Bridge Inspection Guidance Document

Technical Note Notification
No. 05
December 2024

Technical Note 05

1. Initial and Unscheduled Inspections

Commentary: Clarification provided regarding when an Initial Inspection is performed. An initial inspection shall be performed after construction (or phase/state of construction) is complete. When superstructure elements (such as girders) are placed over state owned roadways or over navigable waterways, an Unscheduled Inspection shall be performed to record clearances. Inspectors shall still perform an Initial Inspection after construction is complete. Section 5.2.7.3 is being added to Chapter 5.

For OSOW record keeping regarding vertical/horizontal clearance, the BITL shall indicate any clearances for temporary condition (i.e., bridge under construction with no deck or barriers) versus the final configuration and use clearances from the plan unless the temporary condition is more restrictive. It should not be necessary for bridge inspectors to measure and record vertical/horizontal clearance at each construction activity (i.e., pouring deck, installing barrier, etc.) since the construction plans should include deflection information.

5.2.7.3 Partially Constructed Bridges over State Owned Roadways or Navigable Waterways

When superstructure elements are being constructed over state owned roadways and/or over a navigable waterway, the DBIS or designee will request a BITL perform an Unscheduled Inspection. The Unscheduled Inspection shall be performed to determine clearances over the roadway and/or waterway. The Unscheduled Inspection shall change the Traffic Status (NBI 041) to "K - Bridge closed to all traffic"; it cannot remain "G - New structure not yet open to traffic". Clearances for temporary condition shall be reported based on the plans unless the temporary condition is more restrictive than the clearances on the bridge plans. An Unscheduled Inspection shall be performed when a permanent component of the partially constructed bridge first impedes existing clearances. An Initial Inspection shall still be performed per Section 4.1 after construction (or a phase/stage of construction) is complete.

2. In-Depth Inspections (including In-Depth Pin Inspections)

Commentary: Section 4.5 is being updated for clarification to satisfy the reporting needs in order to schedule In-Depth Inspections and maintain inspection procedures.

4.5 IN-DEPTH INSPECTIONS

Table 4.5.1 In-Depth Inspections - Qualifications and BSIP Requirement

Qualification	BSIP
BITL / See BSIP	Mandatory

An in-depth inspection is a close-up, detailed inspection of one or more bridge members using visual or nondestructive evaluation techniques as required to identify any deficiencies not readily detectable using routine inspection procedures. Hands-on inspection may be necessary at some locations. In-depth inspections may occur at intervals as outlined in the BSIP. The members requiring an in-depth inspection, and their locations shall be identified in the BSIP. *Table 4.5.2 lists applicable In-Depth Inspections.*

If a bridge requires an In-Depth Inspection for multiple components, the BITL shall make sure the specific procedures are in place and intervals are specified for each required inspection and that this data is included in the BSIP. The interval associated with the In-Depth Inspection shall ensure that all required inspections will take place as outlined in the BSIP.

Table 4.5.2 Types of In-Depth Inspections

In-Depth Inspection Type	Notes
In-Depth Timber Inspection (IDTI) / In-Depth Timber Underwater Inspection (IDTUW)	See Appendix T
In-Depth Fatigue Inspection (IDFI)	See Section 4.5.1
In-Depth Inspection (IDI)	See Section 4.5.2

4.5.1 In-Depth Fatigue Inspections (IDFIs)

The purpose of scheduling an *In-Depth Fatigue Inspection* is to monitor *F*atigue-*P*rone *D*etails (FPDs). *AASHTO fatigue specifications classify details that are commonly used on steel bridges into fatigue Categories A, B, B', C, C', D, E, and E' based on their fatigue characteristics.* Details which fall into Categories D, E, and E' shall be considered FPDs *and any bridge with a FPD shall have an IDFI scheduled. Other details may require an IDFI to monitor known fatigue concerns.*

Another reason for this type of inspection would be to observe and monitor fatigue crack repairs to determine if they have successfully arrested potential propagation of fatigue cracks. Fatigue categories can be found in Appendix H.

Good practice for *IDFIs* includes marking and dating locations where fatigue cracks are present. To accurately determine the ends of fatigue cracks, NDT methods may need to be incorporated to supplement visual investigation. These NDT methods typically include dye penetrant or magnetic particle testing methods. *Equipment used shall be included in the inspection report. See Section 5.1.7 for requirements for adding, removing, or revising specific testing methods as part of a BSIP.*

When specific testing methods are being added, removed, or revised as part of a BSIP, the BITL performing the inspection or updating the BSIP shall request approval from the BMO for the testing method to be added to the BSIP and shall request a One-Time Inspection to perform the testing. If the testing needs to be added to the BSIP after the One-Time Inspection, the BITL is responsible for adding the approved testing.

The inspection report should *include photographs and* note the locations of the fatigue details as required by Section 5.3.2.15 and Section 5.4.4.2. *Plans showing the locations of fatigue details necessary to inspect should be uploaded to the Bridge File and referenced in the BSIP.*

Interval for *IDFIs* range from 6 months to 24 months depending on the detail and the condition of the FPDs. Fatigue details are inspected at intervals no greater than 24 months for *FPDs on* NSTM*s*. The BITL can recommend an increased inspection interval for fatigue details for *structures other than* NSTMs.

4.5.2 In-Depth Inspection

Bridges with complex components require In-Depth Inspections according to their BSIPs. Examples of In-Depth Inspections on bridges with complex components include cable inspections, post-tensioning tendon inspections, inspections with a survey or detailed monitoring. However, some bridges may require In-Depth Inspections to

compliment or enhance the Routine Inspections according to their BSIPs.

4.5.2.1 In-Depth Inspection on Pins

In-Depth Inspections on pins are required for steel bridges with pin elements. This might include steel truss bridges pinned at their joints, or steel arch bridges with pins. This type of inspection requires specialized equipment and often special access methods to allow for testing of the pin members by NDT methods (i.e. ultrasonic).

Some pin connections are considered NSTMs and require a hands-on, visual inspection of all elements of the connection. This is part of the regularly scheduled NSTM inspection; see Section 4.7. However, because the ultrasonic pin testing usually requires specialized access, such as a mobile elevated work platform (MEWP), to place personnel and the test equipment close to the pin, it also allows for ready access to perform supplementary hands-on inspection of the assembly.

Pin connections not considered NSTMs shall be inspected with ultrasonic testing methods at no greater than a *72-month interval if they are in good or fair condition. Pin connections not considered NSTMs which are in poor or severe condition shall be inspected with ultrasonic testing methods at no greater than a 24-month interval.*

Table 4.5.2.1 Interval for In-Depth Inspections on Pins

Pin Condition	Required Interval
Pin Connection is NSTM	Follow NSTM Requirements in BSIP
Any Quantity of Element 161 in CS1 or CS2	72 Months
Any Quantity of Element 161 in CS3 or CS4	24 Months

This section is not applicable to a pin and hanger structure, if a pin and hanger structure is discovered, the BITL shall contact the BMO.

3. Testing Approval by BMO

Commentary: The BMO shall approve all specialty testing which may be added, removed, or revised to a bridge's BSIP. Text below is being added to Section 5.1.7.

When specialty testing methods are being added, removed, or revised as part of a BSIP, the BITL performing the inspection or updating the BSIP, shall request approval from the BMO for the testing method to be added to the BSIP and shall request a One-Time Inspection to perform the testing. If the testing needs to be added to the BSIP after the One-Time Inspection, the BITL is responsible for adding the approved testing. Specialty testing may include any of the tests included in Table 5.1.7.

Table 5.1.7 Types of Specialty Testing

Steel	Concrete	Other Materials
Radiographic	Impact Echo	Stress Wave
Eddy Current	GPR	Vibration
Acoustic Emissions	Infrared Thermal	Underwater Imaging
	Rebound/Penetrometer	Borings/Corings[1]
	Electromagnetic Methods	Sonic Testing
	Pachometer	

1 – Not including timber resistance drilling.

4. Updates Related to Load Rating Practices (Part 1)

Commentary: Several sections of the BIGD are being updated to reflect current load rating and posting practices. The following language is being added to Section 5.5 regarding phased or staged construction.

For bridges constructed with staged, phased, or partial-width construction, a load rating shall be requested at the completion of each phase or stage. This construction stage stipulation extends to existing structures that are being rehabilitated or replaced, requiring a load rating to be performed for any intermediate stages during which a partially demolished bridge will be open to traffic. A load rating shall be completed within the timelines established within the LRGD. All load ratings shall be completed within three months of the phase/stage being opened to traffic. Load ratings should be completed prior to the phase/stage being opened to traffic whenever possible.

5. Updates Related to Load Rating Practices (Part 2)

Commentary: The following language is being added to Section 5.3.8.4 regarding posting signs.

For state owned structures, the BITL shall verify the posting signs used match the signs (R-12-6-48 and/or R-12-9-36) included on the signed Posting Form. Any deviation in the type of signs used (R-12-6-48 and/or R-12-9-36) to limit load on state owned bridges where there is a signed Posting Form shall be considered a Critical Finding. Any outdated sign types which deviate from the R-12-6-48 and/or R-12-9-36 signs that may have been used previously are considered retired for state owned bridges and must be replaced.

