U.S. Department of Transportation
Federal Highway Administration
Office of Infrastructure

Specifications for the National Bridge Inventory (SNBI)

2022 BrMUG Meeting
September 13, 2022

Disclaimers

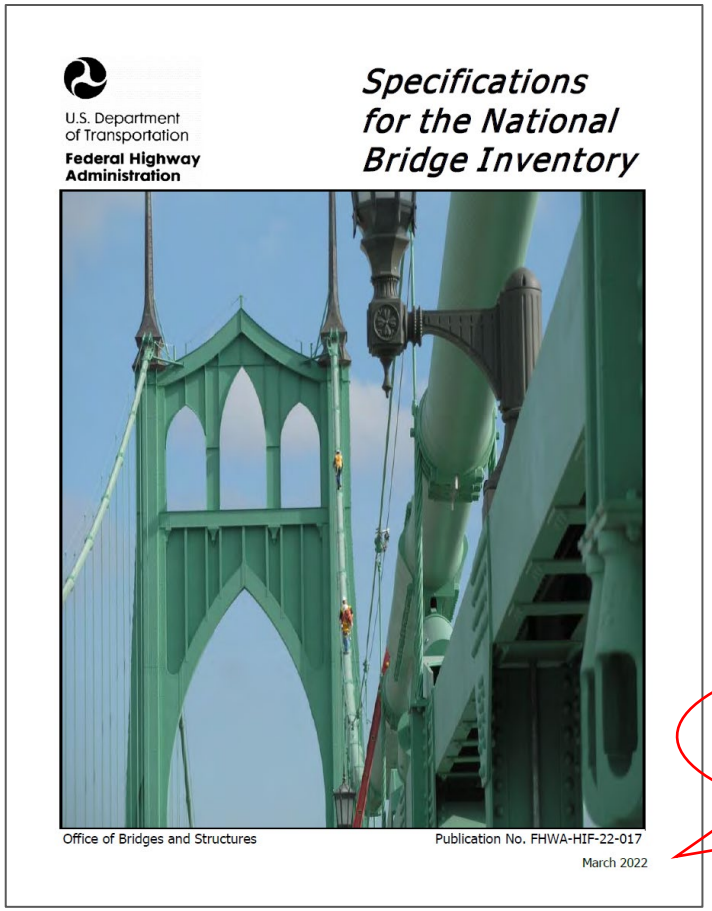
Except for the statutes and regulations cited, the contents of this presentation do not have the force and effect of law and are not meant to bind States in any way. This presentation is intended only to provide clarity regarding existing requirements under the law or agency policies.

Included images are from FHWA documents unless otherwise noted.

Outline

- Background
- Implementation Schedule
- Implementation Resources
- SNBI Content

Background



- Supersedes 1995 Recording and Coding Guide
- Incorporated reference to the May 6, 2022 NBIS regulatory update (article 23 CFR 650.317)
- Document location https://www.fhwa.dot.gov/bridge/nbi.cfm

Current SNBI version discernible by March 2022 date

Background

Development History

- October 2006 version: More than 2,000 comments
- Long pause …
- Additional stakeholder outreach
- FHWA independent QC review
- AASHTO T-18 review: More than 500 comments
- Reviewed and updated to align with the proposed NBIS update
- NBIS and SNBI posted for comment in Federal Register on 11/12/19
- Final Rule posted in Federal Register on 05/06/22

Background

Development Criteria

- *Highway bridge safety*
- *NBIS oversight*
- *Consistency with NBIS*
- *Reporting to Congress*
- *Emergency response*
- *Risk-based, data driven, asset & performance management program*
- *Utilize data from existing management systems*
- *Clarity and ease of use (lessen interpretation)*
- *Consistency with Specifications for the National Tunnel Inventory & Highway Performance Monitoring System (where appropriate)*

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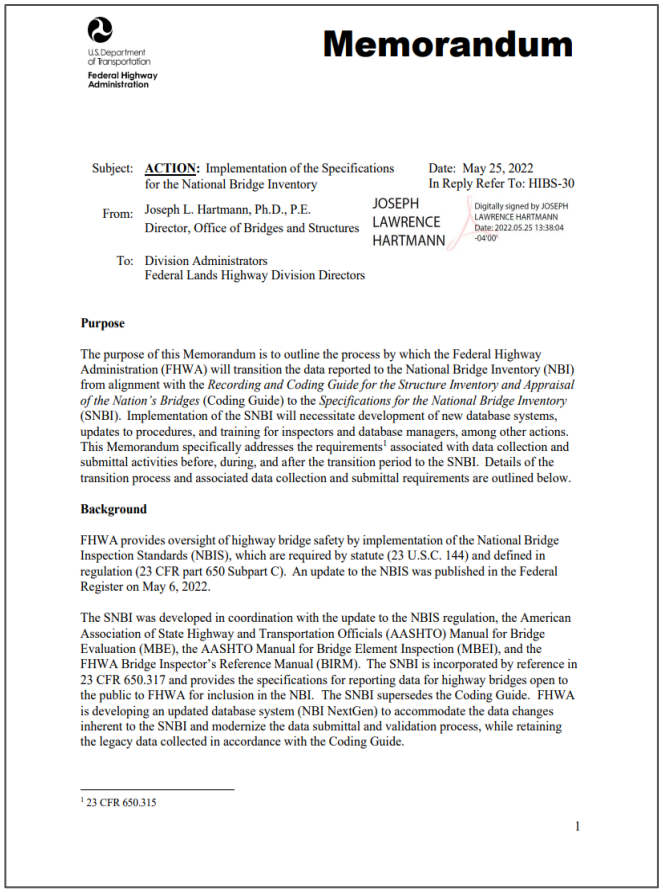
Implementation Schedule

Implementation Schedule



U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **ACTION:** Implementation of the Specifications for the National Bridge Inventory
Date: May 25, 2022
In Reply Refer To: HIBS-30

From: Joseph L. Hartmann, Ph.D., P.E.
Director, Office of Bridges and Structures

JOSEPH LAWRENCE HARTMANN
Digitally signed by JOSEPH LAWRENCE HARTMANN
Date: 2022.05.25 13:38:04 -04'00'

To: Division Administrators
Federal Lands Highway Division Directors

Purpose

The purpose of this Memorandum is to outline the process by which the Federal Highway Administration (FHWA) will transition the data reported to the National Bridge Inventory (NBI) from alignment with the *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges* (Coding Guide) to the *Specifications for the National Bridge Inventory* (SNBI). Implementation of the SNBI will necessitate development of new database systems, updates to procedures, and training for inspectors and database managers, among other actions. This Memorandum specifically addresses the requirements[1] associated with data collection and submittal activities before, during, and after the transition period to the SNBI. Details of the transition process and associated data collection and submittal requirements are outlined below.

Background

FHWA provides oversight of highway bridge safety by implementation of the National Bridge Inspection Standards (NBIS), which are required by statute (23 U.S.C. 144) and defined in regulation (23 CFR part 650 Subpart C). An update to the NBIS was published in the Federal Register on May 6, 2022.

The SNBI was developed in coordination with the update to the NBIS regulation, the American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation (MBE), the AASHTO Manual for Bridge Element Inspection (MBEI), and the FHWA Bridge Inspector's Reference Manual (BIRM). The SNBI is incorporated by reference in 23 CFR 650.317 and provides the specifications for reporting data for highway bridges open to the public to FHWA for inclusion in the NBI. The SNBI supersedes the Coding Guide. FHWA is developing an updated database system (NBI NextGen) to accommodate the data changes inherent to the SNBI and modernize the data submittal and validation process, while retaining the legacy data collected in accordance with the Coding Guide.

[1] 23 CFR 650.315

1

- Reference May 25, 2022 Memo Implementation of the Specifications for the National Bridge Inventory
- Outlines transition from Coding Guide to SNBI with focus on reporting of data and availability of supporting FHWA systems and resources
- Document location https://www.fhwa.dot.gov/bridge/pubs/Memo-Implementation_Specifications_National_Bridge_Inventory_FINAL.pdf

Implementation Schedule

Treatment of Historical Data

- Two types of historical data
  - Legacy data = data reported using Coding Guide in originally reported form
  - Transitioned data = data reported using Coding Guide that has been migrated to SNBI specification and not validated
- During data transition period States will report a combination of transitioned data and validated/collected data
- During data transition period FHWA will not be able to reliably distinguish between transitioned and validated/collected data (excluding some items and codes)
- At conclusion of transition period all data has been validated/collected

Implementation Schedule

Timeline (from Memo Implementation of the Specifications for the National Bridge Inventory)

Target Date	Action
May 2022	NBIS and SNBI published
July 2022	FHWA publishes Data Crosswalk
October 2022	FHWA publishes Data Submittal Schema and Data Submittal Validation Logic (Initial Version)
April 2023	Transition Tool is made available online
October 2024	FHWA makes NBI NextGen available online for data validation only
March 15, 2025	Last NBI data submittal in accordance with 1995 Coding Guide
January 1, 2026	**Last date to begin** verification of transitioned data and collection of SNBI-based data for inspected bridges – Agencies may elect to begin SNBI-based data collection and verification earlier to meet the March 15, 2028, deadline for submittal of a complete SNBI-based NBI dataset
January 1, 2026	FHWA makes NBI NextGen available for Data Submittals

Implementation Schedule

Timeline (cont.)

