# SNBI Section 2 Material & Type

#### Rob Coop, PE & Erich Hart, PE



## Bridge Material & Type

- Except for any statutes or regulations cited, the contents of this
  presentation do not have the force and effect of law and are not meant
  to bind the States or the public in any way. This presentation is intended
  only to provide information regarding existing requirements under the
  law or agency policies.
- The Federal Highway Administration is the source for all images unless otherwise noted.



### Section 2 – Bridge Material & Type

- Data items grouped in three subsections
  - 2.1 Span Material and Type
  - 2.2 Substructure Material and Type
  - 2.3 Roadside Hardware
- Data identify the structural materials, structure types, and structural configurations that make up a bridge
- Data typically remain static once a bridge has been inventoried

#### SECTION 2: BRIDGE MATERIAL AND TYPE

This section has data items that have been grouped by the following three subsections: Span Material and Type, Substructure Material and Type, and Roadside Hardware. The data items in these subsections identify the structural materials, structure types, and structural configurations that make up a bridge.

The data items in Span Material and Type subsection identify the bridge configuration based on material(s), type(s), and continuity. These items are considered part of the Span Data Set and have a many-to-one relationship with a bridge when applicable.

The data items in the Substructure Material and Type subsection identify the bridge substructure and foundation material(s) and type(s). These items are considered part of the Substructure Data Set and have a many-to-one relationship with a bridge when applicable.

The data items in the Roadside Hardware subsection identify crash-tested roadside hardware. These data items are considered part of the Primary Data Set and have a one-to-one relationship with a bridge.

The data for items in this section typically remain static once a bridge has been inventoried. The following data items are included in this section.

SUBSECT	ION 2.1: SPAN MATERIAL AND TYPE
Item ID	Data Item
B.SP.01	Span Configuration Designation
B.SP.02	Number of Spans
B.SP.03	Number of Beam Lines
8.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
B.SP.12	Deck Reinforcing Protective System
B.SP.13	Deck Stay-In-Place Forms
SUBSECT	ION 2.2: SUBSTRUCTURE MATERIAL AND TYPE
Item ID	Data Item
B.SB.01	Substructure Configuration Designation
B.58.02	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
SUBSECT	ION 2.3: ROADSIDE HARDWARE
Item ID	Data Item
B.RH.01	Bridge Railings
B BH 02	Transitions

March 2022

54 TOC Condensed TOC Expanded



- Data items identify the span and deck configurations based on material(s), type(s), and continuity for the bridge
  - Considered part of the Span Data Set
  - Many-to-one relationship with a bridge when applicable
  - Reported for each span configuration present in the bridge
    - A span configuration characterizes all spans of similar material, type, and continuity
    - Spans of similar configuration do not need to be contiguous to be reported in the same data set



- All bridges have at least one span configuration
  - At least one data set must be reported for each bridge
  - Additional data sets are reported when applicable
- Data items typically remain static once a bridge has been inventoried



Source: USI Consultants



#### • Data Relationships – Span Sets

Many Span Configuration Designations



- **Code Description** •
- M## Main ۲
- A## Approach ٠
- C## Culvert ٠
- V## Culvert extension •
- W## Widening •

3 - SPAN SETS				
State Code				
Bridge Number				
Span Configuration Designation				
Number of Spans				
Number of Beam Lines				
Span Material				
Span Continuity				
Span Type				
Span Protective System				
Deck Interaction				
Deck Material and Type				
Wearing Surface				
Deck Protective System				
Deck Reinforcing Protective System				
Deck Stay-in-Place Forms				

