Bridge Inspection Guidance Document

Issue Date: 2020

GUIDANCE DOCUMENT APPROVALS

The purpose of this Guidance Document is to provide guidance and direction with regards to the inspection of bridges in South Carolina. Any modifications to this Guidance Document require approval of the South Carolina Department of Transportation (SCDOT) Bridge Maintenance Office (BMO) and Federal Highway Administration (FHWA). This Guidance Document will be reviewed and updated as needed by the Assistant State Bridge Maintenance Engineer (ASBME) or designated representative. However, SCDOT reserves the right to make interim updates to the procedures to address lessons learned, evolving approaches, updates to federal, state, local laws, regulations, and policies, provided those updates are reviewed with SCDOT and FHWA oversight.

Recommended By: ______________________ 09/21/2020
Director of Maintenance — Date

Recommended By: ______________________ 29-Sep-20
Chief Engineer for Operations — Date

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Project Delivery Team Leader — Date
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DISCLAIMER

THE BRIDGE INSPECTION GUIDANCE DOCUMENT IS PUBLISHED SOLELY TO PROVIDE INFORMATION AND GUIDANCE TO BRIDGE INSPECTORS WHEN INSPECTING BRIDGES IN THE STATE OF SOUTH CAROLINA. THIS DOCUMENT IS ISSUED TO PROMOTE, SO FAR AS POSSIBLE, UNIFORMITY OF PRACTICE AND PROCEDURE IN COMPLIANCE WITH THE NATIONAL BRIDGE INSPECTION STANDARDS. THIS DOCUMENT IS NOT PURPORTED TO BE A COMPLETE GUIDE IN ALL AREAS OF BRIDGE INSPECTION AND IS NOT A SUBSTITUTE FOR ENGINEERING JUDGMENT.

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Attachments which shall be attached, when applicable, to an inspection report are noted with "**"; see Section 5.4.5. The Bridge Inspection Quality Control Form (Attachment 5.25) is included in the Chapter 5 Attachment List as it is included with every bridge inspection report. Attachment 5.25 is discussed in Section 9.2 of the BIGD.

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CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

The National Bridge Inspection Standards (NBIS) are published in the Code of Federal Regulations (CFR), 23 CFR 650, Subpart C. The NBIS sets the national standard for the proper safety inspection and evaluation of bridges and apply to all structures defined part of the National Bridge Inventory (NBI). The 23 Federal Highway Administration (FHWA) metrics were utilized as a guide to assist with the development of this document. 23 CFR 650, Subpart C is available as Appendix A.

The South Carolina Department of Transportation (SCDOT) created the bridge maintenance program in the 1970's which began to formalize the inspection of the state's bridges. This program continues to evolve as conditions, needs and new technologies become available. Safety is the primary goal; however, in addition to safety, the data collected is critical to managing the state's bridge infrastructure and asset management reporting to the Government Accounting Services Board (GASB) after each state fiscal year. SCDOT performs or contracts all bridge inspections for bridges on public roads; therefore, SCDOT is the only agency interacting with FHWA. SCDOT is responsible for maintaining the inventory of all public bridges within South Carolina.

Private bridge owners are responsible for adherence to the CFR for their structure. Private bridges are not inspected by SCDOT with the exception of Contractor owned temporary bridges open to the public (see Section 2.3.8).

1.2 PURPOSE AND SCOPE

The purpose of this document is to organize, document and combine SCDOT policies and procedures for bridge inspection practices and post-inspection recommendations so SCDOT personnel, local agencies and consultants will have a readily available resource. Previously, bridge inspection policies and procedures were documented in numerous locations, making it difficult to provide consistent answers to questions regarding bridge inspection topics. This document is intended to promote uniformity and document best practices for inspection of South Carolina's bridges, especially as new inspection personnel join SCDOT.

There are several goals of South Carolina's bridge maintenance program:

- Assure the safety of the traveling public on bridges
- Achieve and maintain compliance with the NBIS assuring eligibility for Federal-Aid Highway Bridge Replacement and Rehabilitation Program Funds
- Identify deficiencies to initiate maintenances and support identification of project needs
- Provide accurate and reliable data to support sound asset management of South Carolina's bridge inventory

1.3 SCDOT BRIDGE MAINTENANCE ORGANIZATION

The Bridge Maintenance Office (BMO) staff at SCDOT Headquarters in Columbia administers the statewide inspection standards, performs various field reviews and completes quality assurance activities. SCDOT bridge inspection personnel are under the supervision of district maintenance; however, district inspectors will coordinate with BMO as required by the Bridge Inspection Guidance Document (BIGD). Bridge inspection organization and chain of command for both headquarters and the districts are described below.

The BMO is responsible for collecting, maintaining and reporting bridge inspection information and for ensuring the bridge maintenance program complies with the requirements of the NBIS. The bridge maintenance program provides data which SCDOT uses when determining preservation, rehabilitation, and replacement options for each bridge. The BMO has the responsibility of running the SCDOT's Bridge Management System (BMS). This system is two-fold and comprises both the SCDOT Roadway Information Management System (RIMS) and SCDOT AASHTOWare™ Bridge Management software (BrM) databases. SCDOT's BMS uses both the NBI data and additional state defined bridge data. This system is used as a tool along with input from districts and SCDOT management in making decisions regarding preservation, rehabilitation and replacement.

1.3.1 SCDOT Headquarters

1.3.1.1 Executive Positions at SCDOT Headquarters

Executive positions related to bridge maintenance at SCDOT Headquarters include the Secretary of Transportation, the Deputy Secretary of Engineering and the Chief Engineer for Operations.

1.3.1.2 Director of Maintenance

Sets direction and provides guidance to the seven districts and headquarters in the area of maintenance operations, including but not limited to bridge maintenance, inspections, load ratings and oversize overweight (OSOW).

1.3.1.3 State Bridge Maintenance Engineer (SBME)

Oversees the BMO and assists in resolving any issues related to the bridge maintenance program. Manages the maintenance of SCDOT owned bridges. Develops and reviews bridge work related contracts as necessary. Coordinates project selections, asset management activities, and special programs to assist in bridge management. The SBME is also responsible for the state's load rating program and oversees the bridge program.

1.3.1.4 Assistant State Bridge Maintenance Engineer (ASBME) – Bridge Inspection Program Manager (BIPM)

Has statewide responsibility for SCDOT bridge inspections. Assists the SBME as necessary and reviews the bridge inspection and load rating programs. Monitors compliance with the NBIS. Prepares and analyzes summaries of bridge inspection computer data. Serves as a contract manager overseeing consultant inspection and load rating contracts. Monitors consultants' progress and work quality; checks invoices and associated documents; evaluates deliverables; oversees the Quality Assurance (QA) initiative; verifies consultants have written Quality Control (QC) Plans; performs review of consultants' QC records (if needed); monitors the consultant's compliance with the terms of the contract; and evaluates consultant performance.

1.3.1.5 Bridge Maintenance Quality Engineer (BMQE)

Under general guidance from the SBME and the BIPM, has responsibility for the quality of bridge inspection operations. Performs quality assurance reviews of inspection reports. Maintains a critical bridge list and coordinates with the district staff on Critical Findings involving bridges to have them posted, repaired or closed. The BMQE also tracks inspection frequency conformance.

1.3.2 SCDOT Districts

See Appendix B: SCDOT District Map.

1.3.2.1 District Engineering Administrator (DEA)

As the district executive, oversees operations and activities within each district across South Carolina. The DEA coordinates public communication. The DEA may have assistants assigned at the district office.

1.3.2.2 District Maintenance Engineer (DME)

Has responsibility for resolving any maintenance issues reported in the Highway Maintenance Management System (HMMS). The DME may have assistants assigned to the maintenance division of the district office.

1.3.2.3 District Bridge Inspection Supervisor (DBIS)

Oversees and supervises the Bridge Inspection Team Leaders (BITLs) in each district and is also responsible for confirming maintenance requests are reported in the HMMS. Schedules, assigns, and oversees bridge inspection activities. Performs inspections (as needed), reviews, and signs inspection reports. Coordinates with the district staff as well as county officials and contractors on Critical Findings.

1.3.2.4 Bridge Inspection Team Leader (BITL)

Coordinates, plans, prepares for and performs the day-to-day field inspections as the individual in charge. Enters data for bridge inspection findings and prepares reports for submittal to the DBIS (or another BITL) for review as described in Chapter 9. Holds responsibility for signing of inspection report.

1.3.2.5 Bridge Inspector (BI)

Assists the BITL during the day-to-day field inspections, data entry, and report preparations.

1.3.2.6 Resident Maintenance Engineer (RME)

Under general supervision of the DME, directs and oversees the operation of a county maintenance unit. Supervises, plans and manages the maintenance of primary and secondary road and bridge systems, repair shop activities, and management of county maintenance employees in an effective and economical manner using sound engineering practices.

1.3.2.7 Resident Construction Engineer (RCE)

Manages and supervises engineering, technical and administrative functions for highway and bridge construction projects as assigned to a construction project within his or her county. Maintains knowledge of construction project requirements and assures that inspection and survey work is carried out by competent personnel as required.

1.4 COORDINATION

Users shall direct questions concerning the applicability or requirements of the referenced documents to the BIPM.

1.5 REVISIONS

Revisions may be the result of changes in SCDOT specifications, FHWA requirements or American Association of State Highway and Transportation Officials (AASHTO) requirements.

Users are invited to send suggestions for revisions to this Guidance Document to the BIPM or designated representative. Suggestions need to be written with identification of the problem, the recommended revision and the reason for the recommendation.

SCDOT will consider suggestions submitted and changes determined to be acceptable shall be submitted to FHWA for review and approval. Approved policy and editorial revisions to this Guidance Document will be indicated with a line in the margin of the applicable page.

Interim updates are not included in this document. Refer to posted Technical Notes for items such as text, images, photos and appendices which may have been updated. The posted Technical Notes are contained within the SCDOT Bridge Maintenance Office website.

1.6 DEFINITIONS, REFERENCES, ABBREVIATIONS, AND ACRONYMS

1.6.1 Definitions

The following terms in this guidance document are used as defined below:

- *Ancillary Structures* – These are non-bridge structures such as overhead sign structures, high mast light poles, and traffic signal mast arms.
- *Appurtenances* – These are items which are not technically part of the bridge but are generally associated, inspected, and maintained with the bridge. Examples include approach guardrail, fender systems, traffic control devices, bridge mounted signs, and approach slabs.
- *Bridge* – A structure, including supports, erected over a depression or an obstruction such as water, a highway, or a railway; having a track or passageway for carrying traffic or other moving loads; and having an opening measured along the centerline of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches or extreme ends of openings for multiple boxes. It may also contain multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening; see *Culvert*. Any bridge meeting this definition needs to be inspected and load rated per NBIS.
- *Bridge Inspection Report Form (BIRF)* – SCDOT's programmed bridge inspection application, currently BIO, uses inspector completed forms to output a standardized report which contains NBI information, the BIRF.
- *Bridge Management (AASHTOWare™ BrM) (previously Pontis)* – A software program developed to assist in managing highway bridges and other structures.
- *Controlling Component* – The component of a structure which controls the live load carrying capacity.
- *Critical Finding* – A structural or safety-related deficiency requiring immediate follow-up inspection or action; see Chapter 8.

- *Culvert* – A type of structure which is designed hydraulically to take advantage of submergence to increase water carrying capacity. Culverts are usually covered with embankment and are composed of structural material around their entire perimeter. **Culverts shall only carry water.** A culvert is considered a bridge and needs to be inspected and load rated per the NBIS if any of the following conditions are met. Whether a culvert has a floor or not does not matter when determining if a culvert is considered a bridge or not.
  - The culvert has a hydraulic opening greater than 20 feet as measured along the center of the roadway.
  - A grouping of culverts with a total length greater than 20 feet as measured along the roadway centerline, and where the clear distance between openings is less than half the smaller contiguous opening.
- *Fatigue* – The tendency of a member to fail at a stress level below yield stress when subjected to cyclical loadings.
- *Fatigue-Prone Detail (FPD)* – A steel bridge detail which falls into fatigue Categories D, E and E' per the AASHTO fatigue specifications classifications; see Appendix H.
- *Fracture Critical Member (FCM)* – A non-redundant steel member in tension or with a tension element, whose failure would be expected to cause a partial or full collapse of the bridge.
- *Glulam* – Glue laminated timber, which is an engineered wood product consisting of individual laminations of wood, usually 2 inches or less in thickness, bonded together.
- *Gusset Plate* – A rectangular or triangular steel plate connecting members of a truss together.
- *HEC-18* – Hydraulic Engineering Circular No. 18 (HEC-18), which presents the state of knowledge and practice for the design, evaluation, and inspection of bridges for scour.
- *Histoplasmosis* – A disease contracted from contact with microscopic fungi borne from decomposing biological fluids such as bird droppings.
- *Inventory Record* – Defines how a bridge relates to a route and identifies whether the bridge carries the route or crosses over the route.
- *Load Rating* – The determination of the live load capacity of an existing bridge using bridge plans and supplemented by information gathered from a field inspection.
- *Non-NBI Bridge (SCDOT owned)* – A structure, including supports, erected over an obstruction such as water; having a passageway for carrying traffic or other moving loads; exhibiting characteristics of a bridge, such as a foundation and/or piles but shorter than the minimum NBI length (20 feet), excluding pipes and culverts, and that should be included in the state database.
- *Phased Construction* – The process of building a bridge's cross section in stages and opening portions to traffic as such until the final cross section is completed
- *Program Manager* – The individual in charge of the bridge inspection program, who has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, and inventory. The Program Manager provides overall leadership and is available to BITLs to provide guidance. The Program Manager for SCDOT is the ASBME.
- *Quality Assurance* – Planned and systematic activities implemented within a quality system and demonstrated as needed to provide adequate confidence that deliverables will satisfactorily fulfill quality requirements. Quality Assurance is defined as the use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program.
- *Quality Control* – Efforts within a quality system encompassing operational techniques and activities used to verify an established level of quality has been achieved. Quality Control is defined as procedures intended to maintain the quality of a bridge inspection and load rating at or above a specified level.
- *Redundant* – Where multiple load paths exist so that if one element fails, alternate load paths will allow the load to be redistributed.
- *Scour* – Removal of material from a streambed or embankment as a result of excessive action of stream flow.
- *Scour Critical Bridge* – A bridge with a foundation element determined to be unstable for the observed or evaluated scour condition.