March 15, 2026	First SNBI-based NBI data submittal – Transitioned/Hybrid Dataset – At a minimum, all bridges submitted with transitioned data except for specified fields required to manage FHWA programs, which shall be collected or verified in accordance with the SNBI – Continue verification of transitioned data and collection of SNBI-based data
June 2026	Transition Tool sunsets
March 15, 2027	Second SNBI-based NBI data submittal – Transitioned/Hybrid Dataset – Continue verification of transitioned data and collection of SNBI-based data
March 15, 2028	Third SNBI-based NBI data submittal – 100% populated and verified – No temporary codes permitted – First complete SNBI-based dataset with collected and verified SNBI-based data for all bridges

Implementation Schedule

Special consideration for bridges on reduced and extended inspection intervals

- "Although collection of SNBI-based data is not required to begin until January 1, 2026, complete and verified data for all bridges, including those on inspection intervals greater than 24 months, should be included in the 2028 data submittal. FHWA recommends that each Agency develop a plan to address the data for bridges currently on extended intervals such that they can meet this timeline." (from Memo Implementation of the Specifications for the National Bridge Inventory)

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Implementation Resources

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Located at https://www.fhwa.dot.gov/bridge/nbi.cfm
- Mapping of relationships between items and codes of the Coding Guide and SNBI
- Serves several purposes (for FHWA and agencies)
  - Starting point for data collection using SNBI
  - Allows for lookup of historical data from a SNBI-based system/database (note: accurate representation requires lookup in original form)
  - Allows for continuity of pre-SNBI and SNBI data for temporal comparison (note: accurate representation requires lookup in original form)

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Item-to-Item
  - Coding Guide to SNBI item mapping and logic
- Code-to-Code
  - Coding Guide to SNBI item code mapping and logic

- Not all items map. Not all codes map.
  - SNBI items which ALL Coding Guide codes map are termed “clean transition”
    - Does not mean data maps with full reliability. Validation required.
  - SNBI items which SOME Coding Guide codes map are termed “partial transition”
    - Does not mean data maps with full reliability. Validation required.
    - Temporary codes used in instances when Coding Guide code maps to several potential SNBI codes (often refined codes). Allows for both starting point and partial continuity for historical data representation.
  - SNBI items which Coding Guide codes do not map have a “null transition”

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Assumptions were applied in all cases. Data still needs collected/validated in accordance with implementation schedule.
- Example assumptions/limitations
  - Small differences in item specification language not considered
  - Clarifying item language and examples not considered
  - Metric to English conversion rounding
  - Features datasets
  - Span Sets datasets
  - Routes datasets
  - Etc.

Therefore, validation of transitioned data is required!!!

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Examples

B.H.03 NHS Designation

CG ID	CG Value	SNBI Value	SNBI Description
104	0	N	Non-NHS
104	1	Y	NHS

- *Questions: Is this a Clean, Partial, or No Transition?*

SNBI ID	Data Tag	SNBI Item Name	SNBI Format	1995 Coding Guide ID	1995 Coding Guide Item Name/Description	1995 Coding Guide Format (as shown in Appendix E)	Clean Transition?
B.H.03	BH03	NHS Designation	AN (1)	104	Highway System of the Inventory Route	1/N	Yes

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Examples

B.SP.09 Deck Material and Type

CG ID	CG Value	CG ID	CG Value	SNBI Value	SNBI Description	TEMP
		107	1	CR-T	TEMP - concrete cast-in-place - C01 or C04 or CX	*
		107	2	CP-T	TEMP - concrete precast - C02 or C03 or C05 or CX	*
		107	3	S01	Steel – open grid	
		107	4	S02	Steel – filled or partially filled grid	
43B/44B	not 08	107	5	S-T	Steel – plate or orthotropic - S03 or S04	*
43B/44B	08	107	5	S04	Steel – orthotropic	
		107	6	S05	Steel – corrugated	
		107	7	A01	Aluminum	
		107	8	T-T	TEMP - timber - T01 or T02 or T03 or T04 or TX	*
		107	9	X-T	TEMP - other - CX or F01 or F02 or F03 or FX or SX or X	*
		107	N	0	None	

* Temporary code to be phased out

  - *Question: Is this a Clean, Partial, or No Transition?*
  - *Answer: Partial*

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Examples

Additional SNBI Codes

SNBI Value	SNBI Description
C01	Reinforced concrete – cast-in-place
C02	Reinforced concrete – precast
C03	Prestressed concrete – pre-tensioned
C04	Prestressed concrete – cast-in-place post-tensioned
C05	Prestressed concrete – precast post-tensioned
CX	Concrete – other
F01	FRP composite – aramid fiber
F02	FRP composite – carbon fiber
F03	FRP composite – glass fiber
FX	FRP composite – other
SX	Steel – other
T01	Timber – glue laminated
T02	Timber – nail laminated
T03	Timber – solid sawn
T04	Timber – stress laminated
TX	Timber – other
X	Other

Implementation Resources

FHWA Transition Logic (Data Crosswalk)

- Examples

SNBI ID	Data Tag	SNBI Item Name	SNBI Format	1995 Coding Guide ID	1995 Coding Guide Item Name/Description	1995 Coding Guide Format (as shown in Appendix E)	Clean Transition?
B.SP.09	BSP09	Deck Material and Type	AN (3)	107	Deck Structure Type	1/AN	Partial

Implementation Resources

Frequently Asked Questions (FAQs)

- In development
- Monitor https://www.fhwa.dot.gov/bridge/nbi.cfm

Implementation Resources

SNBI Training

- Development has started on an in-person/virtual training session
- Delivery by FHWA
- TBD
  - Content focus areas?
  - Catered to what audience?
  - Length?
  - In-person or virtual?
  - Number of deliveries?

A PAUSE FOR QUESTIONS

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SNBI Content

Document Structure & Data Organization

Document Structure

Specification and Commentary format

Data Item Name		
Format	Frequency	Item ID
Specification	Commentary	
Requirements for reporting the data item.	Expanded guidance on the specification.	
Specification Continued, Commentary Continued, or Examples		
Additional space for Specification or Commentary, if needed. Examples are presented to further clarify the specification. Each item typically has brief examples. A more comprehensive example can be found at the end of each section or subsection.		

Document Structure

Data Format
- Three types
  - Alphanumeric (items range from 1 to 300 characters, includes pipe delimiters)
  - Numeric (items range from 2 to 10 char… …st 6 decimal places)
  - YYYYMMDD

Data Frequency
- Three types
  - Initial (quasi static)
  - Each Inspection (verified and/or u…
  - Calculated (do not require reportin…

See Appendix B summary

Item ID
- Format is B.XX.XX
  - B for bridge
  - XX document section or subsection designation
  - XX order within document section or subsection

Document Structure

Sections and subsections (synonymous with item grouping)

Section	Subsection	Identifier
Identification	Identification	ID
	Location	L
	Classification	CL
Material & Type	Span Material & Type	SP
	Substructure Material & Type	SB
	Roadside Hardware	RH

Section	Subsection	Identifier
Geometry	n/a	G
Features	Feature Identification	F
	Routes	RT
	Highways	H
	Railroads	RR
	Navigable Waterways	N

Document Structure

Sections and subsections (cont.)

