this item

This capacity rating, for the vehicle type used in the rating, will result in a load level which can safely utilize an existing structure for an indefinite period of time. Code the Inventory Rating as a 3 digit code composed of two segments. The statements and codes in Item 64 - Operating Rating apply only to this item also.

Segment	Description	Length
66A	Type of loading	1 digit
66B	Gross loading in tons	2 digits

Code 299 for a structure under sufficient fill such that, according to AASHTO design, the live load is insignificant in the structure load capacity.

Structural Condition (Item 67)	1 Digit

Data entry will be made by Bridge Division.

Evaluate and code the overall condition taking into account all major structural deficiencies. The appraisal rating is to be based on the condition rating of Item 59 - Superstructure, Item 60 - Substructure and Item 66 - Inventory Rating. This item generally should be coded no higher than the lowest condition rating the superstructure or the substructure. The code will also be based on the value obtained from Table 1 which evaluates the inventory rating (HS equivalent) shown for various traffic volumes.

For other than culverts, the lowest of the code obtained from Item 59 - Superstructure, Item 60 - Substructure or Table 1 should generally be used.

For culverts, the lowest of the codes obtained from Item 62 - Culverts or Table 1 should generally be used.

Note: All reinforced box culverts, structural plate pipes, 8 feet in diameter and greater, and multiple culvert installations 20 feet or greater in structure length and meet the requirements of multiple pipe installations require field analysis.

Table 1 Notes:

1. Use the lower rating code for values between those listed in the table.

2. The live load used in establishing the Inventory Rating shall be one of the standard AASHTO vehicles or the maximum legal loads of the state.

3. To use Table 1, the Inventory Rating must be the coded HS rating or its equivalent. If the comparable HS equivalent is not calculated for the controlling rating, using a factor to determine the HS equivalent is acceptable even though converting other rating loads to an HS equivalent is not a constant.

4. Those highway agencies which have used other than an HS loading for calculating the inventory rating may use the following purposely conservative factors to convert to an equivalent coded HS rating load for use with Table 1. These factors will be used for conversion of data transmitted to the NBI.

1st digit or Item 66	Multiply 2nd and 3rd digits by
1	1.25
2	1.00
3	1.20
4	1.00
5	.70
6	.64
9	1.00

5. All bridges on the interstate system shall be evaluated using the ADT column of > 5,000 regardless of the actual ADT on the bridge.

Table 1. Rating by Comparison of ADT - Item 29 and Inventory Rating - Item 66

Structural Evaluation Rating Code	Inventory Rating Average Daily Traffic (ADT) 0 - 500	501 - 5,000	> 5,000
9	> 236* (HS20)**	> 236 (HS20)	> 236 (HS20)
8	236 (HS20)	236 (HS20)	236 (HS20)
7	231 (HS17)	231 (HS17)	231 (HS17)
6	223 (HS13)	225 (HS14)	227 (HS15)
5	218 (HS10)	220 (HS11)	222 (HS12)
4	212 (HS7)	214 (HS8)	218 (HS10)
3	Inventory rating less than value in rating code of 4 and requiring corrective action.		
2	Inventory rating less than value in rating code of 4 and requiring replacement.		
0	Bridge closed.		

* Coded HS rating load (typical)
** HS Designation (typical)

Deck Geometry (Item 68) — 1 Digit

Data entry will be made by Bridge Division.

The overall rating for deck geometry will include two evaluations: (a) the curb-to-curb or face-to-face of rail bridge width using Table 2A, B, C or D and (b) the minimum vertical clearance over the bridge roadway using Table 2E. The lower of the codes obtained from these tables shall be used. When an individual table lists several deck geometry rating codes for the same roadway width under a specific ADT, use the lower code. (For example, Table 2A lists deck geometry rating codes of 6, 7 and 8 for a 44 foot roadway width and an ADT of >5,000. Use the code of 6.) Use the lower code for values between those listed in the tables.

The curb-to-curb or face-to-face of rail dimensions shall be taken from Bridge Roadway Width, Curb-to-Curb (Item 51). Minimum Vertical Clearance Over Bridge Roadway (Item 53) shall be used to evaluate the vertical clearance.

The values provided in the tables are for rating purposes only. Current design standards must be used for structure design or rehabilitation.

Table 2A and 2B. Rating by Comparison of ADT - Item 29 and Bridge Roadway Width, Curb-to-Curb - Item 51

TABLE 2A							TABLE 2B	
Deck Geometry Code	Bridge Roadway Width 2 Lanes; 2-Way Traffic						Bridge Roadway Width 1 Lane, 2 Way Traffic	
	ADT (Both Directions)						ADT Both Directions	
	0-100	101-400	401-1000	1001-2000	2001-5000	>5000	0 - 100	> 100
9	> 32	> 36	> 40	> 44	> 44	> 44	-	-
8	32	36	40	44	44	44	15'-11"	-
7	28	32	36	40	44	44	15'	-
6	24	28	30	34	40	44	14'	-
5	20	24	26	28	34	38	13'	-
4	18	20	22	24	28	32 (28*)	12'	-
3	16	18	20	22	26	30 (26*)	11'	15'-11"
2	Any width less then required for a rating code of 3 and structure is open.							
0	Bridge Closed							

* Use value in parentheses for bridges longer than 200 feet.

Notes:

1. Use the lower rating code for values between those listed in the table.
2. Dimensions are in feet.
3. For three or more undivided lanes of two-way traffic, use Table 2C, Other Multi-lane Divided Facilities.
4. Do not use Table 2B for code 9 and for codes 8 through 4 inclusive when the ADT is >100. Single lane bridges less than 16 feet wide carrying two-way traffic are always appraised at 3 or below if they carry more than an ADT of 100.

Table 2C and 2D. Rating by Comparison of Number of Lanes - Item 28 and Bridge Roadway Width, Curb to Curb - Item 51

TABLE 2C					TABLE 2D	
Deck Geometry Code	Bridge Roadway Width 2 or More Lanes				Bridge Roadway Width 1-Way Traffic	
	Interstate and Other Divided Freeways		Other Multi-Lane Divided Facilities		Ramps Only (5C = 7)	
	2 Lanes	3 or more lanes	2 Lanes	3 or more lanes		
9	> 42	>12N + 24	> 42	>12N + 18	> 26	>12N + 12
8	42	12N + 24	42	12N + 18	26	12N + 12
7	40	12N + 20	38	12N + 15	24	12N + 10
6	38	12N + 16	36	12N + 12	22	12N + 8
5	36	12N + 14	33	11N + 10	20	12N + 6
4	34 (29)*	11N + 12 (11N + 7)*	30	11N + 6	18	12N + 4
3	33 (28)*	11N + 11 (11N + 6)*	27	11N + 5	16	12N + 2
2	Any width less than required for a rating code of 3 and structure is open.					
0	Bridge closed.					

* Use value in parentheses for bridges longer than 200 feet.
N= number of lanes of traffic.

Notes:

1. Use the lower rating code for values between those listed in the tables.
2. Dimensions are in feet.
3. Use Table 2C, other Multi-lane Divide Facilities, for three or more undivided lanes of two-way traffic.

Table 2E. Rating by Comparison of Minimum Vertical Clearance over Bridge Roadway - Item 53 and Functional Classification - Item 26

Deck Geometry Rating Code	Minimum Vertical Clearance		
	Functional Class		
	Interstate and Other Freeway	Other Principal and Minor Arterials	Major and Minor Collectors and Locals
9	> 17'-0"	> 16'-6"	> 16'-6"
8	17'-0"	16'-6"	16'-6"
7	16'-9"	15'-6"	15'-6"
6	16'-6"	14'-6"	14'-6"
5	15'-9"	14'-3"	14'-3"
4	15'-0"	14'-0"	14'-0"
3	Vertical clearance less than value in rating code of 4 and requiring corrective action.		
2	Vertical clearance less than value in rating code of 4 and requiring corrective action.		
0	Bridge closed.		

* Use for routes in highly-developed urban areas only when there is an alternative interstate, freeway or expressway facility with a minimum of 16'-0" clearance.

Notes:

1. Use the lower rating for values between those listed in the table.

Underclearances, Vertical and Horizontal (Item 69) 1 Digit

Data entry will be made by Bridge Division.

This refers to vertical and horizontal underclearances from the through roadway to the superstructure or substructure units, respectively. Code "N" unless the bridge is over a highway or railroad.

The vertical underclearance shall be evaluated using Table 3A. The horizontal underclearance shall be evaluated using Table 3B. The lower of the codes obtained from Table 3A and Table 3B shall be used.

Bridges seldom are closed due to deficient underclearances; however, these bridges may be good candidates for rehabilitation or replacement.

Minimum Vertical Underclearance (Item 54), Minimum Lateral Underclearance on Right (Item 55) and Minimum Lateral Underclearance on Left (Item 56) shall be used to evaluate this item.

The functional classification to be used in the table is for the underpassing route. Therefore, the functional classification must be obtained from the record for the route "under" the bridge (see Inventory Route (Item 5)).

If the underpassing route is not a federal-aid system is not a defense route or is not otherwise important, an "under" record may not be available. If no "under" record exists, it is assumed that the route under the bridge is a major or minor collector or a local road for use in Tables 3A and 3B.

Table 3A. Rating by Comparison of Minimum Vertical Clearance Item 54 and Functional Classification of Underpassing Route

Under-Clearance Rating Code	Minimum Vertical Clearance			
	Functional Class			
	Interstate and Other Freeway	Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroad
9	> 17'-0"	> 16'-6"	> 16'-6"	> 23'-0"
8	17'-0"	16'-6"	16'-6"	23'-0"
7	16'-9"	15'-6"	15'-6"	22'-6"
6	16'-6"	14'-6"	14'-6"	22'-0"
5	15'-9"	14'-3"	14'-3"	21'-0"
4	15'-0"	14'-0"	14'-0"	20'-0"
3	Vertical clearance less than value in rating code 4 and requiring corrective action.			
2	Vertical clearance less than value in rating code 4 and requiring replacement.			
0	Bridge closed.			

* Use for routes in highly-developed urban areas only when there is an alternative interstate, freeway or expressway facility with a minimum of 16'-0" clearance.

Notes:

1. Use the lower rating code for values between those listed in the table.
2. The functional classification of the underpassing route shall be used in the evaluation. If an "under" record is not coded, the underpassing route shall be considered a major or minor collector or a local road.

Table 3B. Rating by Comparison of Minimum Lateral Underclearance Right and Left - Items 55 and 56 and Functional Classification of Underpassing Route

Under-Clearance Rating Code	Minimum Lateral Clearance						
	Functional Class						
	1-Way Traffic				2-Way Traffic		
	Principal Arterials - Interstate, Freeways or Expressways				Other Principal and Minor Arterials	Major and Minor Collector and Locals	Rail-road
	Main Line		Ramp				
	Left	Right	Left	Right			
9	> 30	> 30	> 4	> 10	> 30	> 12	> 20
8	30	30	4	10	30	12	20
7	18	21	3	9	21	11	17
6	6	12	2	8	12	10	14
5	5	11	2	6	10	8	11
4	4	10	2	4	6	4	8
3	Underclearance less than value in rating code 4 and requiring corrective action.						
2	Underclearance less than value in rating code 4 and requiring replacement.						
0	Bridge closed.						

Notes:

1. Use the lower rating code for values between those listed in the tables.
2. Dimensions are in feet.
3. When acceleration or deceleration lanes or ramps are provided under two-way traffic, use the value from the right ramp column to determine code.
4. The functional classification of the underpassing route shall be used in the evaluation. If an "under" record is not coded, the underpassing route shall be considered a major or minor collector or a local road.

Bridge Posting (Item 70) **1 Digit**

Data entry will be made by Bridge Division.

The National Bridge Inspection Standards require the posting of load limits only if the maximum legal load in the state produces stresses in excess of the operating stress level. If the load capacity at the operating level is such that posting is required, this item shall be coded 0 through 4. If no posting is required at the operating level, this item shall be coded 5.

This item evaluates the load capacity of a bridge in comparison to the state legal load. It differs from Structural Condition (Item 67) in that Structural Condition uses the inventory rating while the bridge posting requirement is based on the operating rating.

Although posting a bridge for load carrying capacity is required only when the maximum legal load exceeds the operating rating capacity, highway agencies may choose to post at lower rating capacities. This posting practice may appear to produce conflicting coding when Structure Open, Posted or Closed (Item 41) to Traffic is coded to show the bridge as actually posted at the site and Bridge Posting (Item 70) is coded as bridge posting is not required. Since different criteria are used for coding these two items, this coding is acceptable and correct when the highway agency elects to post at less than the operating rating stress level. Bridge Posting shall be coded 0 through 4 only if the legal load of the state exceeds that permitted under the operating rating.

The use or presence of a temporary bridge affects the coding. The load capacity shall reflect the actual capacity of the temporary bridge at the operating rating. This also applies to bridges shored up or repaired on temporary basis.

Code	Description
0, 1, 2, 3 or 4	Posting required
5	No posting required

The degree that the operating rating stress level is under the maximum legal load stress level may be used to differentiate between codes. As a guide and for coding purposes only, the following values may be used to code this item:

Code	Relationship of Operating Rating Stress to Legal Load Stress
5	Equal to or above legal loads
4	0.1 - 9.9% below
3	10.0 - 19.9% below
2	20.0 - 29.9% below
1	30.0 - 39.9% below
0	> 39.9% below

NOTE: For the purpose of this item, the North Dakota DOT uses the stresses of an HS20 truck for the legal load test.

Waterway Adequacy (Item 71) — 2 Digit

This item appraises the waterway opening with respect to passage of flow through the bridge. The following codes shall be used in evaluating waterway adequacy. Site conditions may warrant somewhat higher or lower ratings than indicated by the table (e.g., flooding of an urban area due to a restricted bridge opening).

Where overtopping frequency information is available, the description given in the table for chance of overtopping mean 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.

Note: *The first digit must be alpha or numerical. The second digit shall be coded "C" for calculated, "E" for estimated, or "N" for nonapplicable. If the second digit has a code of "C", the first digit is determined by hydraulic calculations and doesn't change unless there is a change condition at the site. Then the inspector shall notify Bridge Division of the condition and the Bridge Hydraulics Section will re-evaluate and select the proper coding. If the second digit has a code of "E", then the first digit is determined by inspector with the aid of high water marks or public input. The first digit is determined from table on next page.*

Functional Classification			
Principal Arterials - Interstates, Freeways, or Expressways	Other Principal and Minor Arterials and Major Collectors	Minor Collectors, Locals	Description
Code			
N	N	N	Bridge not over waterway
9	9	9	Bridge deck and roadway approaches above flood water elevations (high water). Chance of overtopping is remote.
8	8	8	Bridge deck above roadway approaches. Slight chance of overtopping roadway approaches.
6	6	7	Slight chance of overtopping bridge deck and roadway approaches.
4	5	6	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delay.
3	4	5	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays.
2	3	4	Occasional overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	3	Frequent overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	2	Occasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays.
0	0	0	Bridge closed.

Approach Roadway Alignment (Item 72) — 1 Digit

Code the rating based on the adequacy of the approach roadway alignment. This item identifies those bridges which do not function properly or adequately due to the alignment of the approaches.

It is not intended that the approach roadway alignment be compared to current standards but rather to the existing highway alignment. This concept differs from other appraisal evaluations. The establishment of set criteria to be used at all bridge sites is not appropriate for this item. The basic criteria is how the alignment of the roadway approaches to the bridge relate to the general highway alignment of the section of highway the bridge is on.

The individual structure shall be rated in accordance with the general appraisal rating guide in lieu of specific design values. The approach roadway alignment will be rated intolerable (a code of 3 or less) only if the horizontal or vertical curvature requires a substantial reduction in the vehicle operating speed from that on the highway section. A very minor speed reduction will be rated a 6 and when a speed reduction is not required, the appraisal code will be an 8. Additional codes may be selected between these general values.

For example, if the highway section requires a substantial speed reduction due to vertical or horizontal alignment, and the roadway approach to the bridge requires only a very minor additional speed reduction at the bridge, the appropriate code would be a 6. This concept shall be used at each bridge site.

Speed reductions necessary because of structure width and not alignment shall not be considered in evaluating this item.

Bridge Division Commentary

Curvature (vertical and horizontal) and speed reduction from the typical speed controlled by the general highway alignment are the determining factors in this appraisal.

Appraisal Ratings to be Used

Code	*Horizontal Curve*	*Vertical Curve*	*Speed Reduction*
N			*Not applicable*
9			
8	*None*	*None*	*No speed reduction*
7	*Slight*	*Slight*	*No speed reduction necessary; caution advisable*
6	*Moderate*	*Moderate*	*5 mph speed reduction*
5	*Moderate*	*Moderate*	*5-10 mph speed reduction*
4	*Sharp*	*Sharp*	*10-15 mph speed reduction*
3	*Sharp*	*Sharp*	*15-20 mph speed reduction*
2	*Severe or 90^{o} corner*	*Severe*	*30 mph speed reduction or near stop condition*
0			*Bridge closed*

The above table assumes the speed limit is 50 to 55 mph.

Type of Work (Item 75) **3 Digits**

Data entry will be made by Bridge Division.

The information to be recorded for this item will be the type of work proposed to be accomplished on the structure to improve it to the point that it will provide the type of service needed and whether the proposed work is to be done by contract or force account. Code this item in Pontis under the work tab NBI Project Data. Drop down menus are available for the two part input..

Description

Type of Work Proposed
Work done by

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program (Sufficiency Rating ≤ 80.0). It may be coded for other bridges at the option of the highway agency. Use one of the following codes to represent the proposed work type:

Code	Description
31	Replacement of bridge or other structure because of substandard load carrying capacity or substandard bridge roadway geometry.
32	Replacement of bridge or other structure because of relocation of road.
33	Widening of existing bridge or other major structure without deck rehabilitation or replacement; includes culvert lengthening.
34	Widening of existing bridge with deck rehabilitation or replacement.
35	Bridge rehabilitation because of general structure deterioration or inadequate strength.
36	Bridge deck rehabilitation with only incidental widening.
37	Bridge deck replacement with only incidental widening.
38	Other structural work.

The second portion of the Type of Work shall be coded using one of the following codes to indicate whether the proposed work is to be done by contract or by force account:

Code	Description
1	Work to be done by contract.
2	Work to be done by owner's forces

Examples:	Code
A bridge is to be replaced by contract because it has deteriorated to the point that it can no longer carry legal loads. The same code should be used if the bridge is replaced because it is now too narrow or the original design was too light to accommodate today's legal loads.	|3|1|1|
A bridge is to be replaced because the roadway must be straightened to eliminate a dangerous curve. The work will be done by contract.	|3|2|1|
A bridge is to be widened to increase shoulder width or the number of traffic lanes. The existing deck is in good condition and will be incorporated as is into the new structure. The work is to be done by contract.	|3|3|1|
A culvert is to be extended by contract to accommodate additional roadway width as part of a reconstruction contract to improve the safety of the adjacent slopes.	|3|3|1|
A deck is to be rehabilitated and the bridge widened to provide a full 12 foot shoulder. The existing shoulder is only 4 feet wide and an extra line of girders with appropriate substructure widening must be added. The work will be done by contract.	|3|4|1|
A bridge superstructure and substructure are to be rehabilitated by state forces to increase the bridge's load capacity.	|3|5|2|
A bridge deck is to be rehabilitated by contract and a safety curb to be removed which results in incidental widening of two feet.	|3|6|1|

A bridge deck is to be replaced by contract and the deck cantilever overhang extended two feet, which is the maximum that can be done without adding another line of stringers or girders to the superstructure. | 3 | 7 | 1 |

A bridge which is no longer needed is to be demolished and an at grade crossing built by state forces. (This code could also be used to designate incidental safety work on a bridge such as bridge rail upgrading or replacement.) | 3 | 8 | 2 |

Length of Structure Improvement (Item 76) 6 Digits

Data entry will be made by Bridge Division.

Code a number to the nearest thousandth of a foot that represents the length of the proposed bridge improvement. For replacement or rehabilitation of the entire bridge, the length should be back to back of backwalls of abutments or from pavement notch to pavement notch. For replacement or rehabilitation of only part of the structure, use the length of the portion to be improved.

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. It may be coded for other bridges at the option of the highway agency.

For culvert improvements, use the proposed length measured along the centerline of the barrel regardless of the depth below grade. The measurement should be made between the inside faces of the top parapet or edge stiffening beam of the top slab.