Non-SCDOT owned bridges which have a signed Posting Form in the Bridge File may have signs that deviate from the sign type on the Posting Form (R-12-6-48 and/or R-12-9-36). Deviations are allowed for non-SCDOT owned bridges per the requirements below:

- *The bridge owner has submitted the deviation to verify it is conservative and encompasses load rating results for all legal vehicles.*
- *The BMO has processed the deviation and documented the deviation by adding it to a revised Posting Form.*

Signs which deviate from the sign type on the Posting Form (R-12-6-48 and/or R-12-9-36) without additional documentation in the Bridge File may be considered a Critical Finding if the posted values are above the values

included on the signed Posting Form.

Note that a signed Posting Form may be repealed by a signed Posting Rescission Form.

The following language is being revised in Appendix O:

The list below provides an example of what shall be considered a Critical Finding:

- Missing or illegible at-bridge posting signs *including deviations in posting sign type on the Posting Form (R-12-6-48 and/or R-12-9-36 for state owned bridges),*

The list below provides an example of what shall be considered a Repair Recommendation – Priority A – "A Flags":

- Missing or illegible approach posting signs *including deviations in posting sign type on the Posting Form (R-12-6-48 and/or R-12-9-36 for state owned bridges),*

6. Updates Related to Load Rating Practices (Part 3)

Commentary: If any of the conditions are met in Section 5.5, a load rating shall be requested. A load rating engineer will then make the determination if a new load rating is required, or the load rating engineer can make an assessment that the current load rating is still valid. The following language is being revised in Section 5.5 and Section 5.5.1 while Section 5.5.2 is being added.

A new load rating shall be requested for bridges for any of the following reasons:

- *If a repair or rehabilitation has been completed that would potentially change the Condition Rating of the bridge, change the capacity of a structural member, or change the load configuration on the bridge.*
- If the Condition Rating for Deck (NBI Item 58), Superstructure (NBI Item 59), Substructure (NBI Item 60) or Culvert (NBI Item 62) NBI items drops to 4, Poor Condition or 3, Serious Condition. An exception to this requirement is for timber substructures, if a timber substructure Condition Rating for NBI Item 60 is at 5, Fair Condition, it shall be load rated; see Section 5.5.1.
- If the Condition Rating for Deck (NBI Item 58), Superstructure (NBI Item 59), Substructure (NBI Item 60) or Culvert (NBI Item 62) NBI items is *decreased from Good Condition (7) to Fair Condition (5) (i.e. a decrease of two (2))* since the last load rating was performed.
- *If a structural element is placed in Condition State 4 and must be load rated in accordance with Section 5.5.2.*
- If the existing bridge is found, during inspection, to be supporting an increased dead load, such as a thicker *overlay of 2" or more*, or if the bridge did not previously have an overlay and has received an overlay of the existing deck since the previous inspection.
- If the BITL determines a *load rating assessment/request* is required.

5.5.2 Evaluation (Load Rating) for Structural Elements in Condition State 4 (CS4)

If a structural element (see Table 5.5.2) is discovered that meets the criteria for Condition State 4 (CS4), a load rating shall be requested. A Repair Recommendation or Critical Finding shall also be submitted per Chapter 8.

Table 5.5.2 Structural Elements (CS4 Quantity Requires Load Rating Request)

Element No.	Element Name	Element No.	Element Name
12	Reinforced Concrete Deck	157	Other Floor Beam
13	Prestressed Concrete Deck	161	Steel Pin
15	Prestressed Concrete Top Flange	162	Steel Gusset Plate
16	Reinforced Concrete Top Flange	202	Steel Column
28	Steel Deck - Open Grid	203	Other Column
29	Steel Deck - Conc Fill Grid	204	Prestressed Concrete Column
30	Steel Deck - Orthotropic	205	Reinforced Concrete Column
31	Timber Deck	206	Timber Column
38	Reinforced Concrete Slab	207	Steel Tower
54	Timber Slab	208	Timber Trestle
60	Other Deck	210	Reinforced Concrete Pier Wall
65	Other Slab	211	Other Pier Wall
102	Steel Closed Box Gird	212	Timber Pier Wall
104	Prestressed Closed Box Girder	213	Masonry Pier Wall
105	Reinforced Concrete Closed Box Girder	215	Reinforced Concrete Abutment*
106	Other Closed Web/Box Girder	216	Timber Abutment*
107	Steel Open Girder/Beam	217	Masonry Abutment*
109	Prestressed Open Conc Girder/Beam	218	Other Abutments*
110	Reinforced Concrete Open Girder/Beam	219	Steel Abutment*
111	Timber Open Girder	220	Reinforced Concrete Pile Cap/Footing
112	Other Open Girder/Beam	225	Steel Pile
113	Steel Stringer	226	Prestressed Concrete Pile
115	Prestressed Concrete Stringer	227	Reinforced Concrete Pile
116	Reinforced Concrete Stringer	228	Timber Pile
117	Timber Stringer	229	Other Pile
118	Other Stringer	231	Steel Pier Cap
120	Steel Truss	233	Prestressed Concrete Pier Cap
135	Timber Truss	234	Reinforced Concrete Pier Cap
136	Other Truss	235	Timber Pier Cap
141	Steel Arch	236	Other Pier Cap
142	Other Arch	240	Steel Culvert

Table 5.5.2 Structural Elements (CS4 Quantity Requires Load Rating Request) (continued)

Element No.	Element Name	Element No.	Element Name
143	Prestressed Concrete Arch	241	Reinforced Concrete Culvert
144	Reinforced Concrete Arch	242	Timber Culvert
145	Masonry Arch	243	Other Culvert
146	Timber Arch	244	Masonry Culvert
147	Steel Main Cables	245	Prestressed Concrete Culvert
148	Sec Steel Cables	870	Timber Pile Under Crutch
149	Other Secondary Cable	872	Stubbed or Spliced Timber Pile
152	Steel Floor Beam	874	Wrapped Timber Pile
154	Prestressed Floor Beam	876	Rebar Repair Timber Pile
155	Reinforced Concrete Floor Beam	877	FRP Repair Timber Pile
156	Timber Floor Beam	878	Structural Repair Timber Pile

** = If abutment (end bent) elements are used only for lagging or retaining approach fill/embankments, the provisions in Section 5.5 are not applicable. The provisions of Section 5.5 shall only apply if the structural element is used to transmit vertical loads to the foundation and not only lateral loads.*

5.5.2.1 Action if Repairs on CS4 Element Completed

If requested repairs are made before the load rating is submitted:

- *The Load Rating Engineer shall be informed to pause for submitting the load rating.*
- *An Initial or Unscheduled Inspection shall be performed and a BITL shall inspect the structural repair. The BITL shall collect applicable data for a new load rating based on its repaired condition, including notes and photographs of repair as required by Section 5.3.12.*
- *The Initial or Unscheduled Inspection shall update the applicable element(s), deficiency notes, and scheduled/upcoming inspections based on the new as-repaired condition.*
- *After inspecting the repairs, the BITL shall request a new load rating, noting that changes to the structure have been made requiring an updated load rating.*
- *The in-progress load rating can be submitted incomplete once the new load rating request is assigned by the BMO. Text should be added to the in-progress load rating to note that the load rating request was superseded by a repair and more current load rating request has been assigned. Progress can be incorporated into the newly requested, as-repaired load rating (once assigned by the BMO).*

Commentary: An example timeline is included below following the guidance issued in Section 5.5.2.1.

- During an inspection on February 1st, a deterioration is discovered that will require a load rating and repair. A new load rating is initiated based on this discovery.

- The repair recommendation and load rating request are required to be issued to BMO and the district within 5 days of the bridge inspection.
- The load rating is assigned to a consultant on February 7th, with the required due date to be complete and through QC/QA of May 1st (3 calendar months from the initiating event).
- The consultant has the option to contact the district to determine if repairs are underway. If repairs are underway, the consultant may (at their own risk) elect to delay the load rating. The 3-month calendar turnaround time for the load rating remains the same, regardless of the state of repairs. This 3-month window includes approximately four weeks dedicated to QC/QA. For this example, the load rating would need to be completed by March 20th to allow for adequate time for QC/QA.
- If the district schedules and performs a repair, and the repairs are flagged for review, the load rating can be paused. In this example, if repairs occurred on March 1st, two months remain to complete the load rating. If the consultant has started the load rating effort, they should pause the original load rating and complete the original load rating in BrM. The load rating engineer would initiate the load rating in BrM as an "event" and add load rating notes that could say "Rating not completed due to repair being performed on March 1, 2024.". This rating can then move through QC and potentially QA to keep the original load rating on time per the original three (3) month requirement.
- For the repaired bridge, inspectors perform the initial or unscheduled inspection and finalize the associated report. An inspection would take place to document the repair, and the inspector would request a second/repaired load rating within 5 days of the inspection. For our example, this inspection takes place March 6th if the repairs are done on March 1st. This creates a second load rating request that BMO would assign to the consultant approximately by March 12th. This second load rating has a new three (3)-month schedule due by June 1st.
- The load rating engineer then uses new bridge data to perform the second/repaired load rating with a new timeframe.
- The rating then must go through the process of QC and posting reviews (if applicable). The second/repaired load rating has a new deadline of June 1st instead of May 1st. This process is permitted per FHWA because FHWA considers the initiating event for the 3-month deadline for the load rating as the date the condition of the bridge changes, whether that be by an observed defect or a repair. In this example, the condition of the bridge changed with the repair on March 1st.

7. Updates Related to Load Rating Practices (Part 4)

Commentary: If a QC or QA review prompts the need for a load rating, a load rating request shall still be made by the BITL. The following language is being added to a new Section 5.5.3.