Source: SNBI March 2022

Bridge Number Feature Type	Relation La mathem	- L	e eace and MM	and a second second	
Faaturo Typo			Gridae Number	Gridge Nember	
Concerco o gale	Fashes Time	r	Eriden Name	Dection Status (	Saman De
Q ru ao Operanation	Feature Location	- 1	Drevin is Bridge Number	Load Destion Sto	an an agus sans
Po ce Nimber	Best ine Name		County Code	Even reading at	5000
Por te Direction	5 noticed Classification		Flore Code	6 1990	UNCER
Local Directory	Fundioria Catistication		Hole Code	Claim Comin	TINGEW
Coole Type	UNA Determine		ignitially wateries broater.	Palatan Manthem	
ave the	N IS Designation		Caucae	- Solge reader	e
	National Highway traght Network.		Longitude	Logal Load Cons	ingur adværs
	STRAFINET Designation		Border Bridge Number	Legal Load Ratin	ng Pactor
	LRS Route ID		Border Bridge State or Country Code	Posting Type	
	LRS Mile Point		Border Bridge Inspection Responsibility	Posting Value	
	Lanes on highway		Border Bridge Designated Load State		
	Annual Average Daily Traffic		Bridge Location	7-1	INSPECT
	Annual Average Daily Truck Traffic		Metropolitan Planning Groanization	State Code	
	Year of Annual Average Daily Traffic		Owner		
	Hidoway Maxim in Litable Vertical Clearance		Maintenance Responsibility	Inspection Type	2
	History Minimum Vertical Clearance		Federal or Tribal Land Access	Interction Benja	n Onte
	Hohees Minimum Harizontal Cleanance Left		Historic Similicance	Engeneration Com	niction Da
	Highway Minimum Horizontal Clearance, Right		Tol	Nationally Certifi	od Bridge
	Lohn to Maxim millighte Surface 20 dth		Emmana: Evacuation Designation	Engrantico Latera	val.
	Distant Dateur Landt		Critic go rey Evacuation Designation	Crispection Crist	Pol.
	oʻgoss becdi cergar		choge Karrigs	chipe coorribute t	CUW Inter
	crossing bridge number		irans tons	Risk-Dabed ansp	ection into
	klairoad service Type		NBIS Bridge Length	unspection Quar	ty control
	Kairoad Minimum Vertical Clearance		lota bridge Length	Linspection Quar	ity Assuran
	Rairoad Minimum Horizontal Offset		Maximum Span Length	Inspection Data	Update D
	Navigable Waterway		Minimum Span Lerigth	Inspection Note	
	Nsvigation Minimum Vertical Clearance		Bridge Width Out-to-Dut	Enspection Equip	ment
	Movable Bridge Maximum Navigation Vertical Cleanance		Bridge Width Curb-to-Curb		
	Navigation Channel Width		Left Curb or Sidewalk Width	8	- ELEME
	Navigation Channel Minimum Horizontal Gearance		Richt Curb or Sidewalk Width	State Code	
	Substructure Navigation Protection		Approach Roadway Width	Svidge Nember	
			Bridge Median	Element Austhe	~
	3 - SPAN SETS		Gran	Gement Recent	Number
	Etern Carlo	- 1	C much Perdan	Electron Total /	hunder bu
	State Loop	<b>N</b>	Strategy on the first bit side	Element Threads	guarie cy
	Charles Conferences Contenents		estatutentenagersegne	Element Quarter	y conduce
	open un right east neisgreast	- 1	scennecoge	cieneir draine	\$ Longing
	Number of spars		Erregular Dedit Area	Elected Control	y Londoc
	Number of Beam Lines		Calculated Deck Area	element Quantit	3 Conditio
	Span Material		Design Load		
	span continuity		Design Memod		9- WUR
	Span Type		Load Nating Uate	Sabe Court	
	Span Protective System		coad Racing Meeting	Choge Manuel	
	Deck Interaction		Enventory Load Rating Hactor	Year Wark Perfo	xmed
	Ded: Material and Type		Operating Load Rating Factor	Nork Performed	1.
	Wearing Surface		Controlling Legal Load Rating Pactor		
	Deck Protective System		Routine Permit Loads		
	Deck Reinforcing Protective System		NSTM Inspection Required		
	Deck Stay-in-Place Forms		Fatigue Details		
			Underwater Inspection Required		
	4 - SUBSTRUCTURE SETS	<u> </u>	Complex Feature		
	State Code		Deck Condition Rating		
	Bridge Averber	₽	Superstructure Condition Ration		
	Substructure Configuration Oceanation	_ F	Substructure Condition Risting		
	Number of Substructure Lights	_	C feet Coodilion Rating		
	Cohemisticae Matarial		Bridge Reling Condition Patient		
	Substructure Turn		Biden Balaya Transitions Condition Bating	1	
	Cubertructure Destautions Stateme		Bridge Bearings Concilition Dations	1	
	Foundation Trans		Deleting Science Consistence Patients	1	
	Foundation Type		Charge Johns Condition Rabing		
	roundation Protective System		Channe Condoon Kating		
			Channel Protection Condition Rating	1	
	20 10 10 10 10 10 10		scour Condition Rating	1	
	Key: Unqué table record identifiar items		Unoge Condition Classification	1	
			Lowest Condition Rating Code	1	
			NSTM Inspection Condition	1	
			Underwater Inspection Condition	1	
			Approach Roadway Alignment	1	
			Overtopping Likelihood	1	
			Scour Vulnerability	1	
			Scour Plan of Action		
			Seismic V Inerability		
			Near Built	1	
				•	
Figure 1 SNBI	data relationships				
rigare 1. Ontor	data relationships.				







- B.SP.01 Span Configuration Designation (many-to-one)
- B.SP.02 Number of Spans
- B.SP.03 Number of Beam Lines (new)
- B.SP.04 Span Material
- B.SP.05 Span Continuity (new)
- B.SP.06 Span Type

- B.SP.07 Span Protective System (new)
- B.SP.08 Deck Interaction (new)\*
- B.SP.09 Deck Material and Type
- B.SP.10 Wearing Surface\*
- B.SP.11 Deck Protective System\*
- B.SP.12 Deck Reinforcing Protective System\*
- B.SP.13 Deck Stay-In-Place Forms (new)\*

\* DO **NOT** REPORT THESE DATA ITEMS FOR BRIDGES AND CULVERTS UNDER FILL



- Format AN (3), Frequency I [SNBI pg. 56-57]
- Many-to-One

W## Widening

- Item captures how spans of the reported bridge configuration are classified and designated
- Report the assigned span configuration designation using one of the following codes:
   M## Main

   A## Approach
   C## Culvert
   V## Culvert extension

- Key Point: Data items are reported for each unique span configuration
- Unique Span Configuration
  - Characterizes all span units that have the same
     Span Material,
     Span Continuity,
     and Span Type

3 - SPAN SETS	
State Code	
Bridge Number	
Span Configuration Designation	
Number of Spans	
Number of Beam Lines	
Span Material	
Span Continuity	
Span Type	
Span Protective System	
Deck Interaction	
Deck Material and Type	
Wearing Surface	
Deck Protective System	
Deck Reinforcing Protective System	
Deck Stay-in-Place Forms	