- *Scour Plan of Action* – A written procedure developed by the bridge owner or the bridge owner's designee outlining the foundation scour monitoring plan to be followed for a specific bridge during flood events.
- *Structurally Deficient Bridge* – A bridge in which significant load-carrying elements are found to be in poor condition due to deterioration, or a bridge in which the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing intolerable traffic interruptions. This term is no longer used by FHWA and is included herein to memorialize previous inspection reports.
- *Temporary Bridge* – A bridge which is constructed to carry vehicular traffic until the permanent bridge is built, repaired, rehabilitated or replaced.
- *Thalweg* – The line defining the lowest points or maximum depth along the length of a river bed or valley.
- *Triaxial Constraint* – A 3-dimensional stress state reducing the ductility of a material. Under triaxial constraint, steel is unable to deform, and brittle fracture can occur under service conditions where ductile behavior is normally expected.
- *Tunnel* – An enclosed roadway with vehicle access that is restricted to portals regardless of type of structure or method of construction. Tunnels do not include highway bridges, railroad bridges or other bridges over a roadway. Tunnels are structures that require special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity. This is the official AASHTO Definition as adopted by the AASHTO Subcommittee on Bridges and Structures in 2008. A "*tunnel*" does not include bridges or culverts inspected under the NBIS.

1.6.2 References

The user is encouraged to refer to the following references for additional information when performing a bridge inspection. If a more recent edition of the references is available, the current edition should be used as a reference.

- AASHTO Publications
  - Standard Specifications for Highway Bridges, 17th Edition
  - AASHTO LRFD Bridge Design Specifications, Current Edition
  - Manual for Bridge Evaluation (MBE), Current Edition
  - Manual for Bridge Element Inspection (MBIE), 2nd Edition, 2019
  - Movable Bridge Inspection, Evaluation and Maintenance Manual
  - Manual for Assessing Safety Hardware (MASH), Second Edition, 2016
  - Guide Specifications for Analysis and Identification of Fracture Critical Members and System Redundant Members, 1st Edition, 2018
  - AASHTO/TRB Task Force Survey, Security and Emergency Response Survey of State Transportation Agencies, 2001
- SCDOT Publications and Engineering Directives (ED)
  - Bridge Design Manual (BDM), 2006
  - Bridge Drawings and Details
  - Bridge Design Memorandums
  - Bridge File Policy (BFP)
  - Load Rating Guidance Document (LRGD)
  - Bridge Management Parametric Study – Final Report
  - Digital Signatures Manual
  - SCDOT Employee Safety Manual
  - SCDOT Supplemental MUTCD
  - Rule on Work Zone Safety and Mobility: The Policy for SCDOT
  - Rule on Work Zone Safety and Mobility: Implementation, Maintenance & Safety Guidelines
  - Work Zone Traffic Control Training Requirements for Contractor/Subcontractors
  - Work Zone Safety Guidelines for SCDOT, Municipalities, Counties, Utilities & Contractors
  - Hourly Restrictions for Lane Closures on Interstate Routes
  - Hourly Restrictions for Lane Closures on Primary and Secondary Routes

Work Zone Traffic Control Training Guidelines Training Provides / Courses for Contractors & Subcontractors
SCDOT MASH-2016 Transition Plan
ED 8 - Road Inspections
ED 11 - Procedures for Posting or Changing Weight Limits on Bridges
ED 18 - Bridge Security and the Release of Plans
ED 35 - Emergency Procurement of Construction Services
ED 42 - Inspection and Repair of Guardrail, Cable Barrier, and Crash Attenuators
ED 43 - Bridge Ices Before Road Warning Signs (W8-13)
ED 44 - Procedures for Removing Closed Bridges from the State System
ED 68 - NHS Bridge Replacement Project Prioritization Process
ED 70 - Load Restricted Bridge Replacement Project Prioritization Process
SCDOT Street Finder
SC DNR USGS Topographic Quadrangle Maps and GIS Data
SCDOT GIS/Mapping County Maps from SCDOT SharePoint
SCDOT Bridges Over Divided Routes Map
SCDOT Statewide Rail Plan

- FHWA Publications

Load Rating Guidance and Examples for Bolted and Riveted Gusset Plates in Truss Bridges
Memorandum on Bridge Load Ratings for the National Bridge Inventory
Manual on Uniform Traffic Control Devices (MUTCD)
Bridge Inspector's Reference Manual, 2015
Metrics for the Oversight of the National Bridge Inspection Program, 2017
Culvert Inspection Manual
Underwater Bridge Inspection Reference Manual
Recommended Framework for a Bridge Inspection Quality Control/Quality Assurance Program
Specification for the National Bridge Inventory Bridge Elements
Bridge Preservation Guide
Clarification of Requirements for Fracture Critical Members
Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges (and Errata)
Evaluating Scour at Bridges, Fifth Edition
Design and Evaluation of Steel Bridges for Fatigue and Fracture
AASHTO/FHWA Joint Implementation Agreement for MASH
Guidance on Structures Subject to the National Tunnel Inspection Standards (October 2015 Memorandum)
FHWA-HRT-12-071 Application of Radiographic Testing to Multilayered Gusset Plate Inspection

- Other

American Institute of Steel Construction, 1900, Iron and Steel Beams 1873 to 1952
Army Corps of Engineers, Study of Navigable Rivers in South Carolina, 1977
23 CFR 650 Subpart C, NBIS
NCHRP Synthesis 375 Bridge Inspection Practices
NCHRP Report, 337 Guidelines for Inspecting Complex Components of Bridge
NCHRP Report, 354 Inspection and Management of Bridges with Fracture Critical Details
NCHRP Report 406, Redundancy in Highway Bridge Superstructures
NCHRP Report 458, Redundancy in Highway Bridge Structures
NCHRP Report 725, Guidelines for Analysis Methods and Construction Engineering of Curved and Skewed Steel Girder Bridges

AISC Steel Manual, 15th Edition Steel Construction Manual

Society for Protective Coatings-Visual Standard (SSPC-VIS), Standard Method of Evaluating Degree of Rusting on Painted Steel Surface

1.6.3 Abbreviations and Acronyms

The abbreviations and acronyms used in this guidance document are defined in Table 1.6.3.

To shorten the length of the textual components of the inspection report, the use of common abbreviations is permitted. Inspection note shorthand and abbreviations are included in Appendix P and not in the Table below.

Table 1.6.3 Abbreviations and Acronyms

Abbreviation	Term
AASHTO	American Association of State Highway and Transportation Officials
ABAND	Abandoned
ADCI	Association of Diving Contractors International
ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
AIKR	Aiken Railway Company, LLC
AISC	American Institute of Steel Construction
ALT	Alternate (Route)
ANSI	American National Standards Institute
ASBME	Assistant State Bridge Maintenance Engineer
ASR	Allowable Stress Rating
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AVE, AV	Avenue
BDM	SCDOT Bridge Design Manual
BEG	Beginning
BEGTD	Bridge Element Group Textual Data
BFP	SCDOT Bridge File Policy
BI	Bridge Inspector (no Team Leader status)
BIGD	SCDOT Bridge Inspection Guidance Document
BINS	Bridge Inspection Nondestructive Seminar
BIPM	Bridge Inspection Program Manager
BIRF	Bridge Inspection Report Form
BIRM	Bridge Inspector’s Reference Manual
BITL	Bridge Inspection Team Leader
BKY	Bikeway
BME	Bridge Management Element
BMO	Bridge Maintenance Office
BMQE	Bridge Maintenance Quality Engineer
BMS	SCDOT Bridge Management System
BR	Branch
BRK, BK	Brook
BrM	AASHTOWare™ Bridge Management Software (previously Pontis)
BSIP	Bridge-Specific Inspection Procedure
BUS	Business (Route)

Table 1.6.3 Abbreviations and Acronyms

Abbreviation	Term
BYP	Bypass (Route)
CFR	Code of Federal Regulations
CIRF	Consultant Inspection Request Form
CLNA	Carolina Coastal Railway
CON	Connector (Route)
CPDR	Carolina Piedmont Railroad
CPR	Cardiopulmonary Resuscitation
CRK, CR	Creek
CS	Condition State
CSB	Critical Security Bridge
CSXT	CSX Transportation
CT	Court
DBIS	District Bridge Inspection Supervisor
DCE	District Construction Engineer
DEA	District Engineering Administrator
DM	Design Memorandum
DME	District Maintenance Engineer
DNR	South Carolina Department of Natural Resources
DOM	Director of Maintenance
DOP	Director of Preconstruction
DR	Drive
DT	Destructive Testing
DTE	District Traffic Engineer
EAC/ABET	Engineering Accreditation Committee of the Accreditation Board for Engineering and Technology
EB, E	Eastbound
ED	SCDOT Engineering Directive
EOR	Engineer of Record
EPA	Environmental Protection Agency
EV	Emergency Vehicle
FCM	Fracture Critical Member
FHWA	Federal Highway Administration inside the U.S. Department of Transportation
FOIA	Freedom of Information Act
FP	Floodplain
FPD	Fatigue-Prone Details
FWY, FY	Freeway
GASB	Government Accounting Services Board
GIS	Geographic Information System
GRLW	Greenville & Western Railway Company
HEC-18	Hydraulic Engineering Circular No. 18
HL-93	Highway Loading (Developed in 1993)
HMA	Hot-Mix Asphalt
HMMS	Highway Maintenance Management System

Table 1.6.3 Abbreviations and Acronyms

Abbreviation	Term
HWY	Highway
I-	Interstate
ICWW	Intercostal Waterway
LC	Lancaster & Chester Railway Company
LFD	Load Factor Design
LFR	Load Factor Rating
LRFD	Load and Resistance Factor Design
LRFR	Load and Resistance Factor Rating
LRGD	SCDOT Load Rating Guidance Document
LRSF	Load Rating Summary Form
LSC	Long Span Concrete Bridges
LSS	Long Span Steel Bridges
LT	Left
MASH	AASHTO Manual for Assessing Safety Hardware
MBE	AASHTO Manual for Bridge Evaluation
MBIE	Manual for Bridge Element Inspection
MEWP	Mobile Elevating Work Platform
MSA	Multi-Span Approach Bridges
MSH	Marsh
MSM	Multi-Span Main Bridges
MUTCD	SCDOT Supplemental Manual on Uniform Traffic Control Devices
NB, N	Northbound
NBE	National Bridge Element
NBI	National Bridge Inventory
NBIS	National Bridge Inspection Standards
NCEES	National Council of Examiners for Engineering and Surveying
NCHRP	National Cooperative Highway Research Program
NDT	Non-Destructive Testing
NHI	National Highway Institute
NHS	National Highway System
NICET	National Institute for Certification in Engineering Technologies
NS	Norfolk Southern Railway
NSPE	National Society of Professional Engineer
NTIS	National Tunnel Inspection Standards
OSHA	Occupational Safety and Health Administration
OSOW	Oversize Overweight
OVF	Overflow
PDF	Portable Document Format
PDRR	Pee Dee River Railway Corporation
PED	Pedestrian Bridge
PICK	Pickens Railway Company
PKY	Parkway

Table 1.6.3 Abbreviations and Acronyms

Abbreviation	Term
PL	Place
PM	Project Manager
POA	Plan of Action
PPE	Personal Protective Equipment
PR	Palmetto Railways (previously South Carolina Public Railways)
QA	Quality Assurance
QAR	Quality Assurance Reviewer
QC	Quality Control
QCR	Quality Control Reviewer
RCE	Resident Construction Engineer
RD	Road
RDS	SCDOT Road Data Services
RIMS	SCDOT Roadway Information Management System
RIV, R	River
RJCS	R.J. Corman Railroad
RME	Resident Maintenance Engineer
ROE	Right of Entry
ROW	Right of Way
RR	Railroad
RT	Right
SB, S	Southbound
SBI	State Bridge Inventory
SBME	State Bridge Maintenance Engineer
SC	SC Route
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCMZ	South Carolina Museum
SCRF	South Carolina Central Railroad Company
SCUBA	Self-Contained Underwater Breathing Apparatus
SHV	Specialized Hauling Vehicle
SI&A	Structure Inventory and Appraisal
SPRAT	Society of Professional Rope Access Technicians
SRS	Savannah River Site
SSU	Substructure Unit
ST	Street
STR, SR	Stream
SU	Single Unit (Truck)
SWP	Swamp
TL	Test Level
TMP	Transportation Management Plan
TRB	Transportation Research Board

Table 1.6.3 Abbreviations and Acronyms

Abbreviation	Term
TPM	Tunnel Program Manager
TRIB, TR	Tributary
UBIU	Under Bridge Inspection Unit
US	US Route
USC	United States Code
USCG	United States Coast Guard
USGS	United States Geological Survey
UW	Underwater
WB, W	Westbound

1.6.4 Bridge Terminology Figures

Figures 1.6.4.1 through 1.6.4.17 are provided to standardize the terminology and labeling of bridge components to be used in inspection reports. The bridges portrayed represent the majority of bridge types used throughout the State of South Carolina, both on the State and U.S. highway system and on the local roads system.