5.5.3 Discovery of a Load Rating Need during Inspection Review

5.5.3.1 BITL Omitted Load Rating Request

If a QC or QA Review discovers that a BITL omitted the load rating request based on the requirements of Section 5.5, a load rating request shall be requested by the BITL, and the load rating due date shall be 3 months from the inspection date. The BITL's omission shall be noted in the load rating request by the BITL.

5.5.3.2 Load Rating Request Based on Data Revisions

If comment resolution during a QC or QA Review leads to a reduction in the General Condition Rating, Condition State, or other bridge data, and then a load rating would be required based on the relevant revisions, a load rating request shall be requested by the BITL, and the load rating due date shall be 3 months from the date the QC or QA comment was incorporated. A note regarding the circumstances around the need for the load rating shall be included in the load rating request.

8. Updates Related to Load Rating Practices (Part 5)

Commentary: Language is being added to Section 8.5 regarding the procedure to document updated posting signs placed on a bridge.

Following the signing of a Posting Form or the signing of a Posting Rescission Form, the district responsible for the bridge shall install or remove the posting signs. An Unscheduled Inspection shall be performed by the district to document the status of the signs and update applicable bridge data (i.e. Traffic Status, Posting Sign Values, etc.) in the inventory. Action shall only take place when a signed Posting Form or a signed Posting Rescission Form is placed in the Bridge File.

If an unsigned Posting Form or Posting Rescission Form is discovered in the Bridge File, the BMO shall be notified immediately.

9. Steel Section Remaining Documentation Requirements

Commentary: Language is being added to Section 5.3.10.3 to require detailed inspection notes if inspectors discover a measurable (or more than negligible) amount of loss of section on steel.

5.3.10.3 Steel Section Remaining

When inspectors discover diminished section remaining on structural steel elements (i.e.; girders, stringers, truss elements, *piles,* or reinforcing bars) they shall measure and state the **remaining** structural steel available. The inspector shall not assume a section loss percentage but shall provide measurements of remaining thickness. Non-destructive test equipment such as an ultrasonic thickness gauge may be advantageous in this situation especially for webs.

Inspectors can use Appendix V as a tool to document the amount of steel section remaining on certain elements. The use of Appendix V or a similar means of documenting steel section remaining on certain elements shall be required as detailed below. The tool in Appendix V does not need to be included in the inspection report, however, SCDOT requires detailed notes for the elements and Appendix V can be used to produce the required level of detail for the elements. Detailed notes for steel elements shall be included as detailed below.

- *Where a load rating is being requested due to corrosion for the subject structural steel element.*
- *Where at least one (1) pile or one (1) linear foot or more of the structural steel element is in CS4 for Corrosion (Defect 1000) requires a load rating per Section 5.5.2, or*
- *When deemed necessary by a BITL.*

Diaphragms on some curved bridges may be acting as a primary member. If a diaphragm is acting as a primary member and it has the condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge, the provisions of Appendix V shall be followed for the member.

Detailed notes are also required for exposed reinforcement in concrete members. For exposed reinforcing bars in superstructure elements with section remaining of less than 90 percent (more than 10% section loss), inspectors shall include the length of the exposed reinforcement and the section remaining over the length. Inspectors shall provide detailed measurements along the length of the exposed reinforcement if the section remaining varies over the length of the defect and note that the section remaining is "up to" a certain percent over a certain length of exposed bar.

10. Asset IDs for Temporary Bridges

Commentary: Section 5.4.3.1.1 will be added to the BIGD to discuss SCDOT's policy regarding the Asset ID linked to a temporary bridge. This will also allow the full history of the temporary bridge to remain intact. Applicable language in Section 2.3.8 shall be considered removed.

5.4.3.1.1 Asset ID Number on a Temporary Bridge

SCDOT may assign an Asset ID to a temporary bridge that will not change as the bridge is assembled and disassembled. Bridges will be assigned to a county according to the maintenance yard responsible for maintaining the temporary bridge. When a temporary bridge is assembled, the inspectors shall request RDS and staff responsible for updating the Bridge File information regarding the new location, the route carrying, the county where the bridge is located, and the feature intersected. When a temporary bridge is disassembled and returned to the yard, the same Asset ID shall be temporarily retired, and bridge data shall be updated to note the bridge's returned status to the maintenance yard.

11. Approach Spans

Commentary: NBI Item 44 (Approach Span Type) and NBI Item 46 (Number of Approach Spans) shall be coded according to the Coding Guide. SBI Item 308 (Approach Span Length) is no longer being recorded. 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. Per the Coding Guide, spans are considered approach spans when the material type or design type is different from the main span. Changing span length,

beam size, or the number of beams in a span does not mean the span is an approach span if the material and design type is the same as the main span.

12. Cross Sections

Commentary: Language is being revised in Section 5.3.4.1 to require previous Scour Stream Ground Profiles (Cross Section) to be included in the inspection report. Critical Scour Elevations (if available) will be included in the 7-Scour-Waterway Folder of ProjectWise.

Historic scour measurements are available in the Bridge File.

Historic scour measurements from the previous inspection (Routine, Underwater, etc.) shall be added to the Scour Stream Ground Profile (Cross Section) during the completion of the subject inspection event. Only the most recent Scour Stream Ground Profile (Cross Section) shall be added unless required by this section. Inspectors may choose to add additional Scour Stream Ground Profiles (Cross Sections), if desired.

Historical data listed below shall be input into the Scour Stream Ground Profile (Cross Section) if any of the following criteria is met:

- *NBI Item 61 [SNBI Item B.C.09] (Channel Condition Rating) is 4 or less*
- *SBI Item 631 [SNBI Item B.C.11] (Scour Condition Rating) is 4 or less*
- *If inspectors are contemplating a reduction for SBI Item 61 or SBI Item 631 to 4 or less*

Historical data which shall be input includes the following:

- *Foundation Bottom Elevation (i.e. Footing Elevations, Drilled Shaft Bottom Elevations, Pile Tip Elevations) (if known)*
- *Critical Scour Elevations (from Hydraulic Analysis) (if available)*
- *Water Elevations from the minimum of the last five (5) inspections (Routine, Underwater, etc.) or from the last ten (10) years (if the data is reliable).*
- *Channel Bottom Elevations from the minimum of the last five (5) inspections (Routine, Underwater, etc.) or from the last ten (10) years (if the data is reliable).**

** = While inspectors only need to input data as required by this section into Scour Stream Ground Profiles (Cross Sections), if scour is observed at the bridge and the channel and/or scour are in poor or worse condition, the inspectors shall review all available information to determine if scour occurred beyond the minimum of the last five (5) inspections (Routine, Underwater, etc.) or from the last ten (10) years. If data showing that scour occurred beyond the minimum of the last five (5) inspections (Routine, Underwater, etc.) or from the last ten (10) years, inspectors shall continue to input reliable data until the inspection before the historical scour had occurred, if available.*

13. Inspection Guidance for Scour and Countermeasures

Commentary: Coding guidance is being added to Chapter 7 to assist inspectors in coding SNBI B.C.10 (Channel Protection Condition Rating) and B.C.11 (Scour Condition Rating).

7.1.2.4 Channel Protection Condition Rating (SNBI B.C.10) and Scour Condition Rating (SNBI B.C.11)

The general condition ratings shown in Table 7.1.2.4.1 shall be used as a guide in evaluating a bridge for SNBI B.C.11, the general condition ratings shown in Table 7.1.2.4.2 shall be used as a guide in evaluating a culvert for SNBI B.C.11, and the general condition ratings shown in Table 7.1.2.4.2.3 may be used as a guide in evaluating the channel protection in the form an apron on culverts.

Table 7.1.2.4.1 General Condition Ratings for Scour Condition Rating (B.C.11) (Bridges)

Code	Description
N	Bridge does not cross over water.
9	No scour. Only used if not open to traffic.
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. Scour countermeasures (if placed) are marginally effective.
4	Widespread moderate or isolated major scour; strength and/or stability of the bridge is affected. Scour countermeasures (if placed) are ineffective.
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. Scour countermeasures (if placed) are ineffective or have failed.
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. Scour countermeasures (if placed) are ineffective or have failed.
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.

Table 7.1.2.4.2.1 General Condition Ratings for Scour Condition Rating (B.C.11) (Culverts)

Code	Description
N	Culvert does not cross over water.
9	No scour. Only used if not open to traffic.
8	Refer to the Table 7.1.2.4.2.2 and Figure 7.1.2.4.2 below.*
5 to 7	Not applicable for culverts.
2 to 4	Refer to the Table 7.1.2.4.2.2 and Figure 7.1.2.4.2 below.*
1	Failure is imminent, and the culvert is closed to traffic.
0	Failure has occurred and the culvert is closed to traffic.