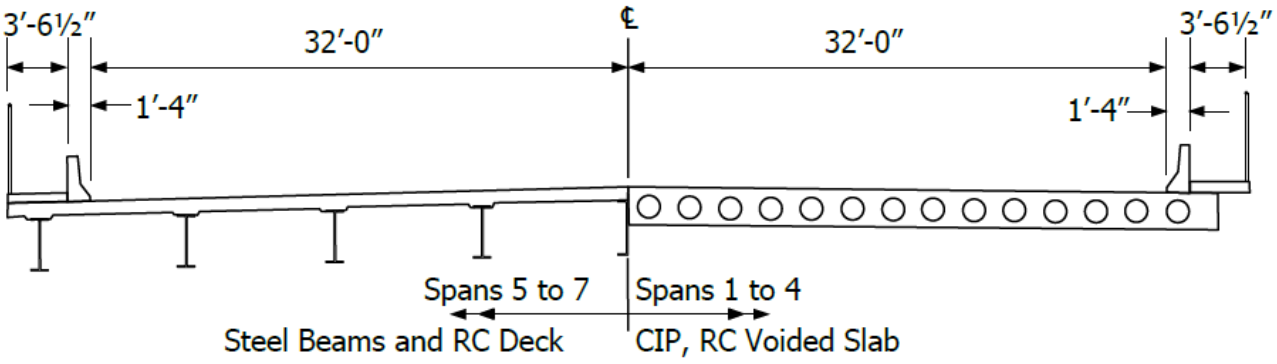
Section	Subsection	Identifier
Loads, Load Rating, & Posting	Loads & Load Rating	LR
	Load Posting Status	PS
	Load Evaluation & Posting	EP
Inspections	Inspection Requirements	IR
	Inspection Events	IE

Section	Subsection	Identifier
Condition	Component Condition	C
	Element Identification	E
	Element Conditions	CS
	Appraisal	AP
	Work Events	W

Document Structure

Many Examples

- nearly all items have examples
- end of section examples
- end of document example (comprehensive example)



Document Structure

- U.S. customary units
- Latitude & Longitude in decimal degrees
- Linear Referencing System (LRS) data items match HPMS

Items Summary

Compared to the Coding Guide

- ≈21 discontinued items (including calculated items)
- ≈61 new items (including calculated items)
- continued items (many with clarification and expanded coding options)

Items Summary

Discontinued items (≈ 21 items)

- FHWA Region Code (1B)
- Base Highway Network (12)*
- LRS Subroute Number (13B)
- Structure Flared (35)
- Approach Guardrail (36C)
- Approach Guardrail Ends (36D)
- Reference Feature (54A)*
- Reference Feature (55A)*
- Structural Evaluation (67)
- Deck Geometry (68)
- Underclearances, Vt. & Hz. (69)
- Work Done By (75B)
- Length of Structure Improvement (76)
- Bridge Improvement Cost (94)
- Roadway Improvement Cost (95)
- Total Project Cost (96)
- Year of Improvement Cost Estimate (97)
- Parallel Structure Designation (101)
- Temporary Structure Designation (103)
- Future Average Daily Traffic (114)
- Year of Future Average Daily Traffic (115)

Also no sufficiency rating, structurally deficient classification, or functionally obsolete classification

Items Summary

New items (≈ 61 items)

- Bridge Name
- Previous Bridge Number
- Border Br. Desig. Lead State
- Metropolitan Planning Org.
- Emergency Evac. Desig.
- Minimum Span Length
- Curved Bridge
- Maximum Bridge Height
- Sidehill Bridge
- Irregular Deck Area
- Design Method
- Load Rating Date
- Controlling Legal Load R.F.
- Routine Permit Loads
- Fatigue Prone Details
- Complex Feature
- Railing Condition
- Railing Transitions Condition
- Bearings Condition
- Joints Condition
- Bridge Condition Classification
- Lowest Condition rating Code
- NSTM Inspection Condition
- Underwater Inspection Condition
- Scour Plan of Action
- Seismic Vulnerability
- Feature Location
- Feature Name
- Crossing Bridge Number
- Railroad Service Type
- Nav Channel Min HC
- Span Configuration Designation
- Number of Beam Lines
- Span Protective System
- Deck Interaction
- Deck Stay-in-Place Forms
- Substructure Configuration Designation
- Number of Substr. Units
- Substructure Material
- Substructure Type
- Substructure Protective Sys.
- Foundation Type
- Foundation Protective System
- Posting Status Change Date
- Legal Load Configuration
- Legal Load Rating Factor
- Posting Type
- Posting Value
- Inspection Completion Date
- Nationally Certified Br. Insp.
- Inspection Interval
- Inspection Due Date
- Risk Based Insp. Interval Method
- Inspection QC Date
- Inspection QA Date
- Inspection Data Update Date
- Inspection Note
- Inspection Equipment
- Work Performed
- Year Work Performed

Data Organization

There are groups of data that can be reported multiple times for same bridge.

- Features
- Routes
- Span Sets
- Substructure Sets
- Inspection Events
- Posting Status Events
- Work Events

In Coding Guide, only under records are comparable (can report multiple)

Data Organization

Features data subset

- A *group* of items that are reported for each unique and reportable feature type
- Reportable feature types include highways, waterways, railroads, pathways, urban feature, dry terrain, other

Data Organization

Span configurations data subset

A *group* of items that is reported for each unique superstructure – deck – span continuity combination

- Item group includes attribute data (Number of Spans, Superstructure Material, Superstructure Type, Deck Interaction, Deck Material and Type, Span Continuity, etc.)

Data Organization

Substructure configurations data subset

- A ***group*** of items that is reported for each unique sub design - sub material - foundation combination

- Each unique abutment and foundation combination
  - Item group includes attribute data (Substructure Design Type, Substructure Material Type, Foundation Type, etc.)

- Each unique pier type and foundation combination
  - Item group includes attribute data (Substructure Material, Substructure Type, Foundation Type, etc.)

Data Organization

"Event" data subsets

- A *group* of items that is reported for each occurrence or change (i.e. event) between a specified period.
- A YYYYMMDD item is reported and used as one unique identifier for reporting to FHWA
- Includes
  - Inspection events
  - Posting status events
  - Work events

Data Organization

Multi-Value items

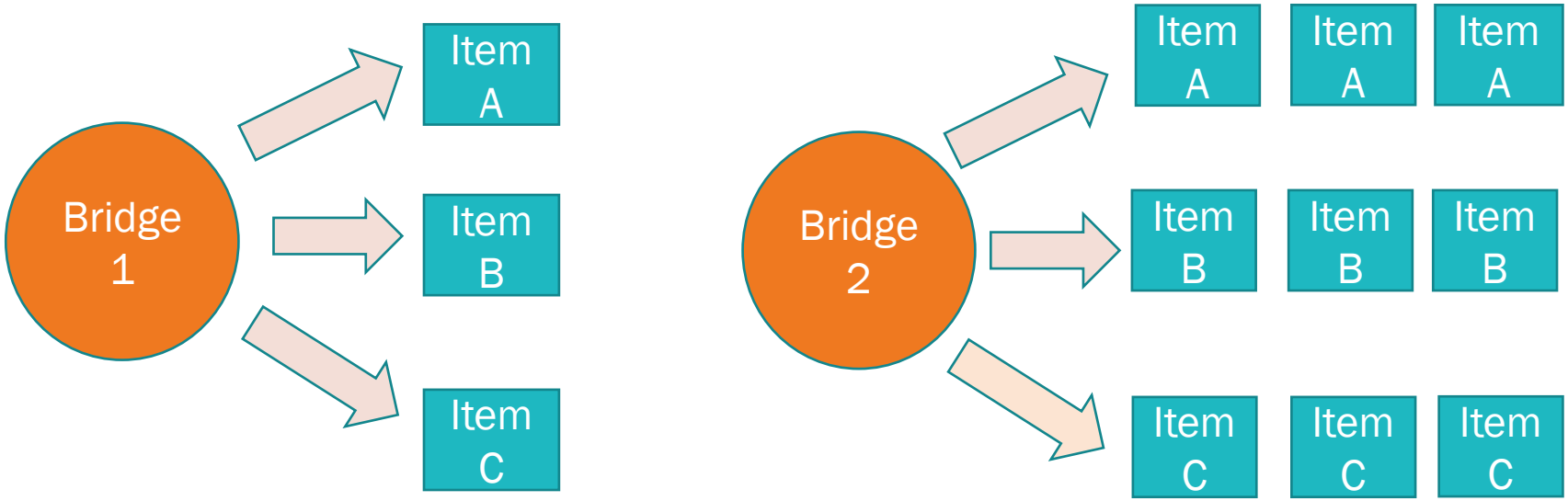
- An item which says report all applicable codes
  - Example: Inspection Equipment item

Code	Description
AN	No access equipment used
A01	Ladder
A02	Bucket lift vehicle
A03	Under bridge inspection vehicle
A04	Rigging
A05	Waders
A06	Boat
A07	Snorkel
A08	SCUBA

Data Organization

Item relationships

- Some items *one-to-one* relation w/ bridge
- Some items *many-to-one* relation w/bridge



Data Organization

one-to-one

- an item that is reported a single time only for bridge
- an item that a single code/value is reported
- current status is always reported

Bridges
Bridge 1
Bridge 2
…
Bridge x

Item A	value
Item B	value
…	value
Item x	value

Data Organization

many-to-one

- an item that can be reported multiple times
- an item that can report multiple codes/values (ex. Inspection Equipment item, Work Performed item)
- can report more than one group of items (ex. Features, Span Groups, Substructure Groups, Events)