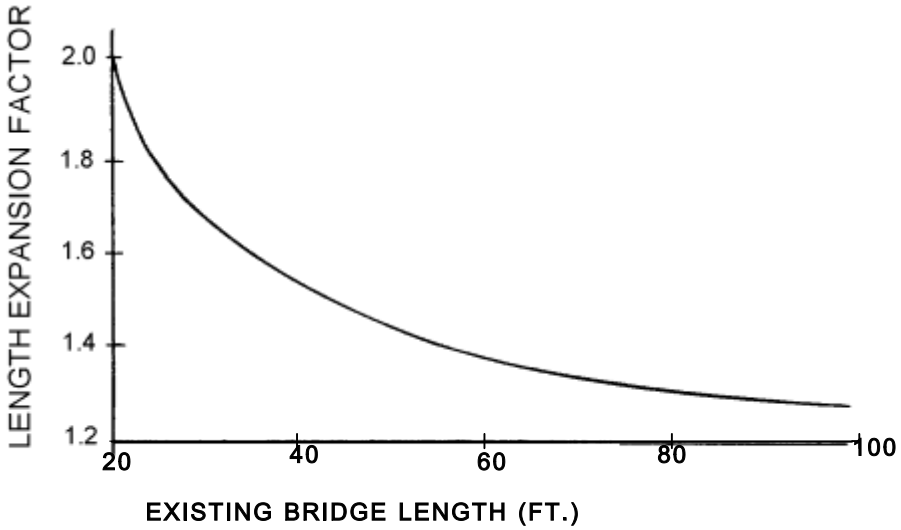
Examples:	Code	Length of Improvement
	|0|0|0|2|5|0|	250 feet
	|0|0|1|2|0|0|	1200 feet
	|0|1|2|3|4|5|	12345 feet

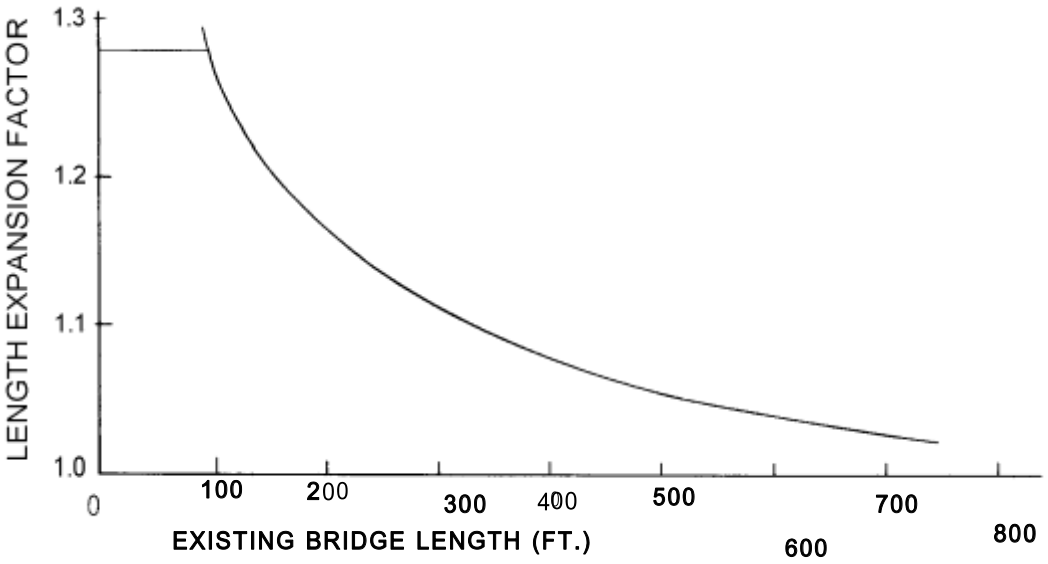
For substructure or channel work only, code the length of superstructure over or supported by the substructure or channel.

Typically, a replacement bridge is longer than the existing bridge. Nationwide averages for the increase in bridge length with replacement as a function of the existing length are given in the following figure. The length-expansion factors represent data for the years 1981 to 1985. Where site specific data is lacking, these factors are suggested for estimating the length of replacement bridges. For exceedingly long bridges (i.e., 1,000 feet or more), the length-expansion factor approaches 1.0.

INCREASED LENGTH OF REPLACED BRIDGES

X = EXISTING BRIDGE LENGTH Y = LENGTH EXPANSION FACTOR





REPLACEMENT BRIDGE LENGTH = EXISTING BRIDGE LENGTH x LENGTH EXPANSION FACTOR

Inspection Date (Item 90) — 6 Digits

Record the month, day and year that the last routine inspection of the structure was performed in the Pontis Schedule Tab. This inspection date may be different from those recorded in Item 93 - Critical Feature Inspection Date. Code a 8 digit number in Pontis to represent the month, day and year.

New structure, when let by the Department of Transportation, will be coded 01-01-1980.

Designated Inspection Frequency (Item 91) — 2 Digits

Data entry will be made by Bridge Division.

Code two digits to represent the number of months between designated inspections of the structure. Leading zeros shall be coded. This interval is usually determined by the individual in charge of the inspection program. For posted, understrength bridges, this interval should be substantially less than the 24 month standard. The designated inspection interval could vary from inspection to inspection depending on the condition of the bridge at the time of inspection. All bridges with an Alert Code 3 will have inspection frequency of not more than 12 months.

Examples:	Code
Posted bridge with heavy truck traffic and questionable structural details which is designated to be inspected each month.	|0|1|
Bridge is scheduled to be inspected every 24 months.	|2|4|

It should be noted that bridges will also require special non-scheduled inspections after unusual physical traumas such as floods, earthquakes, fires or collisions. These special inspections may range from a very brief visual examination to a detailed in-depth evaluation depending upon the nature of the trauma. For example, when a substructure pier or abutment is struck by an errant vehicle, in most cases only a visual examination of the bridge is necessary. After major collisions or earthquakes, in-depth inspections may be warranted as directed by the engineer in overall charge of the program. After and during severe floods, the stability of the substructure of bridges may have to be determined by probing, underwater sensors or other appropriate measures. Underwater inspection by divers may be required for some scour critical bridges immediately after floods. See Scour Critical Bridges (Item 113).

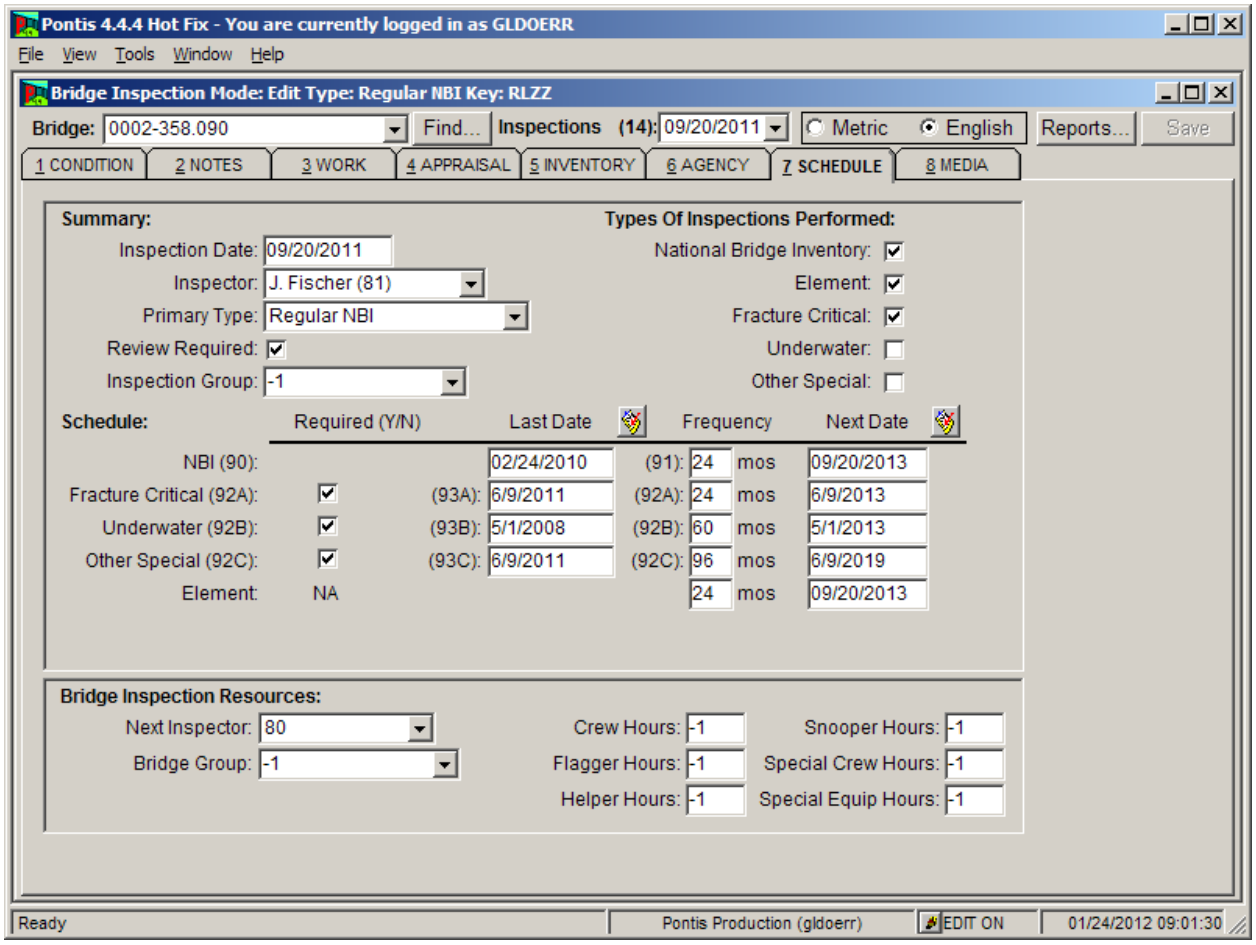
Critical Feature Inspection (Item 92) **9 Digits**

Data entry will be made by Bridge Division.

In the Pontis Schedule Tab denote critical features that need special inspections or special emphasis during inspections and the designated inspection interval in months as determined by the individual in charge of the inspection program. The designated inspection interval could vary from inspection to inspection depending on the condition of the bridge at the time of inspection.

Segment	Description
92A	Fracture Critical Details
92B	Underwater Inspection
92C	Other Special Inspection

Place a check in the box in the Pontis Schedule Tab for each of the above critical feature inspections. In the frequency box, code a 2 digit number to indicate the number of months between inspections only if the box is checked indicating the need for that inspection type. If the box is unchecked, code is -1.


Pontis 4.4.4 Hot Fix - You are currently logged in as GLDOERR
File View Tools Window Help
Bridge Inspection Mode: Edit Type: Regular NBI Key: RLZZ
Bridge: 0002-358.090
Find...
Inspections (14): 09/20/2011
Metric
English
Reports...
Save
1 CONDITION
2 NOTES
3 WORK
4 APPRAISAL
5 INVENTORY
6 AGENCY
7 SCHEDULE
8 MEDIA
Summary:
Inspection Date: 09/20/2011
Inspector: J. Fischer (81)
Primary Type: Regular NBI
Review Required:
Inspection Group: -1
Types Of Inspections Performed:
National Bridge Inventory:
Element:
Fracture Critical:
Underwater:
Other Special:
Schedule:
Required (Y/N)
Last Date
Frequency
Next Date
NBI (90): 02/24/2010 (91): 24 mos 09/20/2013
Fracture Critical (92A): (93A): 6/9/2011 (92A): 24 mos 6/9/2013
Underwater (92B): (93B): 5/1/2008 (92B): 60 mos 5/1/2013
Other Special (92C): (93C): 6/9/2011 (92C): 96 mos 6/9/2019
Element: NA 24 mos 09/20/2013
Bridge Inspection Resources:
Next Inspector: 80
Bridge Group: -1
Crew Hours: -1
Flagger Hours: -1
Helper Hours: -1
Snooper Hours: -1
Special Crew Hours: -1
Special Equip Hours: -1
Ready
Pontis Production (gldoerr)
EDIT ON
01/24/2012 09:01:30

Critical Feature Inspection Date (Item 93) 18 Digits

Code only if the "Required" box is checked. Record as a series of 8 digit code segments, the month, day and year that the last inspection of the denoted critical feature was performed.

Segment	Description
93A*	Fracture Critical Details
93B	Underwater Inspection
93C*	Other Special Inspection

For each segment of this item, when applicable, code a 8 digit number to represent the month, day and year. The number of the month should be coded in the first two digits with leading zeros as required the third and fourth should be coded with two digits with leading zeros as required and the number of the year coded as the fifth, sixth, seventh and eighth digits of the field. If the "Required" box Item 92 is not checked, then the corresponding part of this item shall be blank.

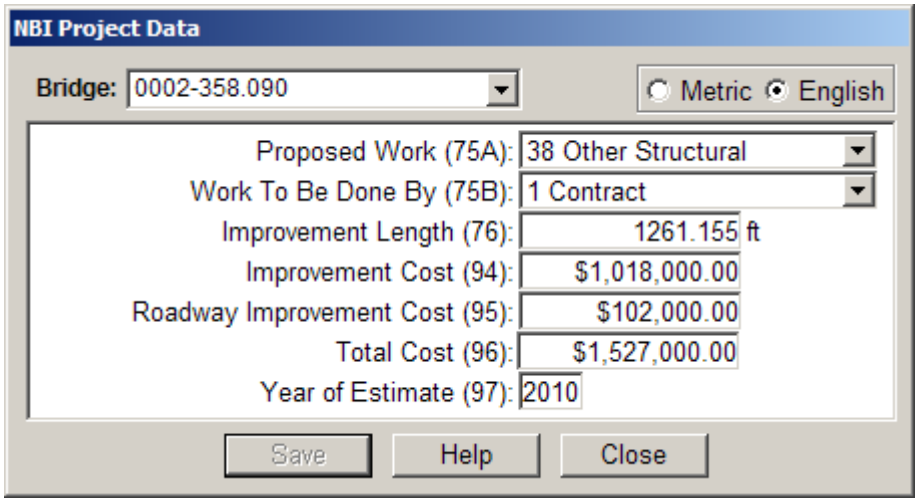
**** Note:*** *The inspector is to fill out the date on which the Fracture Critical Inspection, (93A), or Special Inspection, (93C) was completed. Underwater Inspection, (93B), dates will be completed by Bridge Division only for structures inspected by divers. Structures done by probing will be completed by the inspector. Fracture Critical and Special Inspections will also be completed by Bridge Division if the inspection was done by contract.*

Bridge Improvement Cost (Item 94)	6 Digits

Data entry will be made by Bridge Division.

In the Pontis Work tab under NBI Project Costs, code the estimated improvement cost. This cost shall include only bridge construction costs, excluding roadway, right of way, detour, demolition, preliminary engineering, etc. Code the year of the estimate in Year of Estimate (Item 97). Do not use this item for estimating maintenance cost.

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. It may be coded for other bridges at the option of the highway agency.



Nationally, the deck area of replaced bridges is averaging 2.2 times the deck area before replacement. The deck area of rehabilitated bridges is averaging 1.5 times the deck area before rehabilitation. Widening square foot costs are typically 1.8 times the square foot cost of new bridges with similar spans. For example, if the average cost of a new bridge is $50 per square foot, the average cost of the widened area would be $90 per square foot.

Each highway agency is encouraged to use its best available information and established procedures to determine bridge improvement costs. In the absence of these procedures, the highway agency may wish to use the following procedure as a guide in preparing bridge improvement cost estimates.

Applying a construction unit cost to the proposed bridge area developed by using (1) current state deck geometry design standards and (2) proposed bridge length from Length of Structure Improvement (Item 76).

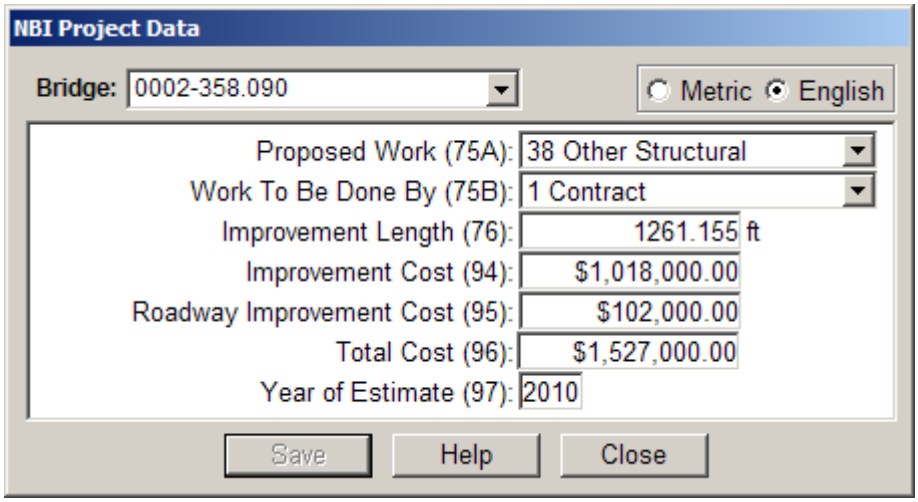
Item 95 - Roadway Improvement Cost	6 Digits

Data entry will be made by Bridge Division.

In the Pontis Work tab under NBI Project Costs, code the estimated roadway improvement cost. This shall include only roadway construction cost, excluding bridge, right of way, detour, extensive roadway alignment costs, preliminary engineering, etc. Code the base year for the cost in Year of Improvement Cost Estimate (Item 97). Do not use this item for estimating maintenance cost.

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. It may be coded for other bridges at the option of the highway agency.

In the absence of a procedure for estimating roadway improvement costs, a guide of 10 percent of the bridge costs is suggested.



Total Project Cost (Item 96)	6 Digits

Data entry will be made by Bridge Division.

In the Pontis Work tab under NBI Project Costs, code the total cost, including incidental costs not included in Improvement Cost or Roadway Improvement Cost. This item should include all costs normally associated with the proposed bridge improvement cost. The Total Project cost will therefore usually be greater than the sum of the Improvement Cost or Roadway Improvement Cost. Code the base year for the cost in Year of Improvement Cost Estimate (Item 97). . Do not use this item for coding maintenance costs.

This item must be coded for bridges eligible for the Highway Bridge Replacement and Rehabilitation Program. It may be coded for other bridges at the option of the highway agency.

In the absence of a procedure for estimating the total project cost, a guide of 150 percent of the bridge cost is suggested.

Year of Improvement Cost Estimate (Item 97) — 4 Digits

Data entry will be made by Bridge Division.

In the Pontis Work tab under NBI Project Costs, code the Year of Improvement Cost Estimate that the costs of work estimated in Bridge Improvement Cost (Item 94), Roadway Improvement Cost (Item 95) and Total Project Cost (Item 96 were based upon. This date and the data provided for the improvement costs must be current; that is, Year of Improvement Cost Estimate shall be no more than eight years old. Code the four digits of the year so recorded.

Examples:		Code
Year of Cost Estimate	1988 costs	1988
	2010 costs	2010

Border Bridge (Item 98) — 5 Digits

Data entry will be made by Bridge Division.

Use this item to indicate structures crossing borders of states. Use the dropdown boxes to code the State and Region of the bridge in the inventory/ID/Admin Tab. Use the Share box to specifying the responsibility for improvements to the existing structure when it is shared with a neighboring state.

Description	
Neighboring State Code	drop down box
Percent Responsibility	numerical box

For the special case of a structure on the border with Canada or Mexico, code the state code value = CAN or MEX respectively. If structure is not on a border, select not applicable.

Border Bridge Structure Number (Item 99)	15 Digits

Data entry will be made by Bridge Division.

In the inventory/ID/Admin tab code the neighboring state's 15 digit National Bridge Inventory structure number for any structure noted in the Border Bridge No. text box. This number must match exactly the neighboring state's submitted NBI structure number. The entire 15 digit field must be accounted for including zeros and blank spaces whether they are leading, trailing or embedded in the 15 digit field. If Border Bridge is not applicable, this item is blank.

STRAHNET Highway Designation (Item 100) 1 Digit

Data entry will be made by Bridge Division.

This item shall be coded for all records in the inventory. For the inventory route identified in Inventory Route, under the Inventory/Roads tab ,indicate STRAHNET highway conditions using one of the following codes in the dropdown menu:

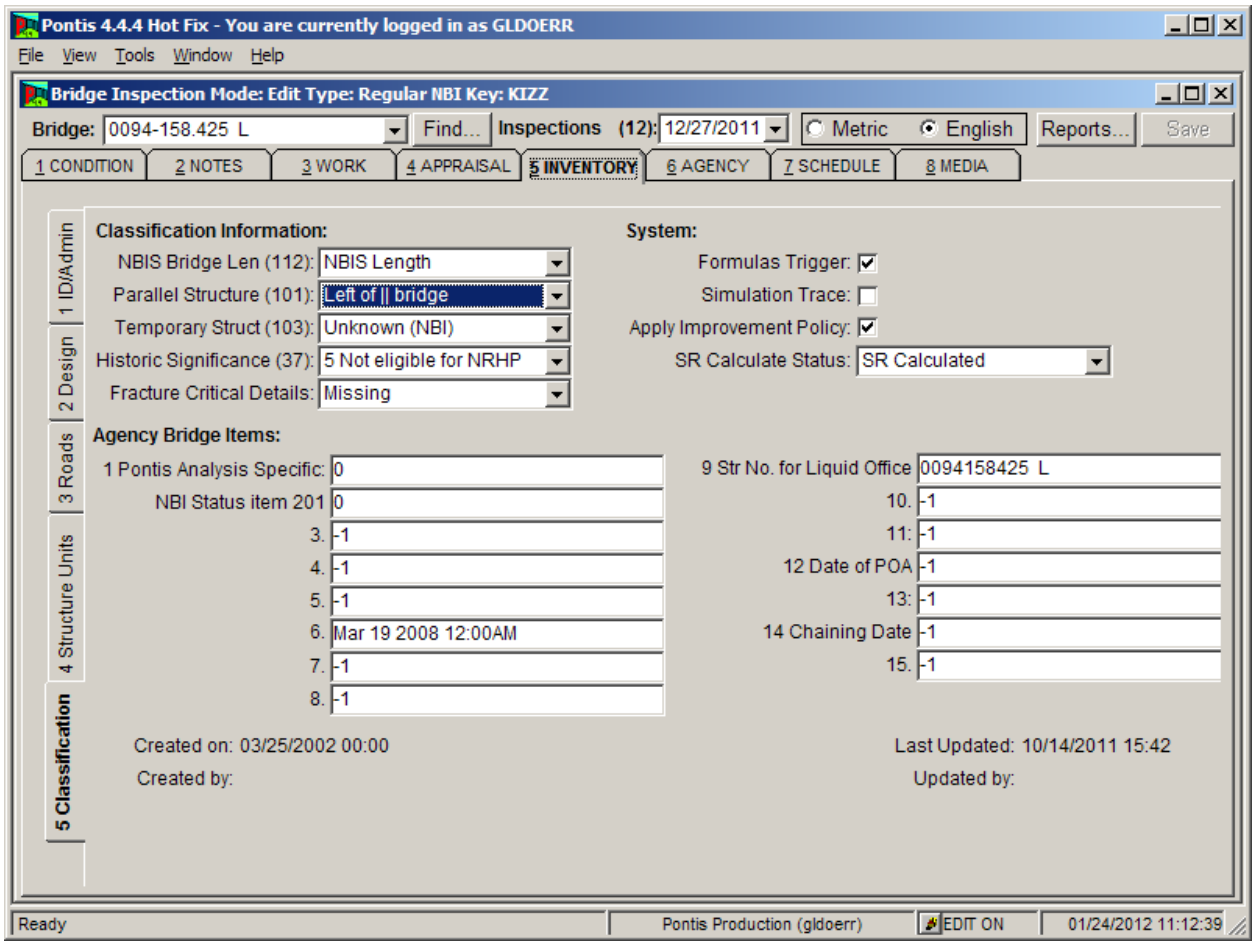
Code	Description
0	The inventory route is not a STRAHNET route..
1	The inventory route is on a Interstate STRAHNET route.
2	The inventory route is on a Non-Interstate STRAHNET route.
3	The inventory route is on a STRAHNET connector route.
	Unknown

Parallel Structure Designation (Item 101) 1 Digit

In the Inventory/Classification tab code this item to indicate situations where separate structures carry the inventory route in opposite directions of travel over the same features.