** = Figure 7.1.2.4.2 is only applicable for culverts where the inlet/outlet is within 10 feet of the edge of the roadway. If the inlet/outlet is over 10 feet from the edge of the roadway. Table 7.1.2.4.2.1 and the Table 7.1.2.4.1 may be used to code B.C.11.*

Table 7.1.2.4.2.2 Supplemental Table for GCR Scour Condition Rating (B.C.11) (Culverts)

Item B.C.11 Coding	Exposure and/or Undermining Category	*Choose the Most Critical Mechanism (See Figure 7.1.2.4.2)*	
		Culvert Undermining	Culvert Toewall Exposure *(if present)*
8	Minimal	< 1 ft	< ⅓ $H_{t,c}$
4	Moderate	1 – 3 ft	≤ $H_{t,c}$
3	Major	3 – 5 ft	= $H_{t,c}$
2	Major & Severely Compromised	> 5 ft	> $H_{t,c}$

Table 7.1.2.4.2.3 Supplemental Table for GCR Channel Protection Condition Rating (B.C.10) (Culverts)

Item B.C.10 Coding	Description	*Choose the Most Critical Mechanism (See Figure 7.1.2.4.2)*	
		Apron Undermining *(if present)*	**Apron Toewall Exposure** *(if present)*
8	Some inherit defects.	–	–
7	Some minor defects.	–	$\leq$ ½ $H_{t,a}$
6	Widespread minor or isolated moderate defects.	< ⅕ L_a	$\leq H_{t,a}$
5	Some moderate defects; performance of the channel protection is not affected.	$\approx$ ⅕ L_a	$\leq H_{t,a}$
4	Widespread moderate or isolated major defects; performance of channel protection is affected.	⅕ L_a – ⅗ L_a	$> H_{t,a}$
3	Major defects; performance of channel protection is seriously affected. Condition typically necessitates more frequent monitoring or corrective actions.	⅗ L_a – L_a	–
2	Major defects; channel protection is severely compromised. Condition typically necessitates more frequent monitoring or corrective actions.	> L_a	–
1	Channel protection has failed, but corrective action could restore it to working condition.	Failed Apon, Repairable.	
0	Channel protection is beyond repair and must be replaced.	Failed Apon, Replacement Required.	

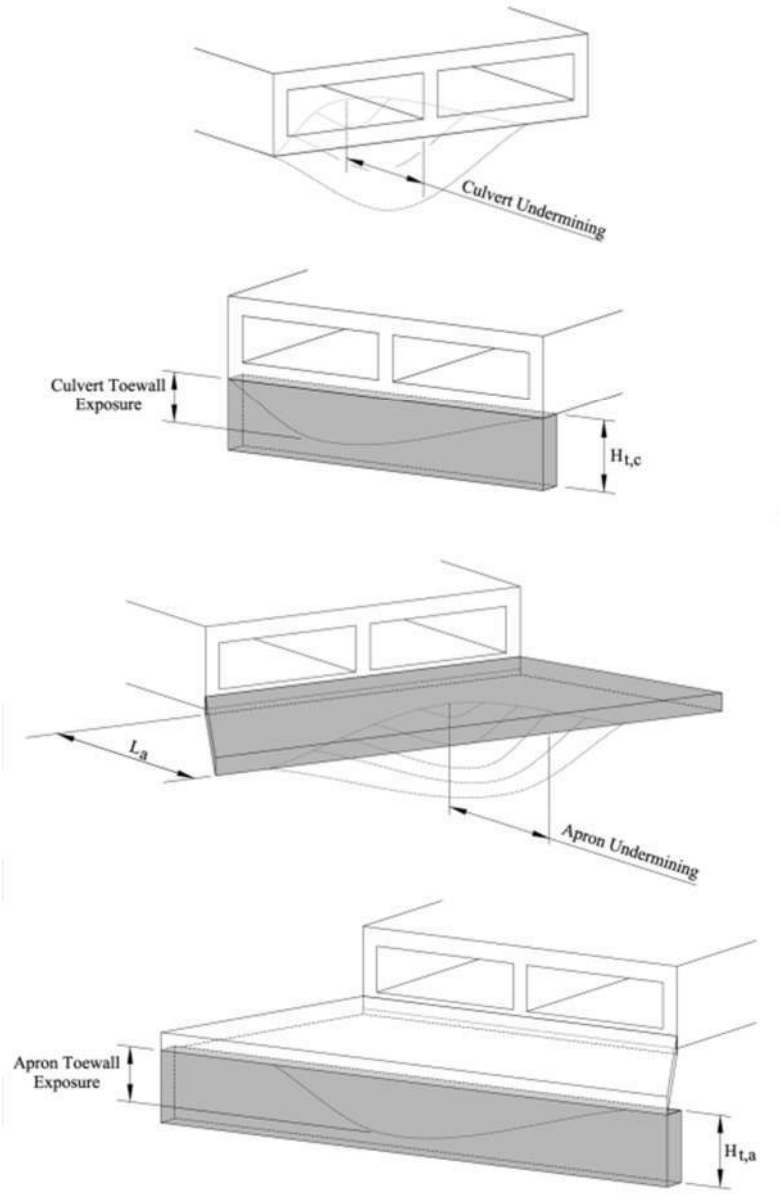

Figure 7.1.2.4.2 Supplemental Figure for GCR Ratings for Culverts*

** = Figure 7.1.2.4.2 is only applicable for culverts where the inlet/outlet is within 10 feet of the edge of the roadway. If the inlet/outlet is over 10 feet from the edge of the roadway. Table 7.1.2.4.2.1 and the Table for SNBI Item B.C.10 shall be used to code.*

14. Additional SNBI Fields in BrM

Commentary: Inspectors shall report Bridge Length (NBI 049), NBIS Bridge Length (SBI 634) [B.G.01] and Total Bridge Length (SBI 635) [B.G.02]. Inspectors shall report Irregular Deck Area (SBI 636) [B.G.15] on qualifying bridges with an irregular geometry only. Reference the Specifications for the National Bridge Inventory (SNBI) for additional coding requirements.

15. General Condition Ratings – Use of '9'

Commentary: Inspectors shall only use '9' for the General Condition Ratings (GCR) for bridges not yet open to traffic. The list below includes the GCRs where this provision is applicable.

- Deck Condition Rating – NBI 058 [SNBI B.C.01]
- Superstructure Condition Rating – NBI 059 [SNBI B.C.02]
- Substructure Condition Rating – NBI 060 [SNBI B.C.03]
- Culvert Condition Rating - NBI 062 [SNBI B.C.04]
- Bridge Railing Condition Rating - SBI 602 [SNBI B.C.05]
- Bridge Railing Transitions Condition Rating - SBI 603 [SNBI B.C.06]
- Bridge Bearings Condition Rating - SBI 604 [SNBI B.C.07]
- Bridge Joints Condition Rating - SBI 605 [SNBI B.C.08]
- Channel Condition Rating - NBI 061 [SNBI B.C.09]
- Channel Protection Condition Rating - SBI 601 [SNBI B.C.10]
- Scour Condition Rating - SBI 631 [SNBI B.C.11]

Language is being added to Section 7.1.2:

A condition rating of '9' shall only be applied to bridges that are not yet open to traffic. If the bridge is open the traffic, the highest allowable condition rating shall be '8'.

16. Next Inspection Date

Commentary: Depending on the inspection type, an inspection interval and the estimated date of the future inspection event may or may not be required to be completed. The calendar day used in the date field for the estimated date of the future inspection event shall match the date of the subject inspection field. For example, a routine inspection with a 12-month interval that has an inspection date of 04/05/2024 shall have a routine inspection scheduled with a 12-month interval and an estimated date of the future Routine Inspection of 04/05/2025. **The date of the future inspection should match the day in the month N-months in advance. Users should not use the first or last days of the month.** Inspectors may want to have the inspection occur sooner than the date required by the interval. For example, a routine inspection with a 24-month interval that has an inspection date of 10/20/2024 would have an estimated date of the future Routine Inspection of 10/20/2026, but if the inspector

wanted to perform the bridge in April of 2026 for scheduling concerns, they can select 04/20/2026 as the next date and leave the interval at 24 months.

17. Waterway Names

Commentary: When adding new bridges to the inventory, inspectors shall use the FEMA tool below to determine the name of the waterway. Inspectors do not need to change the waterway for bridges already in the inventory, unless desired. The following sections of the BIGD are being updated in accordance with this guidance:

Language is being added to Section 1.6.2:

> FEMA MSC National Flood Hazard Layer Maps – Use for Waterway Names

Language is being revised in Appendix M:

> **TOOL TO DETERMINE WATERWAY NAMES**
>
> *The coder shall use the Federal Emergency Management Agency (FEMA) Flood Map Service Center (MSC) to determine official waterway names (see link in TN05).*

18. Element Validation for Decks and Slabs

Commentary: Inspectors shall only use deck elements when there is a superstructure element. If there is no superstructure element, consider a slab or frame element. Appendix L is being reissued with this clarification.

Language is being added to Section 7.2:

> *The BITL shall review the NBEs applied to each bridge and confirm that they are accurate for the structure. For a bridge to have a deck element as defined in Appendix L, a superstructure element shall be included on the bridge. If there is no superstructure element on the bridge, a deck element cannot be used.*

19. Curb and Curb Reveal

Commentary: The following sections of the BIGD are being updated to provide clarification regarding the requirements to document and measure the curb reveal. Railings, parapets, and barriers are not considered curbs and do not need to be measured. This new language shall supersede any previously released language; Section 5.3.1.5 shall be replaced with the following language.

> *Condition of the curb shall be included in the inspection report. If the structure has no curb, then no notes should appear for the bridge. Determining if a curb is mountable or non-mountable is an important data point that is*

required for load distribution calculations that may be part of a load rating analysis. The classification of a mountable curb versus a non-mountable is determined based off the curb's reveal which is defined as the vertical face or vertical portion of the curb measured from the top of deck or wearing surface to the top of the curb. Inspectors shall indicate the type of curb on a structure using the following definitions for each category.