Bridges
Bridge 1
Bridge 2
…
Bridge x

→

Item A
Value 1
Value 2
…
Value x

OR

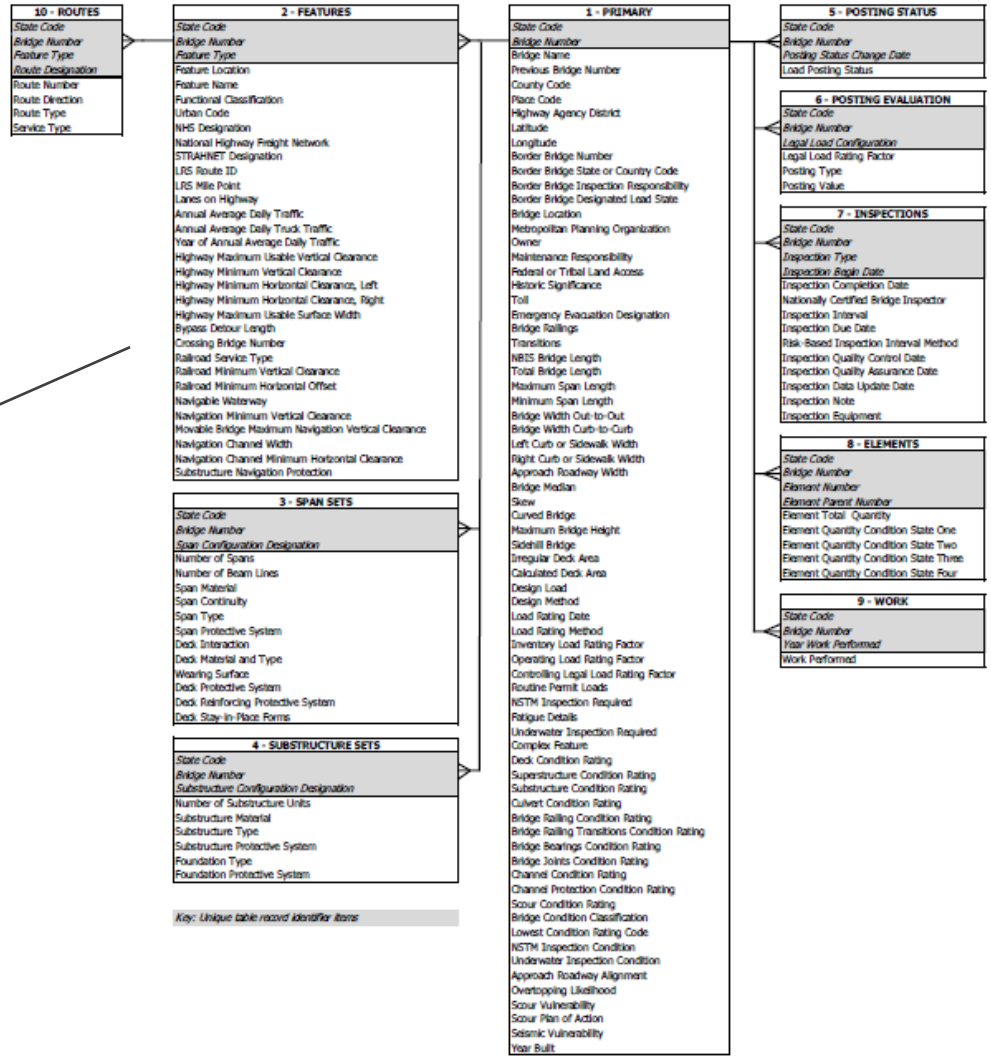
Bridges
Bridge 1
Bridge 2
…
Bridge x

→

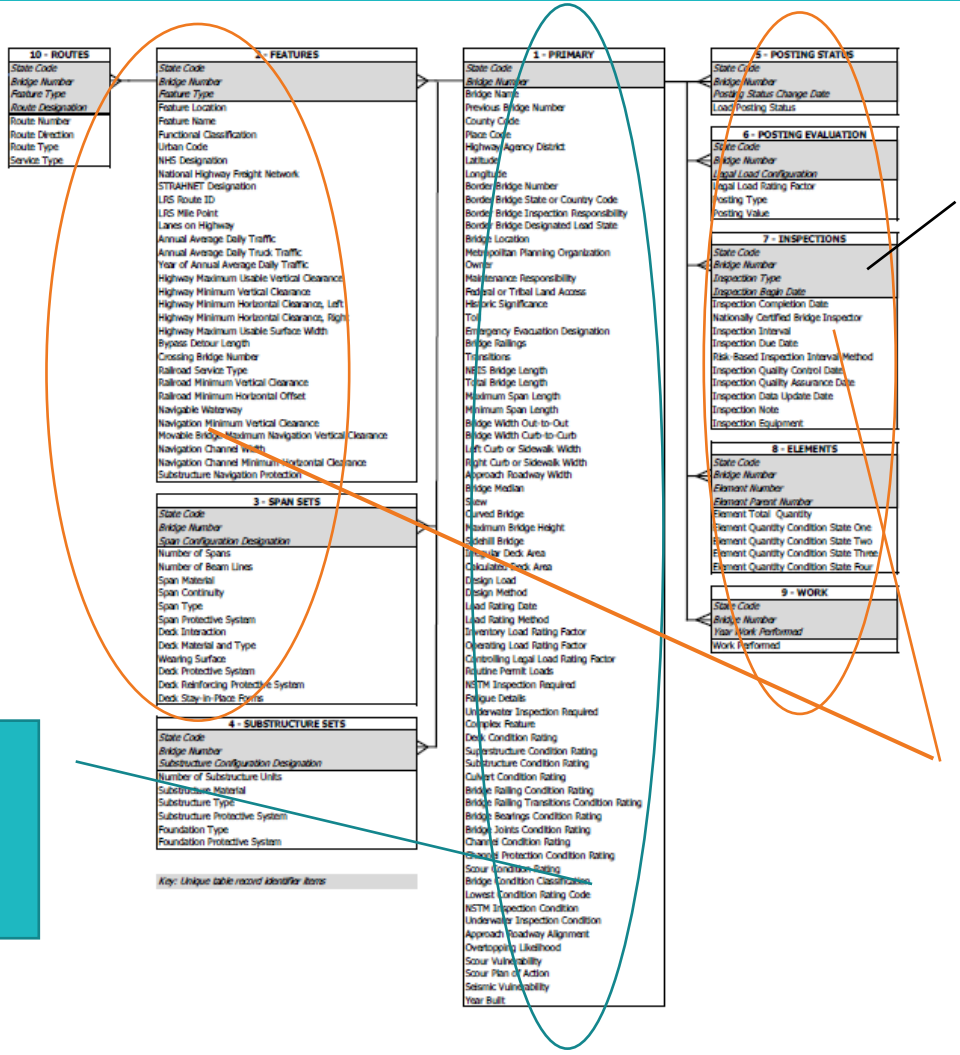
Data Subset i	Data Subset ii	…	Data Subset ij
Item A	Item A	Item A	Item A
Item B	Item B	Item B	Item B
…	…	…	…
Item x	Item x	Item x	Item x

Data Organization

Data Relationships (reference page 5 of Introduction)



Data Organization



Items in grey FHWA will use as unique identifiers

Primary Dataset (one-to-one with bridge)

Non-Primary Datasets (many-to-one with bridge)

Data Organization

- Dataset 1 – Primary (72 items)

ID	Name	ID	Name
B.CL.01	Owner	B.L.03	Place Code
B.CL.02	Maintenance Responsibility	B.L.04	Highway Agency District
B.CL.03	Federal or Tribal Land Access	B.L.05	Latitude
B.CL.04	Historic Significance	B.L.06	Longitude
B.CL.05	Toll	B.L.07	Border Bridge Number
B.CL.06	Emergency Evac. Designation	B.L.08	Border Bridge State or Country Code
B.ID.01	Bridge Number	B.L.09	Border Bridge Inspection Responsibility
B.ID.02	Bridge Name	B.L.10	Border Bridge Designated Lead State
B.ID.03	Previous Bridge Number	B.L.11	Bridge Location
B.L.01	State Code	B.L.12	Metropolitan Planning Organization
B.L.02	County Code	B.RH.01	Bridge Railings

Data Organization

- Dataset 1 – Primary cont. (72 items)

ID	Name	ID	Name
B.RH.02	Transitions	B.G.11	Skew
B.G.01	NBIS Bridge Length	B.G.12	Curved Bridge
B.G.02	Total Bridge Length	B.G.13	Maximum Bridge Height
B.G.03	Maximum Span Length	B.G.14	Sidehill Bridge
B.G.04	Minimum Span Length	B.G.15	Irregular Deck Area
B.G.05	Bridge Width Out-to-Out	B.G.16	Calculated Deck Area
B.G.06	Bridge Width Curb-to-Curb	B.LR.01	Design Load
B.G.07	Left Curb or Sidewalk Width	B.LR.02	Design Method
B.G.08	Right Curb or Sidewalk Width	B.LR.03	Load Rating Date
B.G.09	Approach Roadway Width	B.LR.04	Load Rating Method
B.G.10	Bridge Median	B.LR.05	Inventory Load Rating Factor