1.6.4.1 Timber Stringer Bridge

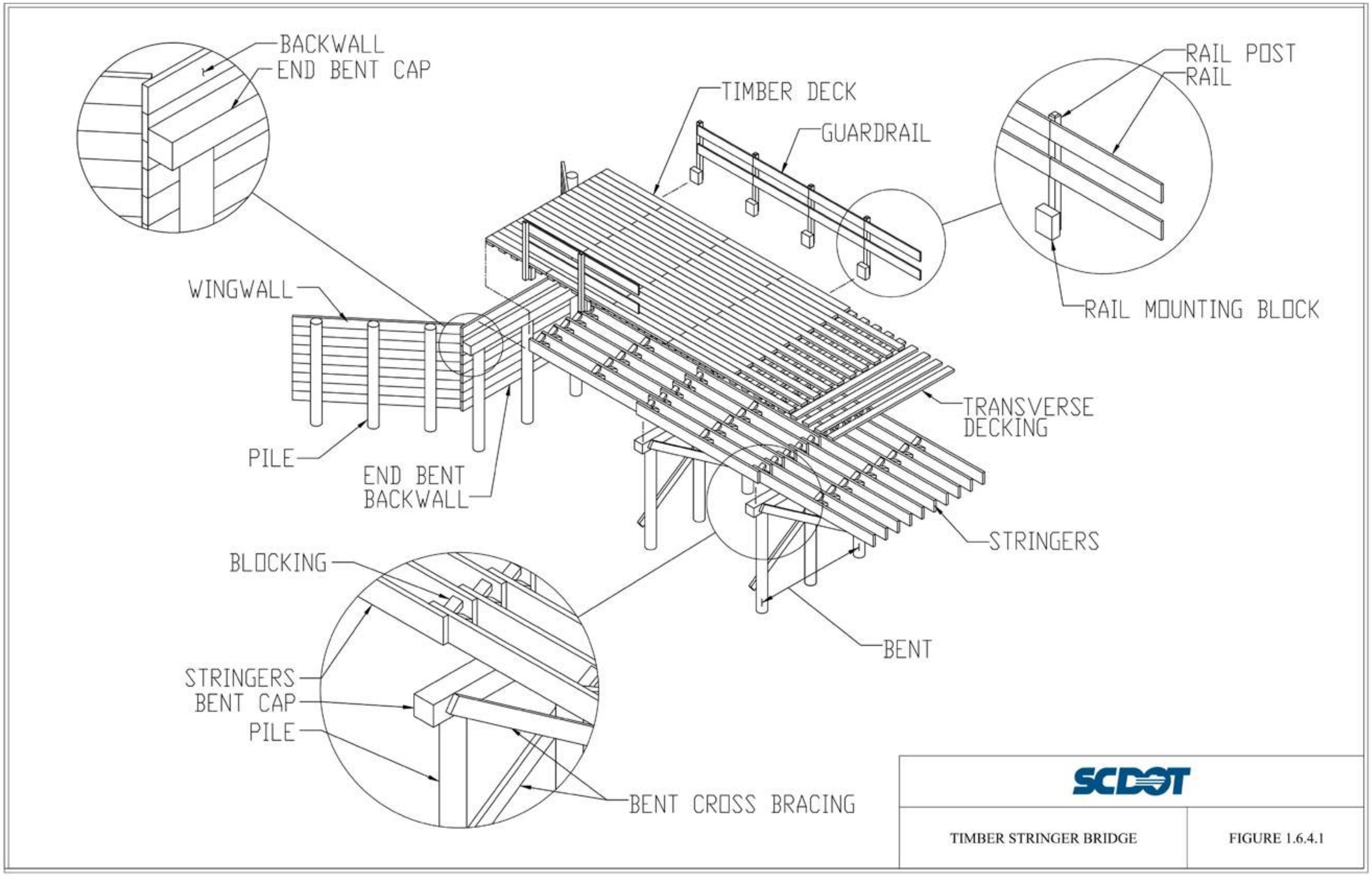


Figure 1.6.4.1 Timber Stringer Bridge Components

1.6.4.2 *Reinforced Concrete Slab Bridge*

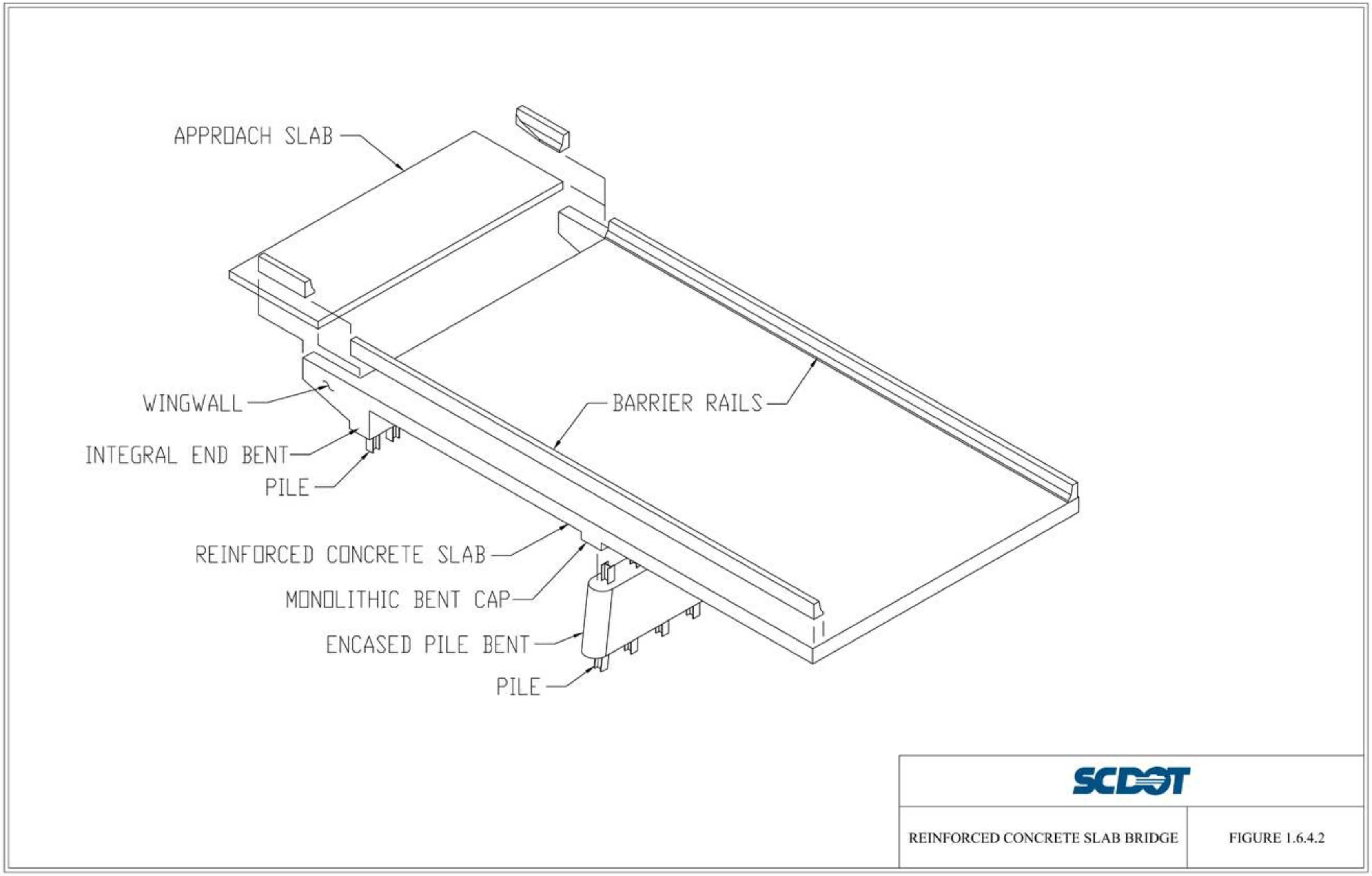


Figure 1.6.4.2 Reinforced Concrete Slab Bridge Components

1.6.4.3 *Reinforced Concrete Beam Bridge*

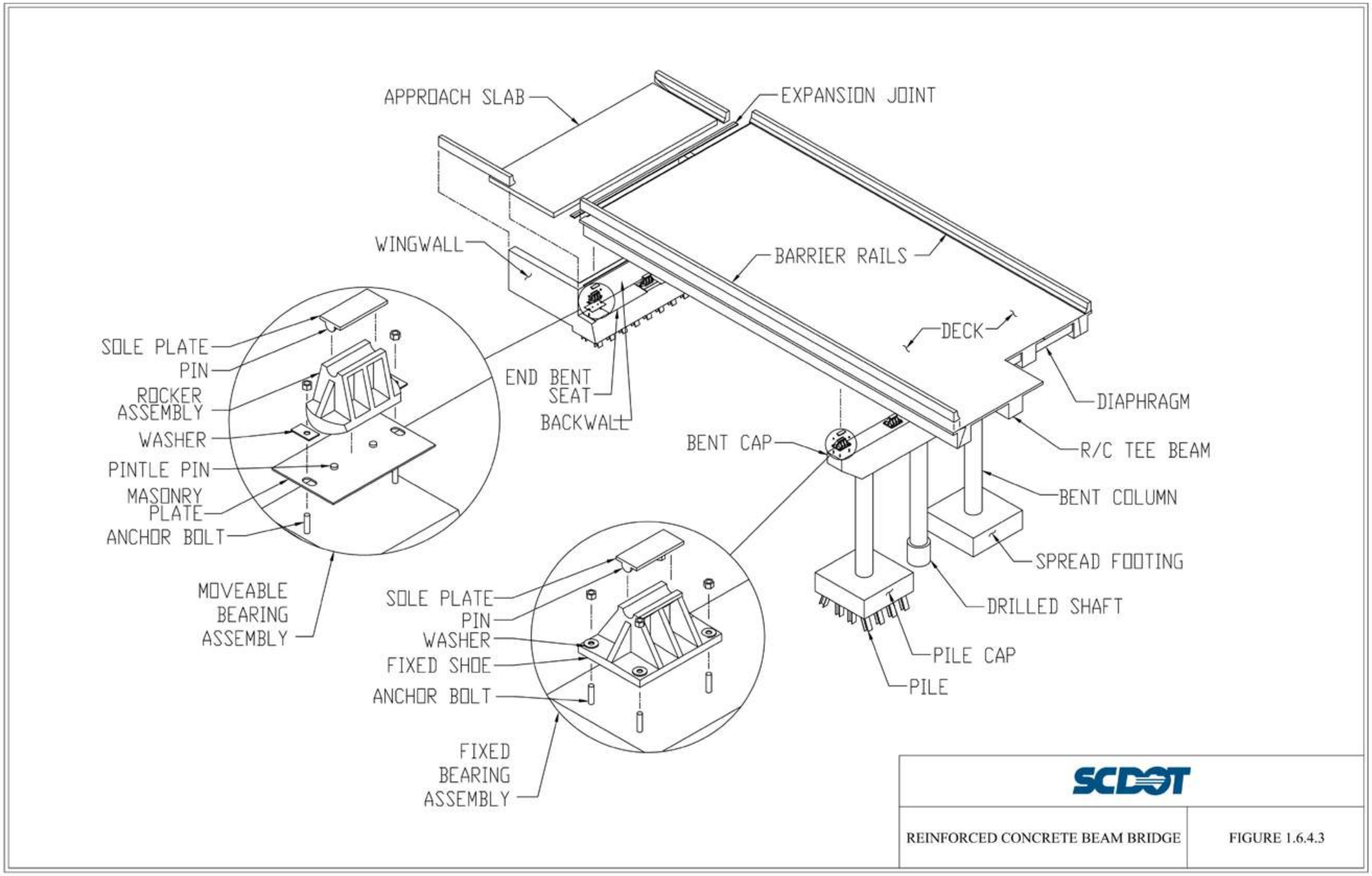


Figure 1.6.4.3 Reinforced Concrete Beam Bridge Components

1.6.4.4 *Prestressed Concrete Beam Bridge*

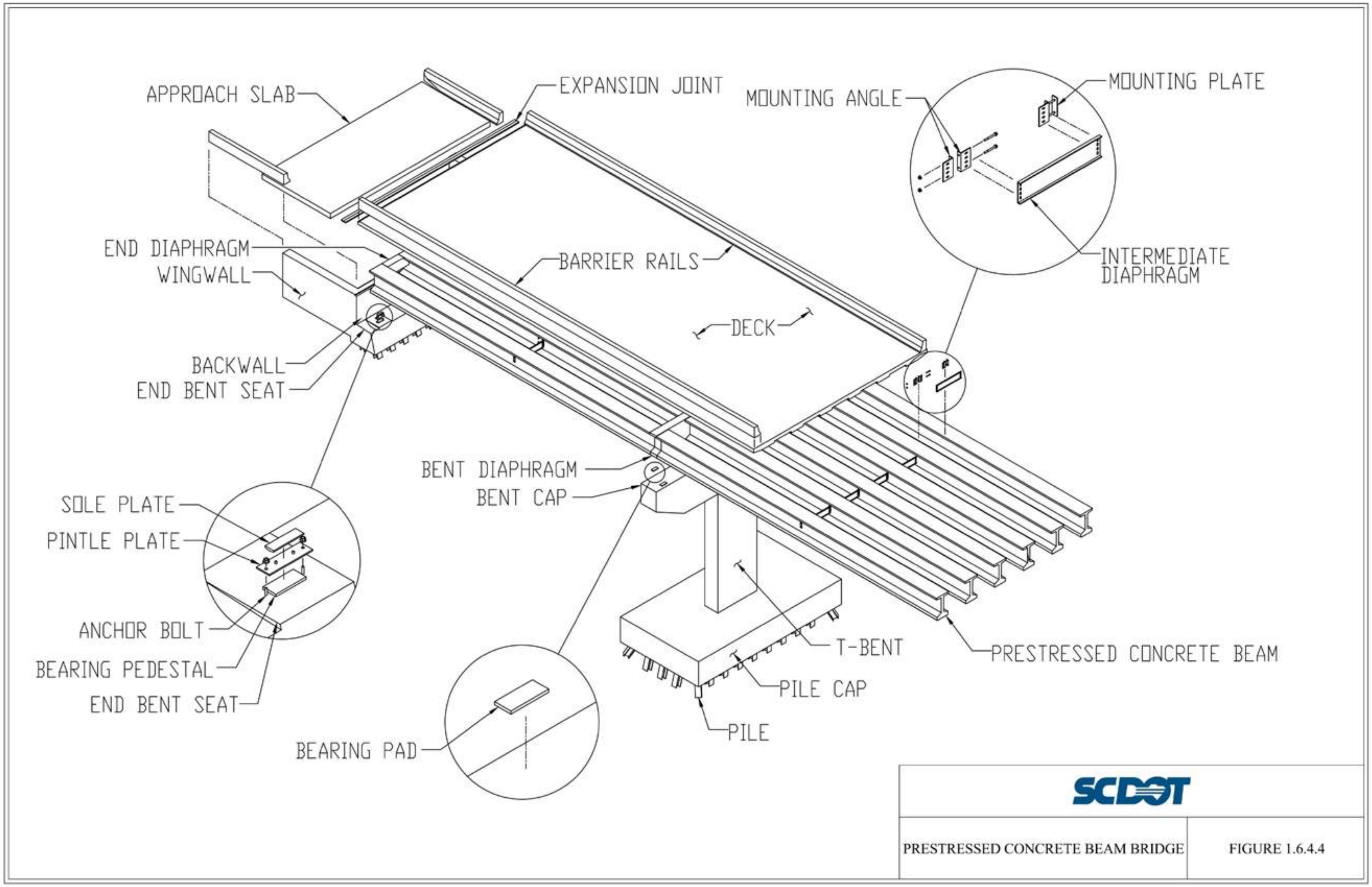


Figure 1.6.4.4 Prestressed Concrete Beam Bridge Components

1.6.4.5 *Prestressed Concrete Quad Tee Beam Bridge*

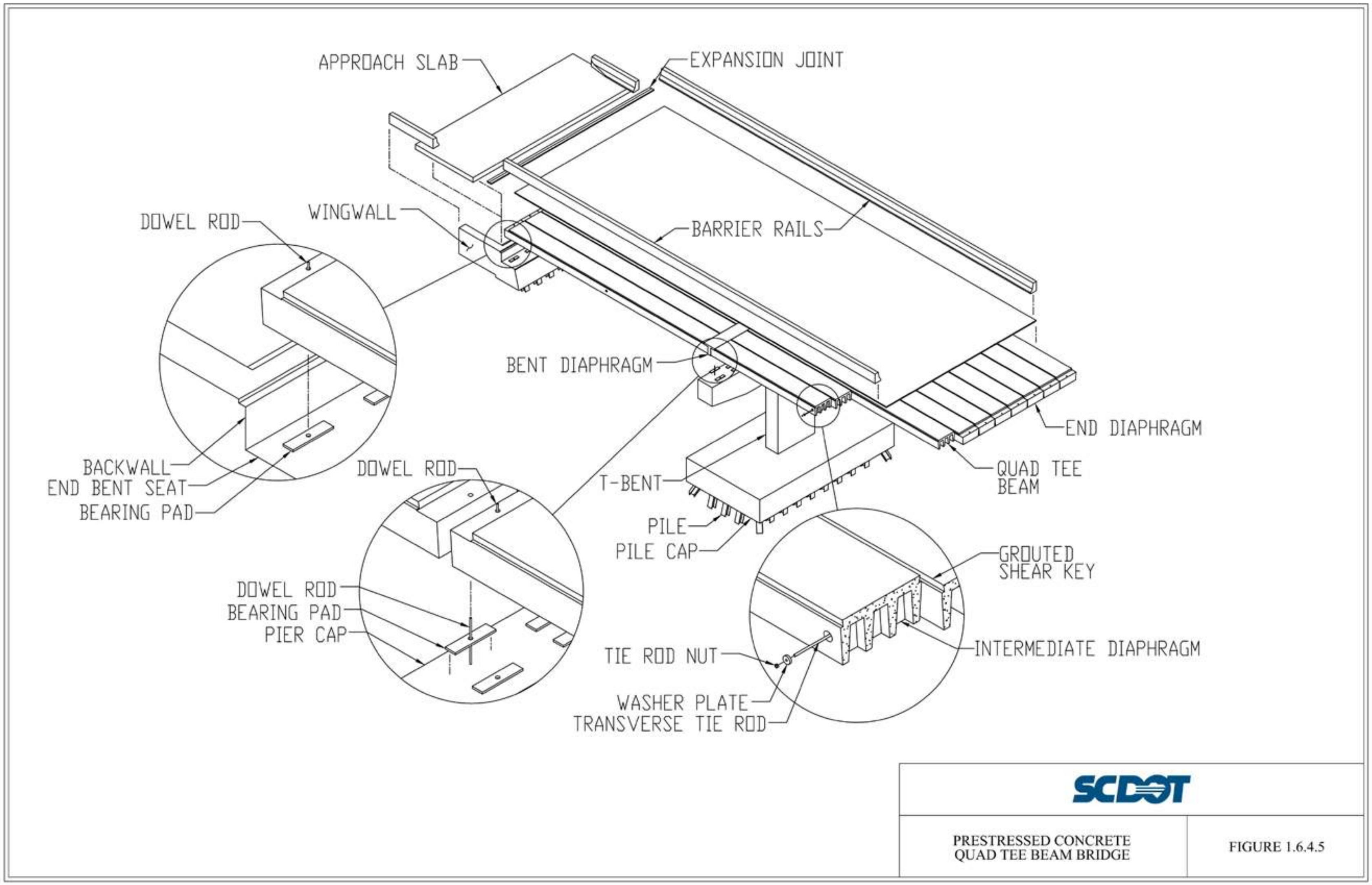


Figure 1.6.4.5 Prestressed Concrete Quad Tee Beam Bridge Components

1.6.4.6 Precast Concrete Box Beam Bridge

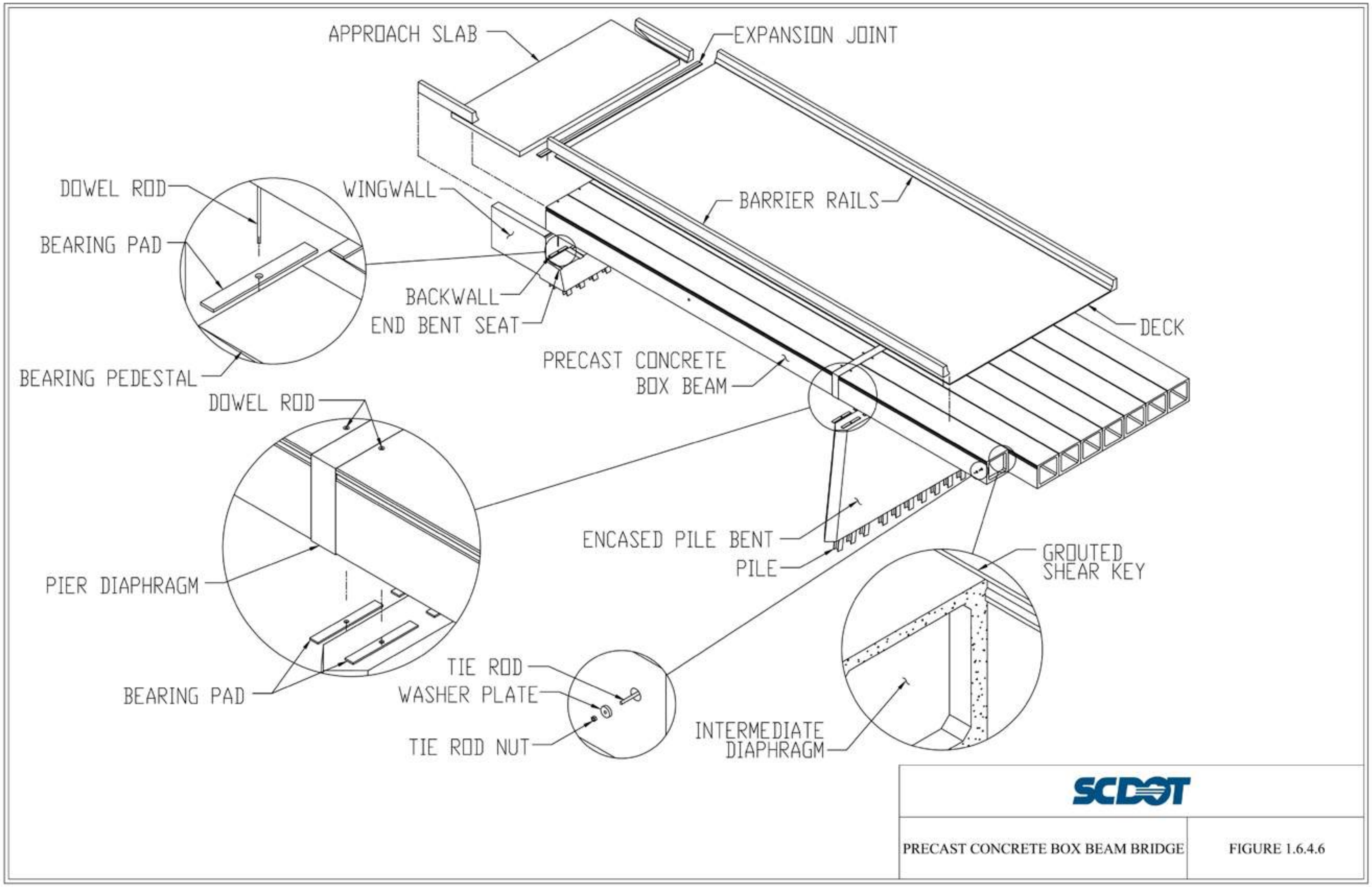


Figure 1.6.4.6 Precast Concrete Box Beam Bridge Components

1.6.4.7 *Precast Concrete Panel Beam Bridge*

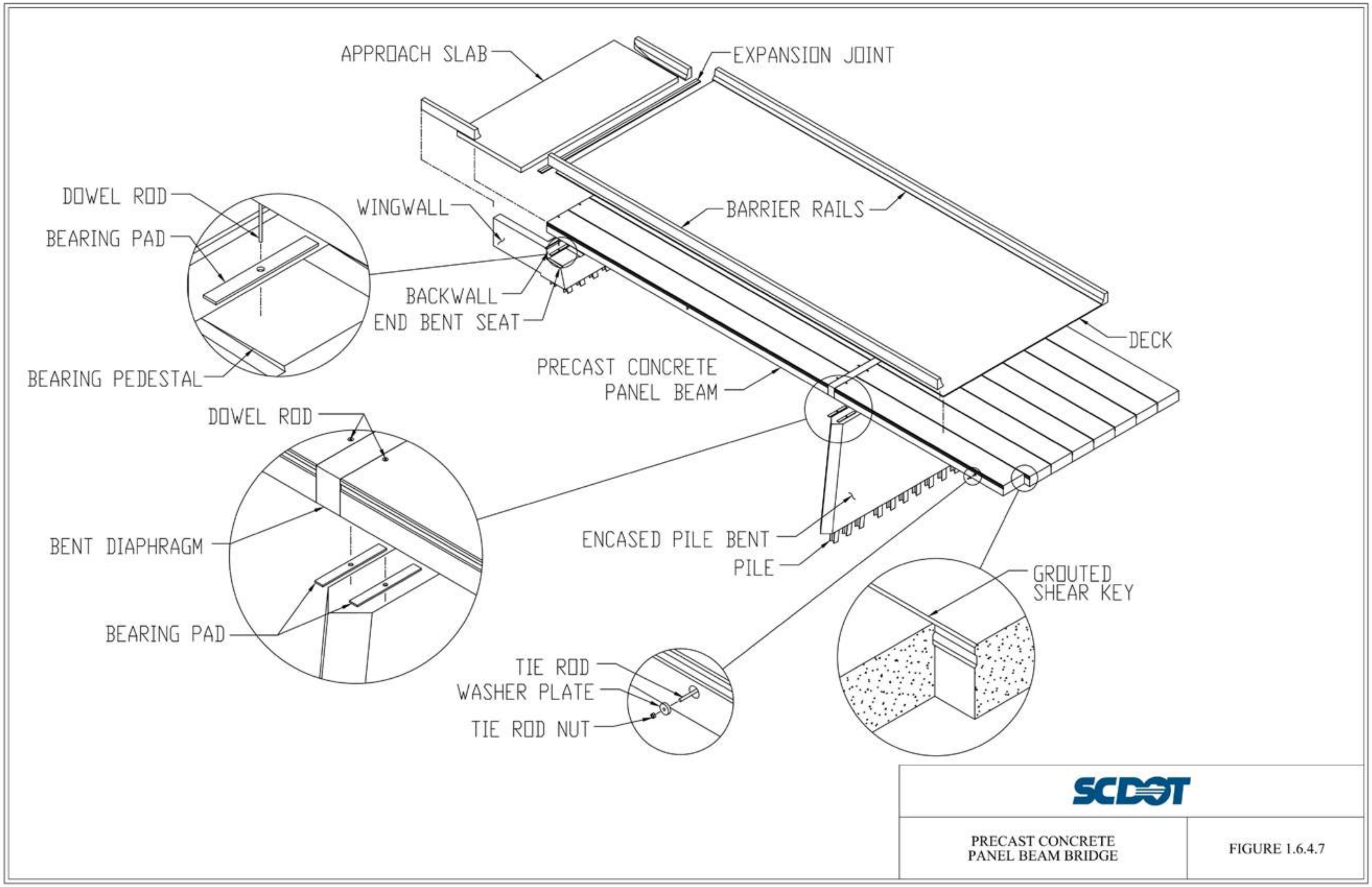


Figure 1.6.4.7 Precast Concrete Panel Beam Bridge Components

1.6.4.8 *Steel Rolled Beam or Welded Steel Plate Girder Bridge*

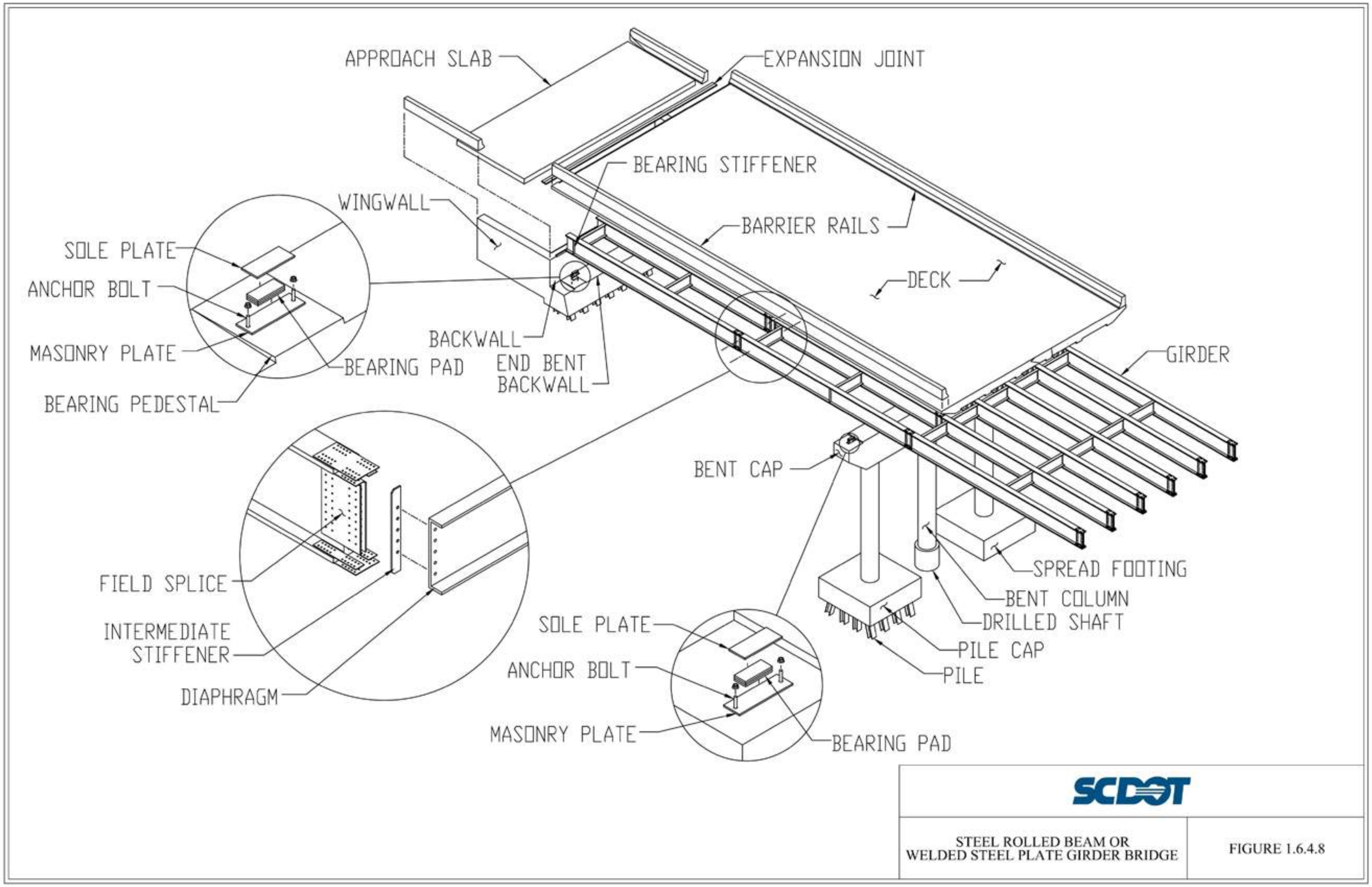


Figure 1.6.4.8 Steel Rolled Beam or Welded Steel Plate Girder Bridge Components

1.6.4.9 *Steel Girder and Floor Beam Bridge*

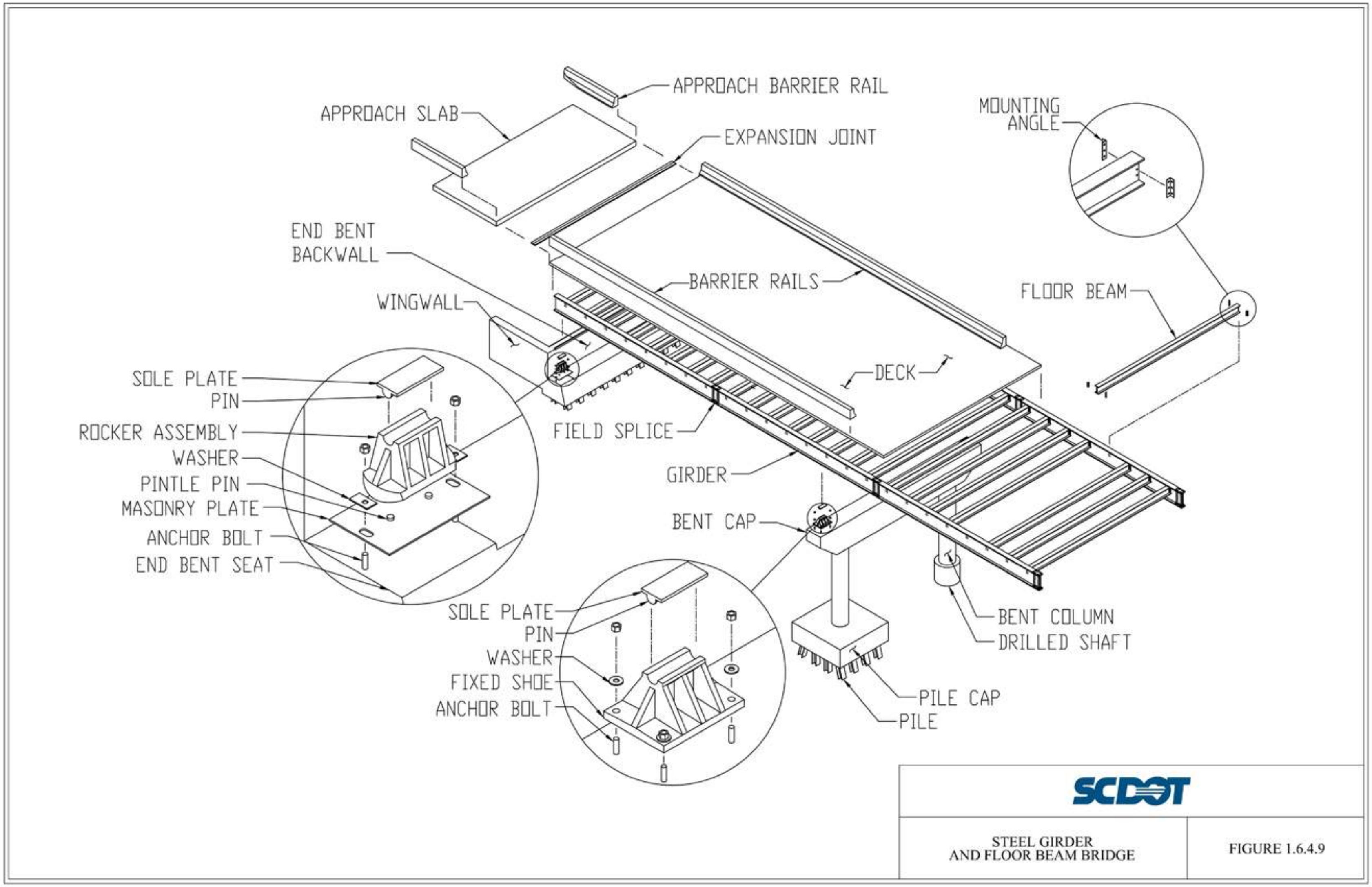


Figure 1.6.4.9 Steel Girder and Floor Beam Bridge Components

1.6.4.10 *Steel Truss Bridge*

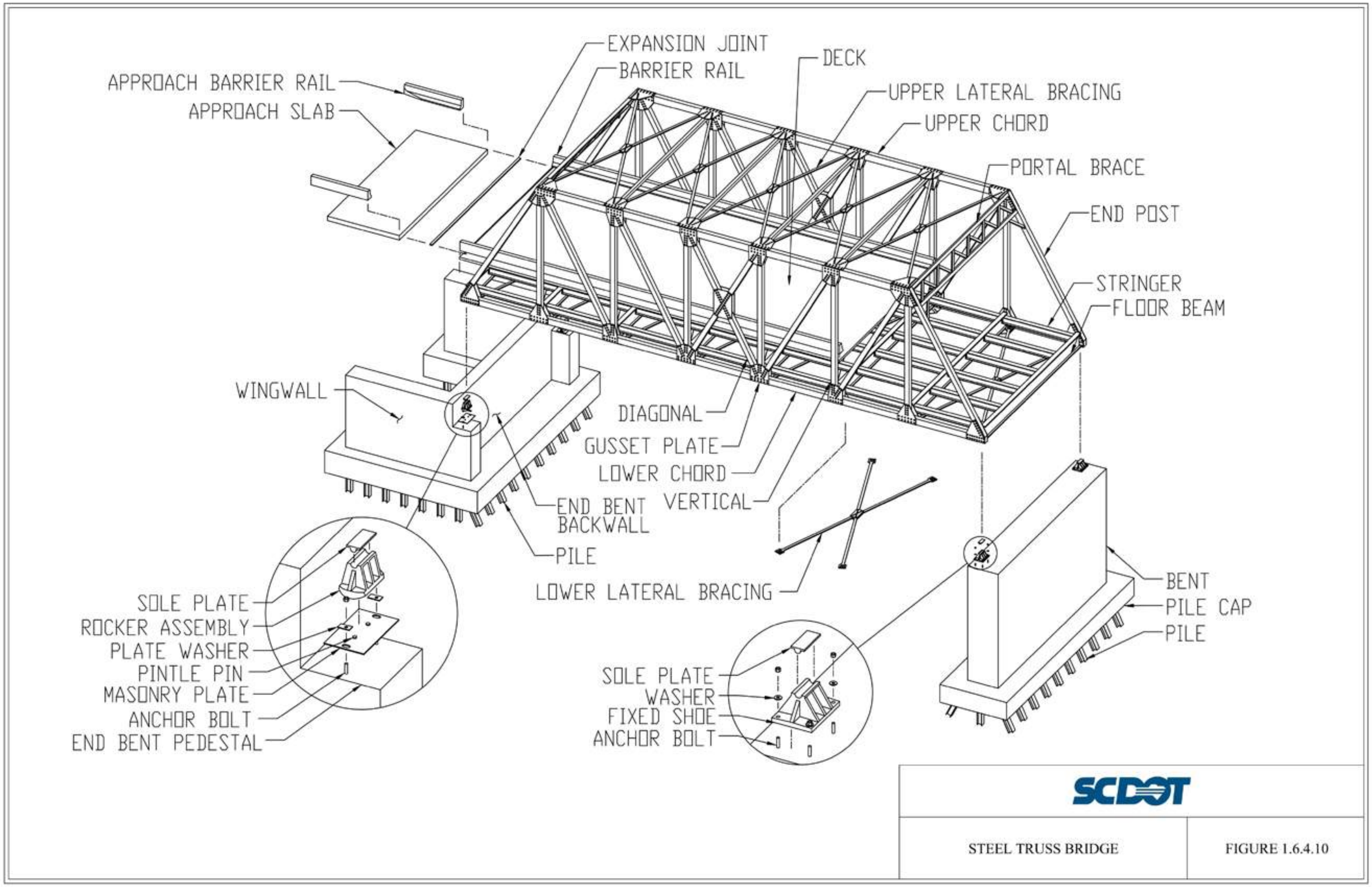


Figure 1.6.4.10 Steel Truss Bridge Components

1.6.4.11 Steel Tied Arch Bridge

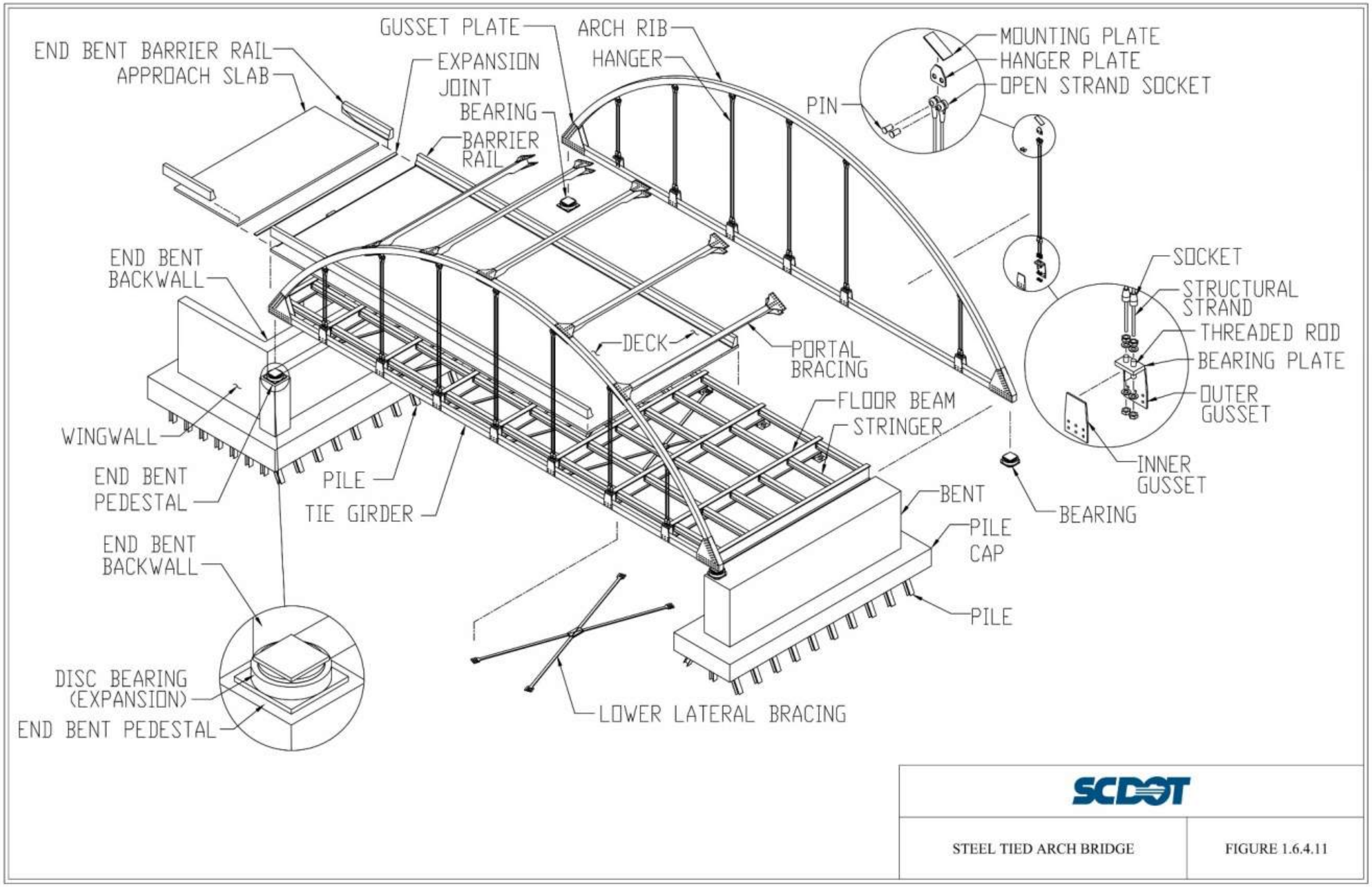