Use the dropdown menu to code one of the following codes to describe the situation:

Description
The right structure of parallel bridges carrying the roadway in the direction of the inventory. (For a STRAHNET highway, this is west to east and south to north.)
The left structure of parallel bridges. This structure carries traffic in the opposite direction.
No parallel structure exists.

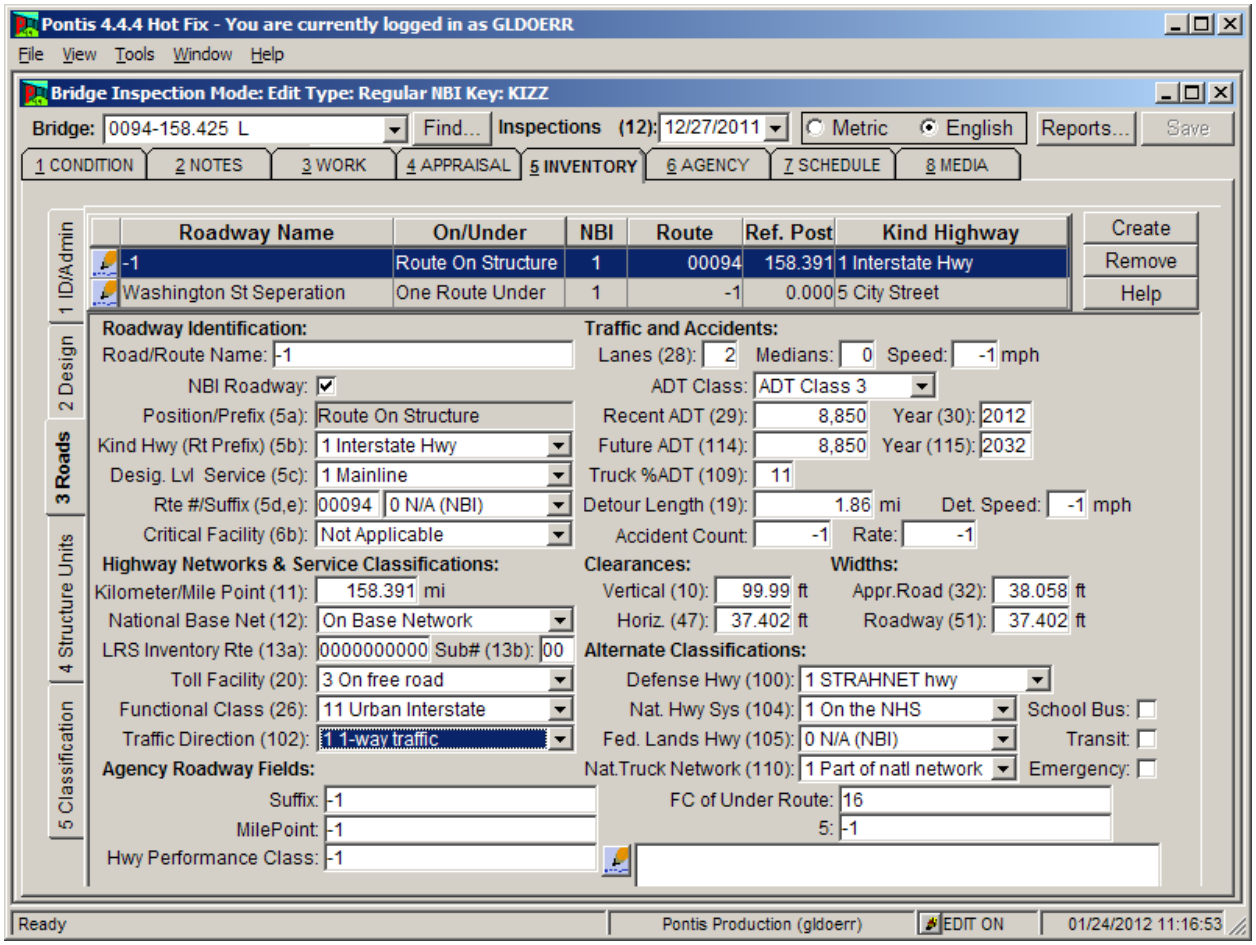

Pontis 4.4.4 Hot Fix - You are currently logged in as GLDOERR
File View Tools Window Help
Bridge Inspection Mode: Edit Type: Regular NBI Key: KIZZ
Bridge: 0094-158.425 L
Find...
Inspections (12): 12/27/2011
Metric
English
Reports...
Save
1 CONDITION
2 NOTES
3 WORK
4 APPRAISAL
5 INVENTORY
6 AGENCY
7 SCHEDULE
8 MEDIA
1 ID/Admin
2 Design
3 Roads
4 Structure Units
5 Classification
Classification Information:
NBIS Bridge Len (112): NBIS Length
Parallel Structure (101): Left of || bridge
Temporary Struct (103): Unknown (NBI)
Historic Significance (37): 5 Not eligible for NRHP
Fracture Critical Details: Missing
System:
Formulas Trigger:
Simulation Trace:
Apply Improvement Policy:
SR Calculate Status: SR Calculated
Agency Bridge Items:
1 Pontis Analysis Specific: 0
NBI Status item 201 0
3. -1
4. -1
5. -1
6. Mar 19 2008 12:00AM
7. -1
8. -1
9 Str No. for Liquid Office 0094158425 L
10. -1
11: -1
12 Date of POA -1
13: -1
14 Chaining Date -1
15. -1
Created on: 03/25/2002 00:00
Created by:
Last Updated: 10/14/2011 15:42
Updated by:
Ready
Pontis Production (gldoerr)
EDIT ON
01/24/2012 11:12:39

Direction of Traffic (Item 102)	1 Digit

In the Inventory/Roads Tab code the direction of traffic in the dropdown menu. This item must be compatible with other traffic related items such as Average Daily Traffic (Item 29) and Bridge Roadway Width, Curb to Curb (Item 51).

Code	Description
0	Highway traffic not carried
1	One way traffic
2	Two way traffic
3	One lane bridge for two way traffic *

** Code Item 102 with a 3 if the structure carries two way traffic and if Item 51 is less than 16 feet.*



Temporary Structure Designation (Item 103) — 1 Digit

Code this item from the dropdown menu in the Inventory/Classification tab to indicate situations where temporary structures or conditions exist. This item should be coded not applicable if this is not a temporary structure.

Code	Description
T	Temporary structure(s) or conditions exist.
P	Not Applicable
NBI	Unknown

Temporary structure(s) or conditions are those which are required to facilitate traffic flow. This may occur either before or during the modification or replacement of a structure found to be deficient. Such conditions include the following:

1. Bridges shored up, including additional temporary supports.

2. Temporary repairs made to keep a bridge open.

3. Temporary structures, temporary runarounds or bypasses.

4. Other temporary measures, such as barricaded traffic lanes to keep the bridge open.

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

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

Inventory Route, Minimum Vertical Clearance	(Item 10)
Structure Open, Posted or Closed to Traffic	(Item 41)
Inventory Route, Total Horizontal Clearance	(Item 47)
Minimum Vertical Clearance Over Bridge Roadway	(Item 53)
Minimum Vertical Underclearance	(Item 54)
Minimum Lateral Underclearance on Right	(Item 55)
Minimum Lateral Underclearance on Left	(Item 56)
Bridge Posting	(Item 70)

Highway System of the Inventory Route (Item 104) — 1 Digit

Code this item in the inventory/Roads tab for all records in the inventory. For the Inventory Route identified in Item 5, indicate whether the Inventory Route is on the NHS or not on that system. Initially, this code shall reflect an Inventory Route on the designated NHS as reported to the FHWA to meet the NHS "Interim System" description in Section 1006(a) of the 1991 ISTEA. Upon approval of the NHS by Congress, the coding is to reflect the approved NHS. Use one of the following codes from the dropdown menu:

Description
Not on the NHS
On the NHS

Federal Lands Highways (Item 105) — 1 Digit

Structures owned by State and local jurisdictions on roads which lead to and traverse through federal lands sometimes require special coded unique identification because they are eligible to receive funding from the Federal Lands Highway Program. One of the following codes shall be selected from the dropdown menu in the Inventory/Roads Tab:

Code	Description
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

Year Reconstructed (Item 106) — 4 Digits

Record and code the year of reconstruction of the structure in the Inventory/ID/Admin tab. Code all four digits of the latest year in which reconstruction of the structure was completed. If there has been no reconstruction, code -1.

For a bridge to be defined as reconstructed, 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.

Normal and even heavy maintenance activity should not be classified as reconstruction unless there is a substantive increase in basic capacity. Capacity may be waterway, roadway width or load capacity.

If box culverts or pipes have been lengthened to expand the safety clear zone, do not code as reconstruction. If box culverts or pipes have been lengthened to accommodate more roadway width, consider it reconstruction just as it would be if the structure were a bridge.

Some types of eligible work not to be considered as reconstruction 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 substantial element or extra girder).

Some type of eligible work considered as reconstruction are:

- *Replacing all timber stringers or entire timber deck.*
- *Replacement of superstructure only.*

If superstructure is replaced or if superstructure and some substructure is replaced - code as new structure under Year Built (Item 27).

Deck Structure Type (Item 107) 1 Digit

Record the type of deck system on the bridge in the dropdown menu in the Inventory/ID/Admin Tab. If more than one type of deck system is on the bridge, code the most predominant. Code N (N/A) for a filled culvert or arch with the approach roadway section carried across the structure. Use one of the following codes:

Code	Description
1	Concrete Cast-in-Place
2	Concrete Precast
3	Open grating
4	Closed grating
5	Steel Plate (includes orthotropic)
6	Corrugated Steel
7	Aluminum
8	Timber
9	Other
N	Not applicable

Code "N" for bridges without decks.

Adjacent box beam
Channel beam
Quad T
Triple T
Double T

Deck Surface/Protection System (Item 108) 3 Digits

Information on the wearing surface and protective system of the bridge deck shall be coded using three segments in the dropdown menus in the Inventory/Design Tab.

Segment	Description
108A	Deck Surface Type
108B	Deck Membrane Type
108C	Deck Protection

Deck Surface Type (Item 108A):

Code	Description
1	Monolithic Concrete
2	Integral Concrete*
3	Latex Concrete (MMA)
4	Low Slump Concrete
5	Epoxy Overlay
6	Bituminous
7	Timber
8	Gravel
9	Other
0	None
N	Not Applicable (applies only to structures with no deck)

* Separate layer of concrete added but not latex modified, low slump, etc.

Type of Membrane (Item 108B):

Code	Description
1	Built-up
2	Preformed Fabric
3	Epoxy
8	Unknown
9	Other
0	None
N	Not Applicable (applies only to structures with no deck)

Deck Protection (Item 108C):

Code	Description
1	Epoxy coated Reinforcing ****
2	Galvanized Reinforcing
3	Other Coated Reinforcing
4	Cathodic Protection
6	Polymer Impregnated
7	Internally Sealed
8	Unknown
9	Other
0	None
N	Not Applicable (applies only to structures with no deck--adjacent girders and culverts)

***** NOTE:** *Most state bridges built after 1977 have epoxy coated reinforcement.*

Structures with "no deck" will be coded │N│N│N│ in Deck Surface/Protective Systems (Item 108) even if they are overlaid.

Average Daily Truck Traffic (XX percent) (Item 109) 2 Digits

Data entry will be made by Bridge Division.

In the Inventory/Roads Tab code a 2 digit percentage that shows the percentage of Average Daily Truck Traffic (Item 29) that is truck traffic. Do not include vans, pickup trucks and other light delivery trucks in this percentage.

If this information is not available, an estimate which represents the average percentage for the category of road carried by the bridge may be used. Leave blank if Item 29 - Average Daily Traffic is not greater than 100.

Designated National Network (Item 110) — 1 Digit

Data entry will be made by Bridge Division.

The national network for trucks includes most of the Interstate System and those portions of the Federal Aid Primary System in the Code of Federal Regulations (23 CFR 658). The national network for trucks is available for use by commercial motor vehicles of the dimensions and configurations described in these regulations. For the inventory route identified in Inventory Route, indicate conditions using one of the following codes from the dropdown menu in the Inventory/Roads Tab:

Code	Description
0	Not part of the national network for trucks.
1	Part of the national network for trucks.

Pier or Abutment Protection (for Navigation) (Item 111) — 1 Digit

If Navigation Control (Item 38) has been coded Permit Required, use the codes below in the pull down menu in the Appraisal/Other Ratings Tab to indicate the presence and adequacy of pier or abutment protection features such as fenders, dolphins, etc. The condition of the protection devices may be a factor in the overall evaluation of Substructure (Item 60). If Navigation Control has been coded Permit Not Required or No Waterway, code Not Applicable.

Code	Description
1	Navigation protection not required
2	In place and functioning
3	In place but in a deteriorated condition
4	In place but reevaluation of design suggested
5	None present but reevaluation suggested
P	Not Applicable

NBIS Bridge Length (Item 112) — 1 Digit

Does this structure meet or exceed the minimum length specified to be designated as a bridge for National Bridge Inspection Standards purposes? The following definition of a bridge is used by AASHTO and is given in the NBIS, 23 CFR 650.3:

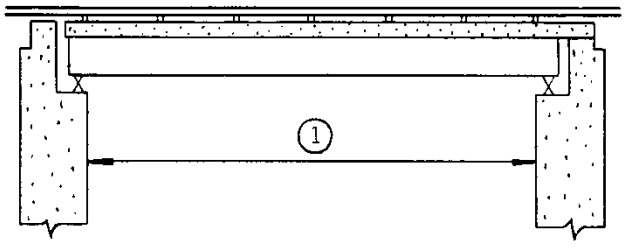
> A structure, including supports erected over a depression or an obstruction, such as water, highway or railway and having a track or passageway for carrying traffic or other moving loads and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments 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. Code this item in the Inventory/Classification Tab in the dropdown menu:

Code	Description
Y	NBIS Length
N	Not NBIS Length

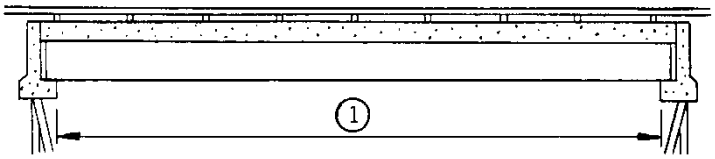
The following is from a memo received from the FHWA, North Dakota Division, in Bismarck, on March 7, 1990.

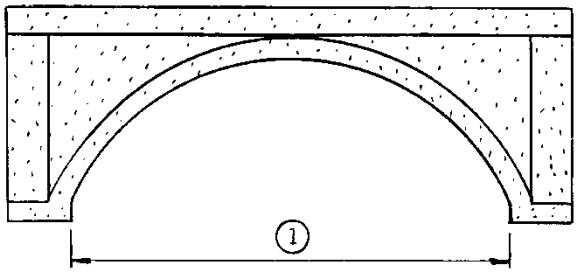
" NBIS bridge length, Item 112, has been created . The actual dimension is not recorded since no calculations are likely to be based on the value. Yes or no is all that is required for the national records. Measured as shown below (undercoping to undercoping) a 19.99 foot dimension is to be coded N, a 20.00 foot or greater dimension is to be coded Y."

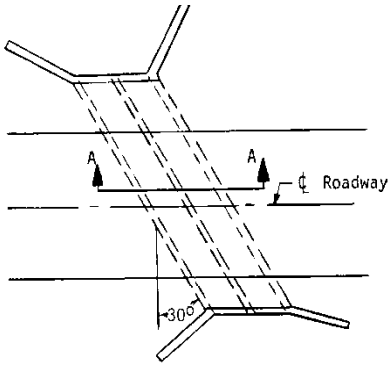
EXAMPLES: ∈ Item 112 - NBIS Bridge Length

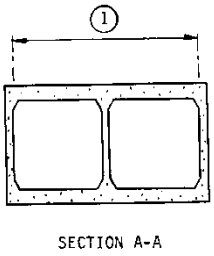


EXAMPLES: ∈ Item 112 - NBIS Bridge Length

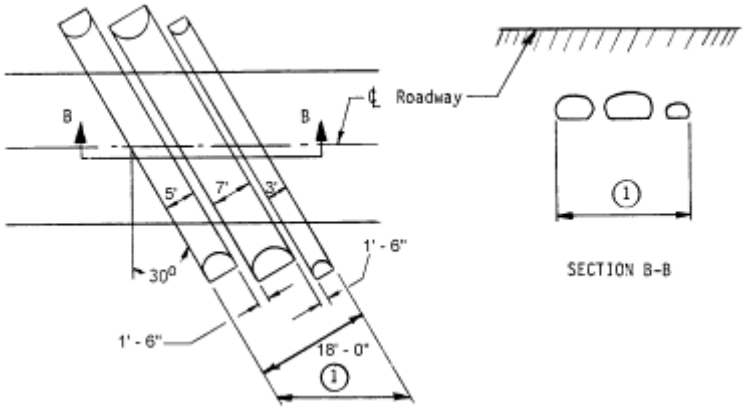








SECTION A-A



SECTION B-B

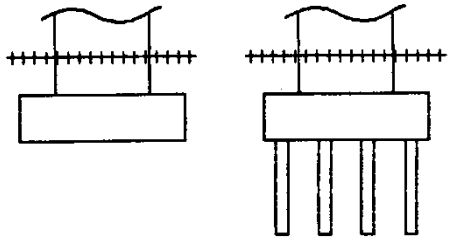
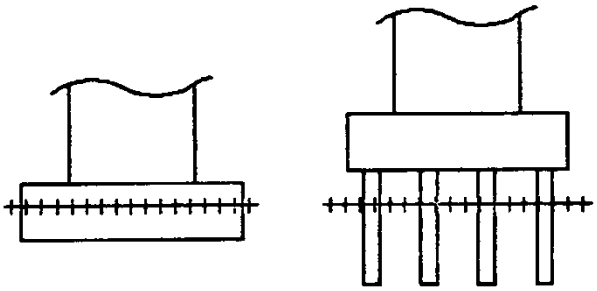
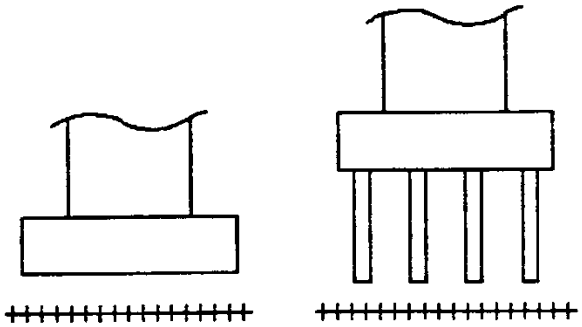
Scour Critical Bridges (Item 113) — 1 Digit

Data entry will be made by Bridge Division.

In the Appraisal/Other Ratings Tab use the dropdown menu to identify the current status of the bridge regarding its vulnerability to scour. The scour calculations/analysis and field inspections for this determination shall be made by hydraulic/foundation engineers. Details on conducting a scour analysis are included in the FHWA Technical Advisory entitled, "Scour at Bridges". Whenever a rating factor of four or below is determined for this item the rating factor for Substructure (Item 60) may need to be revised to reflect the severity of actual scour and resultant damage to the bridge. For foundations on rock where scour cannot be calculated, use the coding most descriptive of site conditions. 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.

Code	Description
N	Bridge not over waterway.
T	Bridges over "tidal" waters that have not been evaluated for scour, but are considered low risk. These bridges will be monitored with regular inspection program and appropriate underwater inspections.
U	Bridges with "unknown" foundations that have not been evaluated for scour. Since scour risk on these bridges cannot be determined, they should be flagged for monitoring during flood events and, if appropriate, closure.
9	Bridge foundations (including piles) well above flood water elevations (on dry land).
8	Bridge foundations determined to be stable for calculated scour conditions; calculated scour is above top of footing.
7	Countermeasures have been installed to correct a previously existing problem with scour. Bridge is no longer scour critical.
6	Scour calculation/evaluation has not been made. (Use only to describe case where bridge has not yet been evaluated for scour potential.)
5	Bridge foundations determined to be stable for calculated scour conditions; scour within limits of footing or piles.

Code	Description
4	Bridge foundations determined to be stable for calculated scour conditions; field review indicates action is required to protect exposed foundations from effects of additional erosion and corrosion.
3	Bridge is scour critical; bridge foundations determined to be unstable for calculated scour conditions: - Scour within limits of footing or piles. - Scour below spread-footing base or pile tips.
2	Bridge is scour critical; field review indicates that extensive scour has occurred at bridge foundations. Immediate action is required to provide scour countermeasures.
1	Bridge is scour critical; field review indicates that failure of piers/abutments is imminent. Bridge is closed to traffic.
0	Bridge is scour critical; bridge has failed and is closed to traffic.

EXAMPLES	CALCULATED SCOUR DEPTH	ACTION NEEDED
A. Above top of footing		None - indicate rating 8 for this item
B. Within limits of footing or piles		Conduct foundation structural analysis
C. Below pile tips or spread-footing base		Provide for monitoring and scour counter-measures as necessary
++++++++++++++ = Calculated scour depth		

Future Average Daily Traffic (Item 114) — 6 Digits

Future ADT over 100 will be coded by Bridge Division.

In the Inventory/Roads Tab code the forecasted average daily traffic (ADT) for the inventory route (Item 5). This shall be projected at least 17 years but no more than 22 years from the year data is submitted to the NBI. The intent is to provide a basis for a 20 year forecast. This item may be updated any time, but must be updated when the forecast falls below the 17 year limit. If planning data is not available, use the best estimate based on site familiarity.

The future ADT must be compatible with the other items coded for the bridge. For example, parallel bridges with an open median are coded as follows: If Lanes On and Under the Structure (Item 28) and Bridge Roadway Width, Curb to Curb (Item 51) are coded for each bridge separately, then the future ADT must be coded for each bridge separately (not the total for the route).

Code the Future ADT in the text box in the Inventory/Roads Tab.