- ***No Curb on Bridge***
- ***Hidden/Overhung Curb****: Used when a structure has either a mountable or non-mountable curb, and an overhanging bridge rail. A curb cannot be classified as hidden/overhung if the structure has a width coded for sidewalk (NBI Item 50A or NBI Item 50B).*
- ***Mountable Curb****: Used when a structure has an exposed curb with a reveal 6" or less.*
- ***Non-Mountable Curb****: Used when a structure has an exposed curb with a reveal greater than 6".*

Figure 5.3.1.5 Hidden/Overhung Curb

If inspectors indicate if the bridge has a mountable or non-mountable curb, the inspectors shall review previous measurements or measure the curb reveal at each corner of the structure and include the measurements in the inspection report. This measurement only needs to be measured at most once and can be visually confirmed during subsequent inspections with no other required updates unless a change is noted. For example, curb reveal measurements shall be retaken if conditions on the bridge change such as overlay is placed, barrier is replaced, or other bridge modifications that impact the previously documented measurements.

Section 5.3.1.9 including all subsections, shall be replaced with the following language.

5.3.1.9 Wearing Surface

All inspection notes regarding the wearing surface shall be placed in the inspection report under the wearing surface element. Often, signs of distress or failures of the underlying bridge deck will be relayed through the overlaying wearing surface. Inspect for loose or missing pavement, exposed waterproofing membrane, and cracks. Cracks, especially map cracking, usually indicate deterioration of the underlying bridge deck. The condition of the wearing surface shall not be considered in the overall deck condition evaluation but can be helpful in identifying locations where further inspection of the deck may be warranted.

5.3.1.9.1 Wearing Surface Thickness

If there is an asphalt overlay or some other wearing surface above the deck, the thickness of the wearing surface shall be measured. The wearing surface thickness shall be clearly recorded in the inspection notes for comparison to record plans to aid in determining if an overlay has been applied on the bridge. Three common techniques of

measuring the wearing surface are provided in the subsequent sections, however, inspectors are encouraged to exercise their discretion when choosing a methodology and should consider available tools, safety, and site conditions.

5.3.1.9.1.1 Boring for Direct Measurement

The preferred and most accurate method for determining the wearing surface thickness is to drill a small diameter hole in locations as needed, measure the drill bit penetration to concrete, then plug the hole with adequate sealant. The hole should only be large enough to probe and measure the length of the probe. This method allows the inspector to visually identify variances or tapers in the wearing surface and perform targeted borings to measure and record the maximum wearing surface thickness.

5.3.1.9.1.2 Reveal Measurements with Plans

When the wearing surface spans the entire deck and no deck element is exposed, inspectors can determine the maximum wearing surface thickness by measuring the vertical reveal from the top of curb or bridge rail to the top of the wearing surface. For this method to be applicable, the plans must provide a curb/rail height over the deck element. A wearing surface thickness is calculated by subtracting the thickness of the measured reveal from the plan value of the curb/rail height over the deck element. Inspectors shall calculate a wearing surface thickness at all corners of the structure and combine with any observed crowns or tapers in the wearing surface to estimate and record the approximate maximum thickness for reporting.

5.3.1.9.1.3 Direct Measurement at Taper

When the wearing surface does not span the entire deck and areas of the deck element are exposed, a direct initial thickness measurement may be taken at all corners of the structure. Inspectors shall then compare the thickness measurements with any observed crowns or tapers in the wearing surface to estimate and record the approximate maximum wearing surface thickness for reporting.

20. Uncoated Weathering Steel

Commentary: Additional guidance is being provided regarding what must be collected for SBI Item 550 (Main Span Uncoated Weathering Steel) and Item 565 (Approach Span Uncoated Weathering Steel). A new section (Section 7.3.17) is being added to provide guidance.

7.3.17 Uncoated Weathering Steel

SBI Item 550 (Main Span) and SBI Item 565 (Approach Span) identify if uncoated weathering steel is present in the main span or approach span of the bridge. If present, SBI Item 550 and SBI Item 565 identify if the uncoated weathering steel is in the superstructure, the substructure, or both. See Table 7.3.17.

Table 7.3.17 Uncoated Weathering Steel Coding Guidance (SBI Item 550 and SBI Item 565)

Code	Description
0	No Uncoated Weathering Steel on Bridge
1	Uncoated Weathering Steel in Superstructure Only
2	Uncoated Weathering Steel in Substructure Only
3	Uncoated Weathering Steel in Superstructure and Substructure

21. Navigation Control for Waterways

Commentary: Additional guidance is being provided regarding what must be collected for NBI Item 038 (Navigation Control). A new section (Section 7.3.18) is being added to provide guidance.

7.3.18 Navigation Control for Waterways

NBI 038 (Navigation Control) identifies whether navigation control (a bridge permit for navigation) is required for the applicable bridge. The presence of a bridge permit in the bridge file would indicate such control. See Table 7.3.18. Inspectors can review if a bridge permit is located in the Bridge File or if the waterway is deemed navigable by the U.S. Department of Transportation (see link in Section 1.6.2).

Table 7.3.18 Navigation Control for Waterways (NBI 038)

Code	Description
N	Not applicable, no waterway.
0	No navigation control on waterway (bridge permit not required).
1	Navigation control on waterway (bridge permit required).

Language is being added to Section 1.6.2:

U.S. Department of Transportation: ArcGIS Online - Navigable Waterway Network Lines

22. Required Field Observation

Commentary: Guidance is being updated to revise the required quantity of field reviews for SCDOT inspectors from two annually to one review annually. In addition, a requirement has been added for the supervisor of the DBIS or their designee to perform the field review. A BITL shall not perform the review of his or her supervisor.

9.2.2.2 Field Review of SCDOT Teams

The DBIS shall routinely visit each BITL in the field where any pertinent items are discussed. Significant items are

discussed further during district quality meetings for the benefit of the entire inspection staff of the district. The DBIS shall observe the inspection team at work during the visit, although the entire inspection need not be observed.

The DBIS will perform a formal field review of each BITL at least once per calendar year. Each review will occur at a different bridge from all previous reviews. The DBIS shall select when the field review shall take place. While the DBIS may be present during many inspections, this formal field review is a structured, quality review.

If a district does not have an additional BITL to support the field review, another qualified BITL shall perform the field review. The DBIS of the subject district is responsible to coordinate this effort. *If the DBIS is serving as a BITL throughout the course of the year, the supervisor of the DBIS or their designee shall perform a field review of the DBIS at least once per calendar year as well.*

BITLs subject to a field review are any inspectors who have served as BITLs on at least *one* NBI reportable inspection in that calendar year *or any inspector who performed as a QC Reviewer on at least one NBI reportable inspection in that calendar year. The once annual requirement for field reviews is applicable for a BITL who is certified for the entire 12 months of the year or if the BITL is certified before August 1. If a BITL is certified after August 1, they are exempt from this field review process for that calendar year.* If a BITL retires or leaves the position during the course of the calendar year, they are exempt from the requirement to be subject to a field review. If a BITL had stopped performing inspections in a previous calendar year and they have no field reviews in their inspection history for the following year, the BIPM or their designee may grant temporary BITL status. However, a field review on the subject BITL must occur within three (3) months of their first completed routine inspection.

This evaluation shall document the arrival time, set-up time, preparations made for equipment, safety conformance, access methods. The quality and thoroughness of each inspection team's activities. It shall also note whether or not safety equipment was properly used, whether appropriate access methods were used and an evaluation of whether the inspection served its desired purpose.

During a field review, the reviewer shall complete the Field Review Quality Form, which is available as Attachment 9.2. This quality form is meant to assist the reviewer in the field review but is not all-inclusive.

The completed Field Review Quality Form shall be released by the reviewer to the BITL being reviewed, the BIPM and BMQE. This form shall be released within 30 calendar days from the date of the field review.

If a team field evaluation results in an unsatisfactory review of the inspection performed by the BITL, then the reviewer shall notify (via email) the BIPM, BMQE, DME, DBIS, and BITL of the result of the field evaluation. The subject BITL shall then address the comments for the unsatisfactory review and shall email them to the BIPM, BMQE, DME, and DBIS. *If a team field evaluation results in an unsatisfactory review of the inspection performed by the BITL, the BITL shall be given temporary BITL status and be reviewed again in three months.*

Any significant or pertinent items shall be discussed at the next Annual QA Meeting for the benefit of all inspectors.

The BMQE, or a designee, may, at any time, perform an additional field review of a BITL using a similar process as described herein.

23. Inspection Quality Summary Form

Commentary: SCDOT inspectors shall complete the Inspection Quality Summary Form (IQSF) annually. Attachment 9.9 includes inspector information and a summary the field review and independent inspections performed for each inspector. Section 9.2.2 is being updated:

9.2.2 Quality Control (QC) Procedures for SCDOT Performed Inspections

Inspectors are responsible for confirming documentation is properly captured for their field reviews and independent inspections. Inspector information and a summary of the field review and independent inspections are to be included on Attachment 9.9, the Inspection Quality Summary Form (IQSF). The IQSF will be updated annually by each BITL.

24. Independent Inspection and QC Review of DBIS Performed Inspections

Commentary: A requirement has been added for the supervisor of the DBIS or their designee to perform the independent inspection and QC reviews if the DBIS is the subject inspector. A BITL shall not perform the review of his or her supervisor.

9.2.2.3 Independent Inspection

For the DBISs who are serving as BITLs, the supervisor of the DBIS or their designee shall perform his/her independent inspection review. A subordinate cannot complete the review.