Data Organization

- Dataset 1 – Primary cont. (72 items)

ID	Name	ID	Name
B.LR.06	Operating Load Rating Factor	B.AP.05	Seismic Vulnerability
B.LR.07	Controlling Legal Load Rating Factor	B.C.01	Deck Condition Rating
B.LR.08	Routine Permit Loads	B.C.02	Superstructure Condition Rating
B.IR.01	NSTM Inspection Required	B.C.03	Substructure Condition Rating
B.IR.02	Fatigue Details	B.C.04	Culvert Condition Rating
B.IR.03	Underwater Inspection Required	B.C.05	Bridge Railing Condition Rating
B.IR.04	Complex Feature	B.C.06	Bridge Railing Transitions Condition Rating
B.AP.01	Approach Roadway Alignment	B.C.07	Bridge Bearings Condition Rating
B.AP.02	Overtopping Likelihood	B.C.08	Bridge Joints Condition Rating
B.AP.03	Scour Vulnerability	B.C.09	Channel Condition Rating
B.AP.04	Scour Plan of Action	B.C.10	Channel Protection Condition Rating

Data Organization

- Dataset 1 – Primary cont. (72 items)

ID	Name	ID	Name
B.C.11	Scour Condition Rating		
B.C.12	Bridge Condition Classification		
B.C.13	Lowest Condition Rating Code		
B.C.14	NSTM Inspection Condition		
B.C.15	Underwater Inspection Condition		
B.W.01	Year Built		

Data Organization

- Dataset 2 – Features (30 items)

ID	Name	ID	Name
B.F.01	Feature Type (many-to-one)	B.H.09	Annual Average Daily Traffic
B.F.02	Feature Location	B.H.10	Annual Average Daily Truck Traffic
B.F.03	Feature Name	B.H.11	Year of Annual Average Daily Traffic
B.H.01	Functional Classification	B.H.12	Highway Maximum Usable Vertical Clearance
B.H.02	Urban Code	B.H.13	Highway Minimum Vertical Clearance
B.H.03	NHS Designation	B.H.14	Highway Minimum Horizontal Clearance, Left
B.H.04	National Highway Freight Network	B.H.15	Highway Minimum Horizontal Clearance, Right
B.H.05	STRAHNET Designation	B.H.16	Highway Maximum Usable Surface Width
B.H.06	LRS Route ID	B.H.17	Bypass Detour Length
B.H.07	LRS Mile Point	B.H.18	Crossing Bridge Number
B.H.08	Lanes on Highway	B.N.01	Navigable Waterway

Data Organization

- Dataset 2 – Features cont. (30 items)

ID	Name	ID	Name
B.N.02	Navigation Minimum Vertical Clearance		
B.N.03	Movable Bridge Maximum Navigation Vertical Clearance		
B.N.04	Navigation Channel Width		
B.N.05	Navigation Channel Minimum Horizontal Clearance		
B.N.06	Substructure Navigation Protection		
B.RR.01	Railroad Service Type		
B.RR.02	Railroad Minimum Vertical Clearance		
B.RR.03	Railroad Minimum Horizontal Offset		

Data Organization

- Dataset 3 – Span Sets (13 items)

ID	Name	ID	Name
B.SP.01	Span Configuration Designation (many-to-one)	B.SP.12	Deck Reinforcing Protective System
B.SP.02	Number of Spans	B.SP.13	Deck Stay-in-Place Forms
B.SP.03	Number of Beam Lines		
B.SP.04	Span Material		
B.SP.05	Span Continuity		
B.SP.06	Span Type		
B.SP.07	Span Protective System		
B.SP.08	Deck Interaction		
B.SP.09	Deck Material and Type		
B.SP.10	Wearing Surface		
B.SP.11	Deck Protective System		

Data Organization

- Dataset 4 – Substructure Sets (7 items)

ID	Name	ID	Name
B.SB.01	Substructure Configuration Designation (many-to-one)		
B.SB.02	Number of Substructure Units		
B.SB.03	Substructure Material		
B.SB.04	Substructure Type		
B.SB.05	Substructure Protective System		
B.SB.06	Foundation Type		
B.SB.07	Foundation Protective System		

Data Organization

- Dataset 5 – Posting Status (2 items)

ID	Name	ID	Name
B.PS.01	Load Posting Status (many-to-one)		
B.PS.02	Posting Status Change Date		

Data Organization

- Dataset 6 – Posting Evaluation (4 items)

ID	Name	ID	Name
B.EP.01	Legal Load Configuration (many-to-one)		
B.EP.02	Legal Load Rating Factor		
B.EP.03	Posting Type		
B.EP.04	Posting Value		

Data Organization

- Dataset 7 – Inspections (12 items)

ID	Name	ID	Name
B.IE.01	Inspection Type (many-to-one)	B.IE.12	Inspection Equipment
B.IE.02	Inspection Begin Date		
B.IE.03	Inspection Completion Date		
B.IE.04	Nationally Certified Bridge Inspector		
B.IE.05	Inspection Interval		
B.IE.06	Inspection Due Date		
B.IE.07	Risk-Based Inspection Interval Method		
B.IE.08	Inspection Quality Control Date		
B.IE.09	Inspection Quality Assurance Date		
B.IE.10	Inspection Data Update Date		
B.IE.11	Inspection Note		

Data Organization

- Dataset 8 – Elements (7 items)

ID	Name	ID	Name
B.E.01	Element Number (many-to-one)		
B.E.02	Element Parent Number		
B.E.03	Element Total Quantity		
B.CS.01	Element Quantity Condition State One		
B.CS.02	Element Quantity Condition State Two		
B.CS.03	Element Quantity Condition State Three		
B.CS.04	Element Quantity Condition State Four		

Data Organization

- Dataset 9 – Work (2 items)

ID	Name	ID	Name
B.W.02	Year Work Performed (many -to-one)		
B.W.03	Work Performed		

Data Organization

- Dataset 10 – Routes (5 items)

ID	Name	ID	Name
B.RT.01	Route Designation (many-to-one)		
B.RT.02	Route Number		
B.RT.03	Route Direction		
B.RT.04	Route Type		
B.RT.05	Service Type		

154 items total

A PAUSE FOR QUESTIONS

U.S. Department of Transportation
Federal Highway Administration
Office of Infrastructure

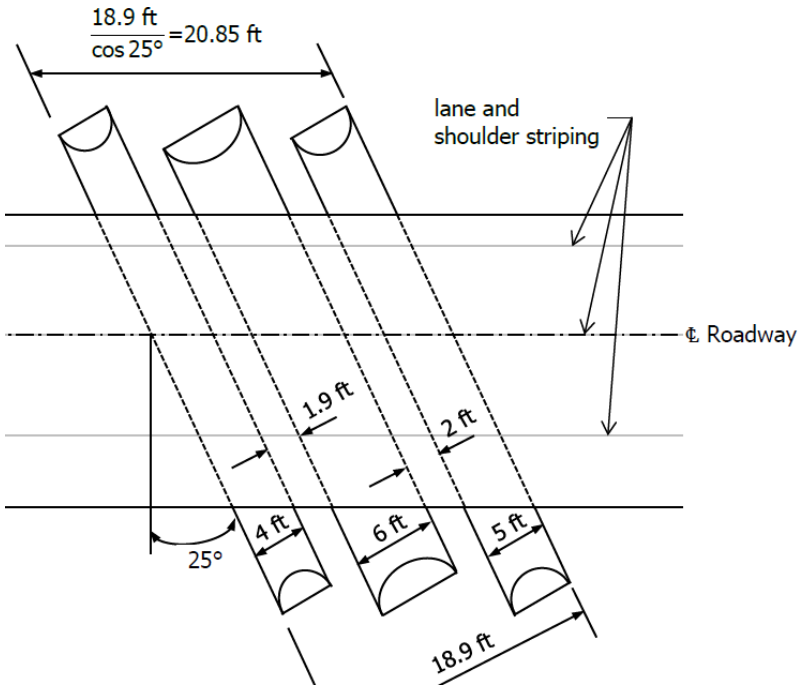
SNBI Content

Item Discussion

Primary Dataset

NBIS Bridge Length (B.G.01; Numeric (7,1))

- Continued from Coding Guide but revised
- Reporting a length value rather than Y or N
- May be estimated from drawings or indirect measurement when Total Bridge Length is > 30.0 ft
- Clarifying language added “roadway centerline is the physical center of the portion of the roadway for the movement of vehicles, regardless of striping, and exclusive of shoulders”
- Length value provides confirmation that reported bridges are greater than 20.0 ft



Primary Dataset

Component condition items

- Deck, Superstructure, Substructure, Culvert
- Railing (new)
- Railing Transitions (new)
- Joints (new)
- Bearings (new)
- Channel (revised)
- Channel Protection (revised)
- Scour (new)

Primary Dataset

Condition rating items

- General condition rating descriptions that apply to Deck, Superstructure, Substructure, Culvert, Railing, Railing Transitions, & Bearings

Table 20. Codes and descriptions for component condition ratings.