Year of Future Average Daily Traffic (Item 115) — 4 Digits

In the Inventory/Roads Tab code the four digits of the year represented by the Future ADT (Item 114). The projected year of future ADT shall be at least 17 years but no more than 22 years from the year data is submitted to the NBI.

Code the Year of Future ADT in the text box in the Inventory/Roads Tab.

Add 20 years to the year shown in Item 90.

Minimum Navigation Vertical Clearance (Item 116) **3 Digits**
Vertical Lift Bridge (XXX Feet)

In the Appraisal/Other Ratings Tab, report to the nearest one thousandth of a foot the minimum vertical clearance imposed at the site as measured above a datum that is specified on a navigation permit issued by a control agency. Code this item only for vertical lift bridges in the dropped or closed position, otherwise leave blank.

North Dakota does not have any lift bridges.

The remaining items have been added by the NDDOT for our use in tracking and maintaining our bridges. The items have been added to Pontis either in the main program or in our Agency specific items.

Agency Admin Area (*Item 200)*

Code this item in inventory/ID/Admin Tab - Item used for computer processing and queries- the determination/designation of the system category on which the structure is located. System categories are:

1 State
2 County On
3 County Off
4 Urban

Status (Item 201)

From computer analysis; entries are:

0 Non-deficient
1 Structurally deficient
2 Functionally obsolete

General Qualifications:

Pontis automatically calculates this item for all bridges that are of NBIS Length. Bridges/culverts shorter than NBIS Length are calculated via the site http://mydot.nd.gov/dotnet2/pontis/admin/pontisreports.aspx by selecting the Update NBI Status. The results are stored in Pontis under the Inventory/Classifications Tab in the Agency Bridge Items under NBI Status Item 201. This item may be manually changed if needed.

In order to be considered for either the structurally deficient or functionally obsolete classification, the first digit of Highway Route must be Route On Structure and Structure Length ≥ 20.0'.

Structurally Deficient

1. A condition rating of 4 or less for
Item 58 - Deck; or
Item 59 - Superstructures; or
Item 60 - Substructures; or
Item 62 - Culvert and Retaining Walls[1].

or 2. An appraisal rating of 2 or less for
Item 67 - Structural Condition; or
Item 71 - Waterway Adequacy[2].

Functionally Obsolete

1. An appraisal rating of 3 or less for
Item 68 - Deck Geometry
Item 69 - Underclearances[3]; or
Item 72 - Approach Roadway Alignment.

or 2. An appraisal rating of 3 for
Item 67 - Structural Condition; or
Item 71 - Waterway Adequacy[2].

Any bridge classified as structurally deficient is excluded from the functionally obsolete category.

1. *Culvert and Retaining Walls (Item 62) applies only if the last two digits of Design Main (Item 42) are coded Frame or Culvert.*

2. *Waterway Adequacy (Item 71) applies only if the last digit of Design Main (Item 42) is coded Other (0), Waterway (5), Highway-Waterway (6), Railroad-waterway (7), Hwy-Waterway-RR (8) or Relief for waterway (9).*

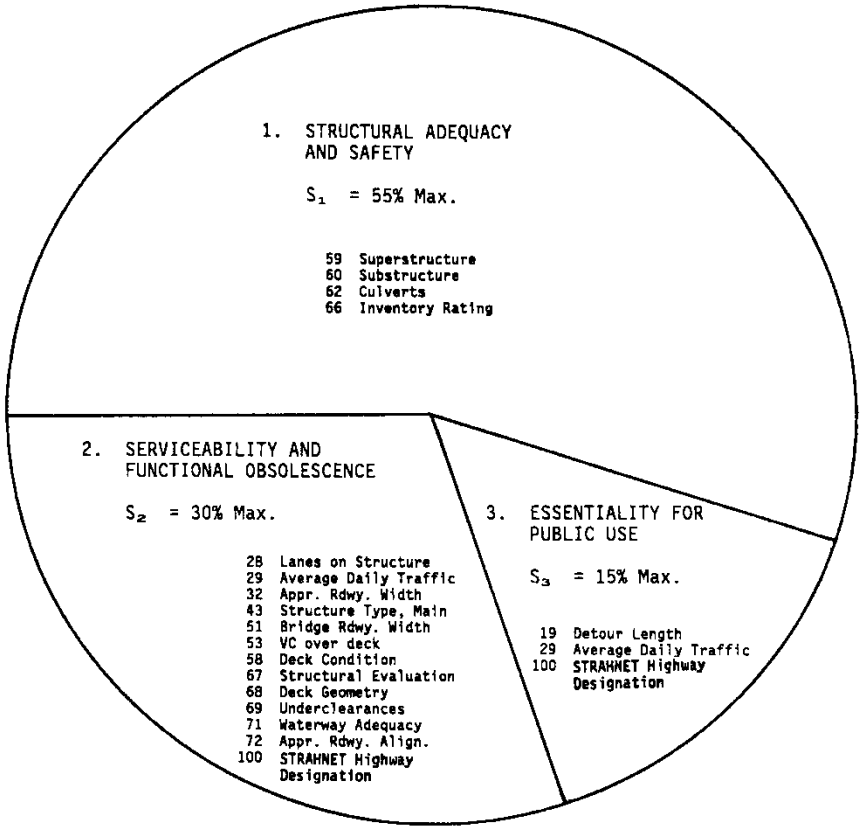
3. *Underclearances (Item 69) applies only if the last digit of Design Main (Item 42) is coded Other (0), Highway (1), Railroad (2), Highway-Railroad (4), Highway-Waterway (6), Railroad-Waterway (7) or Hwy-Waterway-RR (8).*

Sufficiency Rating (*Item 202)*

Calculations are by computer. No coding required. Pontis stores the SR for each structure. Calculations are made by selecting the Sufficiency Rate button in the Conditions Tab.

Sufficiency Rating Formula and Example

The sufficiency rating formula described herein is a method of evaluating data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge.



Sufficiency Rating Formula

1. Structural Adequacy and Safety (55% maximum)

a. Only the lowest code of Item 59, 60 or 62 applies.

If #59 (Superstructure Rating) or #60 (Substructure Rating) is	≤2	then	A = 55%
	=3		B = 40%
	=4		C = 25%
	=5		D = 10%
If #59 and #60 = N and #62 (Culvert Rating) is	≤2	then	E = 55%
	=3		F = 40%
	=4		G = 25%
	=5		H = 10%

b. Reduction for Load Capacity:

(1) Calculate AIT (Adjusted Inventory Tonnage) as follows:

If the 1st digit of #66 = 1, AIT=the 2nd & 3rd digits x 1.56

If the 1st digit of #66 = 2, AIT=the 2nd & 3rd digits x 1.00

If the 1st digit of #66 = 3, AIT=the 2nd & 3rd digits x 1.56

If the 1st digit of #66 = 4, AIT=the 2nd & 3rd digits x 1.01

If the 1st digit of #66 = 5, AIT=the 2nd & 3rd digits x 0.77

If the 1st digit of #66 = 6, AIT=the 2nd & 3rd digits x 0.67

If the 1st digit of #66 = 9, AIT=the 2nd & 3rd digits x 1.00

(2) Calculate using the following formulas:

$$I = (36 - AIT)^{1.5} \times 0.2778$$

If (36 - AIT) ≤ 0, then I = 0

"I" shall not be less than 0% nor greater than 55%.

$$S_1 = 55 - (A + B + C + D + E + F + G + H + I)$$

S_1 shall not be less than 0% nor greater than 55%.

2. Serviceability and Functional Obsolescence (30% maximum)

a. Rating Reductions (13% maximum)

If #58 (Deck Condition) is	≤ 3	then A = 5%
	= 4	A = 3%
	= 5	A = 1%
If #67 (Structural Evaluation) is	≤ 3	then B = 4%
	= 4	B = 2%
	= 5	B = 1%
If #68 (Deck Geometry) is	≤ 3	then C = 4%
	= 4	C = 2%
	= 5	C = 1%
If #69 (Underclearances) is	≤ 3	then D = 4%
	= 4	D = 2%
	= 5	D = 1%
If #71 (Waterway Adequacy) is	≤ 3	then E = 4%
	= 4	E = 2%
	= 5	E = 1%
If #72 (Appr. Road Alignment) is	≤ 3	then F = 4%
	= 4	F = 2%
	= 5	F = 1%

J = (A + B + C + D + E + F)

J shall not be less than 0% nor greater than 13%.

b. Width of Roadway Insufficiency (15% maximum)

Use the sections that apply:

(1) applies to all bridges;
(2) applies to 1 lane bridges only;
(3) applies to 2 or more lane bridges;
(4) applies to all except 1 lane bridges.

Also determine X and Y:

X (ADT/Lane) = #29 (ADT) / first 2 digits or #28 (Lanes)

Y (Width/Lane) = #51 (Bridge Rdwy. Width) / first 2 digits of #28

(1) Use when the last 2 digits of #43 (Structure Type) are not equal to 19 (Culvert):

If (#51 + 2 ft.) < #32 (Appr. Rdwy. Width) G = 5%

(2) For 1 lane bridges only, use Figure 1 or the following:

If the first 2 digits of #28 (Lanes) are equal to 01 and

Y < 14	**then**	**H = 15%**
Y ≥ 14 < 18		**H = 15 (18 - Y) / (4) %**
Y ≥ 18		**H = 0%**

(3) For 2 or more lane bridges. If these limits apply, do not continue on to (4) as no lane width reductions are allowed.

If the first 2 digits of #28 = 02 and Y ≥ 16, H = 0%

If the first 2 digits of #28 = 03 and Y ≥ 15, H = 0%

If the first 2 digits of #28 = 04 and Y ≥ 14, H = 0%

If the first 2 digits of #28 = 05 and Y ≥ 12, H = 0%

(4) For all <u>except</u> 1 lane bridges, use Figure 1 or the following:

If	**Y < 9 and X > 50**	**then**	**H = 15%**
	Y < 9 and X ≤ 50		**H = 7.5%**
	Y ∃ 9 and X ≤ 50		**H = 0%**
If X > 50 but # 125 and			
	Y < 10	**then**	**H = 15%**
	Y ≥ 10 < 13		**H = 15 (13 - Y) / (3) %**
	Y ≥ 13		**H = 0%**

If X > 125 but ≤ 375 and

Y < 11	**then**	**H = 15%**
Y ≥ 11 < 14		**H = 15 (14 - Y) % (3)**
Y ≥ 14		**H = 0%**

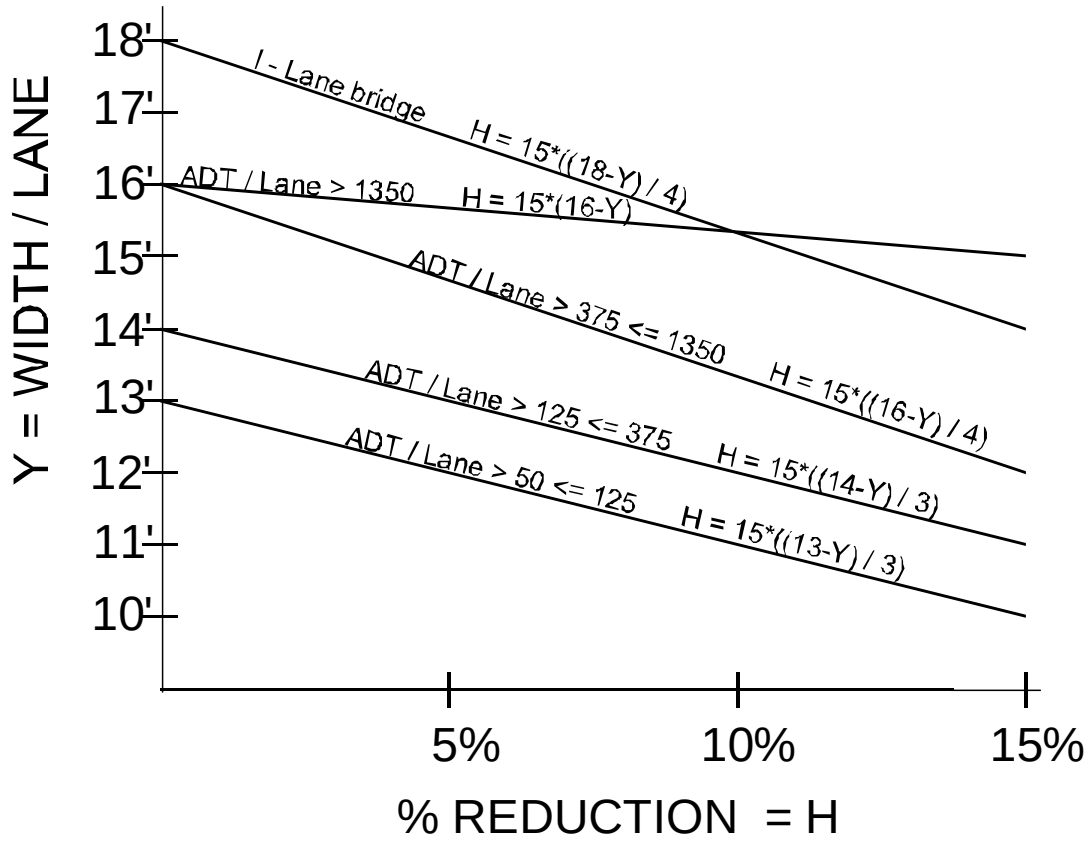


FIGURE 1

If X > 375 but # 1350 and

Y < 12	**then**	**H = 15%**
Y ≥ 12 and < 16		**H = 15** $\left(\frac{16 - Y}{4}\right)$ **%**
Y ≥ 16		**H = 0%**

If X > 1350 and

Y < 15	**then**	**H = 15%**
Y ≥ 15 < 16		**H = 15(16 - Y)%**
Y ≥ 16		**H = 0%**

G + H shall not be less than 0% nor greater than 15%.

c. Vertical Clearance Insufficiency - (2% maximum)

If #100 (Defense Highway Designation) > 0 and

#53 (VC over Deck) ≥ 1600	**then**	**I = 0%**
#53 < 1600		**I = 2%**

If #100 = 0 and

#53 ≥ 1400	**then**	**I = 0%**
#53 < 1400		**I = 2%**

S_2 **= 30 - J + (G + H) + I**

S_2 **shall not be less than 0% nor greater than 30%.**

3. Essentiality for Public Use (15% maximum)

a. Determine:

$$K = \frac{S_1 + S_2}{85}$$

b. Calculate:

b. Calculate:

$$A = \frac{\#29 \text{ (ADT)} \times \#19 \text{ (Detour Length)}}{200{,}000 \times K} \times 15$$

"A" shall not be less than 0% nor greater than 15%.

c. Defense Highway Designation:

If #100 is > 0 then B = 2%

If #100 = 0 then B = 0%

$S_3 = 15 - (A + B)$

S_3 shall not be less than 0% nor greater than 15%.

4. Special Reductions (Use only when $S_1 + S_2 + S_3 \exists 50$)

a. Detour Length Reduction, use the following:

$A = (\#19)^4 \times (5.205 \times 10^{-8})$

"A" shall not be less than 0% nor greater than 5%.

b. If the 2nd and 3rd digits of #43 (Structure Type, Main) are equal to 10, 12, 13, 14, 15, 16 or 17; then

B = 5%

c. If 2 digits of #36(Traffic Safety Features)= 0 C = 1%
If 3 digits of #36 = 0 C = 2%
If 4 digits of #36 = 0 C = 3%

$S_4 = A + B + C$

S_4 sha11 not be less than 0% nor greater than 13%.

Sufficiency Rating = $S_1 + S_2 + S_3 - S_4$

The Rating shall not be less than 0% nor greater than 100%.

Example

Calculation of Sufficiency Rating

1. Structural Adequacy and Safety

A, B, C, E, F, G, H = Not Applicable

D = 10%

$$I = [36 - (1.00 \times 22)]^{1.5} \times 0.2778 = 14.6$$

$$S_1 = 55 - (10 + 14.6) = 30.4$$

2. Serviceability and Functional Obsolescence

A = 3%, B = 1%, C = 4%, D = NA, E = NA, F = NA

J = (3 + 1 + 4) = 8%

$$X = \frac{18500}{2} = 9250 \quad Y = \frac{26.0}{2} = 13.0$$

(1) If (26.0 + 2) < 40 then G = 5

(2) Not Applicable

(3) Not Applicable

(4) If X = 9250 and Y = 13.0 then H = 15

G + H = 5 + 15 = 20 (however, maximum allowable = 15)

I = 0

$$S_2 = 30 - [8 + (15) + 0] = 7.0$$

3. Essentially For Public use

$$K = \frac{30.4 + 7.0}{85} = 0.44$$

$$A = \frac{18500 \text{ x } 8}{200{,}000 \text{ x } 0.44} \text{ x } 15 = 25.2$$

(however, maximum allowable = 15)

B = 0

S_3 = 15 - (15 + 0) = 0

4. Special Reductions

$$S_1 + S_2 + S_3 = (30.4 + 7.0 + 0.0) = 37.4 < 50$$

S_4 = NA

SUFFICIENCY RATING = 30.4 + 7.0 + 0.0 = 37.4

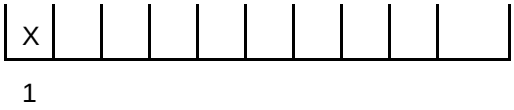
Transporter Erector Routes and Sites (Item 207) — 10 Digits

Data entry made by Bridge Division.

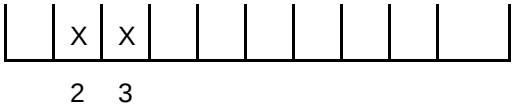
This item is coded in the text box in the Agency/Bridge Tab. Leave blank if TE routes do not apply.

Code	Item
2	Minot Complex

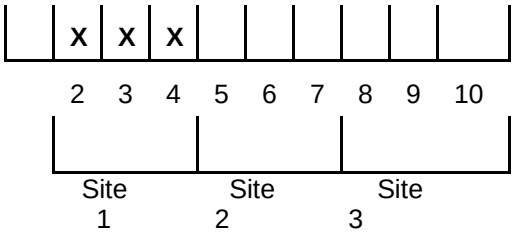
A code of two (2) in the first digit will print the complex.



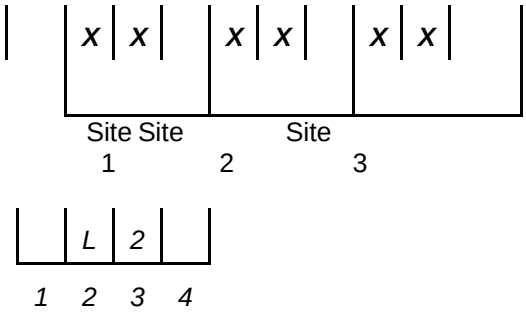
State Structures:
Code "ND" in second and third digits.



County Structures:
Code the missile site number in digits two through ten in groups of three (left justified). Each group represents a missile site served by this route. A maximum of three (3) sites can be coded.



For two digit missile site code: Example: Missile site L2



Structures on Transporter Erector routes that do not lead directly to a missile site but connect with another highway, shall be coded with a "Z" in the second digit.

Deck Overburden (Bridges Only) (Item 208) — 3 Digits

Code this item in the Agency/Bridge tab text boxes. The first box is a 2 digit number for the thickness of the overburden in inches. The second is a dropdown menu that identifies what type of overburden exists. .

Possible coding for the material are listed below:

Code	Description
N	Not Applicable
1	None
2	Gravel/dirt
3	Asphalt
4	Other

Note: Structures with "no deck" coding and an overlay will be coded as having overburden.

Posting In Tons (Item 209) — *2 Digits*

In the Agency/Bridge Tab, code the tonnage shown on the load limit sign(s). If structure is not posted, code "00".

Item 210 - Culvert ***10 Digits***
Item 211 - Description ***50 Digits***

Culvert (Item 210) and Description (Item 211) are used to further describe culvert installations. Code this item in the text box in the Agency/Bridge Tab.

Culvert is entered first. Do not use numbers.

Description, entered next, will be used for the structure description. Order of entry: ***span, height, length.***

Examples:

Installation - Triple 10 x 12 RCB 100' in length
Code:

Item 210 |T|R|I|P|L|E| | | | |

Item 211 |1|0|x|1|2|x|1|0|0|'| |R|C|B| | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | |

Installation - Triple SPP Ellipse 10'8" by 14'8" by 100'

Code:

Item 210 |T|R|I|P|L|E| | | | |

Item 211 |1|0|-|8|x|1|4|-|8|x|1|0|0|'| |S|P|P| |E|L|L|I|P|S|E| |

| | | | | | | | | | | | | | | | | | | | | | | |

***NOTE**: If RCB's are extended with pipe, the length of each shall be recorded.*

Measure barrel lengths only, do not include end sections.

Don't use **"** *for inches. Use* ***in. or inches****.*

For Box Culverts, cast in place is assumed, include precast in description of that is the case.

Date Structure Load Rated (Item 212)	***6 Digits***

Data entry made by Bridge Division.

Pontis has added this in the database. Enter the date the structure was calculated for load rating in the Appraisal/Load Rating Tab. Enter the 8 digit date as month, day and year in the text box.

Federal-Aid Project Number (Item 213)	**30 Digits**

If federal funds have been used for construction or reconstruction of this structure, the federal-aid project number of the most recent project should be recorded, if available. Coding is optional. Code the data in the text box on the Agency/Bridge Tab.

Code this entry if data is readily available.

Delayed Inspection (Item 214) **1 Digit**

Use this item if for any reason the entire inspection cannot be completed. Code "Not Applicable" if this does not apply. After re-inspection to complete, add new date and change the coding to "Not Applicable".

When it is impossible to reach the site.

OR

When on-site conditions prevent complete inspection.

Code	*Item*
	Not Applicable
1	*Roadway Impassable*
2	*Inspection Incomplete*
3	*Channel Not Inspected*

An example of an incomplete inspection would be:

Unable to see a particular part of the structure due to weather or lack of proper equipment.

Channel not inspected:

Example:

Unable to take channel profile or check for scour due to ice, snow, highwater, etc.

Inspector's Name (Item 216) ***25 Digits***

Inspector or inspectors who made the on-site inspection. Include all personnel who were on the inspection team.

Notes (Item 217)

Included in the Notes/Inspection Notes tab a narrative description of any items that are not described in the ratings of the elements or NBI items:

Narrative statements relative to the condition or operation of the existing structure.