9.2.2.4 Quality Control Procedure for Inspection Reports and Data

In the event the DBIS is not able to complete this review or if the DBIS was serving as the BITL, the supervisor of the DBIS or their designee shall serve as the QCR so long as he/she can remain independent. A subordinate cannot complete the review.

25. Inspection Qualifications for FHWA Complex Bridges

Commentary: The BITL who performed the Topside Inspection on a non-movable FHWA Complex Bridge shall have previous experience on the same type of non-movable FHWA Complex Bridge. An inspection procedure for each Topside Inspection of the any non-movable bridge defined as a FHWA Complex Bridge, can be found in Section 4.8.

Language is being added to Section 3.1.6:

One BSIP included for a FHWA Complex Bridge is for the BITL to confirm that they have previous experience as the BITL on a similar FHWA Complex Bridge. The structure types shall match. For example, the BITL for a Stayed Girder Topside Inspection shall have experience as a BITL on a previous Stayed Girder Topside Inspection and the BITL for a Segmental Box Topside Inspection shall have experience as a BITL on a previous Segmental Box Topside Inspection.

26. Point of Contact for Local Agencies

Commentary: The District Bridge Engineer (DBE) shall replace the District Bridge Inspection Supervisor (DBIS) as the point of contact for local agencies.

The following section is being added to the BIGD:

> ***1.3.2.8 District Bridge Engineer (DBE)***
>
> *Has responsibility for bridge related maintenance issues on SCDOT owned bridges in his or her district. The DBE shall serve as the point of contact for bridges owned by others in his or her district.*

The following sections are considered updated for the revised responsibility.

- Section 2.3.2 - Non-SCDOT Owned Bridge Inspection Requirements
- Section 4.1.5 - Immediate Initial Inspection Findings
- Section 5.2.4 - Arrange for Advanced Vegetation Control or Advanced Bridge Washing
- Section 8.3.5 - Review of Critical Findings on Non-SCDOT Owned Bridges
- Section 8.8 - Repair Recommendation Notification (Non-SCDOT Owned Bridges)
- Attachment 2.1 - Non-SCDOT Owned Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings)
- Attachment 2.2 - Non-SCDOT Owned Bridge Inspection Report Release Letter with Repair Recommendations (No Critical Findings)
- Attachment 2.3 - Non-SCDOT Owned No Longer Being Inspected Letter
- Attachment 2.4 - Non-SCDOT Owned Bridge Critical Finding Memorandum
- Attachment 2.5 - Non-SCDOT Owned Bridge Critical Finding Reminder Memorandum
- Attachment 2.6 - Non-SCDOT Owned Bridge Critical Finding Action Taken by SCDOT
- Attachment 2.7 - Non-SCDOT Owned Bridge Inventory List and Status

27. Asset ID for Bridge Widenings

Commentary: A new Asset ID is not required for bridge widenings. Language is being added to Section 5.4.3.1.

> *A bridge being rehabilitated, repaired, and/or widened shall re-use the same Asset ID. The Bridge File shall be updated with applicable documents to maintain the same bridge history until Asset ID retirement.*

28. Inspections of Pins

Commentary: The text below was previously included in Chapter 4 which was re-written in TN04, it is being reissued in this Technical Note. A new section (Section 5.3.2.16) is being added to provide guidance.

5.3.2.16 Inspections of Pins

For typical ultrasonic test procedures, a transmitter and a receiver are attached to one end of a pin member. The transmitter transforms the energy of an electrical voltage into an ultrasonic wave, and the ultrasonic wave travels through the material at a velocity dependent upon the material's properties. The ultrasonic wave travels through the material until the test specimen boundary reflects the signal, and then the reflected signal travels back through the material to a receiver. The receiver converts the mechanical energy back to electrical energy, which is then amplified. The amplified signal, or echo, is displayed on the instrument screen, and, if the member contains a discontinuity, the discontinuity appears as a reflected defect echo on the screen.

29. Signs and Utilities Attached to Bridges

Commentary: Additional guidance is being provided regarding what must be collected for SBI Item 506 (Signs/Utilities Attached). A new section (Section 7.3.19) is being added to provide guidance.

7.3.19 Signs and Utilities Attached to Bridges

SBI 506 (Signs/Utilities Attached) identifies whether signs and/or utilities are attached to the bridge. Only signs and/or utilities that would be used on a load rating should be considered. Asset ID placards, Structure Number placards, and other small signs should not be considered signs. However, all utilities should be reported.

Table 7.3.19 Signs and Utilities Attached to Bridges (SBI 506)

Code	Description
N	No Signs and Utilities Attached
U	Utilities Attached
S	Signs Attached (only signs that would be relevant in a load rating)
M	Signs and Utilities Attached

30. Consultant Repair Recommendations for Existing Repair Recommendations

Commentary: Language is added to Section 8.7 regarding consultant repair recommendations.

Consultant BITLs shall re-issue repair recommendations even if existing repair recommendations exist for the same or similar defect on the same bridge. Repair recommendations shall still be made even if the bridge is scheduled for replacement, repair, or currently under construction.

31. Resistance Drilling Required for In-Depth Timber Underwater Inspections (IDTUWI)

Commentary: If a pile is in decay for CS3 and CS4 but the decay is above the water, the underwater diver does not need to drill the pile. Applicable sections of Appendix T are updated as shown below. If Substructure Condition Rating is governed by non-timber bridge

components or timber elements out of the water, a revision in the In-Depth Timber Underwater Inspection interval is permitted. Underwater timber pile condition states with CS3 and CS4 quantities shall require reduced in-depth timber underwater intervals even if the condition rating does not require it.

6.0 IN-DEPTH TIMBER UNDERWATER INSPECTION (IDTUWI) REQUIREMENTS

A timber pile bridge shall receive an In-Depth Timber Underwater Inspection (IDTUWI) according to the intervals listed in Table 6.0 *so long as there is noted decay on a timber pile within the IDTUWI scope*. An UW BITL may recommend a shorter interval for the inspection. IDTUWIs shall be considered a type of In-Depth Inspection per the NBIS. IDTUWIs may be performed in conjunction with underwater inspections. The interval for the IDTUWIs can be controlled by the Underwater Inspection Condition Rating (SNBI 600/SNBI B.C.15) or be controlled by the condition state of a single pile.

Table 6.0 In-Depth Timber Underwater Inspection (IDTUWI) Interval

SBI 600 / SNBI B.C. 15 (Underwater Inspection Condition) [1]	Any Timber Pile in Condition State [2]	Maximum In-Depth Timber Inspection Interval
9, 8, 7 and 6	CS1 and CS2	Not Needed
5	CS3	60 Months (5 Years)
4, 3, 2 and 1	CS4	24 Months (2 Years)

[1] = *Substructure Condition Rating is governed by non-timber bridge components, a revision in the interval of the IDTUWI is permitted.*

[2] = As coded by the underwater inspection (i.e. defects below water). *The IDTUWI can be removed from the bridge's inspection schedule if there are no CS3 or CS4 defects on timber piles underwater.*

All requirements from an Underwater Inspection shall be followed (see Chapter 5 of the BIGD). *Timber piles from the channel bottom to 1 foot above waterline at the time of the IDTUWI shall be inspected during the IDTUWI.* In addition, inspectors shall perform the following in-depth exercises during an IDTUWI:

- Perform a FHWA Level II inspection on 50% of underwater timber pile elements,
- Determine Remaining Cross Section Area (in square inches) at the worst decay location for any timber pile in CS3 or CS4,
- Sound each through bolt and perform a hands-on inspection of the bolt (if any),
- Sound the timber around each bolt (if any) (above, below and on each side of the bolt on each face of the pile),
- If the controlling defect on the pile is decay (Defect 1140) *and if the decay is noted underwater*, resistance drill one (1) location on one timber pile on each bent for timber piles listed as CS3 or CS4 (FHWA Level III Inspection). If results are unexpected, drilling may be warranted on a maximum of one (1) additional pile in that bent *if additional piles on the bent exhibit underwater decay, and*
- *Determine Remaining Cross Section Area at the controlling decay location for any pile in CS3 or CS4.*

32. Culvert Undermining – Distance from Edge of Roadway to Culvert Inlet/Outlet

Commentary: The text below is considered added to Section 6.1:

If 1 or more feet horizontal of the culvert exhibits undermining at the inlet or the outlet, the inspector shall include in the inspection report the distance from the edge of the roadway closest to the undermining to the impacted inlet or outlet. If the distance is over 10 feet, the distance included in the inspection report can be approximated.

33. Load Rating Results Requiring a Critical Finding

Commentary: The text below is revised in Section 8.2.1.2.

8.2.1.2 Completion of a Load Rating

If a load rating engineer completes the load rating and the resulting *operating rating of the NBI reported vehicle (HS-20 truck)* is 6 tons or less (Rating Factor of *0.167* or less), a Critical Finding shall be documented, *unless the bridge is already posted for 17 tons or less*. Existing posting signs which may be displaying restrictions 6 tons or less shall not be used as a reason for submitting a notification. FHWA has set 3 tons as the absolute minimum gross live load capacity *(inventory rating)* for a bridge and a bridge closure is required for load ratings that result in that capacity. *If the inventory rating factor of any vehicle is 3 tons or less, the bridge needs to be closed.*

Commentary: The text below is revised in Appendix O.

FHWA has set 3 tons as the absolute minimum gross live load capacity *(inventory rating)* for a bridge and a bridge closure is required for load ratings that result in that capacity. *If the inventory rating factor of any vehicle is 3 tons or less, the bridge needs the be closed*, or if there is any situation where the bridge is at risk of collapse or partial collapse (see list below).