Figure 1.6.4.11 Steel Tied Arch Bridge Components

1.6.4.12 *Steel True Arch Bridge*

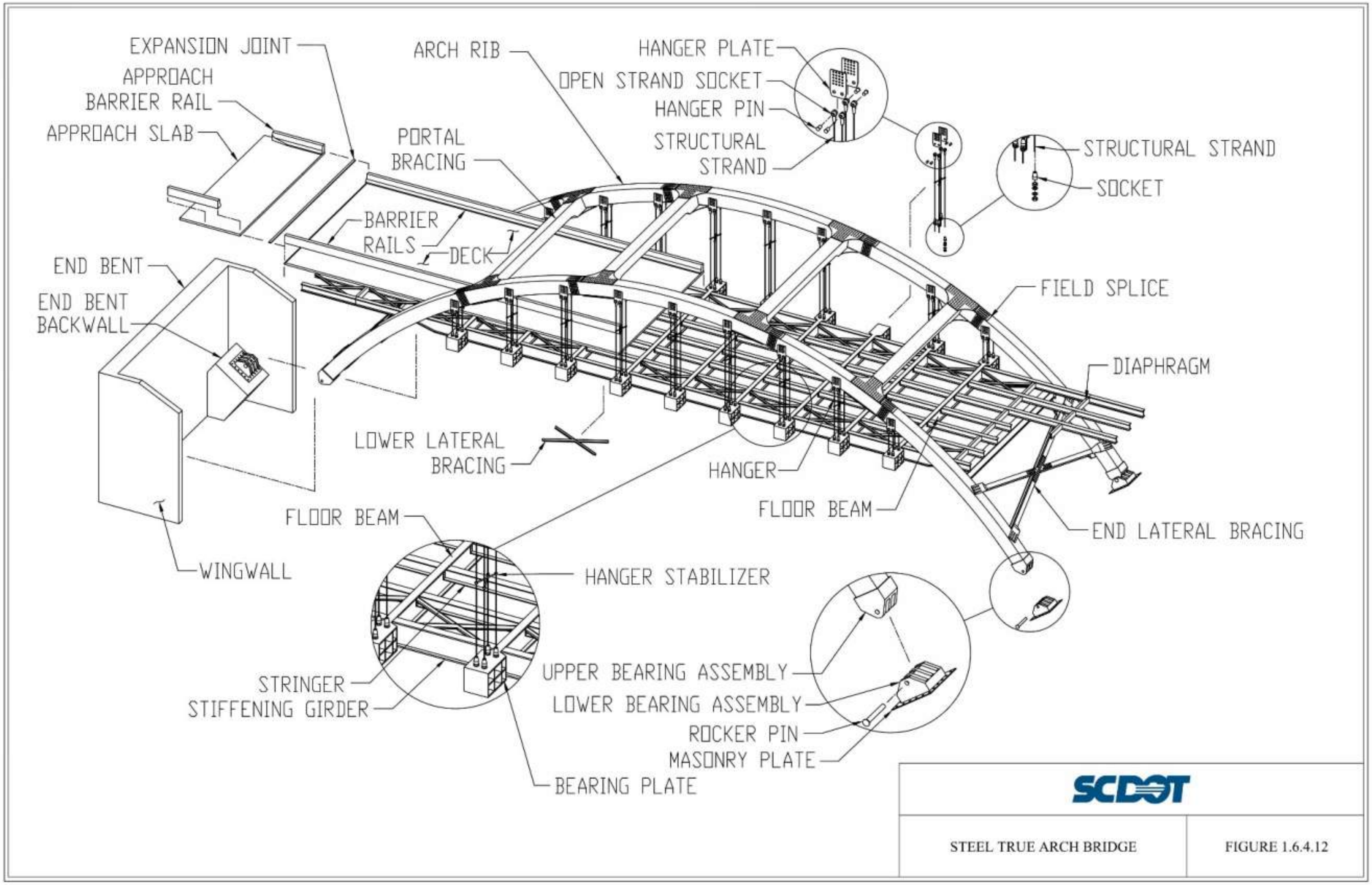


Figure 1.6.4.12 Steel True Arch Bridge Component

1.6.4.13 *Concrete Spandrel Arch Bridge*

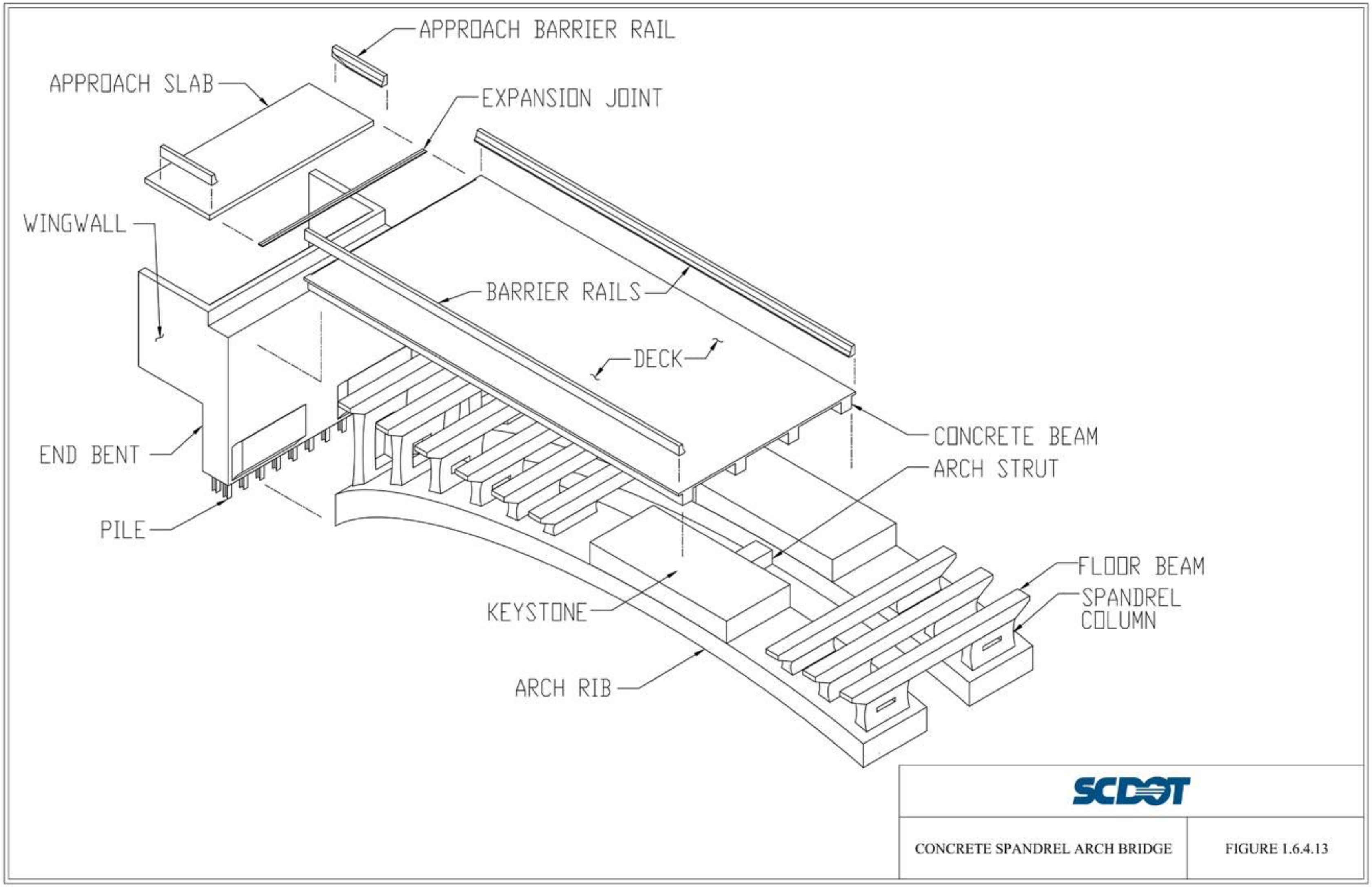


Figure 1.6.4.13 Concrete Spandrel Arch Bridge Components

1.6.4.14 Suspension Bridge

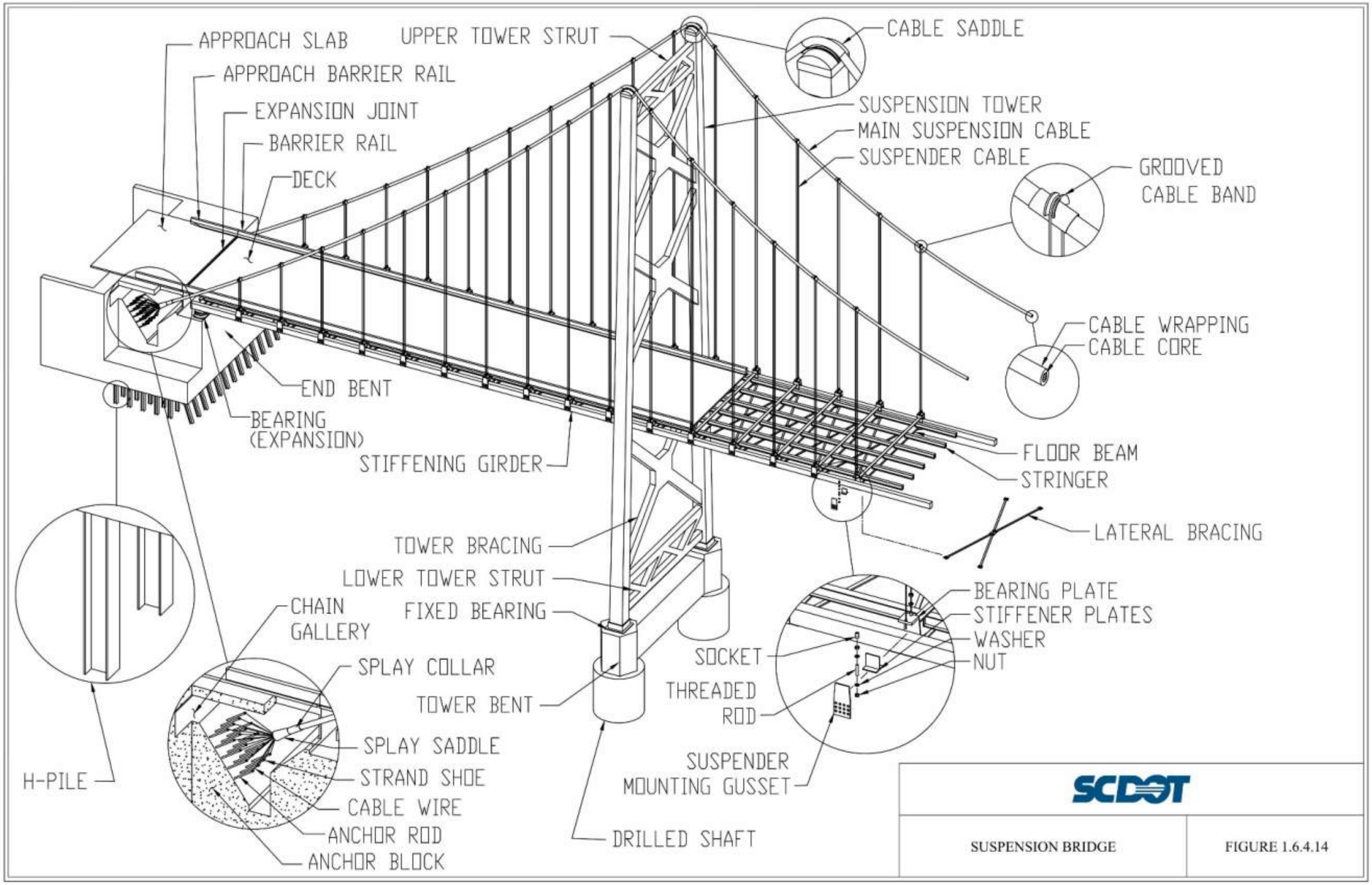


Figure 1.6.4.14 Suspension Bridge Components

1.6.4.15 Cable-Stayed Bridge

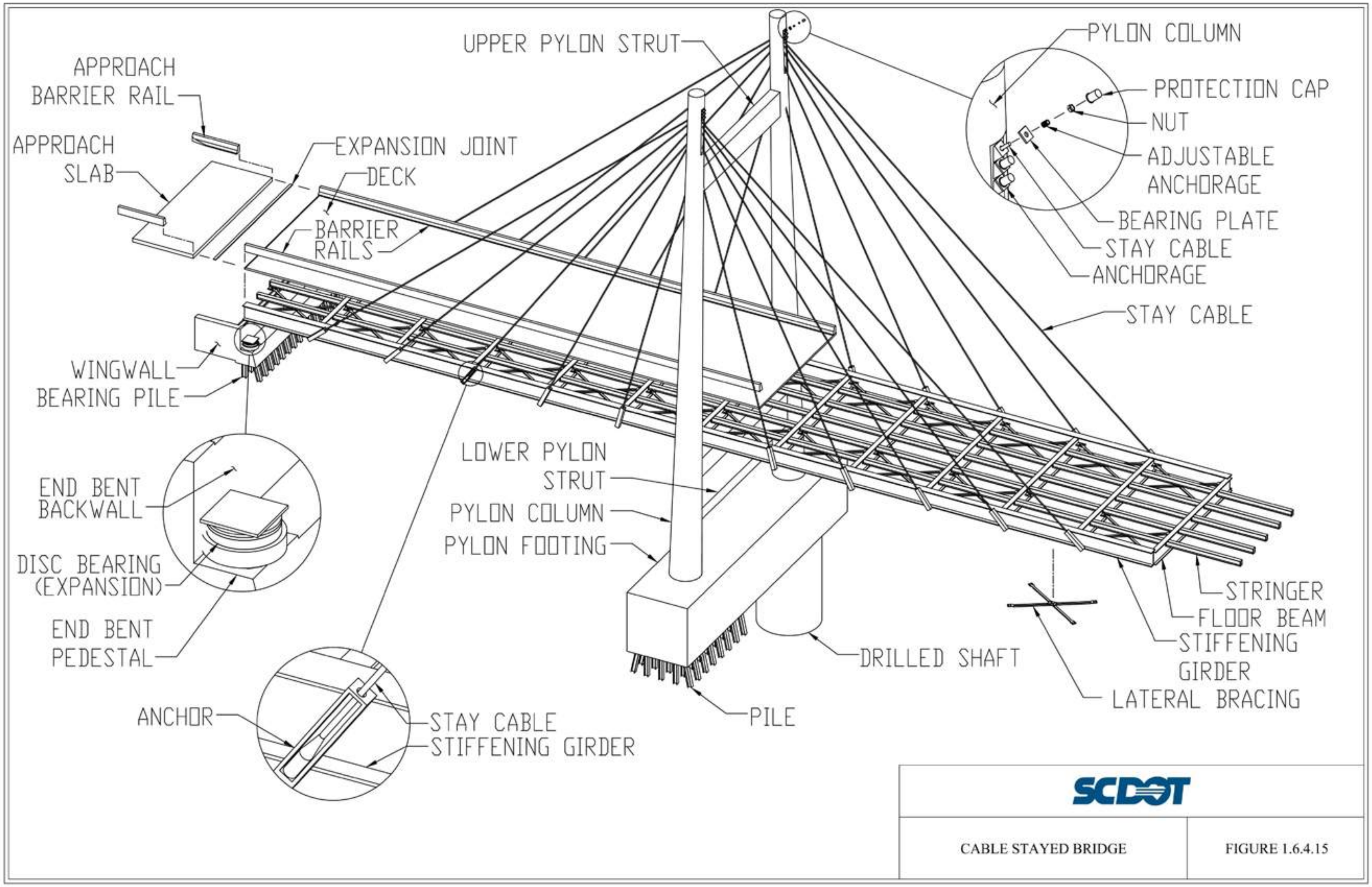


Figure 1.6.4.15 Cable-Stayed Bridge Components

1.6.4.16 Culvert

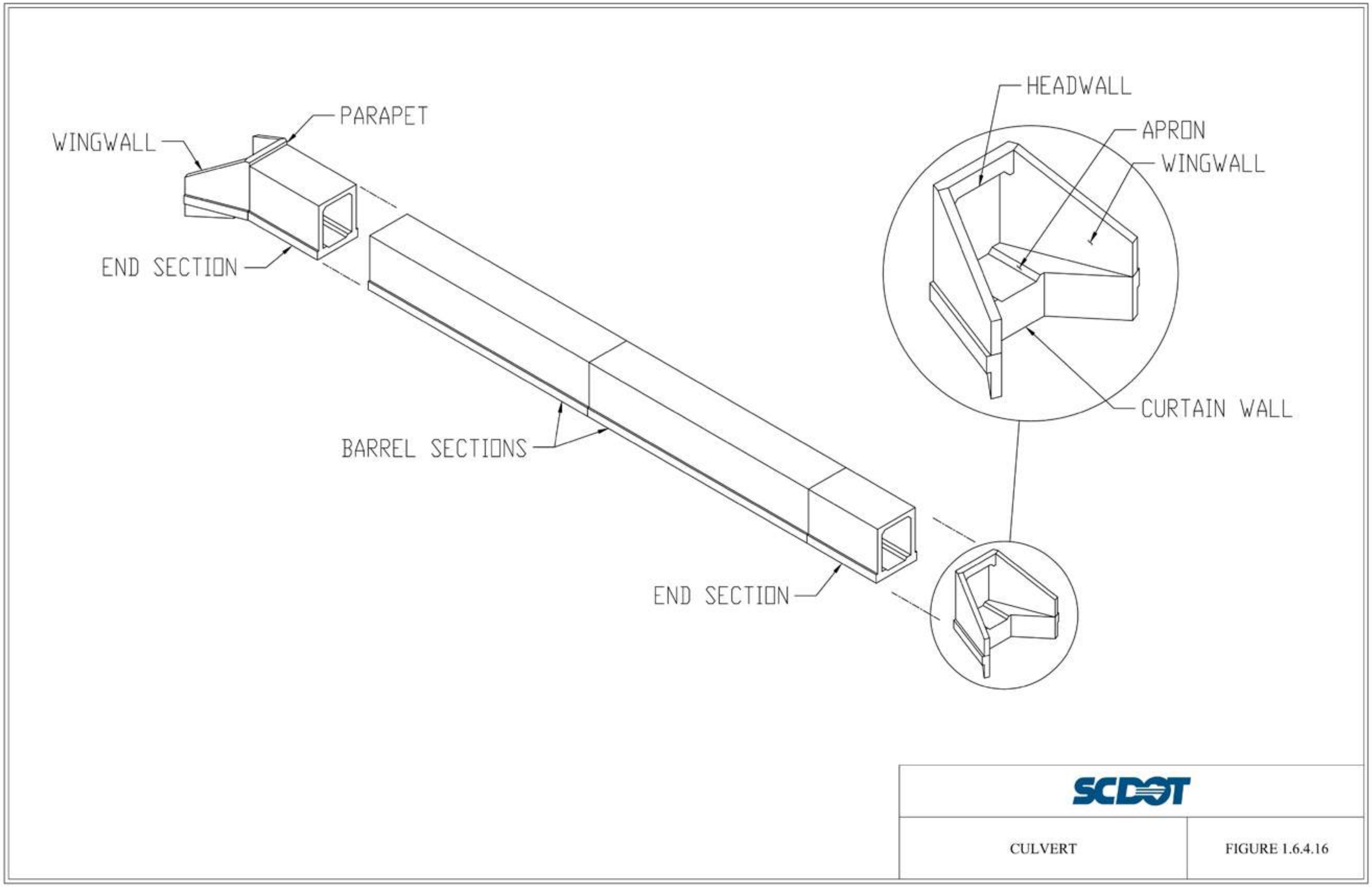


Figure 1.6.4.16 Culvert Components

1.6.4.17 *Bascule Bridges*

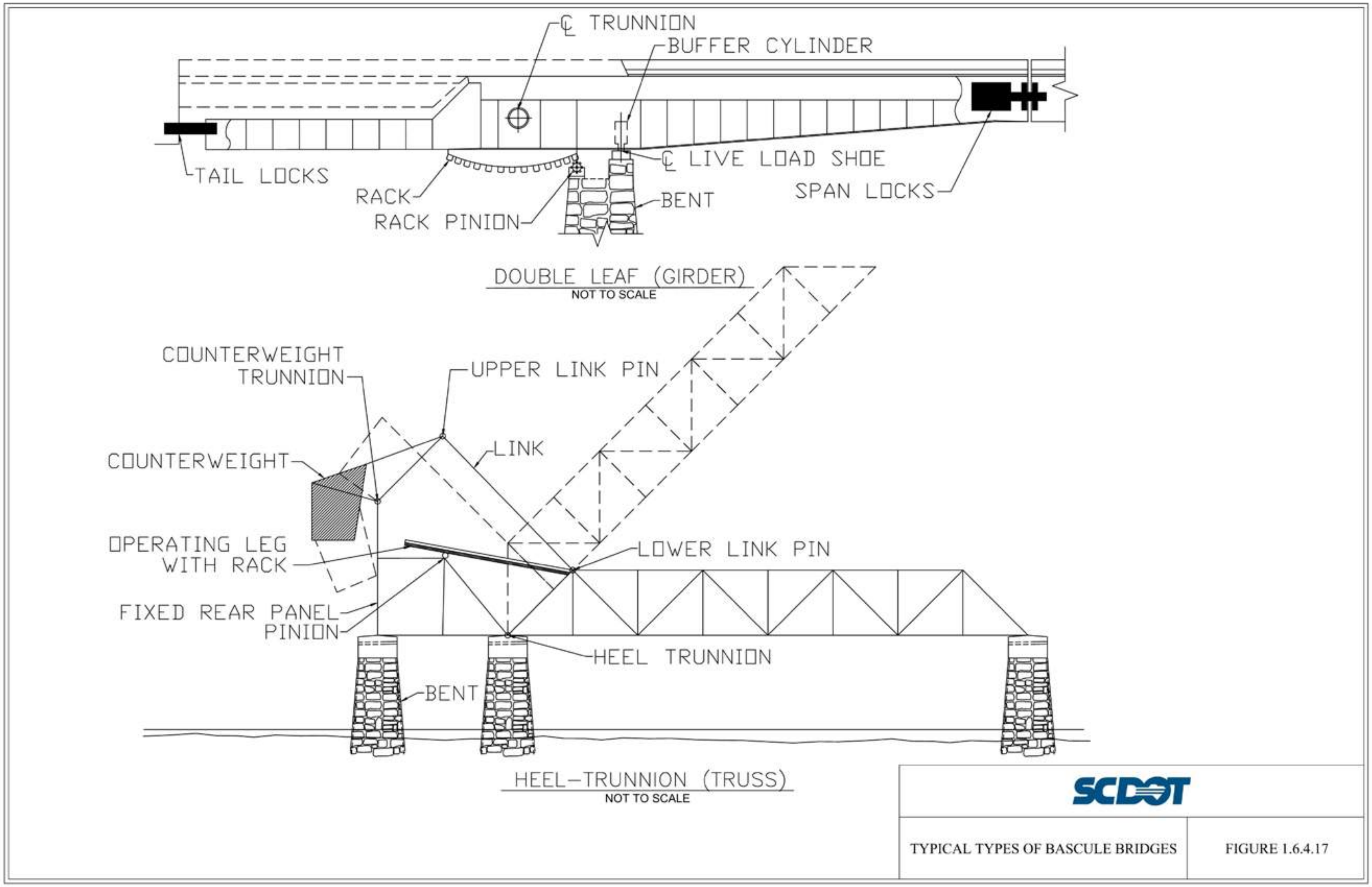


Figure 1.6.4.17 Bascule Bridge Components

1.6.4.18 Covered Bridge

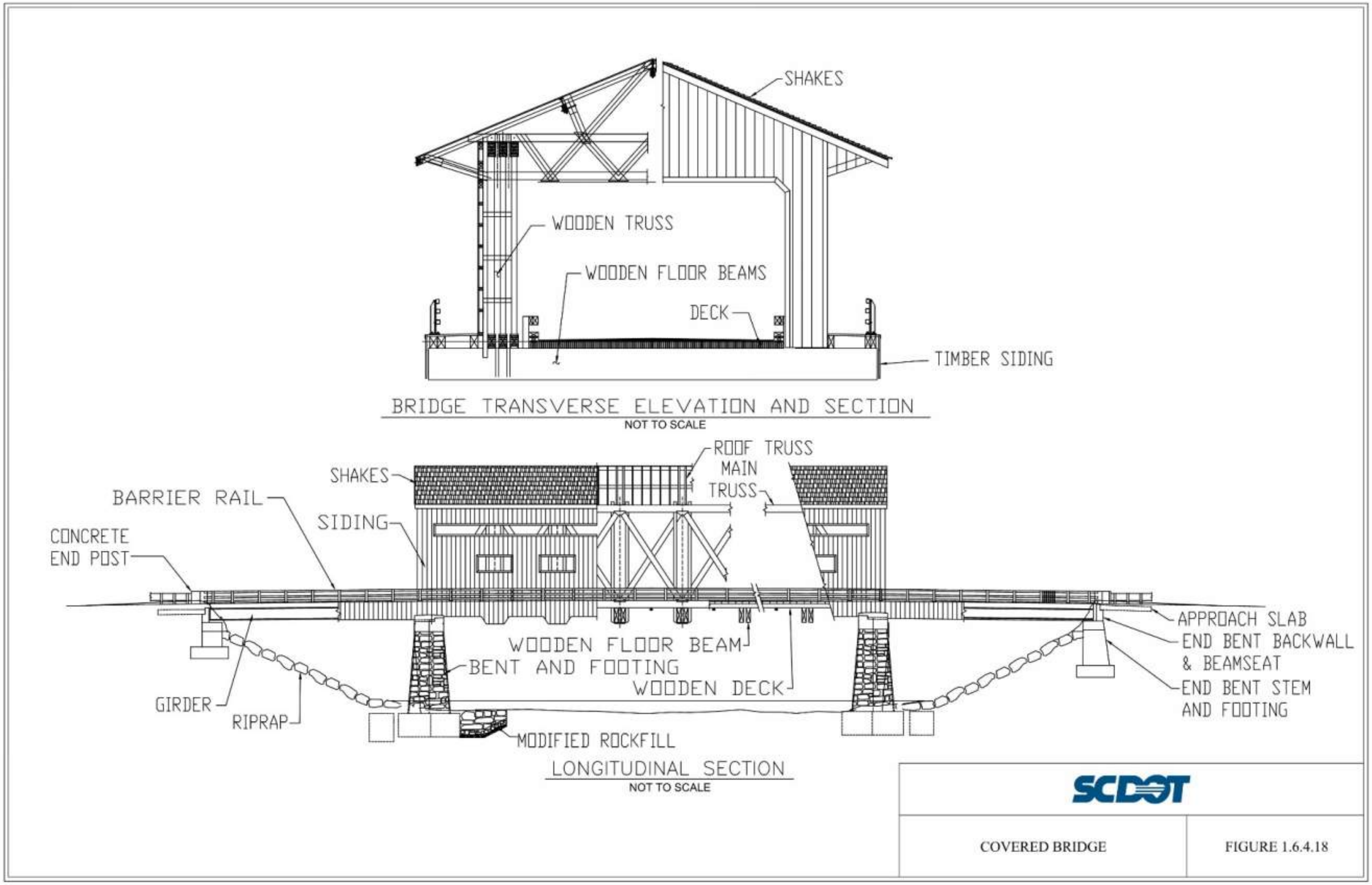


Figure 1.6.4.18 Covered Bridge Components

CHAPTER 2 BRIDGE INSPECTION PROGRAM REQUIREMENTS

2.1 GENERAL REQUIREMENTS

2.1.1 History and Requirements of NBIS

2.1.1.1 History and Background of NBIS

With the mobility introduced to society during the automobile age and the increased development of the current road system in the U.S., the demands on our nation's bridges have evolved throughout the 20th and 21st centuries. With these increasing demands, the responsibility to maintain our nation's bridges for the public's safety has taken on new importance. As bridges have aged and deteriorated, a number of significant bridge failures became the impetus for developing the current NBIS governing how the nation's bridges are inspected, load