NextLevel

- Replace "##" characters with sequential numbers, with leading zeros, assigned to each span configuration
  - Replacing the "##" characters in the codes with a sequential number identifies each unique span configuration present on the bridge
    - Examples: M01, A01, A02....
- Except for culverts, each bridge has at least one main span
  - Main spans include all spans of most bridges or the major span(s) of a sizable bridge



#### SNBI definition for Culvert

- A structure comprised of one or more barrels, beneath an embankment and designed structurally to account for soil-structure interaction
- These structures are hydraulically and structurally designed to convey water, sediment, debris, and, in many cases, aquatic and terrestrial organisms through roadway embankments
- Culvert barrels have many sizes and shapes and have inverts that are either integral or open, i.e., supported by spread or pile-supported footings
- Many culverts take advantage of headwater submergence of the inlet to increase hydraulic efficiency and economy





- A bridge may or may not have approach spans
  - Approach spans are typically those of a different material, type, or design than the main span and are typically at one or both ends of the main span
- Consider the span(s) of vaulted abutments as an approach span
- Use code C for spans that convey water through or under a roadway embankment and are designed hydraulically to take advantage of submergence to increase water-carrying capacity
- Use code V when a culvert is extended using dissimilar construction
- Use code W for widened portions of main or approach spans with dissimilar construction
  - Widening data sets do not contribute to the calculation of the total number of spans for the bridge



- Example 1
  - Steel truss main span bridge. Three prestressed concrete multi-beam approach spans at the north end. Two steel multi-beam approach spans at the south end.

- Bridge has three span data sets
  - Report **M01** for the steel truss data set
  - Report **A01** for the north approach data set
  - Report **A02** for the south approach data set

- Example 2
  - Single span reinforced concrete tee-beam bridge widened with prestressed concrete box beams
    - Bridge has two span data sets
      - Report *M01* for the reinforced concrete tee-beam data set
      - Report **W01** for the prestressed concrete box beams data set
- Example 3
  - Twelve (12) span bridge: Six (6) main spans are weathering steel beams Six (6) main spans are prestressed concrete I-beams
    - Bridge has two span data sets
      - Report M01 for the steel beam data set
      - Report MO2 for the prestressed concrete I-beam data set



- B.SP.03 Number of Beam Lines (new)
  - Format N (3,0), Frequency I [SNBI pg. 59]
  - Report the number of principal beam lines
  - Report 1 for bridges where Item B.SP.06 (Span Type) is F01, F02, S01, or S02
    - Frame three-sided (F01) or four-sided (F02)
    - Slab solid (S01) or voided (S02)
  - Report 0 for bridges where Item B.SP.06 (Span Type) is P01 or P02
    - Pipe rigid (P01) or flexible (P02)
  - Principal beam lines
    - Main longitudinal load-carrying members of the superstructure such as beams, girders, trusses, and arches or arch ribs
    - Do **<u>not</u>** include stringers of a floor beam system or spandrel walls of an arch
  - Use the average number of beam lines for bridges with variable number of beam lines within a span configuration, rounded down



- B.SP.03 Number of Beam Lines Examples
  - Example 1
    - Steel through truss bridge with two trusses and ten stringers
      - Report **2**
  - Example 2
    - Flared three-span tee-beam bridge with 12 beams at the south end, 14 beams in the middle, and 17 beams at the north end
      - Report **14** (12 + 14 + 17)/3 = 43/3 = 14.33 = 14
  - Example 3
    - Three-sided frame culvert, lengthened by adding a four-sided box culvert to the end of the barrel. This bridge has two span data sets (i.e., C01 and V01)
      - Report **1** for the three-sided frame data set (i.e., B.SP.01 = C01)
      - Report **1** for the four-sided frame data set (i.e., B.SP.01 = V01)



#### • B.SP.04 Span Material

- Format AN (3), Frequency I [SNBI pg. 60-61]
- Report the principal span material type using one of the following codes:
  - A01 Aluminum
  - C01 Reinforced concrete cast-in-place
  - CO2 Reinforced concrete precast
  - CO3 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
  - I01 Iron cast
  - IO2 Iron wrought
  - M01 Masonry block
  - M02 Masonry stone
  - P01 Plastic Polyethylene

- PX Plastic other
- S01 Steel rolled shapes
- S02 Steel welded shapes
- S03 Steel bolted shapes
- S04 Steel riveted shapes
- S05 Steel bolted and riveted shapes
- SX Steel other
- T01 Timber glue laminated
- T02 Timber nail laminated
- T03 Timber solid sawn
- T04 Timber stress laminated

- TX Timber other
- X Other

#### • B.SP.05 Span Continuity

- Format AN (1), Frequency I [SNBI pg. 62]
- Captures the continuity of the span(s) in the configuration
- Report the span continuity using one of the following codes:
  - 1 Simple or single span
  - 2 Continuous
  - 3 Continuous for live loads only
  - 4 Cantilever
  - 5 Cantilever with pin and hanger
  - 6 Frame
  - 7 Buried



- Use code 2 for bridges designed continuous for permanent (dead) loads and live loads
- Also, use code 2 for cable stayed and suspension bridges, and for multi-span arches
- Use code 3 for bridges designed as simple spans for permanent (dead) loads and continuous for live loads
  - When it is unknown if the superstructure was designed as continuous for live loads, code this item consistent with the assumption used in the load rating calculations