- Bridges with a recommended *operating* LFR (HS-20 truck) load rating of 6 tons or less (Rating Factor of 0.167 or less) *unless the bridge is already posted for 17 tons or less* ,

34. Traffic Status "G"

Commentary: The text below is revised in Section 7.3.6.

Only the BMO may change the value for NBI 41 to "G" from another traffic status. Bridges that are being rehabilitated and are being re-opened shall not be coded with a Traffic Status of "G"; they shall remain "K" until re-opened when the status can be changed as applicable.

35. Inspection Procedure Updates

Commentary: Bridge Inspection Team Leaders are permitted to perform Inspection Procedure updates and Bridge Inspection Team Leaders are permitted to perform QC/QA on these updates so long as the updates do not pertain to some bridges as defined in the updates Section 4.10 below.

Table 4.10 Non-Field Inspection Event - Qualifications and BSIP Requirement

Inspection	Qualification	BSIP	Notes
Data Update	BMO	Not Required	Used by the BMO only to update bridge inventory information
Load Rating	South Carolina PE	Not Required	As required by the LRGD
Hydraulic Analysis	HDSO	Not Required	After request or notification
Inspection Procedure	*BITL**	Not Required	Used to update inspections procedures as needed

** BITLs may update inspection procedures and review inspection procedure updates except for inspection procedures updated by a consultant on bridges where there is a complex feature, underwater inspection scheduled on the bridge, or a NSTM inspection scheduled on the bridge. Inspection procedure updates by a consultant on bridges where there is a complex feature, underwater inspection scheduled on the bridge, or a NSTM inspection scheduled on the bridge shall be reviewed by registered Professional Engineers licensed in South Carolina.*

36. Section 5.0 from Appendix T

Commentary: If Substructure Condition Rating is governed by non-timber bridge components, a revision in the In-Depth Timber Inspection interval is permitted. Timber pile condition states with CS3 and CS4 quantities shall require reduced in-depth timber intervals even if the condition rating does not require it. In additional, supplemental guidance is being issued on the rest of Section 5.0. Inspectors are not required to remove rip rap or stone to examine timber piles.

Table 5.0 In-Depth Timber Inspection (IDTI) Interval

NBI 60 / SNBI B.C. 03 (Substructure Condition) [1]	Any Timber Pile in Condition State	Maximum In-Depth Timber Inspection Interval
9, 8, 7 and 6	CS1 and CS2	72 Months (6 Years)
5	CS3	24 Months (2 Years)
4, 3, 2 and 1	CS4	12 Months (1 Year)

[1] = If Substructure Condition Rating is governed by non-timber bridge components, a revision in the interval of the IDTI is permitted.

All requirements from a Routine Inspection (Section 4.0) shall be followed. In addition, inspectors shall perform the following in-depth exercises during an IDTI:

- Dig around the base of timber piles *in earth* for a minimum of 12" to examine for hidden defect(s) *if there is visual evidence the decay may continue below the ground*,
- Sound each through bolt and perform a hands-on inspection of the bolt (if any),
- Sound the timber around each bolt (above, below and on each side of the bolt on each face of the pile),
- If the controlling defect on the pile is decay (Defect 1140), resistance drill one (1) location on one timber

pile on each bent for timber piles listed as CS3 or CS4. If results are unexpected, drilling may be warranted on a maximum of one (1) additional pile in that bent, *and*

- *Determine Remaining Cross Section Area at the controlling decay location for any pile in CS3 or CS4.*

37. Missing Approach Transition Guardrail

Commentary: Missing Approach Transition Guardrail is now considered a Critical Finding on a bridge if an Approach Transition Guardrail was present and is no longer present or if an Approach Transition Guardrail is required by the bridge plans.

The following language is being revised in Appendix O:

The list below provides an example of what shall be considered a Critical Finding:

- *Approach guardrail transition is missing on a bridge where it was previously in place or if the approach guardrail transition that is in place is damaged, deteriorated, or otherwise can no longer contain and/or redirect vehicles for bridges designed for loads higher than H-15 and bridges designed for H-10 or H-15 loads which are part of the NHS. See Appendix S, an approach guardrail may not be required for some H-10/H-15 bridges off the NHS.*

38. Timber Pile Drilling Determinations

Commentary: Clarification is provided regarding when resistance drilling is required on timber piles. Language is being revised in Appendix T Section 7.2 as stated below.

The BITL shall determine which locations on each timber pile are drilled. The BITL shall also review any drilling *previously* performed on the bridge. If the pile has previously been drilled and no or minimal defects have been noticed, a different pile should be selected for the current inspection. If decay is noted on the pile, the general area of the decay should be drilled again. *BITLs may be able to determine and measure decay of the pile visually, after removing any decayed timber, or after they sound the pile to determine any internal defects; if they are able to determine (before drilling) that pile decay has already reached a condition where a Critical Finding or 'A Flag' is required, the pile does not need to be drilled and another pile in that bent should be selected to satisfy the requirement of the IDTI.*

Figure 7.2 Exterior Pile with > 50% Decay, Drilling Not Needed (Critical Finding/A Flag per Figure O.3 in Appendix O)

If inspectors are drilling with a resistance drill in a single pile during a single inspection, they are not required to notify the DBIS. If more extensive drilling per pile or per bent is required, the DBIS shall be notified, and the inspector is required to get approval before more extensive drilling per pile is performed.

39. Timber Pile Assessment

Commentary: Generally, the goal of timber resistance drilling is to drill at the location to obtain the controlling or minimum timber cross section area remaining as it will control condition coding and load rating. Inspectors should practice conservatism during their in-depth timber inspections. Load raters may use a more refined process as part of the practice to determine pile cross section per the LRGD. Language is being revised in Appendix T Section 8.2 as stated below.

Bridge inspectors are to consider both moderate and severe decay (per Table 7.3) as decay when determining the percent decay. *Bridge inspectors should attempt to determine the minimum timber cross section area (in square inches) remaining as it will control condition coding and load rating. See Section 7.2 of this appendix for a discussion on visually observable decay or observable decay following sounding. Measured area of decay can be used to determine the percent decay in lieu of drilling, if determined appropriate by the BITL.* Load rating engineers *(per the LRGD)* may consider moderate (or partial) decay by engineering judgement to more accurately determine the remaining pile capacity when performing a load rating on a timber member.

40. Routine and Non-Routine Inspection on Closed Bridges

Commentary: Clarification on inspections on bridges that are closed is being added per a new section, Section 4.13 below.

4.13 Inspections on Closed Bridges

When closing a bridge or inspecting a closed bridge, the BITL may remove all non-routine inspections scheduled for the bridge. The BITL should schedule a Routine Inspection at 24M interval. Routine inspections at an increased interval or non-routine inspections (i.e. special, underwater), may be scheduled as needed by the BITL for a safety reason. If Routine Inspections at an increased interval or non-routine inspections are scheduled for a bridge, the inspection report shall note the reason for the inspections being arranged. Bridges with short term closures (generally less than 3 months) do not need to have the routine inspection interval revised or non-routine inspections removed from the bridge.

If the bridge is re-opened, non-routine inspections may be required to be scheduled per the requirements of Chapter 4 and shall be arranged by the BITL.

41. Inspections and Load Ratings After Repairs

Commentary: Following the completion of repairs, an inspection (initial or unscheduled) is required as bridge data needs to be updated. The post-repair inspection needs to include an appropriate level of documentation if a load rating is required, as outlined below. Section 5.3.12 is being added to the BIGD. See Item #6 in this TN for an update to Section 5.5.2.1 if the repair is completed before the end of the load rating.

5.3.12 Inspections and Load Ratings After Repairs

The inspection that takes place following the completion of repairs shall detail any repairs performed in accordance with SNBI [B.W.03] Work Performed. All locations where repairs have been made shall be included in the inspection report. If structural repairs have been made, a typical photograph of the repair type shall be included in the inspection report. A photograph of every repair location is not required. If plans, sketches, or drawings for the repairs exist, the BITL shall indicate the existence of plans, sketches, or drawings and confirm that those applicable documents have been uploaded to the Bridge File. For contracted repairs, construction documents (as-builts, if available) shall be included in the Bridge File. For in-house repairs, drawings, sketches, plans, work specifications, or other repair documentation shall be uploaded when made available by the DBE or designee; depending on file type, files may be uploaded as bridge plans or maintenance documents as determined by the BFP. The BITL is responsible for confirming the files have been uploaded to the Bridge File.

The Initial Inspection or Unscheduled Inspection shall update General Condition Ratings, Element Condition States, and update applicable bridge data. The inspector shall also request a load rating, if needed.

When the load rating is performed, the load rating engineer is expected to list the results from the Initial Inspection or Unscheduled Inspection as a load rating assumption on the Load Rating Summary Form (LRSF). The load rating engineer can assume the inspection data is accurate. If the load rating engineer believes that the Initial Inspection or Unscheduled Inspection does not have adequate information, the load rating engineer can request approval from the BMO to perform a separate site assessment.

42. Requirement for UW Team Leader Performing Inspections

Commentary: More than one qualified UW Team Leader may be present during an Underwater Inspection; therefore, Section 3.1.5.1 is updated as noted below.

An UW BITL shall inspect at least 25% of substructure units (SSUs) on initial UW inspections and on UW inspections where the UW inspection interval is less than 60 months due to bridge condition (see Section 4.6.1). In addition, an UW BITL should inspect, at a minimum, 25% of substructure units (SSUs) on the bridges during the UW inspections that they lead.