Alerting Statements relative to:

Items that may require maintenance.

Notification of items that may require structural analysis or other action by Bridge Division or the owner of the structure.

Word Efficiency

The "NOTES" section of the report has room for 2000 characters. Language must be used efficiently to provide the proper entries in the space available.

No Recommendations

Notes shall be worded in a non-judgmental manner. ***NO RECOMMENDATIONS*** *are to be made. Notes will reflect only objective statements of conditions.*

Examples:

Judgmental - Guardrail and bridge markers required at bridge ends.

Non-judgmental - No guardrail or bridge markers.

ADDITIONS, DELETIONS AND CHANGES

Adding Notes

To add notes, the new data is entered on the form following existing information. Add the Date (month/day/ year) of the inspection to identify when the notes were added. Items that should be reviewed from inspection cycle to inspection cycle should be added here.

Changing notes

Notes should be changed that no longer apply. Use word type editing to delete or re-arrange notes to address the condition of the bridge during that particular inspection. Leave old notes that still apply.

When adding or revising notes, it may be worthwhile to rewrite the original remarks incorporating the change to eliminate excessive wordage. If major re-wording needed, delete the old notes and add the new to the bottom after the inspection date.

ALERT ENTRIES

"Special Alert Codes" in the Agency/Inspections section of the report are intended to highlight a situation indicating where further attention is required. These alert items are appended to the end of the Notes.

Special attention situations range from elements indicating relatively minor cleanup to a condition indicating the structure should be closed pending repair.

The least serious attention element is entered in the text box Alert Coded 1. The most serious is Alert Coded 3. The text entry in the text box for the appropriate code will describe the situation that is cause for alert. This text will subsequently be selected from the "Notes" and printed in a specialized maintenance work program listing.

Upon receipt of the inspection reports for state structures, Bridge Division will review all the items with alert codes with special emphasis on items coded "3". Based upon Bridge Division's review and/or structural analysis, the codes may be changed to reflect the priority that Bridge Division deems it should have.

ALERT TEXT DESIGNATION

Code Alert Status

1 Minor

The existing condition does not seriously affect the load carrying capacity or the safety of the structure. The defects may be corrected by minimum effort by a small maintenance crew with limited equipment on a "Time Available Basis."

Examples of Items to be Coded 1

- Damaged railing.
- Moderate spalling of concrete deck.
- Moderate spalling of concrete substructure.
- Moderate rust on steel stringers.
- Secondary members or bracing members bent or damaged.
- Cracks in concrete decks.
- Cracks in concrete substructure.
- Decayed or broken timber deck planks.
- Settlement of abutment approach slabs or curbs.
- Minor movement or settlement of substructures.
- Minor decay or cracked timber piling and pile caps.
- Minor scour (holes 1 to 3 feet deep).

Code Alert Status

2 Major

The existing condition may have some effect on the load carrying capacity or the safety of the structure. The defects may be corrected by major efforts of a maintenance crew or by contract on a "Time Available Basis."

Examples of Items to be Coded 2

- Spalled concrete with exposed rebar.
- Heavy rust on steel stringers with minor section loss.
- Main load carrying members that are bent or damaged.
- Major cracks in concrete (more than 2" separation).
- Holes in timber deck planks.
- Major movement or settlement of substructures.
- Advanced decay or major cracks in timber piling and pile caps.
- Minor cracks in timber stringers but still capable of carrying load.
- Bent or damaged fracture critical members.
- Major scour (holes 3 to 10 feet deep).

Code *Alert Status*

3 *Immediate Attention*

The existing condition probably has a major effect on the load carrying capacity or the safety of the structure. Major rehabilitation or replacement may be necessary to correct the situation. An item with this code will cause Bridge Division to reevaluate the load carrying capacity of the structure.

Examples of Items to be Coded 3

- *Heavily spalled concrete with rusty debonded rebar.*
- *Rusty steel stringers with measurable section loss (give dimensions of remaining sound steel).*
- *Main load carrying members that are damaged or deteriorated to the point that they no longer can carry their full share of the load.*
- *Holes in timber deck plank that make the bridge difficult to cross.*
- *Major movement or settlement of substructures that affect the stability of load carrying member.*
- *Advanced decay or damage to piling or substructure where section loss exceeds 50% of original.*
- *Major scour that undermines and threatens the stability of substructures.*
- *Cracked or broken fracture critical members (besides coding this as a 3, it should be called in to the Bridge Division immediately).*

On the following pages are some examples of actual proper uses and improper uses of Alert Codes from the past few years.

EXAMPLES OF THE PROPER USE OF ALERT CODES

CODE	*REMARK*
3	*CRACK APPEARS TO BE DEVELOPING AT FORGE LAP ON THE HEAD OF THE OUTSIDE EYE-BAR ON NORTH SIDE OF BRIDGE OF PANEL L1-L1'.*
	Good comment & correct for a fracture critical member.
3	*SOUTH ABUTMENT CAP HAS TIPPED FREE OF TWO WEST PILING. TOPS OF PILING SPLIT. REMAINDER OF CAP REST ON BACK OF OTHER PILES. CAP IS SPLIT DIAGONALLY, STARTING AT EAST END. ABUTMENT ALSO LEANING BACK 4"-7".*
	Good comments.
1	*NW WING HAS TOP 2/3 MISSING FROM ROT DETERIORATION.*
	Correct code because wingwall does not greatly affect the ability of bridge to carry loads. However, if the missing wing results in erosion that is threatening the stability of the abutment or the backfill, then a code 2 may be appropriate.
3	*FLOOR BEAM SLIDING OFF GIRDER IN CENTER OF STRUCTURE.*
	Pictures indicate that a stringer is sliding off a floor beam of a truss bridge. Alert code 3 is appropriate but terminology is incorrect.
3	*MAJOR DECAY IN STRINGERS.*
	This may be coded appropriately but not enough info is given. In order to assess the seriousness of this, dimensions of the remaining good stringers is needed. There are also no pictures showing decayed stringer. Sketches or photos with dimensions would be appropriate.
2	*SPALLING AND DETERIORATION OF CONCRETE EXPOSING REINFORCING STEEL LOWER PORTION BOTH ENDS SOUTH PIER.*
	When rebar is exposed by spalling or deteriorating concrete, it is appropriate to use code 2. Sketches or photos with dimensions would be appropriate.

3 *EAST ABUTMENT MOVED APPROXIMATELY 10 FEET WEST RESTING AGAINST PIER, CAUSING PILING TO BOW AND PIER CAP IS BENT. EROSION AT EAST END OF STRUCTURE.*

A serious condition that is well described and backed up by several pictures.

1 *SCOUR UNDER STRUCTURE 1' X 15' X 20'.*

Good description.

2 *SEVERAL STEEL STRINGERS ARE BOWED OUT OF ALIGNMENT LATERALLY AND ARE ALSO TWISTED. DECK PLANKS NOW SUPPORTED ON THE EDGES OF THE FLANGES.*

This may even be serious enough for a code 3. More details about the number of stringers and the amount of misalignment would be helpful. Pictures also would be helpful. Bridge Division reduced load capacity ratings by 75% for the defects.

3 *STEEL ENCASED PILING AT NE CORNER OF TRUSS HAS HOLES RUSTED THROUGH CASING. CONCRETE COMPLETELY DETERIORATED FOR 2.5 FEET. EXPOSED WOOD PILING SEVERELY DECAYED.*

Very good description but pictures or sketches with dimensions would be helpful. Bridge Division greatly reduced load capacity rating because of the remark.

EXAMPLES OF ALERT CODES THAT WERE PROBABLY MIS-USED

CODE	*REMARK*
1	*NO PREVIOUS SI&A SHEET TO LOOK AT WHEN INSPECTING THIS BRIDGE.*
	This has nothing to do with structural condition or safety of the bridge and probably shouldn't be an alert item or note.
2	*ABUTMENT #2 HAS NO END MARKERS AND RAILING IS CRACKED.*
	Neither of these affect the structures capability to carry live load and shouldn't have an alert code of 2 but are worthy of a note just not an alert code.
3	*STEEL PILING SHOWING IN EACH BACKWALL. CONCRETE IS DETERIORATING.*
	Pictures show abutments were built with steel pile that go all the way up to the abutment cap. A concrete curtain wall was built between the pile. The abutment was built this way and it appears to be stable and serving its purpose. Deteriorated concrete at the bottom of the abutment doesn't significantly affect structure. Probably shouldn't be an alert code at all.
3	*BACKWALLS ARE SEVERELY SPALLED AND CRACKED.*
	Pictures indicate minor spalling at the bottom of abutment and no major cracks. Abutment is adequately serving its purpose and isn't reducing the carrying capacity of the bridge. Should be an alert code 1 at the most.
2	*STRUCTURE IS VERY NARROW.*
	The narrowness of a bridge is recorded in Items 51 & 52. This doesn't warrant an alert code because it doesn't affect its ability to safely carry live load.

CODE	REMARK
3	*MAJOR SCOUR 3' DEEP EXPOSING SOUTH ABUTMENT FOOTING.*
	This should probably be a code 2 instead of a code 3. Remark guidelines say scour 3' to 10' deep is coded 2. Exposing the abutment footing is not necessarily serious if it is not undermined or if it is on piling. Pictures indicate that it doesn't seem to be too serious.
3	8" DIRT AND GRAVEL OVERBURDEN.
	This info is OK and should be in the notes but isn't an alert code 3. The bridge will be load rated with this overburden as coded in Deck Overburden item.
2	*NO BRIDGE RAILINGS.*
	This info is good and should be in the notes but the lack of railing doesn't affect the capacity of the bridge and thus shouldn't have an alert code.
2	*SOIL ON CAPS.*
	This in itself does not affect load carrying capacity and is not a major concern. If caps are rotted because of this than an alert code may be appropriate. It is OK to mention this in the notes so that maintenance can be planned.

Channel Profile (Item 218)

In the Agency/Inspections Tab, code this item for structures that cross waterways. In the first dropdown menu select if the Channel Profile is required (Yes or No). In the date box code the date of the last Channel Profile from the form submitted. Code the frequency in Months for the Channel Profile. (Normally 48 months) Culverts do not need profiles.

GIS X Coordinate (Item 219) ***8 Digits***

Data entry will be made by Bridge Division

This item is coded in the Agency/Bridge Tab for all records in the inventory. This is the UTM Coordinate for the Easting to the center of the bridge. This coordinate is used to locate the bridge on the State's GIS system.
Shows location of structure.

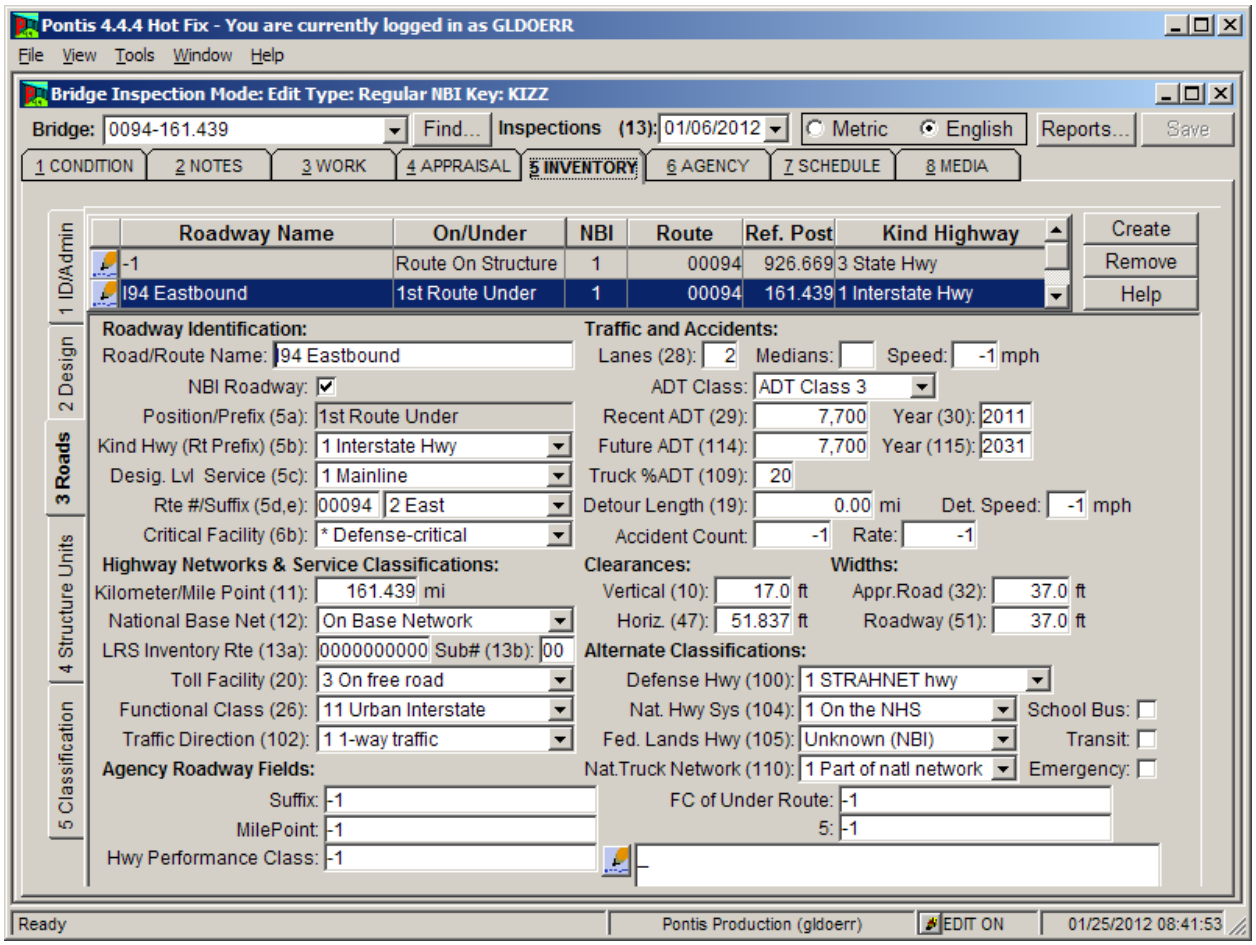
GIS Y Coordinate (Item 220) ***9 Digits***

Data entry will be made by Bridge Division

This item is coded in the Agency/Bridge Tab for all records in the inventory. This is the UTM Coordinate for the Northing to the center of the bridge. This coordinate is used to locate the bridge on the State's GIS system.
Shows location of structure.

Functional Classification of Underpassing Route (Item 226) ***8 Digits***

This item is coded in the Inventory/Roads Tab as the underpassing roadway. All bridges with highways under them should have this item coded. Use the pull down tabs and text boxes to code this item.


Pontis 4.4.4 Hot Fix - You are currently logged in as GLDOERR
File View Tools Window Help
Bridge Inspection Mode: Edit Type: Regular NBI Key: KIZZ
Bridge: 0094-161.439
Find...
Inspections (13): 01/06/2012
Metric
English
Reports...
Save
1 CONDITION
2 NOTES
3 WORK
4 APPRAISAL
5 INVENTORY
6 AGENCY
7 SCHEDULE
8 MEDIA
1 ID/Admin
2 Design
3 Roads
4 Structure Units
5 Classification
Roadway Name
On/Under
NBI
Route
Ref. Post
Kind Highway
-1
Route On Structure
1
00094
926.669
3 State Hwy
I94 Eastbound
1st Route Under
1
00094
161.439
1 Interstate Hwy
Create
Remove
Help
Roadway Identification:
Road/Route Name: I94 Eastbound
NBI Roadway:
Position/Prefix (5a): 1st Route Under
Kind Hwy (Rt Prefix) (5b): 1 Interstate Hwy
Desig. Lvl Service (5c): 1 Mainline
Rte #/Suffix (5d,e): 00094 2 East
Critical Facility (6b): * Defense-critical
Highway Networks & Service Classifications:
Kilometer/Mile Point (11): 161.439 mi
National Base Net (12): On Base Network
LRS Inventory Rte (13a): 0000000000 Sub# (13b): 00
Toll Facility (20): 3 On free road
Functional Class (26): 11 Urban Interstate
Traffic Direction (102): 1 1-way traffic
Agency Roadway Fields:
Suffix: -1
MilePoint: -1
Hwy Performance Class: -1
Traffic and Accidents:
Lanes (28): 2 Medians: Speed: -1 mph
ADT Class: ADT Class 3
Recent ADT (29): 7,700 Year (30): 2011
Future ADT (114): 7,700 Year (115): 2031
Truck %ADT (109): 20
Detour Length (19): 0.00 mi Det. Speed: -1 mph
Accident Count: -1 Rate: -1
Clearances:
Vertical (10): 17.0 ft
Horiz. (47): 51.837 ft
Widths:
Appr.Road (32): 37.0 ft
Roadway (51): 37.0 ft
Alternate Classifications:
Defense Hwy (100): 1 STRAHNET hwy
Nat. Hwy Sys (104): 1 On the NHS
Fed. Lands Hwy (105): Unknown (NBI)
Nat.Truck Network (110): 1 Part of natl network
School Bus:
Transit:
Emergency:
FC of Under Route: -1
5: -1
Ready
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Pontis Coding

Table of Contents

Section 1—Background

1.1—Condition Assessment Philosophy: Multi-Path And Defect Concepts

The Bridge Element Inspection Manual builds on the element level condition assessment methods developed in the AASHTO Guide for Commonly Recognized Structural Elements. Improvements have been made to fully capture the condition of the elements by recon figuring the element language to utilize multiple distress paths within the defined condition states. The multi-path distress language provides the means to fully incorporate all possible defects within the overall condition assessment of the element. The overall condition of an element can be utilized in this aggregate form, or broken down into specific defects present as desired by the agency for Bridge Management System (BMS) use.

The Bridge Element Inspection Manual provides a comprehensive set of bridge elements that is designed to be flexible in nature to satisfy the needs of all agencies. The complete set of elements capture the components necessary for an agency to manage all aspects of the bridge inventory utilizing the full capability of a BMS.

The element set presented within includes two element types identified as National Bridge Elements (NBE) or Bridge Management Elements (BME). The combination of these two element types comprise the full AASHTO element set. All of the elements, whether they are NBE or BME, have the same general requirements:

1. Standard number of condition states
2. The standard number of condition states are comprised of good, fair, poor, and severe general descriptions

1.2—National Bridge Elements (NBEs)

The National Bridge Elements represent the primary structural components of bridges necessary to determine the over- all condition and safety of the primary load carrying members. The NBEs are a refinement of the deck, superstructure, sub- structures, and culvert condition ratings de fined in the Federal Highway Administration's Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. Additional elements included in this section are bridge rail and bearings. The NBEs are designed to remain consistent from agency to agency across the country in order to facilitate the capture of bridge element condition at the national level.

1.3—Bridge Management Elements (BMEs)

Bridge Management Elements include components of bridges such as joints, wearing surfaces, and protective coating systems that are typically managed by agencies utilizing Bridge Management Systems.The BMEs represent a recommended set of condition assessment language that can be modified to suit the agencies needs as these elements are not intended to be utilized for the purposes of national policy making. The BMEs de fined within this manual were purposefully left fairly general in nature to provide the flexibility to develop agency specific elements that best suit the local bridge preservation practices.

1.4—Agency Developed Elements

The elements presented within provide the flexibility for an agency to de f ne custom elements in accordance with the defined element framework that can be subelements of NBEs, BMEs, or state de fined elements without ties to the elements contained in this manual.

By defining a comprehensive set of bridge elements necessary for robust bridge management and the minimum set of elements necessary to assess the condition of primary components of bridges, the Bridge Element Inspection Manual pro- vides a flexible element set that can be tailored to the needs of all agencies.

Section 2—Element Location Matrix

This section is designed to give inspectors a quick reference guide to the defined elements. The matrix organizes the elements by general element type, material, and in accordance to their physical location on the bridge to facilitate ease of use by bridge inspectors in the field. Appendix C contains a flowchart of element changes from the AASHTO commonly recognized element set.

2.1—National Bridge Elements

2.1.1—Decks/Slabs

Element	Units	Element Number (Decks)	Element Number (Slab)	Other
Reinforced Concrete Deck/Slab	AREA	12	38	
Prestressed/Reinforced Concrete Top Flange	AREA	15		
Steel Deck—Open Grid	AREA	28		
Steel Deck—Concrete Filled Grid	AREA	29		
Steel Deck—Corrugated/Orthotropic/Etc.	AREA	30		
Timber Deck/Slab	AREA	31	54	
Bridge Rail		Other		
Metal Bridge Railing	LENGTH			330
Reinforced Concrete Bridge Railing	LENGTH			331
Timber Bridge Railing	LENGTH			332
Other Bridge Railing	LENGTH			333
Masonry Bridge Railing	LENGTH			334

AREA = ft^2 (m^2)
LENGTH= ft (m)

2.1.2—Superstructure

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other
Girder/Beam	LENGTH	107	109	110	111		
Closed Web/Box Girder	LENGTH	102	104	105			
Stringer	LENGTH	113	115	116	117		
Truss	LENGTH	120			135		
Arch	LENGTH	141	143	144	146	145	
Floor Beam	LENGTH	152	154	155	156		
Cable	EA	147, 148					
Gusset Plate	EA	162					
Pin, Pin and Hanger Assembly, or both	EA	161					

LENGTH= ft
(m) EA = each

2.1.3—Substructure

Element	Units	Steel	Prestressed Concrete	Reinforced Concrete	Timber	Masonry	Other
Column/Pile Extension	EA	202	204	205	206		
Column Tower (Trestle)	EA	207			208		
Submerged Pile	EA	225	226	227	228		
Pier Wall	LENGTH			210	212	213	211
Abutment	LENGTH	219		215	216	217	218
Pier Cap	LENGTH	231	233	234	235		
Pile Cap/Footing	EA			220			
Culvert	LENGTH	240		241	242	244	243
Bearings							
Elastomeric Bearing	EA						310
Moveable Bearing (roller, sliding, etc.)	EA						311
Enclosed/Concealed Bearing	EA						312
Fixed Bearing	EA						313
Pot Bearing	EA						314
Disk Bearing	EA						315

LENGTH= ft
(m) EA = each

2.2—Bridge Management Elements

2.2.1—Decks/Slabs

Element	Unit	Element Number
Joints		
Strip Seal Expansion Joint	LENGTH	300
Pourable Joint Seal	LENGTH	301
Compression Joint Seal	LENGTH	302
Assembly Joint/Seal (Modular)	LENGTH	303
Open Expansion Joint	LENGTH	304
Assembly Joint without Seal	LENGTH	305
Approach Slabs		
P/S Concrete Approach Slab	ARE	320
Reinforced Concrete Approach Slab	ARE	321

AREA = ft^2 (m^2)
LENGTH= ft (m)
EA = Each

2.2.2—Wearing Surfaces and Protection Systems

Element	Units	Element Number
Protective Systems		
Wearing Surfaces	AREA	510
Steel Protective Coating	AREA	515
Deck/Slab Protection Systems	AREA	520
Concrete Protective Coating	AREA	521

AREA = ft^2 (m^2)

2.2.3—Smart Flags (Defect Flags)

Smart Flags	Element Number
Steel Cracking/Fatigue	356
Pack Rust	357
Concrete Cracking	358
Concrete Efflorescence	359
Settlement	360
Scour	361
Superstructure Traffic Impact (load capacity)	362
Steel Section Loss	363
Steel Out-of-Plane (Compression Members)	364
Deck Traffic Impact (load capacity)	366
Substructure Traffic Impact (load capacity)	367
Culvert Barrel Distortion	368

Section 3—Detailed Element Descriptions

This section describes the elements detailed use in inspection and bridge management. The detailed description is bro- ken down into six sections:

1. Description—Detailed identification of the element
2. Quantity Calculation—General guideline on how to collect the quantity of the element
3. Condition State Definitions—Defect description and severity
4. Feasible Actions—The actions an agency can take to remove the defect (these are needed for Bridge Management Systems)
5. Element Commentary—additional considerations for the inspector during data collection
6. Element Definitions—Guidelines to the inspector for defect severity categorization

The elements listed in this section will be divided into NBE and BME.