rated, and maintained. The first significant bridge failure leading to the current NBIS requirements was the December 15, 1967, collapse of the Silver Bridge on Route 35 between Point Pleasant, West Virginia, and Gallipolis, Ohio. In this most devastating bridge collapse in U.S. history in terms of loss of life, 46 people died as a result of an eyebar failure in this eyebar-chain suspension bridge. As a result of the collapse, President Lyndon Johnson called for an investigation, which resulted in the 1968 passing of the Federal Highway Act by Congress, USC Title 23, Section 151 setting forth the requirement to establish the NBIS.

In the 1968 Act, responsibility for establishing the NBIS was delegated to the FHWA. In 1970, the AASHTO Manual for Maintenance Inspection of Bridges and the FHWA Bridge Inspector's Training Manual were developed. After publishing the proposed NBIS in the Federal Register and allowing comments from individual states, FHWA published the initial NBIS in 1971.

The NBIS required all public bridges on the federal-aid highway system to have a Structure Inventory and Appraisal (SI&A) conducted by 1972 and the data reported to FHWA. In 1978, the NBIS was extended to include all public bridges regardless of whether they were on the federal-aid highway system. Important aspects of the NBIS were the following:

- All states were required to perform periodic inspections of bridges greater than 20 feet in span length on at least a biennial basis,
- Data collection was standardized and reported to FHWA,