Code	Condition	Description
N	NOT APPLICABLE	Component does not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; strength and performance of the component are not affected.
4	POOR	Widespread moderate or isolated major defects; strength and/or performance of the component is affected.
3	SERIOUS	Major defects; strength and/or performance of the component is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects; component is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.

Primary Dataset

Bridge Joints Condition Rating (B.C.08, AN(1))

condition table

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not have deck joints.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects.
4	POOR	Widespread moderate or isolated major defects.
3	SERIOUS	Some major defects.
2	CRITICAL	Widespread major defects.
1	IMMINENT FAILURE	Joints have failed and are ineffective.
0	FAILED	Joints have failed and present a safety hazard.

Primary Dataset

Channel Condition Rating (B.C.09, AN(1))

condition table

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not cross over water.
9	EXCELLENT	No defects.
8	VERY GOOD	Inherent defects only.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Moderate defects; bridge and approach roadway are not threatened.
4	POOR	Widespread moderate or isolated major defects; bridge and/or approach roadway is threatened.
3	SERIOUS	Major defects; bridge or approach roadway is seriously threatened. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects. Bridge or approach roadway is severely threatened. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to channel condition. Channel rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to channel condition, and is beyond corrective action. Bridge location or design can no longer accommodate the channel, and bridge replacement is needed to restore service.

Primary Dataset

Channel Protection Condition Rating (B.C.10, AN(1))

condition table

Code	Condition	Description
N	NOT APPLICABLE	Bridge does not cross over water or channel protection devices do not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; performance of the channel protection is not affected.
4	POOR	Widespread moderate or isolated major defects; performance of channel protection is affected.
3	SERIOUS	Major defects; performance of channel protection is seriously affected. Condition typically necessitates more frequent monitoring or corrective actions.
2	CRITICAL	Major defects; channel protection is severely compromised. Condition typically necessitates more frequent monitoring or corrective actions.
1	IMMINENT FAILURE	Channel protection has failed, but corrective action could restore it to working condition.
0	FAILED	Channel protection is beyond repair and must be replaced.

Primary Dataset

Scour Condition Rating (B.C.11, AN(1))

condition table

Code	Condition Description
N	Bridge does not cross over water.
9	No scour.
8	Insignificant scour.
7	Some minor scour.
6	Widespread minor or isolated moderate scour.
5	Moderate scour; strength and stability of the bridge are not affected.
4	Widespread moderate or isolated major scour; strength and/or stability of the bridge is affected.
3	Major scour; strength and/or stability of the bridge is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	Major scour; strength and/or stability of the bridge is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions to keep the bridge open.
1	Bridge is closed to traffic due to scour condition. Channel rehabilitation may return the bridge to service.
0	Bridge is closed due to scour condition, and is beyond corrective action. Bridge replacement is needed to restore service.

Primary Dataset

Component condition items (cont.)

- Appendix C includes guidance for determining severity, i.e. minor, moderate, major
- Severity levels are described by common defect types

Table 48. Steel - defect severity guidance for component condition ratings.

Defect	Minor	Moderate
Corrosion	Freckled rust. Corrosion has initiated.	Section loss is evident.
Cracking	Crack that has been effectively arrested.	Crack that has not been arrested.
Connection	Loose fasteners, or pack rust without distortion. Connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.

Primary Dataset

Underwater Inspection Condition (B.C.15; AN(1))

- Supports NBIS risk-based inspection intervals

NSTM Inspection Condition (B.C.14; AN(1))

- Supports NBIS risk-based inspection intervals
- Report lowest of superstructure or substructure NSTM condition

Fatigue Details (B.IR.02; AN(1))

- Supports NBIS risk-based inspection intervals
- Report whether bridge has E or E' details (Y or N)
- Included in routine inspection Method 1 qualifying criteria for extended interval not to exceed 48 months (23 CFR 650.311)

Primary Dataset

Load Rating Date (B.LR.03; YYYYMMDD)

Load Rating Method (B.LR.04; AN(4))

Inventory Load Rating Factor (B.LR.05; N(4,2))

Operating Load Rating Factor (B.LR.06; N(4,2))

Controlling Legal Load Rating Factor (B.LR.07; N(4,2))

- These items are updated concurrently
- Although looks like an event dataset, this is a Primary Dataset (one-to-one with bridge), therefore States only report the most current dataset to FHWA
- In this section the Inventory and Operating Load Rating Factors are for design level loads and Controlling Legal Load Rating Factor is for legal load rating vehicles

Primary Dataset

Controlling Legal Load Rating Factor (B.LR.07; N(4,2))

- Report the lowest (controlling) rating factor for the State's and AASHTO legal loads truncated to the hundredth
- For Allowable Stress and Load Factor Rating of legal loads this will be the operating rating factor
- For Load & Resistance Factor Rating this will be the "Legal Load Rating" which is a single value that is synonymous with operating level
- Example

A bridge has the following calculated legal load rating factors for the AASHTO legal loads and a State-defined legal load:

Legal Load Configuration	Rating Factor
Type 3	1.07
Type 3S2	0.88
Type 3-3	0.80
SU4	0.70
SU5	0.65
FL120	1.15

Report 0.65.

Primary Dataset

Border Bridge items

- New reporting procedure described on page 21
- States must designate a lead and non-lead for each border bridge
- Lead state reports **all** NBI items including features located on both sides of border and associated datasets
- Non-lead state reports **abbreviated** NBI items including highway features on and above the bridge. Does not report non-highway features.
- FHWA will copy the lead state data over to the non-lead record and include in the processed/posted national data. It is essential that the non-lead state uses the same highway feature numbering as the lead state for B.F.01 Feature Type.

Primary Dataset

Border Bridge items (abbreviated record reported by non-lead State)

ID	Name	ID	Name
B.ID.01	Bridge Number	B.F.01	Feature Type
B.ID.03	Previous Bridge Number	B.F.02	Feature Location
B.L.01	State Code	B.F.03	Feature Name
B.L.02	County Code	B.RT.01	Route Designation
B.L.03	Place Code	B.RT.02	Route Number
B.L.04	Highway Agency District	B.RT.03	Route Direction
B.L.07	Border Bridge Number	B.RT.04	Route Type
B.L.08	Border Bridge State or Country Code	B.RT.05	Service Type
B.L.09	Border Bridge Inspection Responsibility	B.H.03	NHS Designation
B.L.10	Border Bridge Designated Lead State	B.H.06	LRS Route ID
B.L.12	Metropolitan Planning Organization	B.H.07	LRS Mile Point
		B.H.18	Crossing Bridge Number

Features Dataset

- Many-to-one relationship with bridge
- Identifies features above, below, and carried on bridge
- Features Dataset (partial listing)
  - Feature Type
  - Feature Location
  - Feature Name
  - Crossing Bridge Number
  - Railroad Service Type

Features Dataset

Feature Type (B.F.01; AN(3))

- All bridges have at least one feature carried and one feature below. Report all the apply.
- Multiple features of same type are numbered sequentially
- Highway feature numbering is sequential starting with the highway(s) carried, then below, then above
- Code D## used when no other feature applies

Code	Description
H##	Highway
R##	Railroad
P##	Pathway
W##	Waterway
F##	Relief for waterway
B##	Urban feature
D##	Dry terrain or side slope
X##	Other

Features Dataset

Feature Location (B.F.02; AN(1))

- Report location of each identified Feature Type

Code	Description
C	Carried on bridge
A	Above bridge
B	Below bridge
T	Top level
L	Lower level

Features Dataset

Railroad Service Type (B.RR.01; AN(2))

- One-to-one relation with a Railroad Feature
- Reports types freight, passenger, multiple (freight and passenger on same tracks)
- Reports electrified or non-electrified

Code	Description
F	Freight
FE	Freight - electrified
P	Passenger
PE	Passenger - electrified
M	Multiple services - not electrified
ME	Multiple services - electrified
I	Inactive

Features Dataset

Railroad Service Type (B.RR.01; AN(2)) cont.