- Use code 6 for three-sided and four-sided frames that are not buried
- Use code 7 for pipe culverts and other structures that rely on soil-structure interaction to support vertical loads

#### • B.SP.06 Span Type

- Format AN (3), Frequency I [SNBI pg. 63-64]
- Report the span type using one of the following codes:
  - A01 Arch under fill without spandrel
  - A02 Arch open spandrel
  - A03 Arch closed spandrel
  - A04 Arch through
  - A05 Arch tied
  - B01 Box girder/beam single
  - B02 Box girder/beam multiple adjacent
    - Adjacent are those sections that are placed directly next to each other and are touching or nearly touching
  - B03 Box girder/beam multiple spread
    - Spread are those sections that are spaced so that the deck spans the space between the sections
  - B04 Box girder/beam segmental
  - F01 Frame three-sided
    - Use for three-sided rigid frames
  - F02 Frame four-sided
    - Use for rigid four-sided concrete box bridges
  - F03 Frame K-shaped

- F04 Frame delta-shaped
- G01 Girder/beam I-shaped adjacent
- G02 Girder/beam I-shaped spread
- G03 Girder/beam tee-beam
- G04 Girder/beam inverted tee-beam
- G05 Girder/beam double-tee adjacent
- G06 Girder/beam double-tee spread
- G07 Girder/beam channel adjacent
- G08 Girder/beam channel spread
- G09 Girder/beam girder & floor beam
  - Use for superstructures with girder and floor beam systems regardless of the girder shape
- G10 Girder/beam through girder
  - Use for through girder type superstructures regardless of the girder shape



#### • B.SP.06 Span Type (cont.)

- GX Girder/beam other
- L01 Cable suspension
- L02 Cable cable-stayed
- L03 Cable extradosed
- LX Cable other
- M01 Movable vertical lift
- M02 Movable bascule
- M03 Movable swing
- MX Movable other
- P01 Pipe Rigid
- P02 Pipe Flexible
  - Use for pipes that rely on the stability of surrounding soils to maintain their structural shape

- S01 Slab solid
- S02 Slab voided
- T01 Truss deck
- T02 Truss through
- T03 Truss pony
- X01 Other railroad flat car
- X02 Other ferry transfer

- X03 Other floating
- X Other

- B.SP.07 Span Protective System (new)
  - Report the span protective system using one of the following codes:
    - O None
      - Use when the span is unprotected
      - Use when unprotected steels either never were coated or currently have no signs of coating systems, and have no protective systems such as cathodic protection or weathering chemistry

- A01 Admixture internally sealed
- A02 Admixture low permeability
- A03 Admixture polymer impregnated
- A04 Admixture corrosion inhibitor
- A05 Admixture ASR inhibitor
- AX Admixture other

#### • Codes (cont.)

- C01 Coating paint
  - Use for weathering steel that has been painted
  - Use for paints and stains on timber
- CO2 Coating sealer
  - Use for sealers such as silanes, siloxanes, linseed oils, etc.
- C03 Coating hot dip galvanizing
- C04 Coating metalizing/thermal spray
- CX Coating other
- E01 Encasement concrete
- EX Encasement other
- M01 Membrane built-up
- M02 Membrane sheet
- M03 Membrane liquid applied
- MU Membrane unknown
- MX Membrane other

- P01 Patina uncoated weathering steel
  - Use only for weathering grades of steel
- S01 Sacrificial cathodic, passive
- S02 Sacrificial cathodic, active
- SX Sacrificial other
- T01 Treated timber preservative
  - Use for oil-based or water-borne timber preservatives

- U Unknown
- X Other

- B.SP.07 Span Protective System (cont.)
  - Code consistent with the material reported for Item B.SP.04 (Span Material)
  - Non-protective anti-graffiti and aesthetic coatings are <u>not</u> considered when coding this item

- In cases where the span configuration may have a combination of protective systems
  - Use the code for the predominant protective system based on protected area
- In cases where multiple systems protect the same area
  - Use the code for the outermost protective layer
- Use appropriate code for span members under fill that have a protective system

#### B.SP.08 Deck Interaction (new)

- Captures the type of structural interaction that occurs between the bridge deck and superstructure
  - May indicate the importance of the deck to the overall stability and capacity of the bridge
- Report the type of interaction between the superstructure and deck for the span configuration using one of the following codes:
- CS Composite shored construction
  - Indicates the deck acts composite with the superstructure, but without the deck the superstructure requires shoring to carry its own self weight, the weight of the deck concrete prior to curing, or both
- CU Composite unshored construction
  - Indicates the deck acts composite with the superstructure, and the superstructure can carry its own self-weight, plus the deck concrete prior to curing
- IM Integral or monolithic
  - Indicates the deck was cast or fabricated of the same material and at the same time as the superstructure and the two can be expected to act as a unit
  - Use IM for slabs, orthotropic steel decks
- NC Non-composite
  - Indicates the deck and the superstructure act independently
- Do not report this item when Item B.SP.09 (Deck Material and Type) is 0 (i.e., None)



#### • B.SP.09 Deck Material and Type

- A01 Aluminum
- C01 Reinforced concrete cast-in-place
- CO2 Reinforced concrete precast
- CO3 Prestressed concrete pre-tensioned
- C04 Prestressed concrete cast-in-place post-tensioned
- C05 Prestressed concrete precast post-tensioned
- CX Concrete other
- Use code CO2, CO3, or CO5, as applicable, for full depth precast panels only
- Use code CO1 or CO4, as applicable, for cast-in-place concrete on partial depth structural panels that are not just considered stay-in-place forms
- F01 FRP composite aramid fiber
- F02 FRP composite carbon fiber
- F03 FRP composite glass fiber
- FX FRP composite other