43. Need for UW Inspections to Perform Routine Inspections

Commentary: Clarification on the requirement for UW inspectors to perform Routine Inspections due to highwater. Language in Section 4.2 is updated as noted below.

If there is minimum freeboard under a bridge or the water level in a culvert is very high, the BITL should first consider performing the inspection during a different time of the year. If a season adjustment will not allow the safe inspection of the bridge, the routine inspection may need to be performed by an underwater inspection team. *If the routine inspectors are unable to enter a culvert due to the water level or if routine inspectors cannot inspect the underside of the superstructure, the inspection should be performed by an underwater inspection team.* For these structures, the routine and underwater inspections shall both have intervals equal to or less than 24 months.

44. Updated Standard Inspection Equipment Table

Commentary: Table 5.1.5.1 is being reissued to include all equipment required for inspections

Table 5.1.5.1 Standard Inspection Equipment

General Access	Inspection	Timber Inspection
Waders (Hip and/or Chest)	Camera	Pick Hammer
Machete / Brush Hook / Sickle	Hammer	Awl, Pointed and Flat Probes
Extension Ladder	Scraper	Cordless Drill and Drill Set
Cellular Phone	Flashlight/Headlamp	Resistance Microdrill
Magnifying Glass	Wire Brush	Resistance Microdrill Supplies
Compass	Binoculars	Silicone Sealant or Marine Adhesive
Device for Internet Connection (Hotspot)	Inspection Mirror	Extra Batteries
Rooftop Strobe Lights (Yellow & White)	Shovel	*Pile Diameter Tape Measure*
Fire Extinguisher	Screwdriver	
Required Entry Phone Numbers and/or Required Entry Permit (if required)	Drill, Sealant, and Caulk	
	Sounding Chain	

Measuring	Note Taking	Personal Protection
6-Foot Rule Ruler	Inspection Forms	Hard Hat
Probing Rod	Extra Paper	High Visibility Vest
Level	Laptop/Tablet Computer	Safety Glasses / Goggles
25-Foot Tape (with weight on end)	*Field Bag / Backpack*	*Rain Gear / Umbrella*
100-Foot Tape *(with weight on end)*	Field Binder	First Aid Kit
Thermometer	Clip Board	Safety Shoes/Boots
Length Measuring Wheel	Calculator	Work Gloves
Plumb Bob/Protractor	Writing Instruments	Ear Protection
Vertical Clearance Device	*Keel / Chalk*	Dust Mask / Respirator
Crack Gauge	*Sharpie / Paint Stick*	Two Way Radio
Electronic Calipers	*Spray Paint*	Harness/ Lanyard
D-Meter	Plans / Labeling Diagrams	Life Jackets
Portable Monitoring Devices (Sonar Depth Finder/ Fathometer)	*Device Charger/Inverter/Charging Cables*	*Hand Sanitizer / Sanitizing Wipes*

Miscellaneous
Cooler / Drinking Water / Provisions
Sunblock
Insect Repellent
Knee Pads
Chargers/Inverter/Extra Batteries
Utility Belt, Tool Belt, or Utility Bag
Eye Wash Bottle
Vehicle Strobes/Cones/Warning Signs
Reference Materials

45. Updated List of Appendices

List of Appendices	
Appendix Letter	**Name of Appendix**
B	SCDOT District Map
H	AASHTO Detail Categories for Fatigue
I	South Carolina Railroad Map and List
K	Supplement Guide for NBI Condition Ratings
L	Supplement Guide for Element-Level Condition States
M	Coding Guide for NBI Items 06 and 07
N	Average Daily Traffic Count Formulas & Example Calculations
O	Example Critical Findings and Repair Recommendations
P	Common Inspection Shorthand and Abbreviations
Q	Critical Security Bridges
R	Underwater Inspection Guidance Document
S	Memorandum Regarding Maintenance of Guardrail on H10 and H15 Bridges
T	Timber Bridge Inspection Guidance (TBIG)
U	Extreme Event Response Plan (EERP)
V	Steel Section Remaining Tool

46. Updated List of Attachments

List of Attachment Files			
Attachment No.	**Name of Attachment File**	**Version**	**Page Count**
OTHER ATTACHMENTS			
A3.3	Complex Inspector Summary Form (CISF) Instructions	DEC2024, V1	1
	Complex Inspector Summary Form (CISF)		1
A5.24	Closed Bridge Re-opening Form Instructions	DEC2024, V1	1
	Closed Bridge Re-opening Form		1
INSPECTION PREPARATION AND PROCEDURES			
A5.1	Bridge Data Form Instructions	DEC2024, V1	1
	Bridge Data Form (Asset ID Request)		1
	Bridge Data Form (Asset ID Retirement)		1
	Bridge Data Form for SCDOT BMO (Admin)		1
	Bridge Data Form for SCDOT Road Data Services (RDS)		1
A5.2	Request for Bridge Preparation Prior to Inspection Instructions	DEC2024, V1	1
	Request for Bridge Preparation Prior to Inspection (Word Document)		2
	Request for Bridge Preparation Prior to Inspection (PDF)		2
A5.3	Railroad Flagging Service Form Instructions	DEC2024, V1	1
	Railroad Flagging Service Form		1
BRIDGE ASSESSMENT FOLLOWING INSPECTION (NON-CRITICAL FINDINGS)			
A4.3	Inspection Out-of-Interval Form Instructions	DEC2024, V1	1
	Inspection Out-of-Interval Form		1
CRITICAL FINDINGS AND REPAIR RECOMMENDATIONS			
A5.6	Repair Recommendations Form Instructions	DEC2024, V1	2
	Repair Recommendations Form (PDF)		2
	Repair Recommendations Form (Spreadsheet)		N/A
NON-SCDOT OWNED BRIDGES – CORRESPONDENCES			
A2.1	Non-SCDOT Owned Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings) Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings) (Word Doc)		1
	Non-SCDOT Owned Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings) (PDF)		1
A2.2	Non-SCDOT Owned Bridge Inspection Report Release Letter (Repair Recommendations) Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Inspection Report Release Letter (Repair Recommendations) (Word Document)		1
A2.3	Non-SCDOT Owned Bridge Receiving Closed Bridge Inspection Letter Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Receiving Closed Bridge Inspection Letter (Word Document)		1
	Non-SCDOT Owned Bridge Receiving Closed Bridge Inspection Letter (Repair Recommendations) (PDF)		1

List of Attachment Files			
Attachment No.	**Name of Attachment File**	**Version**	**Page Count**
NON-SCDOT OWNED BRIDGES – CORRESPONDENCES (CONTINUED)			
A2.4	Non-SCDOT Owned Bridge Critical Finding Memorandum Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Critical Finding Memorandum (Word Doc)		1
	Non-SCDOT Owned Bridge Critical Finding Memorandum (PDF)		1
A2.5	Non-SCDOT Owned Bridge Critical Finding Reminder Memorandum Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Critical Finding Reminder Memorandum (Word Document)		1
	Non-SCDOT Owned Bridge Critical Finding Reminder Memorandum (PDF)		1
A2.6	Non-SCDOT Owned Bridge Critical Finding Action Taken by SCDOT Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Critical Finding Action Taken by SCDOT (Word Document)		1
	Non-SCDOT Owned Bridge Critical Finding Action Taken by SCDOT (PDF)		1
A2.7	Non-SCDOT Owned Bridge Inventory List and Status Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Inventory List and Status (Word Document)		2
	Non-SCDOT Owned Bridge Inventory List and Status (PDF)		2
A2.8	Non-SCDOT Owned Bridge Removed from Inventory Letter Instructions	DEC2024, V1	1
	Non-SCDOT Owned Bridge Removed from Inventory Letter (Word Doc)		1
	Non-SCDOT Owned Bridge Removed from Inventory Letter (PDF)		1
QUALITY			
A9.2	Field Review Quality Form Instructions	DEC2024, V1	1
	Field Review Quality Form		2
A9.3	Independent Inspection Check Form Instructions	DEC2024, V1	1
	Independent Inspection Check Form (SCDOT)		5
	Independent Inspection Check Form (Consultant)		5
A9.4	District Quality Meeting Form Instructions	DEC2024, V1	1
	District Quality Meeting Form		1
A9.8	Consultant QC Plan Review Checklist Instructions	MAR2024, V1	1
	Consultant QC Plan Review Checklist		1
A9.9	Inspector Quality Summary Form Instructions	DEC2024, V1	1
	Inspector Quality Summary Form		1

Technical Note Notification No. 05 December 2024	**Technical Note 05**

Commentary: As part of continuing efforts to improve the bridge inspection practices, additional policy is currently being drafted and may include updates related to:

1. Inspection Guidance for Scour from Hydraulic Design Support Office (HDSO)
2. Inspection Guidance for the Use of Unmanned Aircraft Systems (UAS)
3. Agency Defined Elements (ADEs) and Element Defect Coding Guidance for ADEs

Please direct any questions concerning the above to the Bridge Inspection Program Manager or other representatives at the Bridge Management Office.

Approved: Chris R. Lacy Digitally signed by Chris R. Lacy Date: 2024.12.30 16:06:16 -05'00' 12/30/24

Director of Bridge Management — Date

BIGD Technical Note 01, June 14, 2022
BIGD Technical Note 02, October 28, 2022
BIGD Technical Note 03, March 27, 2023
BIGD Technical Note 04, May 30, 2024