Example – *How many railroad features and what service type codes?*

Code	Description
F	Freight
FE	Freight - electrified
P	Passenger
PE	Passenger - electrified
M	Multiple services - not electrified
ME	Multiple services - electrified
I	Inactive

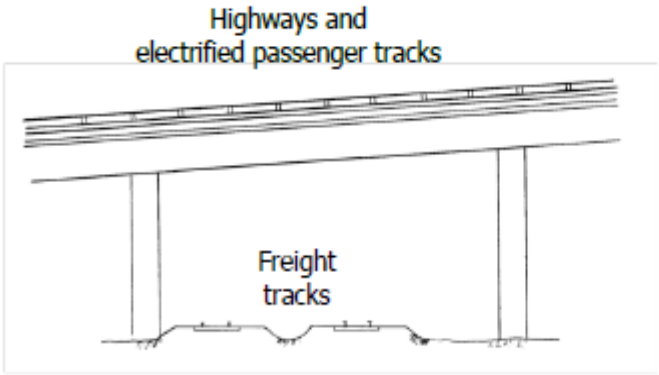


Figure 105. Bridge elevation view with two electrified passenger rail tracks carried on the bridge and two freight rail tracks below the bridge.

Answer: On bridge, PE code. Below bridge, F code.

Features Dataset

Railroad Service Type (B.RR.01; AN(2))

Example - ***How many railroad features and what service type codes?***

Code	Description
F	Freight
FE	Freight - electrified
P	Passenger
PE	Passenger - electrified
M	Multiple services - not electrified
ME	Multiple services - electrified
I	Inactive

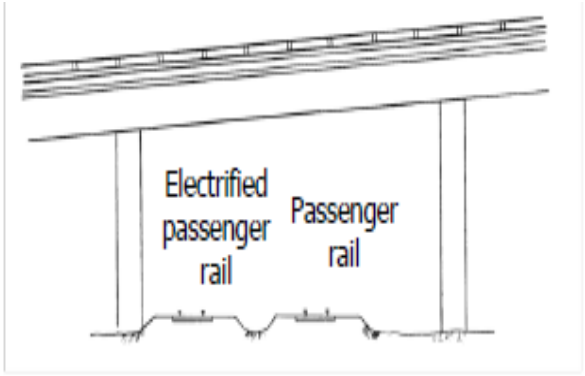
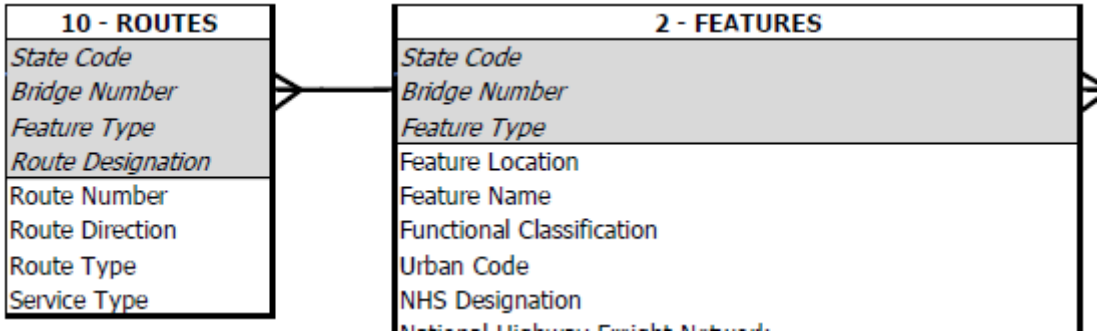


Figure 108. Bridge elevation view with an electrified passenger rail track and a non-electrified passenger rail track below the bridge.

Answer: PE and P for two separate railroad features below bridge

Routes Dataset

- Many-to-one with a Highway Feature



- Dataset
  - Route Designation
  - Route Number
  - Route Direction
  - Route Type
  - Service Type
- Route Designation is the SNBI unique sequential identifier, i.e. R01, R02, etc.

Routes Dataset

Examples

(1) I-66 and State Route 17 northbound share one highway that is not divided at the bridge

- Report R01 for I-66
- Report R02 for State Route 17

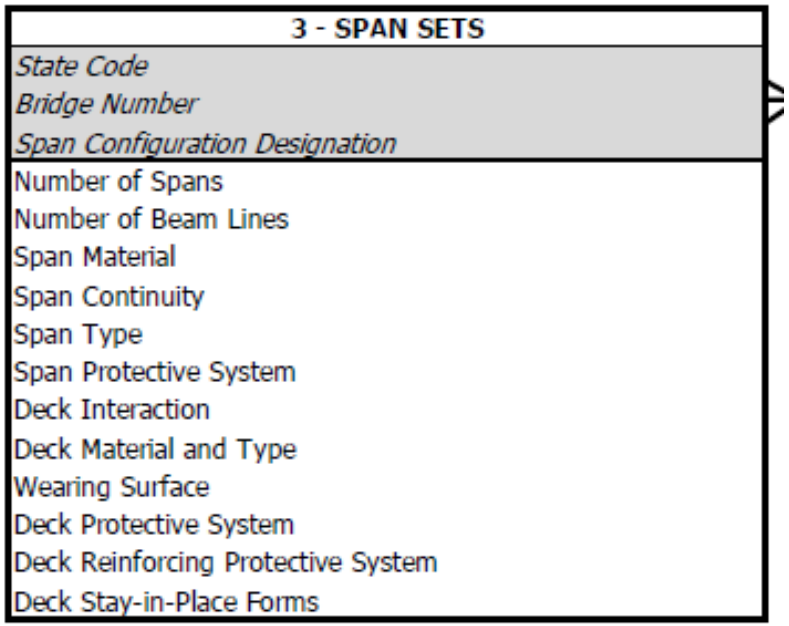
(2) A ramp bridge departs from I-66 westbound and enters I-81 southbound

- Report R01 for I-66
- Report R02 for I-81

(3) One highway feature is signed for both State Highway 43 and Harlem Avenue

- Report R01 for State Highway 43
- Do not report a route record for Harlem Avenue (SNBI "If a highway carries multiple routes, report only those routes that have a route number.")

Span Sets Dataset



- Many-to-one with bridge
- Each unique combination of
  - Span Material (B.SP.04)
  - Span Continuity (B.SP.05)
  - Span Type (B.SP.06)

  form a different span set

Span Sets Dataset

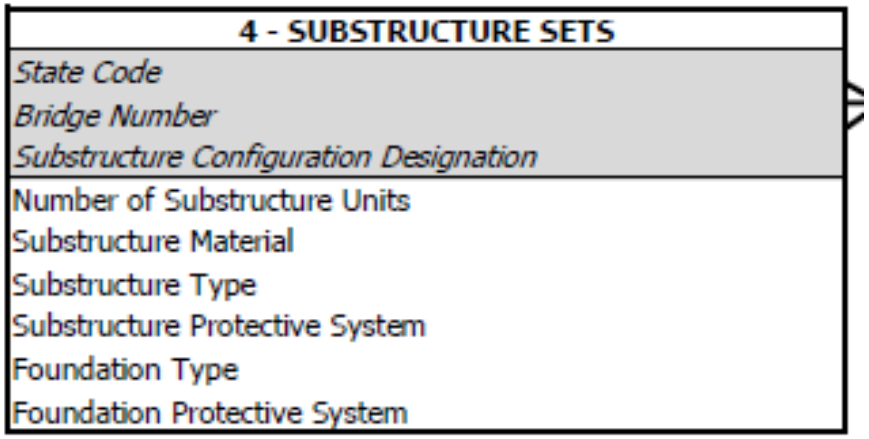
Span Configuration Designation (B.SP.01; AN(3))

- Unique sequential identifier, i.e. M01, A02, etc.

Code	Description
M##	Main
A##	Approach
C##	Culvert
V##	Culvert extension
W##	Widening

- Example
  - Six-span bridge with two continuous steel plate girder main spans and four simply supported steel plate girder approach spans. This bridge has two span sets.
    - Report M01 for the continuous steel plate girder data set
    - Report A01 for the simply supported steel plate girder data set

Substructure Sets Dataset



- Many-to-one with bridge
- Each unique combination of
  - Substructure Material (B.SB.03)
  - Substructure Type (B.SB.04)
  - Foundation Type (B.SB.06)

  form a substructure set

Substructure Sets Dataset

Substructure Configuration Designation (B.SB.01, AN(3))

- Unique sequential identifier, i.e. A01, P02, etc.