3.1—National Bridge Elements

This section describes in detail those elements that are primary structure elements.

3.1.1—Decks/Slabs

These elements describe the component that is transferring load from the vehicle to the bridge. This section does not include secondary deck elements such as joints, deck/slab protection systems, or wearing surfaces.

Deck structures transmit the loads into superstructure systems. Slab elements transmit the load into the substructure. Structures that include slab elements typically do not have superstructure elements. These elements transmit traffic loads directly into the substructure. All deck or slab elements can be supplemented with one or more associated protection system or wearing surface elements.

Description

This element defines all reinforced concrete bridge deck/slab regardless of the wearing surface or protection systems used.

Element #12/38
Reinforced Concrete Deck/Slab

ft² (m²) National Bridge Elements

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The deck/slab evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states. Deck/Slab top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing or indicators in the materials covering the surfaces.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter and no exposed rebar	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element # 15
Prestressed/Reinforced Concrete Top Flange

ft^2 (m^2)
National Bridge Elements

Description

This element defines those bridge girder top flanges that are exposed to traffic. This element defines all prestressed and reinforced concrete bridge girder top flanges regardless of the wearing surface or protection systems used. These bridge types include tee-beams, bulb-tees, and box girders that require traffic to ride on the top flange.

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The flange evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states. Flange top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing, or indicators in the materials covering the surfaces.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter, and no exposed rebar	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Description

This element defines all open grid steel bridge decks with no fill.

Element #28
Steel Deck with Open Grid

ft^2 (m^2) National Bridge Element

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states.

Element Definitions

	Sound	Isolated Failure
Connections	Connectors are in place and functioning	Connectors are loose, missing, or broken

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel section loss is evident without impact on load capacity

Element #29
Steel Deck with Concrete Filled Grid

ft^2 (m^2)

National Bridge Element

Description

This element defines steel bridge decks with concrete fill either in all of the openings or within the wheel tracks.

Quantity Calculation

The quantity for this element should include the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Concrete	Sound	Sound	Isolated Failures	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states.

Element Definitions

	Sound	Isolated Failure
Concrete	Tightly adhered to the grid and in good condition	Missing, deteriorated, or loose concrete
Connections	Connectors are in place and functioning	Connectors are loose, missing, or broken

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

Description

This element defines those bridge decks constructed of corrugated metal filled with portland cement, asphaltic concrete, or other riding surfaces. Orthotropic steel decks are also included.

Element #30
Steel Deck Corrugated /Orthotropic/Etc.

ft^2 (m^2)

National Bridge Elements

Quantity Calculation

The quantity for this element should include the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states. Materials added for riding surface is not part of the element condition.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel section loss is evident without impact on load capacity

Element #31/54
Timber Deck/Slab

ft^2 (m^2)
National Bridge Elements

Description

This element defines all timber bridge deck/slab regardless of the wearing surface or protection systems used.

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The deck/slab evaluation is three dimensional in nature with the defects observed on the top and bottom surface, or both, and being captured using the defined condition states.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, in areas of the tension zone, or both.
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length.	Length of the split is greater than 25% of the member length.
Abrasion	Surface level and no section loss	Section loss less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.2—Superstructure

Superstructure elements described in this section are to transmit load from decks into the substructure. These elements include girders, trusses, arches, and floor systems. The floor systems include floor beams and stringers. Additional elements in this group include cables, gusset plates, and pin and hanger assemblies. These elements do not include bracing components such as diaphragms, cross bracing, or portal sway bracing.

3.1.2.1—Girders

These elements transmit the loads from the deck into the substructure. Elements listed include closed web (boxes) and open girders (I sections). The materials include steel, concrete, and timber.

Description

This element defines all steel box girders or closed web girders, and is for all box girders regardless of protective system.

Element # 102
Steel Closed Web/Box Girder

ft (m) National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all the lengths of each box girder section. The quantity can be determined by counting the visible web faces, dividing by two, and then multiply by the appropriate length.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The box girder evaluation is three dimensional in nature with the defects observed on exterior and interior surfaces being used to capture the condition states.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/ Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element # 104
Prestressed Concrete Closed Web/Box Girder

ft (m)

National Bridge Elements

Description

This element defines pretensioned or post-tensioned concrete closed web girder or box girder, and is for all box girders regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each girder. The quantity can be determined by counting the visible web faces, dividing by two, and then multiply by the appropriate length.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present with no section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The box girder evaluation is three dimensional in nature which includes defect observed on exterior and interior surfaces. If the riding surface is the exposed top surface, evaluation of the riding surface above the f let should be considered with element 15.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Description

This element defines a reinforced concrete box girder or closed web girder, and is for all box girders regardless of the protective system

Element # 105
Reinforced Concrete Closed Web/Box Girder

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder. The quantity can be determined by counting the visible web faces, dividing by two, and then multiply by the appropriate length.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The box girder evaluation is three dimensional in nature with the defects observed including exterior and interior sur - faces being used to capture the condition states. If the riding surface is the exposed top surface, evaluation of the riding surface above the f let should be considered with element 15.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element # 107
Steel Open Girder/Beam

ft (m)

National Bridge Elements

Description

This element defines all steel open girders, and is for all girders regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Exists	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Condition evaluation for this element includes the web face and the top and bottom faces of the f ange.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Description

This element defines pretensioned or post-tensioned concrete open web girders, and is for all girders regardless of protective system.

Element # 109
Prestressed Concrete Girder/Beam

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present with no section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Condition evaluation included the web faces and the top and bottom flange surfaces. If the riding surface is the exposed top surface, evaluation of the riding surface above the f let should be considered with element 15.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations/ Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress

Element #110 Reinforced Concrete Girder/Beam

ft (m)
National Bridge Element

Description

This element defines mild steel reinforced concrete open web girders, and is for all girders regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

If the riding surface is the exposed top surface, evaluation of the riding surface above the fillet should be considered with element 15.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Description

This element defines all timber girders, and is for all girders regardless of protection system.

Element #111
Timber Open Girder

ft (m)

National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all the lengths of each girder.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member or in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member and in the areas of neutral axis, or both	Defect penetrating more than 50% of the thickness of the member and in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.2.2—Stringers

These superstructure elements are part of a floor system, and transmit load from the deck into the floor system, such as floor beams.

Description

This element defines steel members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

Element #113
Steel Stringer
ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each stringer.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Condition evaluation for this element includes the web face and the top and bottom faces of the f ange.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #115
Prestressed Concrete Stringer

ft (m)
National Bridge Element

Description

This element defines pretensioned or post-tensioned concrete members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each stringer.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present without Section Loss	
Cracks	Hairline cracks only	Narrow size or density	Moderate size and density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Condition evaluation included the web faces and the top and bottom flange surfaces.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations/ Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress

Description

This element defines mild steel reinforced concrete members that support the deck in a stringer floor beam system, and is for all stringers regard- less of protective system.

Element #116
Reinforced Concrete Stringer

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each stringer.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element #117
Timber Stringer

ft (m)
National Bridge Element

Description

This element defines timber members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each stringer.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.2.3—Trusses/Arches

These superstructure elements include materials of steel, concrete, timber, and masonry, and are the main load carrying member for the span.

Description

This element defines all steel truss elements, including all tension and compression members, and through and deck trusses. It is for all trusses regardless of protective system.

Element #120
Steel Truss
ft (m)
National Bridge Elements

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exists	
Connections	Sound	Sound	Isolated Failures	
Compression Members	No Out-of-Plane Members	Arrested Out-of-Plane Bending Exists	Out-of-Plane Members Exists	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Distress observed on truss diagonals shall be reported as the length projected along the truss length.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place.	Identified cracks that are not arrested or otherwise addressed

Element #135
Timber Truss

ft (m)
National Bridge Element

Description

This element defines all timber truss elements, including all tension and compression members, and through and deck trusses. It is for all trusses regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

Observed distress in truss diagonal members shall be reported as the projected length along the length of the truss.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Description

This element defines steel arches regardless of type, and is for all arches regardless of protective system.

Element #141
Steel Arch

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Compression Members	No Out-of-Plane Members	Arrested Out-of-Plane Bending Exists	Out-of-Plane Members Exists	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Observed distress in arch diagonals shall be reported as the projected length along the arch length.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #143
Prestressed Concrete Arch

ft (m)
National Bridge Element

Description

This element defines only pretensioned or post-tensioned concrete arches, and is for all arches regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of the length of each arch panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present with no section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Description

This element defines only mild steel reinforced concrete arches, and is for all arches regardless of protective system.

Element #144
Reinforced Concrete Arch

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0 –3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element #145
Masonry Arch
ft (m)
National Bridge Element

Description
This element defines masonry or stacked stone arches, and is for all arches regardless of protective system.

Quantity Calculation
The quantity for this element is the sum of all of the lengths of each arch section measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Mortar Breakdown	None	Cracking, moderate voids, or both	Severe cracking or voids	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Block or Stone	Cracks are present but have not allowed the block or stone to shift	Cracks are present and block or stone has minor shifting	Block or stone is cracked with masonry face deformation. Block or stone are missing	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Patched Areas	None	Present	Present	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary
None

Element Definitions

Defect	Moderate	Severe
Cracking	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Mortar Breakdown	Cracking or voids in less than 10% of joints	Cracking or voids in more than 10% of joints
Efflorescence	Surface white without build-up or leaching	Heavy build-up with rust staining

Description

This element defines only timber arches, and is for all arches regardless of protective system.

Element #146
Timber Arch

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinal to the travel way.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

Observed distress in arch diagonal members shall be reported as the projected length along the arch.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thick-ness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member.	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.2.4—Floor Beams

The elements are the intermediate transverse load carrying members, and can be constructed from steel, concrete, and timber.

Description

This element defines only steel elements that support stringers, and is for all floor beams regardless of protective system.

Element #152
Steel Floor Beam
ft (m)
National Bridge Elements

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each floor beam.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #154
Prestressed Concrete Floor Beam

ft (m)

National Bridge Elements

Description

This element defines only prestressed elements that support stringers, and is for all floor beams regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each floor beam.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present without section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Description

This element defines only mild steel reinforced concrete elements that support stringers, and is for all floor beams regardless of protective system.

Element #155
Reinforced Concrete
Floor Beam

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each f oor beam.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size, density, or both	Medium size, density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element # 156
Timber Floor Beam

ft (m)

National Bridge Elements

Description

This element defines only timber superstructure elements that support stringers, and is for all floor beams regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of all of the lengths of each floor beam.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

Observed distress in truss diagonal members shall be reported as the projected length along the length of the truss.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member and is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.2.5—Miscellaneous Superstructure Elements

Steel pin, pin hanger assemblies, steel gusset plates, and cables will be discussed in this section.

Description

This element defines all steel main suspension or cable stay cables not embedded in concrete. It is for all cable groups regardless of protective systems.

Element # 147
Steel Main Cables

ft (m)
National Bridge Elements

Quantity Calculation

The quantity for this element is the sum of the length of the main cables.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Stands and Banding	Sound	Sound	Isolated Failures	
Anchors	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

This element is intended for use on main cables in suspension bridges or main cable stays in cable stayed bridges. Suspender cables or other smaller cables shall be captured using the secondary cable element.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Anchors	Connections are in place and functioning as intended	Section loss, missing bolts/rivets, broken welds, or a severed connection

	Sound	Isolated Failures
Strands and Banding	Cable strands and banding is in place and functioning as intended	Cables may have strand failures, section loss, or similar distress. Areas of the banding have failed.

Element # 148
Secondary Steel Cables

ft (m)

National Bridge Elements

Description

This element defines all steel suspender cables or other secondary cables not embedded in concrete. It is for all cable groups regardless of protective systems.

Quantity Calculation

The quantity for this element is the sum of the length of the secondary steel cables.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Strands and Banding	Sound	Sound	Isolated Failures	
Anchors	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

This element is intended for use on suspender cables or other smaller cables. Suspension bridge main cables or cable stays shall be captured using the steel main cable element.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without significant impact on load capacity

	Sound	Isolated Failure
Anchors	Connections are in place and functioning as intended	Section loss, missing bolts/rivets, broken welds, or a severed connection

	Sound	Isolated Failures
Strands and Banding	Cable strands and banding is in place and functioning as intended	Cables may have strand failures, section loss, or similar distress. Areas of the banding have failed.

Description

This element defines steel pin and hanger assemblies, and is for all assemblies regardless of protective system.

Element # 161
Steel Pin and Pin and Hanger Assembly or both

Each

National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of pin and hanger assemblies.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

Distress observed on either plate should be considered in the condition assessment. Ultrasonic testing results should be taken into consideration in the condition assessment if available.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or misalignment of the pins and hangers

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Element #162
Steel Gusset Plate
Each
National Bridge Element

Description
This member defines only those steel gusset plate(s) connections that are on the main truss/arch panel(s). These connections can be constructed with one or more plates that may be bolted, riveted, or welded. This element is for all gusset plates regardless of protective systems.

Quantity Calculation

The quantity for this element is the sum of the number of primary load path gusset plate assemblies.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

For built up gusset plates, distress observed on any plate should be considered in the condition assessment. Nondestructive testing results should be taken into consideration in the condition assessment if available.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, or broken welds

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place.	Identified cracks that are not arrested or otherwise addressed

3.1.3—Substructure Elements

Substructure elements described in this section transmit the load from the superstructure into the ground. These elements include columns, piles, pile cap, pile extensions, caps, pier walls, and abutments. These elements include elements of steel, concrete, timber, masonry, and other materials.

3.1.3.1—Columns/Pile/Pier Wall

This section covers supporting elements the span of the structure. These items include columns pile extensions, piles, and pier walls.

Description

This element defines only those steel columns or pile extensions. Piles exposed from erosion or included as part of the diver inspection are not included in this element. This element is for all columns/pile extensions regardless of protective system.

Element #202
Steel Column or Pile Extension

Each
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of columns or pile extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Unarrested Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Scour	None	Arrestment or Countermeasures Exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures Exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without significant impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place.	Identified cracks that are not arrested or other-wise addressed

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #204

Prestressed Concrete Column or Pile Extension
Each
National Bridge Element

Description

This element defines only those prestressed columns or pile extensions. Piles exposed from erosion or included as part of the diver inspection are not included in this element. This element is for all columns/pile extensions regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of the number of columns or pile extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present without Section Loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Scour	None	Arrestment and Counter-measures exist, or both	Minor	
Settlement	None	Arrestment and Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1– 0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines only those reinforced columns or pile extensions. Piles exposed from erosion or included as part of the diver inspection are not included in this element. This element is for all columns/pile extensions regardless of protective system.

Element #205

Reinforced Concrete Column or Pile Extension

Each

National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of columns or pile extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element # 206
Timber Column or Pile Extension

Each
National Bridge Element

Description

This element defines only those timber columns or pile extensions. Piles exposed from erosion or included as part of the diver inspection are not included in this element. This element is for all columns/pile extensions regardless of protective system.

Quantity Calculation

The quantity of this element is the number of columns or pile extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moder	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface and the length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the	Section loss more than 10% of the thick-ness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member.	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines only those steel built up or framed tower supports, and is for all columns/pile extensions regardless of protective system.

Element # 207
Steel Tower
Each
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of built up or framed tower supports.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking	None	Arrested Cracks Exist	Unarrested Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Scour	None	Arrestment and Countermeasures Exist, or both	Minor	
Settlement	None	Arrestment and Countermeasures Exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

This element is intended to be used for truss framed tower supports or built up steel towers. This element is intended to capture large supports and towers associated with suspension bridges, cable stayed bridges, movable bridges, or similar structural configurations.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection.

	Arrested	Moderate
Cracking	Cracks with arrest holes, doubling plates, or similar in place.	Identified cracks that are not arrested or otherwise addressed.

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #208
Timber Trestle

Each

National Bridge Elements

Description

This element defines only those framed timber supports, and is for all timber trestle/towers regardless of protective system.

Quantity Calculation

The quantity of this element is the number of framed timber trestles or towers.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor Moderate		
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

This element is intended to be used for truss framed trestle or towers. This element is intended to capture large supports and towers associated with large deck truss bridges.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member and is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more than 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines reinforced concrete pier walls, and is for all pier walls regardless of protective systems.

Element #210
Reinforced Concrete Pier Wall

ft (m)

National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #211
Other Pier Wall
ft (m)
National Bridge Element

Description
This element defines those pier walls constructed of other materials. This is for all pier walls regardless of protective systems.

Quantity Calculation
The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Condition	Good Condition	Fair Condition	Poor Condition	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exist, or both	Minor	

Element Commentary
This element should be used for materials not otherwise defined.

Element Definitions

Defect	Good	Fair	Poor
Condition	No notable distress	Isolated breakdown or deterioration	Widespread deterioration or breakdown without reducing load capacity

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines those timber pier walls that include pile, timber sheet material, and filler. This is for all pier walls regardless of protective systems

Element #212
Timber Pier Wall

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the length of the pier walls measured along the skew angle

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #213
Masonry Pier Wall
ft (m) National Bridge Elements

Description
This element defines those pier walls constructed of block or stone. The block or stone may be placed with or without mortar. This is for all pier walls regardless of protective systems.

Quantity Calculation

The quantity for this element is the sum of the wall lengths measured along the skew.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Mortar Breakdown	None	Cracking, moderate voids, or both	Severe cracking or voids	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Block or Stone	Cracks are present but have not allowed the block or stone to shift	Cracks are present and block or stone has minor shifting	Block or stone are cracked with masonry face deformation. Block or stone are missing	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Patched Areas	None	Present	Present	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Moderate	Severe
Cracking	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Mortar Breakdown	Cracking or voids in less than 10% of joints	Cracking or voids in more than 10% of joints
Efflorescence	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

3.1.3.2—Abutments

This section covers the abutments for the structure. The materials covered are steel, concrete, masonry, and other material abutments.

Description

This element defines reinforced concrete abutments. This includes the sheet material retaining the embankment and wingwalls, abutment extensions, and any other monolithically placed concrete elements. This is for all abutments regardless of protective systems.

Element #215
Reinforced Concrete Abutment

ft (m) National Bridge Elements

Quantity Calculation

The quantity for this element is the sum of the width of the abutment with wingwalls and abutment extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #216
Timber Abutment

ft (m)

National Bridge Elements

Description

This element defines timber abutments. This includes the sheet material retaining the embankment, wingwalls, and abutment extensions. This is for all abutments regardless of protective systems.

Quantity Calculation

The quantity for this element is the sum of the width of the abutment with wingwalls and abutment extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thick-ness of the member	Decay greater than 10% of the thickness of the member and is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thick-ness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abras ion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thick-ness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines those abutments constructed of block or stone. The block or stone may be placed with or without mortar. This is for all abutments regardless of protective systems.

Element # 217
Masonry Abutment
ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the width of the abutment with wingwalls and abutment extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Mortar Breakdown	None	Cracking, moderate voids, or both	Severe cracking or voids	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Block or Stone	Cracks are present but have not allowed the block or stone to shift	Cracks are present and block or stone has minor shifting	Block or stone are cracked with masonry face deformation. Block or stone are missing	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Patched Areas	None	Present	Present	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Moderate	Severe
Cracking	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Mortar Breakdown	Cracking or voids in less than 10% of joints	Cracking or voids in more than 10% of joints
Efflorescence	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #218
Other Abutments

ft (m)

National Bridge Element

Description

This element defines other material abutments systems. This includes the sheet material retaining the embankment, wingwalls, and abutment extensions. This is for all abutments regardless of protective systems.

Quantity Calculation

The quantity of this element is the sum of the lengths of the abutments measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Condition	Good Condition	Fair Condition	Poor Condition	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Countermeasures exist, or both	Minor	

Element Commentary

This element should be used for materials not otherwise defined.

Element Definitions

Defect	Good	Fair	Poor
Condition	No notable distress	Isolated breakdown or deterioration	Widespread deterioration or breakdown without reducing load capacity

Defect	Minor
Scour	Scour is beginning but no noticeable hole has developed
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines steel abutments. This includes the sheet material retaining the embankment, wingwalls, and abutment extensions. This is for all abutments regardless of protective systems.

Element # 219
Steel Abutment
ft (m)
National Bridge Element

Quantity Calculation

The quantity of this element is the sum of width of the abutment with wingwalls and abutment extensions.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/ Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

3.1.3.3—Submerged Pile/Caps/Footings

Submerged elements are defined as only those elements that are continuously submerged and are visible for inspection.