- S01 Steel open grid
- S02 Steel filled or partially filled grid
- S03 Steel plate
- S04 Steel orthotropic
- S05 Steel corrugated
- SX Steel other
- T01 Timber glue laminated
- T02 Timber nail laminated
- T03 Timber solid sawn
- T04 Timber stress laminated
- TX Timber other
- X Other



- B.SP.09 Deck Material and Type (cont.)
  - In cases where the superstructure configuration may have a combination of deck materials and/or types
    - Code the predominant deck material and type based on the deck area
  - Use the applicable code for superstructure types with integral top flanges that serve as the deck, such as concrete tee-beams and box beams/girders

- For slabs, and for the slab portion of three-sided and four-sided concrete rigid frame bridges and culverts **not under fill** 
  - Use the same applicable material code as used in Item B.SP.04 (Span Material)

#### • B.SP.10 Wearing Surface

- Report the predominant wearing surface material type protecting the deck or slab for the span configuration using one of the following codes
- O None
  - Use when no additional sacrificial concrete thickness or wearing surface is included on the deck or slab
- B01 Bituminous (asphalt)
- CO1 Concrete monolithic
  - Use when there is an additional sacrificial thickness cast concurrently with the structural deck or slab
- C02 Concrete unmodified
  - Use when an additional placement of concrete of the same concrete material as the deck or slab is placed after the deck or slab has cured
- C03 Concrete latex modified
- C04 Concrete low slump
- C05 Concrete fiber reinforced
- C06 Concrete microsilica
- C07 Concrete polyester
- CX Concrete other
- CU Concrete unknown
  - Use when a concrete wearing surface exists, but the specific material composition is unknown



#### • B.SP.10 Wearing Surface (cont.)

- E01 Earth gravel or soil
- P01 Polymer epoxy
- P02 Polymer polyester
- PX Polymer other
- SO1 Steel
  - Use when a steel grid deck is fabricated with an additional sacrificial thickness
  - Not intended for temporary steel plates
- T01 Timber running planks
  - Use where running planks are added on timber decks or slabs
- X Other
- When a span configuration has a combination of wearing surface types, code the predominant wearing surface type based on the deck or slab area

- Do not consider patching materials when coding this item
- Do not report this item when Item B.SP.09 (Deck Material and Type) is 0 (i.e., None)

- B.SP.11 Deck Protective System
  - Report the deck protective system for the span configuration using one of the following codes:
    - 0 None
      - Use when there is no known internal or external protective system in place
    - A01 Admixture internally sealed
      - Use for internally sealed concrete systems that use wax beads in the concrete
        - After the concrete cures, it is heated to melt the wax and seal the concrete
    - A02 Admixture low permeability
      - Use when low permeability concrete is used with admixtures such as flyash, microsilica, or slag

- A03 Admixture polymer impregnated
- A04 Admixture corrosion inhibitor
- A05 Admixture ASR inhibitor
  - Use when admixtures are used to inhibit alkali-silica reactivity (ASR)
- AX Admixture other

- B.SP.11 Deck Protective System
  - Codes (cont.):
    - C01 Coating paint
    - C02 Coating silane/siloxane\*
    - C03 Coating methacrylate\*
      - \*Do not use codes CO2 and CO3 when the material is applied for localized crack repair
    - CX Coating other
    - M01 Membrane built up
      - Use when the membrane is built up using combined layers of liquid and preformed/sheet membranes
    - M02 Membrane sheet
    - M03 Membrane liquid applied
    - MU Membrane unknown
      - Use when a membrane exists, but the type is unknown
    - MX Membrane other
      - Use when a membrane type is known, but does not match the types specified for codes M01, M02, or M03



- B.SP.11 Deck Protective System
  - Code consistent with the predominant material reported in Item B.SP.09 (Deck Material and Type)
  - In cases where the deck may have a combination of protective systems, use the code for the predominant protective system based on protected area
  - In cases where multiple systems protect the same area, use the code for the outermost protective layer

• Do not report this item when Item B.SP.09 (Deck Material and Type) is 0 (i.e., None)

- B.SP.12 Deck Reinforcing Protective System
  - Report the type of deck reinforcing protective system for the span configuration using one of the following codes for concrete decks and slabs:
    - 0 None
      - Use when steel reinforcement is unprotected, such as with black steel
    - C01 Coating epoxy coated
    - CO2 Coating galvanized
    - C03 Coating metalized
    - CX Coating other
      - Use codes C01 to CX when any (e.g., top mat only) or all the reinforcing steel in the deck is protected by the selected steel type\*

- B.SP.12 Deck Reinforcing Protective System
  - Codes (cont.):
    - R01 Reinforcing stainless, clad
    - R02 Reinforcing stainless, solid
    - R03 Reinforcing high chromium
    - R04 Reinforcing FRP, aramid fiber
    - R05 Reinforcing FRP, carbon fiber
    - R06 Reinforcing FRP, glass fiber
    - R07 Reinforcing FRP, other
    - RX Reinforcing other
      - \*Use codes R01 to RX when any (e.g., top mat only) or all the reinforcing steel in the deck is protected by the selected steel type\*