Code	Description
A##	Abutment
P##	Pier or Bent
W##	Widening

Example

- Three-span bridge with a concrete pier wall and concrete stub abutments. The north abutment has a spread footing on rock foundation and the south abutment has a steel H-pile foundation.
  - Report A01 for the north abutment data set
  - Report A02 for the south abutment data set
  - Report P01 for the towers data set

Posting Status Dataset

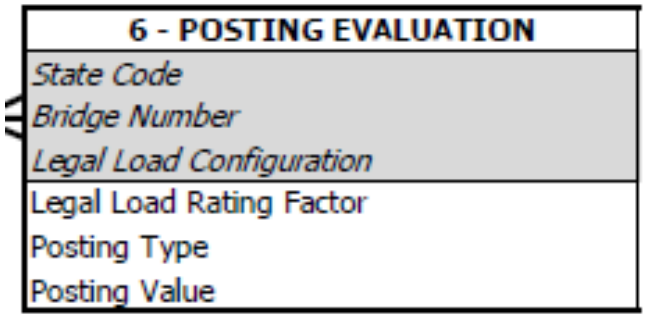
5 - POSTING STATUS
State Code
Bridge Number
Posting Status Change Date
Load Posting Status

- Many-to-one with bridge
- Each occurrence is reported between specified period
- Event dataset because Posting Status Change Date (B.PS.02) is a unique identifier when reporting to FHWA

Table 15. Load Posting Status Codes.

	No restriction			Posted or restricted				Closed
	New	Open	Needs Action	Weight	Other	Needs Reduction	Missing	
Permanent	N	PO	PA	PP	PR	PD	PM	C
Temporary		TO	TA	TP	TR	TD	TM	C
Supported		SO	SA	SP	SR	SD	SM	C

Posting Evaluation Dataset



- Many-to-one with bridge because report multiple legal load rating vehicles as applicable
- Is not an event dataset because Load Rating Date (B.L.03) is part of primary dataset and not used as unique identifier for the Posting Evaluation Dataset

Posting Evaluation Dataset

Legal Load Configuration (B.EP.01; AN(3))

Legal Load Rating Factor (B.EP.02; N(4,2))

Code	Description
3	Type 3
3S2	Type 3S2
3-3	Type 3-3
SU4	SU4 truck
SU5	SU5 truck
SU6	SU6 truck
SU7	SU7 truck
NRL	Notional Rating Load
EV2	Type EV2 emergency vehicle
EV3	Type EV3 emergency vehicle

- Reported rating factors are for the AASHTO legal load configurations or the AASHTO design level load rating when used as a screening load and does not trigger the need to rate AASHTO legal loads
- Does not accommodate reporting of State-specific legal loads

Posting Evaluation Dataset

Posting Type (B.EP.03; AN(1))

Code	Description
G	Gross Load
A	Single Axle Load
D	Tandem Axle Load
T	Truck Load
C	No commercial vehicles
S	Speed reduction
L	Number of lanes restricted
V	Number of vehicles restricted
X	Other

Posting Value (B.EP.04, N(2,0))

- Report weight limit shown on sign

Posting Evaluation Dataset

Example

Q: What is Posting Type and Posting Value?

Answers:

T; 8

T; 12

T; 16

Code	Description
G	Gross Load
A	Single Axle Load
D	Tandem Axle Load
T	Truck Load
C	No commercial vehicles
S	Speed reduction
L	Number of lanes restricted
V	Number of vehicles restricted
X	Other

Inspections Dataset

7 - INSPECTIONS
State Code
Bridge Number
Inspection Type
Inspection Begin Date
Inspection Completion Date
Nationally Certified Bridge Inspector
Inspection Interval
Inspection Due Date
Risk-Based Inspection Interval Method
Inspection Quality Control Date
Inspection Quality Assurance Date
Inspection Data Update Date
Inspection Note
Inspection Equipment

- Many-to-one (more than one dataset per bridge is reported when applicable)
- More than one dataset because more than one inspection may be reported since last submittal**

**Is an event dataset because Inspection Begin Date (B.IE.02) is a unique identifier when reporting to FHWA

Inspections Dataset

Inspection Type (B.IE.01; AN(1))

Code	Description
1	Initial
2	Routine
3	Underwater
4	NSTM
5	Damage
6	In-Depth
7	Special
8	Service
9	Scour Monitoring

Inspections Dataset

Nationally Certified Bridge Inspector (B.IE.04; AN(15))

- Report the unique code identifying the Nationally Certified Bridge Inspector (team leader) responsible for the inspection type performed

- Agencies may choose not to report this item for inspection types defined in the NBIS that do not require a Nationally Certified Bridge Inspector (team leader), even if one is present during the inspection

Inspections Dataset

Inspection Due Date (B.IE.06; YYYYYMMDD

- FHWA calculated item
- Default calculation is the value reported in Item B.IE.03 (Inspection Completion Date) plus the value reported in Item B.IE.05 (Inspection Interval)
- FHWA will populate this item in the NBI processed/posted national dataset

Inspections Dataset

Risk-Based Inspection Interval Method (B.IE.07; AN(1))

Code	Description
N	Not applicable
1	Method 1
2	Method 2

- Method 1, as described in the NBIS, is when inspection intervals are determined by a simplified assessment of risk to classify each bridge into one of three risk levels with an inspection interval not to exceed 12, 24, or 48 months.
- Method 2, as described in the NBIS, is when inspection intervals are determined by a more rigorous assessment of risk to classify each bridge, or a group of bridges, into one of four risk levels with an inspection interval not to exceed 12, 24, 48, or 72 months.

Inspections Dataset

Inspection Quality Control Date (B.IE.08; YYYYMMDD)

- Report the date that the QC review was completed.
- The intent of this item is to identify inspections that have had independent QC reviews to maintain inspection quality at or above a specified level.

Inspections Dataset

Inspection Quality Assurance Date (B.IE.09; YYYYMMDD)

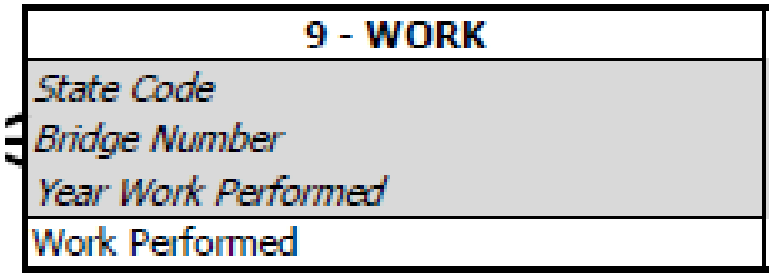
- Report the date that the QA review was completed.
- The intent of this item is to identify inspections that have had independent QA reviews to measure or verify the overall quality of the inspection program.

Inspections Dataset

Inspection Data Update Date (B.IE.10, YYYYMMDD)

- Report the date that the NBI inspection data were entered or updated in the State transportation department, Federal agency, or Tribal government inventory.
- The intent of this item is to verify that a complete NBI inspection data set is accepted and is entered or updated in the inventory within the timeframes required by the NBIS.

Work Dataset



- Many-to-one with bridge
- Event' dataset because Year Work Performed (B.W.02) is a unique identifier when reporting to FHWA
- Report the year that work was completed
- For phased construction, report the year in which the first phase was completed and the bridge was able to carry traffic.
- Reported each year regardless whether work was completed in that year (if no work report year and 0 value for work performed)
- Do not report routine maintenance or routine repair

Work Dataset

Work Performed (B.W.03, AN(120))

Table 29. Bridge replacement code.

Code	Description
BR1	Replaced

Table 30. Bridge improvement codes.

Code	Description
IP1	Widened
IP2	Raised
IP3	Strengthened by retrofit
IP4	Seismic retrofit

Table 31. Rehabilitation codes for deck, superstructure, substructure, and culvert.

Code				Description
Deck	Superstructure	Substructure	Culvert	
DK1	SP1	SB1		Replaced
DK2	SP2	SB2	CU2	Major Rehabilitation
DK3	SP3	SB3	CU3	Minor Rehabilitation

Work Dataset

Work Performed (B.W.03, AN(120)) (cont.)

Table 32. Preservation codes for deck, superstructure, substructure, and culvert.

Code				Description
Deck	Superstructure	Substructure	Culvert	
DK4			CU4	Overlaid
DK5	SP5	SB5	CU5	Sealed
	SP6	SB6	CU6	Coating (New or Replaced)
	SP7	SB7	CU7	Coating (Preserved)

Table 33. Other preservation codes.

Code						Description
Bearings	Deck Joints	Bridge Railings or Transitions	Scour Counter-measures	Channel Protection	Channel	
BG1	JT1	RT1	SC1	CP1		Installed or Replaced
BG2	JT2	RT2	SC2	CP2		Repaired
					CH1	Condition Improved

Closing Remarks

- Monitor https://www.fhwa.dot.gov/bridge/nbi.cfm for current information that includes implementation resources, FAQs, future errata, etc.
- Coordinate with local FHWA Division Bridge Engineer
- Send questions to NBIS_SNBI_Questions@dot.gov

QUESTIONS?