Description

This element defines only those reinforced concrete piles that are typically submerged in water and are visible for inspection. The exposure may be intentional or caused by erosion.

Element # 220
Reinforced Concrete Submerged Pile Cap/ Footing
Each
National Bridge Element

Quantity Calculation

The quantity of this element is the sum of the number of footings or pile caps.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #225
Steel Submerged Pile

Each
National Bridge Element

Description

This element defines only those steel piles that are continuously sub- merged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all pile extensions regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/ Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exists, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or other-wise addressed

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines only those prestressed piles that are continuously submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.

Element # 226
Prestressed Concrete Submerged Pile
Each
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to deter- mine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present with no section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #227
Reinforced Concrete Submerged Pile

Each

National Bridge Element

Description

This element defines only those reinforced concrete piles that are typically submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists–the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines only those timber piles that are typically submerged in water and are visible for inspection. Piles exposed from erosion or are part of the diver inspection are included in this element. This element is for all columns/pile extensions regardless of protective system.

Element # 228
Timber Submerged Pile
Each
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the number of submerged piles.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abras ion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth.	Propagates from a tension zone to a depth greater than 50% of the member depth.

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element # 231
Steel Pier Cap

ft (m)

National Bridge Element

Description

This element defines those steel pier caps that support girders and transfer load into piles, and is for all steel pier caps regardless of protective system

Quantity Calculation

The quantity for this element is the sum of the cap lengths measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection.

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Description

This element defines those prestressed concrete pier caps that support girders and transfer load into piles and is for all caps regardless of protective system.

Element #233
Prestressed Concrete Cap

ft (m)
National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the cap lengths measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/Patch Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Exposed Rebar	None	None	Corrosion without section loss	
Exposed Prestressing	None	None	Present without section loss	
Cracks	Hairline cracks only	Narrow size or density	Medium size or density	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.004 in. (0.1 mm)	0.004–0.009 in. (0.1–0.23 mm)	>0.009 in. (0.23 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining
Spalls/ Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar

Element #234
Reinforced Concrete Pier Cap
ft (m)
National Bridge Element

Description
This element defines those reinforced concrete caps that support girders and transfer load into piles, and is for all pier caps regardless of protective system.

Quantity Calculation

The quantity for this element is the sum of the cap length measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Description

This element defines those timber caps that support girders that transfer load into piles, and is for all timber pier caps regardless of protective system.

Element #235
Timber Pier Cap
ft (m) National Bridge Element

Quantity Calculation

The quantity for this element is the sum of the pier cap lengths measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/ Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thick-ness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

3.1.4—Culverts

This section covers steel, reinforced concrete, timber, masonry, and other types of culverts.

Description

This element defines steel culverts, including arched, round, or elliptical pipes.

Element #240
Steel Culvert

ft (m) National Bridge Element

Quantity Calculation

The quantity for this element is the flow line length of the barrel times the number of barrels.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Cracking/Fatigue	None	Arrested Cracks Exist	Moderate Cracks Exist	
Connections	Sound	Sound	Isolated Failures	
Seams	Sound	Sound	Localized Failure	
Distortion	None	None	Tolerable without reducing load capacity	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Element Definitions

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without impact on load capacity

	Sound	Isolated Failure
Connections	Connections are in place and functioning as intended	Missing bolts/rivets, broken welds, or a severed connection

	Arrested	Moderate
Cracking/Fatigue	Cracks with arrest holes, doubling plates, or similar in place	Identified cracks that are not arrested or otherwise addressed

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #241
Reinforced Concrete Culvert
ft (m)
National Bridge Element

Description
This element defines reinforced concrete culverts, including box, arched, round, or elliptical shapes.

Quantity Calculation

The quantity for this element is the flow line length of the barrel times the number of the barrels.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to deter-mine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines all timber culverts regardless of the protection systems used

Element #242
Timber Culvert
ft (m)
National Bridge Element

Quantity Calculation

The quantity of this element is the flow line length of the barrel times the number of barrels.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Distortion	None	None	Tolerable without reducing load capacity	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thick-ness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thick-ness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length	Length of the split is greater than 25% of the member length
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #243
Other Culvert
ft (m) National Bridge Element

Description
This element defines other material type culverts, including arches, round, or elliptical pipes. These culverts are not included in steel, concrete, or timber material types.

Quantity Calculation

The quantity of this element is the flow line length of the barrel times the number of barrels.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Condition	Good Condition	Fair Condition	Poor Condition	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Scour	None	Arrestment or Countermeasures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Element Definitions

Defect	Good	Fair	Poor
Condition	No notable distress	Isolated breakdown or deterioration	Widespread deterioration or break-down without reducing load capacity

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

.

Description

This element defines masonry block or stone culverts

Element #244
Masonry Culvert

ft (m)

National Bridge Element

Quantity Calculation

The quantity for this element is the flow line length of the barrel times the number of barrels.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Mortar Breakdown	None	Cracking, moderate voids, or both	Severe cracking or voids	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Block or Stone	Cracks are present but have not allowed the block or stone to shift	Cracks are present and block or stone has minor shifting	Block or stone are cracked with masonry face deformation. Block or stone are missing	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Scour	None	Arrestment or Counter-measures exist, or both	Minor	
Settlement	None	Arrestment or Counter-measures exist, or both	Minor	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc. The inspector shall use such factors to assess the proper condition state.

Element Definitions

Defect	Moderate	Severe
Cracking	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Mortar Breakdown	Cracking or voids in less than 10% of joints	Cracking or voids in more than 10% of joints
Efflorescence	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

3.1.5—Bearings

This section covers fixed, movable, and specialty bearings.

Description

This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement.

Element #310
Elastomeric Bearing

Each

National Bridge Element

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Movement	Free to Move	Minor Restriction	Restricted	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Alignment	Good	Tolerable	Approaching Limits	
Condition	No bulging, splitting, or tearing	Minor bulging, split-ting, or tearing	Moderate bulging, splitting, or tearing	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

Element # 311
Movable Bearing

Each (Each)
National Bridge Element

Description

This element defines only those bridge bearings which provide for both rotation and longitudinal movement by means of roller, rocker, or sliding mechanisms.

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Movement	Free to Move	Minor Restriction	Restricted	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Alignment	Good	Tolerable	Approaching Limits	
Condition	No corrosion	Early corrosion	Early section loss	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

None

Element Definitions

Defect	Tolerable	Approaching Limits	Beyond Limits
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

Description

This element defines only those bridge bearings that are enclosed so that they are not open for detailed inspection.

Element #312
Enclosed/Concealed Bearing

Each (Each) National Bridge Element

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Movement	Free to Move	Minor Restriction	Restricted	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Alignment	Good	Tolerable	Approaching Limits	
Condition	No Deterioration	Minor Deterioration	Moderate Deterioration	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

This element should be used for box girder hinges. In cases where the bearing material is not visible, the inspector shall assess the condition based on alignment, grade across the joint, persistence of debris, or other indirect indicators of the condition.

Element Definitions

Defect	Tolerable	Approaching Limits	Beyond Limits
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

Element # 313
Fixed Bearing

Each (Each)
National Bridge Element

Description

This element defines only those bridge bearings that provide for rotation only (no longitudinal movement).

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Alignment	Good	Tolerable	Approaching Limits	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Condition	No corrosion	Early corrosion	Early section loss	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

None

Element Definitions

Defect	Tolerable	Approaching Limits	Beyond Limits
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

Description

This element defines those high load bearings with 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.

Element #314
Pot Bearing

Each (Each) National Bridge Element

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Movement	Free to Move	Minor Restriction	Restricted	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Alignment	Good	Tolerable	Approaching Limits	
Condition	No Deterioration	Minor Deterioration	Moderate Deterioration	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

None

Element Definitions

Defect	Tolerable	Approaching Limits	Beyond Limits
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

Element #315
Disc Bearing

Each (Each)
National Bridge Element

Description

This element defines those high load bearings with a hard plastic disk. This bearing may be fixed against horizontal movement, guided to allow movement in one direction, or floating to allow sliding in any direction.

Quantity Calculation

The quantity is the sum of each bearing of this type.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Movement	Free to Move	Minor Restriction	Restricted	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Alignment	Good	Tolerable	Approaching Limits	
Condition	No Deterioration	Minor Deterioration	Moderate Deterioration	
Capacity	No Reduction	No Reduction	Some Reduction	

Element Commentary

None

Element Definitions

Defect	Tolerable	Approaching Limits	Beyond Limits
Alignment	Minor lateral or vertical alignment changes are present.	The lateral or vertical alignment is noticeable and approaching the limits of the bearing.	Alignment changes have resulted in bearings that are no longer capable of carrying load or are causing damage to supporting material.

3.1.6—Bridge Rail

This section covers bridge rail, which can be comprised of steel, concrete, masonry, and other materials.

Description

This element defines all types and shapes of metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. will all be considered part of this element. Included in this element are the posts of metal, timber or concrete, blocking, and curb.

Element # 330
Metal Bridge Railing

ft (m) National Bridge Element

Quantity Calculation

Quantity is the number of rows of rail times the length of the bridge. The element quantity includes the rail on the bridge.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Corrosion	None	Freckled Rust	Section Loss	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element or bridge, or both.
Connections	Sound	Loose	Loose or Missing Fasteners	
Post	Sound	Misaligned	Section Loss	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

	Sound	Isolated Failure
Connections	All connectors are in place and functioning	Connectors are loose, or broken

	Freckled Rust	Section Loss
Corrosion	Corrosion of the steel has initiated	Steel pitting is evident without significant impact on load capacity

Element #331
Reinforced Concrete Bridge Railing

ft (m)

National Bridge Element

Description

This element defines all types and shapes of reinforced concrete bridge railing. All elements of the railing must be concrete.

Quantity Calculation

Quantity is the number of rows of rail times the length of the bridge. The element quantity includes the rail on the bridge.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0 and 3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Description

This element defines all types and shapes of timber bridge railing. Included in this element are the posts of timber, metal or concrete, blocking, and curb.

Element # 332

Timber Bridge Railing

ft (m) National Bridge Element

Quantity Calculation

Quantity is the number of rows of rail times the length of the bridge. The element quantity includes the rail on the bridge.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Decay	None	None	Moderate	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Checks/Shingles	Minor	Moderate	Severe	
Cracks	None	None	Minor	
Splits	Minor	Minor to Moderate	Minor to Moderate	
Abrasion	Minor	Minor	Moderate	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Decay	Surface penetration only	Less than 10% of the thickness of the member	Decay greater than 10% of the thickness of the member, is in tension zones, or both
Checks/Shingles	Surface level and does not penetrate more than 5% of the member thickness	Defect does not penetrate more than 50% of the thickness of the member, is in the areas of neutral axis, or both	Defect penetrating more that 50% of the thickness of the member, is in areas of the tension zone, or both
Splits	Lengthwise separation of wood from one surface through to the opposite or adjacent surface. Length does not exceed the depth of the member.	Length of the split is less than 25% of the member length.	Length of the split is greater than 25% of the member length.
Abrasion	Surface level, no section loss	Section loss no less than 10% of the thickness of the member	Section loss more than 10% of the thickness of the member
Cracks	Propagates from a compression zone surface or propagates from a tension surface but penetrates less than 10% of the depth of the member	Propagates from a tension zone surface to a depth not greater than 50% of the member depth	Propagates from a tension zone to a depth greater than 50% of the member depth

Element #333
Other Bridge Railing
ft (m)
Bridge Management Element

Description
This element defines all types and shapes of bridge railing except those defined as metal, concrete, timber, or masonry.

Quantity Calculation

Quantity is the number of rows of rail times the length of the bridge. The element quantity includes the rail on the bridge.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Condition	Good Condition	Fair Condition	Poor Condition	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.

Element Commentary

This element should be used for materials not otherwise defined or combinations of materials

Element Definitions

Defect	Good	Fair	Poor
Condition	No notable distress	Isolated breakdown or deterioration	Widespread deterioration or breakdown without reducing load capacity

Description

This element defines all types and shapes of masonry block or stone bridge railing. All elements of the railing must be masonry block or stone

Element #334
Masonry Bridge Railing
ft (m) National Bridge Element

Quantity Calculation

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Mortar Breakdown	None	Cracking or moderate voids, or both	Severe cracking or voids	The condition is beyond the limits established in condition state three (3), warrants a structural review to deter-mine the strength or serviceability of the element or bridge, or both.
Block or Stone	Cracks are present but have not allowed the block or stone to shift	Cracks are present and block or stone has minor shifting	Block or stone are cracked with masonry face deformation. Block or stone are missing	
Efflorescence	None	Moderate but without rust	Severe with rust staining	
Patched Areas	None	Present	Present	
Load Capacity	No Reduction	No Reduction	No Reduction	

Element Commentary

None

Element Definitions

Defect	Shrinkage	Moderate	Severe
Cracking	< 0.005 in. (0.1 mm)	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)
Mortar Breakdown	NA	Cracking or voids in less than 10% of joints	Cracking or voids in more than 10% of joints
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

3.2—Bridge Management Elements

This section describes in detail those other structure elements that agencies have collected to support their Bridge Management System. These elements are de fined in fairly generic terms that can be refined by the agency to suit their desired business practices. Agencies can develop additional BMEs as necessary following the agency developed element conventions. When considering additional elements, the agency should consider such factors as element performance, deterioration rates, feasible actions, and preservation costs. Appendix A contains guidance on developing elements to facilitate an agency's business practice.

3.2.1—Joints

This section covers expansion joints, pourable joints, compression joins, and assembly joints.

Description

This element defines those expansion joint devices which utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland.

Element #300
Strip Seal Expansion Joint

ft (m) Bridge
Management Element

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Leakage	None	Minimal	Moderate	Extensive
Adhesion	Good	Substantially Adhered	Limited Adhesion	Minimal Adhesion
Gland Damage	None	Minor Damage	Punctured, ripped, or partially pulled out	Missing sections or completely removed
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations or spalls	Loose with delaminations, spalls, or both	Unsound, no longer effective

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Gland Damage	Punctured, ripped, or partially pulled out of the extrusion	Punctured, ripped, or partially pulled out of the extrusion	Failed from abrasion or tearing and has pulled out of the extrusion
Debris Impaction	A minor amount of fine material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint.
Adjacent Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, or delaminations	Heavy, deep spalling or delaminations to the depth of the joint anchors

Element #301
Pourable Joint Seal

ft (m)
Bridge Management Element

Description

This element defines those joints filled with a pourable seal with or without a backer.

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Leakage	None	Minimal	Moderate	Extensive
Adhesion	Good	Substantially Adhered	Limited Adhesion	Minimal Adhesion
Cohesion	None	Minor Cracking	Moderate Cracking	Severe Cracking
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations, or spalls	Loose with delaminations, spalls, or both	Unsound, no longer effective

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Debris Impaction	A minor amount of fine material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint
Adjacent Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, or delaminations	Heavy, deep spalling or delaminations to the depth of the joint anchors
Cohesion	Small isolated cracks	Wider cracks or multiple cracks in the same length	Numerous cracks or extremely wide cracking in the same length

Description

This element defines only those joints filled with a preformed compression type seal. This joint does not have an anchor system to confine the seal.

Element #302
Compression Joint Seal

ft (m)
Bridge Management
Element

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Leakage	None	Minimal	Moderate	Extensive
Adhesion	Good	Substantially Adhered	Limited Adhesion	Minimal Adhesion
Gland Damage	None	Minor Damage	Punctured, ripped, or partially pulled out	Missing sections or completely removed
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations, or spalls	Loose with delaminations, spalls, or both	Unsound, no longer effective

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Gland Damage	Punctured, ripped, or partially pulled out of the extrusion	Punctured, ripped, or partially pulled out of the extrusion	Failed from abrasion or tearing and has pulled out of the extrusion
Debris Impaction	A minor amount of f ne material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint
Adjacent Deck Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, delaminations, or loose armor	Heavy, deep spalling, delaminations, or unattached armor.

Element #303
Assembly Joint With Seal

ft (m)
Bridge Management Element

Description

This element defines only those joints filled with an assembly mechanism that have a seal.

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Leakage	None	Minimal	Moderate	Extensive
Adhesion	Good	Substantially Adhered	Limited Adhesion	Minimal Adhesion
Gland Damage	None	Minor Damage	Punctured, ripped, or partially pulled out	Missing sections or completely removed
Metal Damage	None	Minor Damage	Isolated Metal Cracking or Broken Connections	Extensive Metal Cracking or Connection Failures
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations, or spalls	Loose with delaminations, spalls, or both	Unsound, no longer effective

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Gland Damage	Punctured or scraped	Punctured, ripped, or partially pulled out of the extrusion	Failed from abrasion or tearing and has pulled out of the extrusion
Debris Impaction	A minor amount of f ne material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint
Adjacent Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, or delaminations	Heavy, deep spalling or delaminations to the depth of the joint anchors

Description

This element defines only those joints that are open and not sealed

Element #304
Open Expansion Joint

ft (m)
Bridge Management Element

.

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations, or spalls	Loose with delaminations, spalls,	Unsound, no longer effective

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Debris Impaction	A minor amount of f ne material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint.
Adjacent Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, or delaminations	Heavy, deep spalling or delaminations to the depth of the joint anchors

Element #305
Assembly Joint Without Seal

ft (m)

Bridge Management Element

Description

This element defines only those assembly joints that are open and not sealed. These joint includes finger and sliding plate joints.

Quantity Calculation

The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Leakage	None	Minimal	Moderate	Extensive
Adhesion	Good	Substantially Adhered	Limited Adhesion	Minimal Adhesion
Gland Damage	None	Minor Damage	Punctured, ripped, or partially pulled out	Missing sections or completely removed
Metal Damage	None	Minor Damage	Isolated Metal Cracking or Broken Connections	Extensive Metal Cracking or Connection Failures
Debris Impaction	No Significant	Minor	Moderate	Severe
Adjacent Deck or Header	Sound, no spalls	Sound, minor delaminations, or spalls	Loose with delaminations, spalls, or both	Unsound, no longer effective

3.2.2—Approach Slabs

This section will cover bridge approach slabs. These slabs will be constructed with concrete and mild or prestress (posttension) reinforcement.

Description

This element defines those structural sections, between the abutment and the approach pavement, that are constructed of mild steel reinforced concrete.

Element #321
Reinforced Concrete Approach Slab

ft^2 (m^2)
Bridge Management Element

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas an accounting for any flares or ramps present.

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to minor	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or serviceability of the element or bridge, or both.
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	
Settlement	None	Less than 1.5 in. (40 mm)	More than 1.5 in. (40 mm)	
Load Capacity	No reduction	No reduction	No reduction	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0 and 3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Eff orescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Debris Impaction	A minor amount of fine material still allowing the joint to move	A moderate amount of debris would restrict joint movement in local areas	Heavy impaction with debris effectively locking the joint
Adjacent Damage	Small joint edge spalls or delaminations	Larger spalling, deeper local spalling, or delaminations	Heavy, deep spalling or delaminations to the depth of the joint anchors

3.2.3—Smart Flags (Defect Flags)

This section will cover the smart flags and their use. Each flag will be associated with an element and will de f ne the predominate defect for that condition state.

Flag no.	Flag Name	Flag Description	Deck	Super	Sub	Culvert
356	Steel Cracking/ Fatigue	This flag shall be used with steel elements to identify the predominate defect in a given condition state that is not corrosion.	X	X	X	X
357	Pack Rust	This flag shall be used in conjunction with steel elements connection defects (including shapes in contact in built- up members) of steel bridges that are already showing signs of rust packing between plates.	X	X	X	X
358	Concrete Cracking	This flag shall be used with concrete elements to identify the predominate defect in a given condition state that is not spalling or delaminations.	X	X	X	X
359	Concrete Efflorescence	This flag shall be used with concrete elements to identify the predominate defect in a given condition state that is not spalling or delaminations.	X	X	X	X
360	Settlement	This flag shall be used with all substructure and culvert elements to identify the predominate defect in a given condition state that is not material deterioration. The use of the flag is to identify the severity of the settlement.			X	X
361	Scour	This flag shall be used with all substructure and culvert elements to identify the predominate defect in a given condition state that is not material deterioration. The use of the flag is to identify the severity of the scour.			X	X
362	Superstructure Traffic Impact	This flag shall identify all traffic collisions with the superstructure. Application of the flag is in relation to the impact on the structures capacity to carry load.		X		
363	Steel Section Loss	This flag shall be used with steel elements to identify the predominate defect in a given condition state that is not corrosion. Setting this flag will identify the severity of section loss.	X	X	X	X
364	Steel Out- of-Plane Compression Members	This element shall be used with steel truss or arch elements. The use of the flag shall denote any member that is not in plane with the panel (buckling). It shall be used to identify the predominate defect in a given condition state that is not material deterioration.		X	X	
366	Deck Traffic Impact	This flag shall identify all traffic collisions with the deck. Application of the flag is in relation to the impact on the structures capacity to carry load.	X			
367	Substructure Traffic Impact	This flag shall identify all traffic collisions with the substructure. Application of the flag is in relation to the impact on the structures capacity to carry load.			X	
403	Drop Inlet	This flag shall identify the drop inlets that are associated with a structure.		X		X

3.2.4—Protective Systems

The elements in this section are protective systems types. These systems will influence the deterioration and condition of the underlying structural element. The general categories are wearing surfaces and protective coatings.

Description

This element is for all decks/slabs that have overlays made with flexible (asphaltic concrete), semi-rigid (epoxy and polyester material), or rigid (portland cement) materials.