- Qualifications for inspection personnel were defined, and
- Training programs were developed and implemented.

Over the years, the inspection standards have been updated, often as the result of lessons learned from additional bridge failures. In June 1983, a suspended span of the Mianus River Bridge in Connecticut collapsed, killing three people. The cause of the collapse was traced to the failure of one of the four nonredundant steel pin and hanger assemblies which supported the suspended span. This collapse focused attention on bridges with fracture critical members and established national inspection guidelines, additional inspector training, and new fatigue research for these types of structures. FHWA added a new supplement to the Bridge Inspector's Training Manual 70 in 1986: Inspection of Fracture Critical Bridge Members (FCM). FCMs were defined in the supplement as "*steel tension members whose failure would be expected to result in collapse of the span or bridge*".

National attention turned to underwater inspections with the collapse of New York's I-90 bridge over the Schoharie Creek in 1987, which resulted in 10 deaths. With heavy run-off due to snowmelt and 5.9 inches of rainfall, the bearing soils beneath one of the piers were weakened due to scour. Pier No. 3 collapsed, causing the progressive collapse of Spans 3 and 4.

With over 86 percent of the bridges in the national registry spanning waterways and subject to potential scour, FHWA issued a technical advisory guide in 1988 called "*Scour at Bridges*". In October 1988, the NBIS was modified based on suggestions made in the 1987 Surface Transportation and Uniform Relocation Assistance Act. The national underwater inspection frequency interval was set at a maximum of 60 months and scour critical bridge inspections were initiated.