- B.SP.12 Deck Reinforcing Protective System
  - Codes (cont.):
    - S01 Sacrificial cathodic, passive
    - S02 Sacrificial cathodic, active
      - Use when impressed currents are used as the cathodic protection system
    - SX Sacrificial other
    - X Other
    - In cases where the span(s) may have a combination of protective systems, use the code for the predominant protective system based on protected area

- In cases where multiple systems protect the same area, use the code for the outermost protective layer
- If the top and bottom mat have different protective systems, report the protective system for the top mat
- Do not consider bar chairs or other reinforcing steel supports when coding this item
- Report this item only if Item B.SP.09 (Deck Material and Type) is concrete (i.e., codes C01 to CX)

- B.SP.13 Deck Stay-In-Place Forms (new)
  - Do not report this item when Item B.SP.09 (Deck Material and Type) is 0
  - Report the type of deck stay-in-place form for the span configuration using one of the following codes:
    - 0 None
    - C01 Concrete reinforced
      - Use when a precast reinforced concrete panel (partial depth) is used with a cast-in-place reinforced concrete placement on top
    - CO2 Concrete prestressed
      - Use when a precast prestressed concrete panel (partial depth) is used with a cast-in-place reinforced concrete placement on top
    - F01 FRP composite
    - M01 Metal
    - T01 Timber
    - X Other
    - When a span configuration has a combination of stay-in-place form types
      - Code the predominant type based on the deck area
    - Not intended to be used for materials installed only for debris shielding, or when Item B.SP.09 (Deck Material and Type) is S05 (i.e., Steel – corrugated)

- Data items in this subsection identify the substructure and foundation material(s) and type(s)for the bridge and are considered part of the Substructure Data Set
  - Items have a many-to-one relationship with the bridge when appliable
- Data items are reported for each substructure configuration present in the bridge
  - A substructure configuration characterizes all substructure units that have the same material, type and foundation type
  - Substructures of similar configuration do not need to be adjacent to be reported in the same data set
  - Data items are <u>not</u> reported when item B.SP.06 (Span Type) is a pipe
  - Deck and superstructure are not otherwise considered in the determination of a substructure set
  - Data typically remain static once a bridge has been inventoried



#### Data Relationships – Substructure Sets

Many Substructure Configuration Designations

to One Bridge

- **Code Description** ٠
- A## Abutment ٠
- ٠ P## Pier or Bent
- W## Widening

4 - SUBSTRUCTURE SETS		
State Code		
Bridge Number		
Substructure Configuration Designation		
Number of Substructure Units		
Substructure Material		
Substructure Type		
Substructure Protective System		
Foundation Type		
Foundation Protective System		

2 - TERTONES	Chatter Carrier
Reduce Literation	Raldon Ad under
Forsk ers Turne	Bridge Name
Feature Location	Dravin is Bridge Number
Best va Nama	Courto Coda
5 octional Characteria	Class Code
Hum Code	Place Code
Urban Loos	inginitial ingency custrict
NTS Designation	CSOUCCE
National Highway Freight Network	Longitude
STRAHNET Designation	Dorder Bridge Number
LRS Route ID	Border Bridge State or Country Code
LRS Mile Point	Border Bridge Inspection Responsibility
Lanes on Highway	Border Bridge Designated Lead State
Annual Average Daily Traffic	Bridge Location
Annual Average Daily Truck Traffic	Metropolitan Planning Organization
Year of Annual Average Daily Traffic	Owner
Hidhway Maximum Usable Vertical Clearance	Maintenance Responsibility
Highway Minimum Vertical Clearance	Federal or Tribal Land Access
Hohway Minimum Harizantal Cleanance, Left	Historic Similicance
Hidaway Minimum Harizantal Cleanance, Bight	10
Following Maximum Likelike Surface Width	Emergency Everywhen Designation
ng may namendin oseve ponder widen Basser Debur Laseth	Dideo Paliner
Dipess Devoir perger	chofe inen fe
urdes ng bridge number	Fransitions
karoad service Type	Vibis bridge Lengen
karroad minimum Verbcal Clearance	iosal Bridge Length
Rairoad Minimum Horizontal Offset	Maximum Span Length
Navigable Waterway	Minimum Span Length
Navigation Minimum Vertical Elearance	Bridge Width Out-to-Dut
Movable Bridge Maximum Navigation Vertical Cleanance	Bridge Width Curb-to-Curb
Navigation Channel Width	Left Curb or Sidewalk Width
Navigation Channel Minimum Horizontal Clearance	Right Curb or Sidewak Width
Substructure Navigation Protection	Approach Readway Width
	Bridge Median
3 - SPAN SETS	Skew
State Code	Curved Bridge
Bridge Hunther	Maximum Bridge Height
Spen Conflaureton Destanation	Sidehill Bridge
Number of Spars	Irregular Deck Area
Number of Been Lines	Calculated Deck Area
Snan Material	Design Load
Snam Cranting the	Denim Mathed
Some Time	Load Dation Onto
Sport Protection Systems	Load Rating Material
span Protective system	LOSU Kaung Meeting
Ledi Interaction	unventory Load Kating Hactor
Led: Material and Type	Operating Load Rating Factor
Wearing Surface	Controlling Legal Load Rating Pactor
Ded: Protective System	Routine Permit Loads
Deck Reinforcing Protective System	NSTM Inspection Required
Deck Stay-in-Place Forms	Fatigue Details
	Underwater Inspection Required
4 - SUBSTRUCTURE SETS	Complex Feature
State Code	Deck Condition Rating
Bridge Nuttber	Superstructure Condition Rating
Substructure Continuzation Oceanation	Substructure Condition Righting
Muniper of Scindnuctured Inite	Cident Condition Rating
Cristmatic and Antonia Crists	Builds Rains Condition Pation
Substituture meterial	proge Kaing Condition Rating
erseanorse (Abs	progervaring transforms concision Raping
substructure Protective System	onoge Bearings Condition Rating
roundsbon Type	choge Joints Condition Rating
Foundation Protective System	Channel Condition Rating
	Channel Protection Condition Rating
	Scour Condition Rating
Key: Unique table record identifiar items	Bridge Condition Classification
	Lowest Condition Rating Code
	NSTM Inspection Condition
	Inderwater Jospertico Condition
	Annuarh Roada av Alimment
	Contracting likelihood
	Cover supporting to wear wood
	occur Vunerability
	Scour Plan of Action
	Colored V Anorphilips
	action the value denicy
	Year Built