Element #510
Wearing Surfaces

ft^2 (m^2) Bridge Management Element

Quantity Calculation

The quantity for this element should include the area of the deck/slab from edge to edge including any median areas and accounting for any flares or ramps present.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Spalls/Delaminations/ Patch Areas/Potholes	None	Moderate	Severe	The wearing surface is no longer effective.
Cracks	Shrinkage only	Narrow size or density	Medium size or density	
Effectiveness	Good condition, fully effective	Fair condition, substantially effective	Poor condition, limited effectiveness	

Element Commentary

None

Element Definitions

Defect	Minor	Moderate	Severe
Cracking	< 0.02 in. (0.5 mm)	0.02–0.08 in. (0.5–2.0 mm)	>0.08 in. (2.0 mm)
Cracking Density	NA	1.0–3.0 ft apart (0.33–1.0 m)	< 1 ft (0.33 m)

Element #521	Description
Concrete Protective Coating	This element is for concrete elements that have a protective coating applied to them. These coating include silane/siloxane water proofers, crack sealers such as High Molecular Weight Methacrylate (HMWM), or any top coat barrier that protects concrete from deterioration and rein- forcing steel from corrosion.
ft^2 (m^2)	
Bridge Management Element	

Quantity Calculation

The quantity for this element should include the entire exposed surface of the concrete element.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Wear	None	Underlying concrete not exposed, coating showing wears from UV exposure, friction course missing	Underlying concrete is not exposed, thickness of the coating is reduced	Underlying concrete exposed, treated cracks are exposed
Effectiveness	Good condition, fully effective	Fair condition, substantially effective	Poor condition, limited effectiveness	The protective sys- tem has failed or is nonoperational

Element Commentary

None

Element Definitions

Effectiveness is in evaluation made by the inspector to classify the degree to which the protection system is functioning

3.2.5—Environmental Factors (States)

Elements exposed to different environmental conditions deteriorate differently. These factors include:

Operational activities from traff c and truck movements
Exposure to water, salt, and other corrosive materials
Condition of protective and water proof ng systems
Temperature extremes either from nature or man

When inventorying and assessing the condition of the elements, an inspector should consider the environment in which the element is operating. The environment designation of an element can change over time; as it would if operating policies were changed to reduce the use of road salt. By definition, the environment designation cannot change as the result of maintenance work or deterioration.

Environment	Description
1—Benign	Neither environmental factors nor operating practices are likely to significantly change the condition of the element over time or their effects have been mitigated by the presence of highly effective protective systems.
2—Low	Environmental factors, operating practices, or both either do not adversely inf uence the condition of the element or their effects are substantially lessened by the application of effective protective systems.
3—Moderate	Any change in the condition of the element is likely to be quite normal as measured against those environmental factors, operating practices, or both that are considered typical by the agency.
4—Severe	Environmental factors, operating practices, or both, contribute to the rapid decline in the condition of the element. Protective systems are not in place or are ineffective.

Factors that could increase the severity of the environment rating for various elements include: (Record the predominant environment)

Element	Example Environmental Factors
Timber Elements	High Moisture Content Pest Infestation Ice flow impacts
Steel Elements	Distance from salt air Water wet/dry cycles Exposure to corrosive soils and liquids
Concrete Elements	Freeze thaw cycles Tire Chain wear Deck salting Petroleum Based High Temperatures
Joints and Bearings	Extreme Temperature Ranges
Operating Practices	High traffic and or Truck volume

Appendix A—Agency Developed Elements

Description

This element defines loose rock riprap slope protection. This includes the material and installation at each abutment. If there are piers at the bridge and there are separate riprap installations at piers count as separate installations. If full abutment to abutment installation divide into approximate 100’ long units on larger structures..

Element #398
Slope Protection

Each
NDDOT
Bridge Elements

Quantity Calculation

The quantity for this element is the each with larger bridges divided into approximate 100 ft. long units.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Slumping	None to minor	Some slumping but still functioning	Protection missing or not effective	The condition is beyond the limits established in condition state three (3), warrants a review to determine the serviceability of the element or bridge, or both.

Element Commentary

None

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #399
Slope Protection, RC

Each

NDDOT Bridge Elements

Description

This element defines reinforced concrete slope protection. This includes the material and installation at each abutment. Most installations will have 2 units at each structure (one at each abutment)..

Quantity Calculation

The quantity for this element is the each normally .

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Slumping	None to minor	Some slumping but still functioning	Protection cracked, sliding and no longer effective.	The condition is beyond the limits established in condition state three (3), warrants a review to determine the serviceability of the element or bridge, or both.

Element Commentary

None

Defect	Minor
Cracking	Cracks exist that are letting water enter and displace fill under the protection
Settlement	Measurable settlement has occurred but not impacting load capacity

Description

This element defines the wings at each corner of a bridge or box culvert measured by the each. The wings are rated similar to the abutment/piers.

Element #401
Wings

Each
NDDOT
Bridge Elements

Quantity Calculation

The quantity for this element is the number of wings on the structure, typically 4 each. Rate the whole wing as one unit using the defects listed below.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

Element #402
Headwalls

Each

NDDOT Bridge Elements

Description

This element defines the headwalls that protect the ends of pipes. This element will be measured by the each with typically one headwall at each end of a pipe or installation of pipes. The headwalls are rated similar to the abutment/piers.

Quantity Calculation

The quantity for this element is the number of headwalls on the structure, typically one at each end of the installation. Rate the whole headwall as one unit using the defects listed below.

Condition State Definitions

Defect	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Cracking	None to hairline	Narrow size or density, or both	Medium size or density, or both	The condition is beyond the limits established in condition state three (3), warrants a structural review to determine the strength or service-ability of the element
Spalls/Delaminations/Patched Areas	None	Moderate spall or patch areas that are sound	Severe spall or patched area showing distress	
Efflorescence	None	Moderate without rust	Severe with rust staining	

Element Commentary

None

Element Definitions

Defect	Hairline–Minor	Narrow–Moderate	Medium–Severe
Cracking	< 0.0625 in. (1.6 mm)	0.0625–0.125 in. (1.6–3.2 mm)	>0.125 in. (3.2 mm)
Spalls/Delaminations	NA	Spall less than 1 in. (25 mm) deep or less than 6 in. in diameter	Spall greater than 1 in. (25 mm) deep or greater than 6 in. in diameter or exposed rebar
Cracking Density	Spacing greater than 3.0 ft (0.33 m)	Spacing of 1.0–3.0 ft (0.33–1.0 m)	Spacing of less than 1 ft (0.33 m)
Efflorescence	NA	Surface white without build-up or leaching	Heavy build-up with rust staining

Defect	Minor
Scour	Scour exists—the structure remains stable
Settlement	Measurable settlement has occurred but not impacting load capacity

PONTIS ELEMENT ENVIRONMENTS

DECKS/SLABS (ELEMENTS 12-55)
The type of environment shall be determined by the following conditions:

BENIGN (1)	MODERATE (3)
1. Low salt 2. Low traffic	1. High salt 2. Low traffic
LOW (2)	**SEVERE (4)**
1. Low salt 2. High traffic	1. High salt 2. High traffic

SUPERSTRUCTURE (ELEMENTS 101-199)
The type of environment shall be determined by the following conditions:

BENIGN (1)	MODERATE (3)
1. Low salt 2. Low traffic 3. No exposure to moisture	1. High salt 2. Low traffic 3. High exposure to moisture
LOW (2)	**SEVERE (4)**
1. Low salt 2. High traffic 3. Low exposure to moisture	1. High salt 2. High traffic 3. High exposure to moisture

Each element will fall within one of the four environment categories and will be exposed to at least one of the two or three parts of an environment.

Low traffic: 0 - 1500 ADT **High Traffic: ≥ 1501 ADT**

PONTIS ELEMENT ENVIRONMENTS

SUBSTRUCTURE (ELEMENTS 201-299,401,402,403)
The type of environment shall be determined by the following conditions:

BENIGN (1)	MODERATE (3)
1. Low salt 2. Low traffic 3. No exposure to moisture	1. High salt 2. Low traffic 3. High exposure to moisture
LOW (2)	**SEVERE (4)**
1. Low salt 2. High traffic 3. Low exposure to moisture	1. High salt 2. High traffic 3. High exposure to moisture

OTHER SUPER./SUB. (ELEMENTS 300-399)
The type of environment shall be determined by the following conditions:

BENIGN (1)	MODERATE (3)
1. Low salt 2. Low traffic 3. Protective system * 4. No exposure to moisture **	1. High salt 2. Low traffic 3. No or ineffective protective system * 4. High exposure to moisture **
LOW (2)	**SEVERE (4)**
1. Low salt 2. High traffic 3. Protective system * 4. Low exposure to moisture **	1. High salt 2. High traffic 3. No or ineffective protective system * 4. High exposure to moisture **

Each element will fall within one of the four environment categories and will be exposed to at least one of the three or four parts of an environment.

*** Refers to Approach Slab and/or Bridge Railing.**
**** Refers to Bearings and/or Deck Drains.**

Low traffic: 0 - 1500 ADT High Traffic: ≥ 1501 ADT

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

BRIDGE MANAGEMENT SYSTEM

PONTIS CORE ELEMENTS

Element Name	Unit		Decks		Slabs		
DECKS/SLABS							
Concrete (Bare)	SF		12		38		
Conc. Unprotected with AC overlay	SF		13		39		
Conc. Protected with AC overlay	SF		14		40		
Conc. Protected with thin overlay	SF		18		44		
Conc. Protected with rigid overlay	SF		22		48		
Conc. Protected with coated bars **	SF		26		52		
Conc. Protected with cathodic prot.	SF		27		53		
Open Grid - Steel	SF		28				
Concrete Filled Grid - Steel	SF		29				
Corrugated/ Orthotropic/etc.	SF		30				
Timber (Bare)*	SF		31		54		
Timber with AC Overlay	SF		32		55		

*** Elements 54 and 55 is used for laminated decks without girders. If the deck is laminated and has girders it should be coded 31 or 32.**

**** Elements 26 and 52 must have epoxy coated rebar throughout the deck.**

Element Name	Unit	Steel No Paint	Steel Painted	P/S Conc	Reinf Conc	Timber	Other
SUPERSTRUCTURE							
Closed Web/Box Girder	LF	101	102	104	105		
Open Girder	LF	106	107	109	110	111	
Submerged Open Girder	LF	176					
Stringer	LF	112	113	115	116	117	
Thru Truss (Bottom Chord)***	LF	120	121				
Thru Truss (Excluding Bottom Chord)***	LF	125	126				
Deck Truss	LF	130	131				
Arch/Truss	LF					135	
Arch	LF	140	141	143	144		145
Cable (Not embedded in concrete)	Each	146	146				147
Floor Beam	LF	151	152	154	155	156	
Pin and Hanger Assembly	Each	160	161				
Hinge	Each	199	198				
SUBSTRUCTURES							
Column or Pile Extension**	Each	201	202	204	205	206	299
Pier Wall	LF				210		211
Abutment	LF				215	216	217
Submerged Pile Cap/Footing	Each				220		
Submerged Pile**	Each	225		226	227	228	298
Cap	LF	230	231	233	234	235	
Culvert *	LF	240			241	242	243

Note: Girder length - concrete = span length, timber & steel = span length + 1 foot. Unless otherwise obvious.
*** Element 241 is cast in place culvert and 243 is precast culvert and round concrete pipe.**
**** Elements 298 and 299 include Steel Encased Concrete piling. Note that these elements do not include pile extensions on the wings.**
***** Elements 120 & 125 and 121 & 126 must be coded together.**

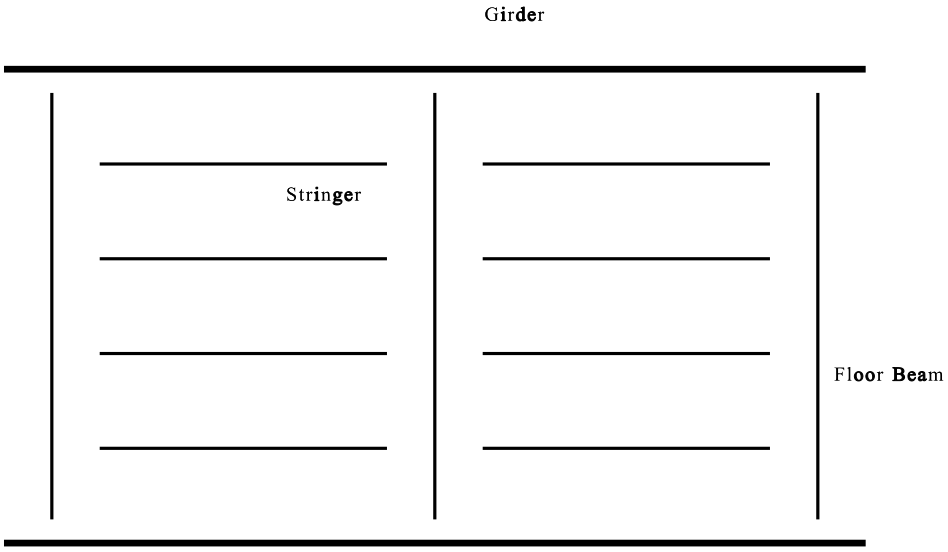
Element Name	Unit	Steel No Paint	Steel Painted	P/S Conc	Reinf Conc	Timber	Other
Other Super/ Substructure Elements							
Strip Seal Expansion Joint	LF						300
Pourable Joint Seal	LF						301
Compression Joint Seal	LF						302
Assembly (modular) Joint Seal	LF						303
Open Expansion Joint	LF						304
Elastomeric Bearing	Each						310
Movable Bearing (roller, sliding, etc)	Each						311
Enclosed/Concealed Bearing	Each						312
Fixed Bearing	Each						313
Pot Bearing	Each						314
Disk Bearing	Each						315
Approach Slab	Each			320	321		
Bridge Railing	LF	330	330		331	332	333** 334
Slope Protection*	Each				399		398

*** Element 398 is Loose Rock Riprap and 399 is Reinforced Concrete.**
**** Element 333 is used for rail retrofit.**

Smart Flags		
	Units	
Steel Fatigue	EA	356
Pack Rust	EA	357
Deck Cracking	EA	358
Soffit	EA	359
Settlement	EA	360
Scour	EA	361
Traffic Impact	EA	362
Section Loss	EA	363
Wings	EA	401
Headwalls	EA	402
Drop Inlet	EA	403

APPENDIX B

Stringers/Floor Beams/Girders. Stringers are the small elements which run longitudinally to the deck and carry the load from the deck to the floor beams. Floor beams are transverse to the deck and carry the stringer load to the truss or girders. Girders are the main longitudinal superstructure members which carry the loads to the substructures. See diagrams below:



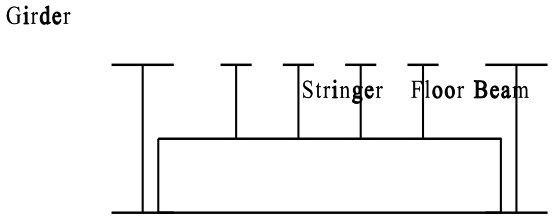
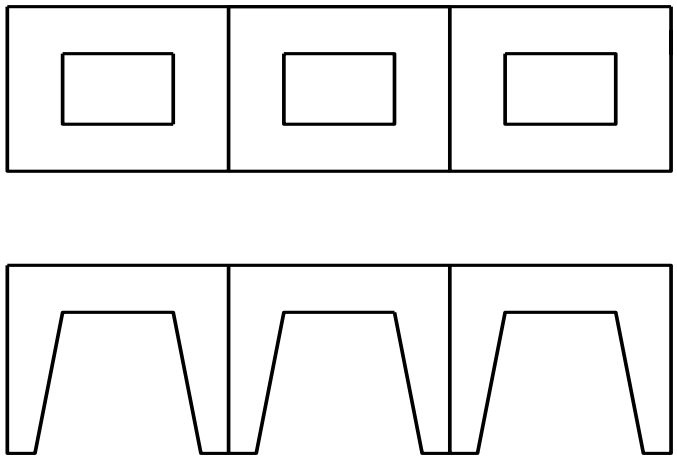


Diagram quantities: Girders = 2 x length, Stringers = 4 x length
Floor Beams = 3 x width

Note: If all the Girders/Stringers are the same depth they are all considered girders, whether they are interior or exterior.

Box Beams and Channel Beams.

If traffic is driving directly on the girder do not rate a deck.

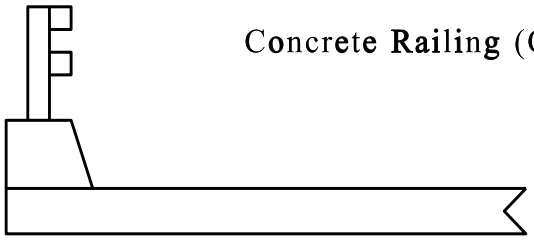


Both drawings contain 3 girders.

Bridge Railing.

Steel Railing

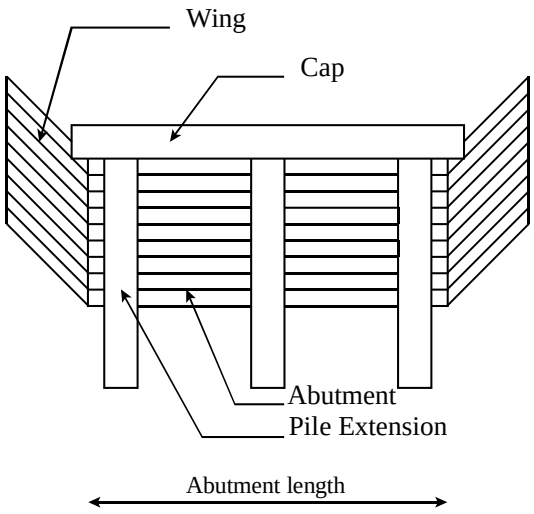
Concrete Railing (Curb)



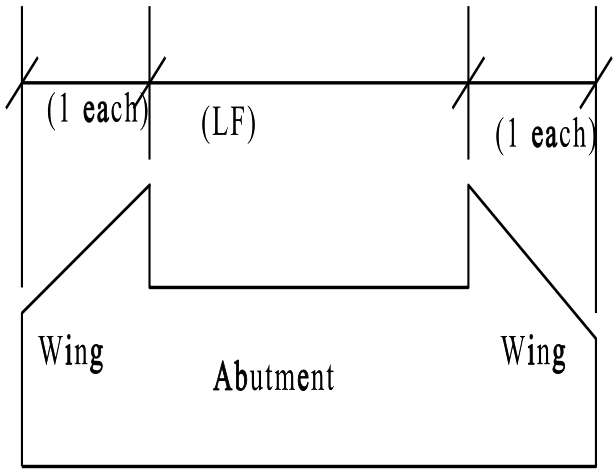
Two Bridge Railing elements should be coded.

Element 330 for Metal Railing and 331 for Concrete Railing.

Timber Abutments.

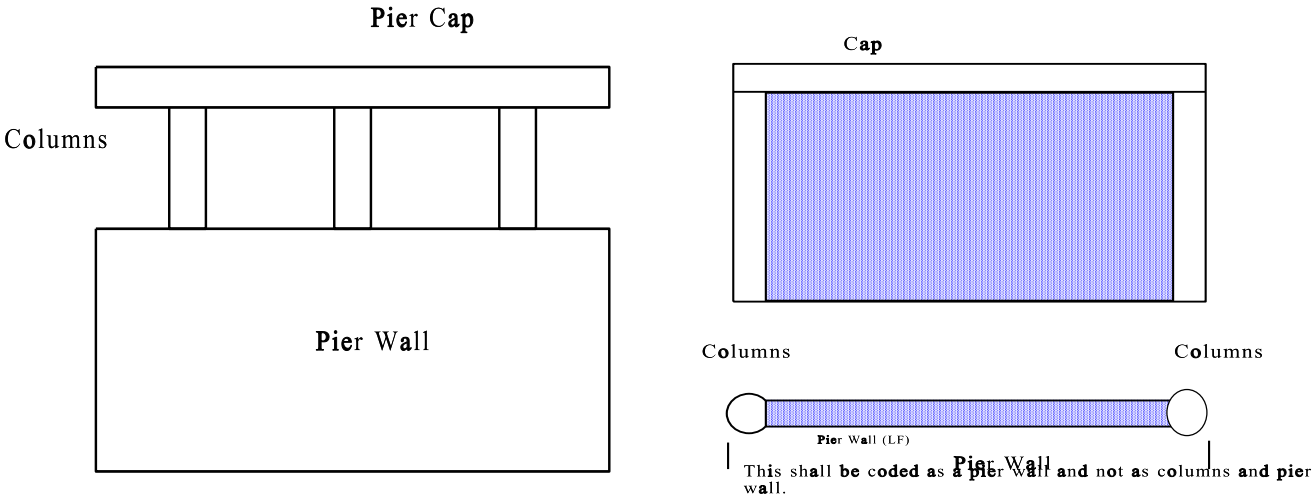


Concrete Abutment

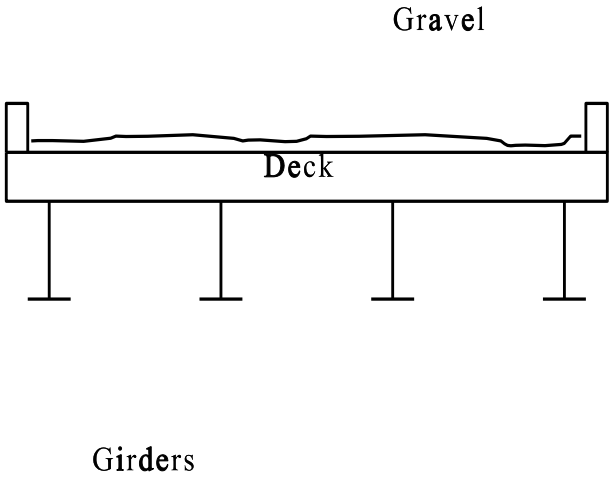


Timber abutments typically will get 3 different elements, a timber cap, timber column (pile extension), and timber abutment. The timber abutment in these cases will consist only of the back wall of the abutment. The wings should be coded under the wings smart flag. Concrete abutments typically will get 2 different elements, concrete abutment and wings.

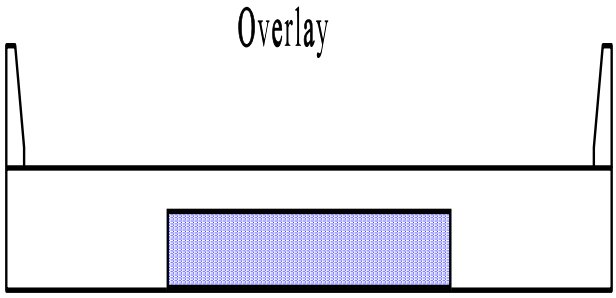
Piers



Decks



The deck should be rated according to the inspector's best judgment, even though there is gravel on the deck.



This should be coded as one deck and not a percentage of each type. The portion that is greatest should be used for coding.

PONTIS CoRe Elements and Smart Flags

By Numerical Order