#### INTRODUCTION



March 2022

iastero Typo Ioute Designatio Ioute Number Ioute Direction Ioute Typo



#### • Items (All New)

#### From datacrosswalk.xlsx file at FHWA webpage

SNBI ID	Data Tag	SNBI Item Name	SNBI Format	1995 Coding Guide ID	1995 Coding Guide Item Name/Description	1995 Coding Guide	Clean Transition?
B.SB.01	BSB01	Substructure Configuration Designation	AN (3)	N/A	N/A	N/A	No
B.SB.02	BSB02	Number of Substructure Units	N (3,0)	N/A	N/A	N/A	No
B.SB.03	BSB03	Substructure Material	AN (3)	N/A	N/A	N/A	No
B.SB.04	BSB04	Substructure Type	AN (3)	N/A	N/A	N/A	No
B.SB.05	BSB05	Substructure Protective System	AN (3)	N/A	N/A	N/A	No
B.SB.06	BSB06	Foundation Type	AN (3)	N/A	N/A	N/A	No
B.SB.07	BSB07	Foundation Protective System	AN (3)	N/A	N/A	N/A	No

Item ID	Data Item	Value (1)	Value (2)	Value (3)	Value (4)	Value (5)
B.SB.01	Substructure Configuration Designation		A02	P01		
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					



- B.SB.01 Substructure Configuration Designation (new)
  - Frequency I (initial)
  - Many-to-one
  - Report designation using the following:
    - A## Abutment: Located at end of bridge
    - P## Pier or Bent: Intermediate locations, Piers have 1 footing, Bents have no footing or have multiple footings
    - W## Widening: Used for widened portions of abutments or piers/bents with dissimilar substructure
    - The substructure is the portion of the bridge below the bearings or below the springline of an arch
  - Reported for each unique configuration based on Substructure Material, Substructure Type and Foundation Type
- B.SB.02 Number of Substructure Units (New)





#### • B.SB.03 Substructure Material (New)

Code	Code Description			
0	None			
A01	Aluminum			
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			

Code	Code Description
E01	Earth – reinforced soil
F01	FRP composite – aramid
	fiber
F02	FRP composite – carbon
	fiber
F03	FRP composite – glass
	fiber
FX	FRP composite – other
101	Iron – cast
102	Iron – wrought
M01	Masonry – block
M02	Masonry – stone
P01	Plastic – Polyethylene
PX	Plastic – other

Code	Code Description
S01	Steel – rolled shapes
S02	Steel – welded shapes
S03	Steel – bolted shapes
S04	Steel – riveted shapes
S05	Steel – bolted / riveted shapes
S06	Steel – pipe
SX	Steel – other
T01	Timber – glue laminated
T02	Timber – nail laminated
T03	Timber – solid sawn
T04	Timber – stress laminated
ТΧ	Timber – other
Х	Other



- Use 0 None when superstructure rests directly on the foundation
- INDOT substructures typically C01 Reinforced concrete cast-in-place

#### • B.SB.04 Substructure Type (New)

Code	Code Description	Code	Code Description
0	None	B01	Bent – column or open
Cada	Code Description	B02	Bent – column with web wall
Code	Code Description	B03	Bent – pile
A01	Abutment – cantilever/wall	B0/	Bont - straddle or c-shaped
A02	Abutment – stub	604	Bent – straudie of c-shaped
A03	Abutment – open/spill through	BX	Bent – other
1.00	Al a state open/opin chrough		
A04	Abutment – integral	Code	Code Description
A05	Abutment – semi-integral	P01	Pier – wall
A06	Abutment – gravity	P02	Pier – single column
A07	Abutment – counterfort	P03	Pier – multiple column
A08	Abutment – pile bent w/lagging	P04	Pier – multiple column w/web w
A09	Abutment – crib	P05	Pier – straddle or c-shaped
A10	Abutment – cellular/vaulted	P06	Pier – movable bridge
A11	Abutment – reinforced soil	P07	Pier – tower
A12	Abutment – footing only	P08	Pier – footing only
AX	Abutment – other	PX	Pier – other

Codo	Code
Code	Description
U	Unknown
Х	Other

- In cases where the substructure may have a combination of designs due to retrofitting actions use the code for the predominant design (not to be confused with widening situations)
- Both piers and bents provide same function
  - Pier has only one footing which may serve as a pile cap, bents have no footing or multiple footings
- Use 0 None when superstructure rests directly on the foundation



#### • B.SB.05 Substructure Protective System (new)

Code	Code Description			
0	None			
A01	Admixture – internally sealed			
A02	Admixture – low permeability			
A03	Admixture – polymer impregnated			
A04	Admixture – corrosion inhibitor			
A05	Admixture – ASR inhibitor			
AX	Admixture – other			
C01	Coating – paint			
C02	Coating – sealer			
C03	Coating – galvanizing/metalizing			
CX	Coating – other			

Code	Code Description			
E01	Encasement – concrete			
EX	Encasement – other			
P01	Patina – weathering steel			
S01	Sacrificial – cathodic, passive			
S02	Sacrificial – cathodic, active			
SX	Sacrificial – other			
T01	Treated – timber preservative			
Х	Other			

- Code consistent with the predominant material
- Do not report this item when Item B.SB.04 (Substructure Type) is 0.



#### B.SB.06 Foundation Type (new)

Code	Code Description			
E01	Earth – reinforced soil			

Code	Code Description				
F01	Footing – not on rock				
F02	Footing – on rock				
F03	Footing – on reinforced soil				

Code	Code Description
P01	Pile – steel H-shape
P02	Pile – steel pipe
P03	Pile – concrete, cast-in-plac
P04	Pile – prestressed concrete
P05	Pile – timber
P06	Pile – auger cast
P07	Pile – micropile
P08	Pile – composite
P09	Pile – FRP composite
PX	Pile – other

Code	Code Description
S01	Drilled shaft – single
S02	Drilled shafts – multiple
S03	Caisson

Code	Code Description						
U	Unknown						
Х	Other						

- Do <u>not</u> consider localized repairs to original foundation types
- Every substructure type will have a foundation type
- E01 Earth When superstructure bears directly on reinforced soil mass
- S03 Caisson Use for footing sunk into position by excavation through or beneath caisson structure



#### B.SB.07 Foundation Protection System (new)

Code	Code Description			
0	None			
A01	Admixture – internally sealed			
A02	Admixture – low permeability			
A03	Admixture – polymer impregnated			
A04	Admixture – corrosion inhibitor			
A05	Admixture – ASR inhibitor			
AX	Admixture – other			
C01	Coating – paint			
C02	Coating – sealer			
C03	Coating – galvanizing/metalizing			
CX	Coating – other			

Code	Code Description			
E01	Encasement – concrete			
EX	Encasement – other			
P01	Patina – weathering steel			
S01	Sacrificial – cathodic, passive			
S02	Sacrificial – cathodic, active			
SX	Sacrificial – other			
T01	Treated – timber preservative			
U	Unknown			
Х	Other			

- Code consistent with the predominant material reported in item B.SB.06 (foundation type)
- 0 None Use when foundation is unprotected
- Anti-graffiti coatings are not considered



- Data items in this subsection identify crash tested roadside hardware on the bridge
- Data items are considered part of the Primary Data Set and have a one-to-one relationship with a bridge
- Data typically remains static; Commonly associated with the bridge
- Inventoried to indicate if hardware at bridge is required, present, or has been crash tested. Does not consider condition







#### • One Data Item – to – One Bridge







Figure 1. SNBI data relationships.

March 2022

TOC Condensed TOC Expanded

#### • One Data Item – to – One Bridge

#### From datacrosswalk.xlsx file at FHWA webpage

SNBI ID	Data Tag	SNBI Item Name	SNBI Format	1995 Coding Guide ID	1995 Coding Guide Item Name/Description	1995 Coding Guide Format	Clean Transition?
B.RH.01	BRH01	Bridge Railings	AN (4)	36A	Traffic Safety Features	1/AN	Partial
B.RH.02	BRH02	Transitions	AN (4)	36B	Traffic Safety Features	1/AN	Partial

Item ID	Data Item	Value
B.RH.01	Bridge Railings	
B.RH.02	Transitions	

• If more than one type of bridge railing or bridge railing transition use the code that first applies going from bottom (0-zero) of Table 6 to the top (MYY).

Code	Test Level Code						Description
	1	2	3	4	5	6	Description
N							Not applicable – roadside hardware i not required.
	MYY1	MYY2	MYY3	MYY4	MYY5	MYY6	Roadside hardware successfully cras tested for AASHTO MASH.
	3501	3502	3503	3504	3505	3506	Roadside hardware successfully crast tested for NCHRP Report 350.
	2301	2302	2303				Roadside hardware successfully crast tested for NCHRP Report 230.
	2391	2392	2393				Roadside hardware successfully crast tested for NCHRP Report 239.
	891	89.2	893				Roadside hardware successfully crast tested for 1989 AASHTO Guide Specifications for Bridge Railings.
х							Roadside hardware successfully crast tested for other criteria.
AYY							Roadside hardware has not been crash-tested but meets AASHTO Standard Specifications for Highway Bridges.
SYY							Roadside hardware has not been crash-tested but meets approved agency standards.
I							Roadside hardware has not been crash-tested and does not meet approved agency standards.
0 (zero)							None - roadside hardware is require but required roadside hardware is no procent

Note that YY, for codes in *Table* 6, represents the last two digits of the year for the crash testing publication, AASHTO Specifications, or agency approved standards.