Most recently in 2007, the collapse of the I-35W bridge over the Mississippi River in Minneapolis, Minnesota has again heightened awareness of NBIS requirements and has focused attention on the inspection and load rating of gusset plates for truss bridges and on potential overload conditions during construction and repair activities. The conclusions drawn from the collapse of the I-35W bridge, which killed 13 people and injured 145, has resulted in new emphasis on gusset plate inspection, has led to the development of FHWA guidelines for the load rating of gusset plates, and has led to increased scrutiny of conditions and loadings which could be imposed during bridge construction or rehabilitation operations.

2.1.1.2 Bridge Inspection Organization

With the revisions to the NBIS which became effective in January 2005, state transportation departments were made responsible for inspecting or causing to inspect all highway bridges located on public roads fully or partially within the state's boundaries, with the exception of bridges owned by federal agencies. The NBIS does allow state transportation departments to delegate responsibility of inspection and load rating to counties or municipalities. The delegation of the duties does not relieve the state transportation departments or the federal agencies of any responsibilities under the NBIS.

A further requirement is for the state transportation departments or federal agency bridge inspection organizations to have a Program Manager, who meets specific required qualifications, to oversee the program. Federal agencies must, in turn, inspect or cause to inspect all highway bridges located on public roads fully or partially within the respective agency's responsibility or jurisdiction.

To execute the duties set forth above, each state transportation department or federal agency must include a bridge inspection organization responsible for the following:

- Statewide or federal agency-wide bridge inspection policies and procedures, QC and QA, and preparation and maintenance of a bridge inventory.
- Inspection reports, load ratings, and other requirements of the NBIS.

While it may be allowed in some states, SCDOT does not delegate inspection responsibilities to counties or municipalities. SCDOT or SCDOT contracted consultants perform inspections of all bridges on public roads in South Carolina. The ASBME shall serve as the designated Program Manager per the requirements of the NBIS.

2.1.1.3 Bridge Inventory Requirements

Each state or federal bridge inspection agency must prepare and maintain an inventory of all bridges subject to the NBIS within its jurisdiction. SCDOT's BMS maintains the state bridge inventory.

Certain NBI data must be collected and retained by the state or Federal agency for compilation by FHWA. The data must be reported using FHWA-established procedures as outlined in the *Recording and Coding Guide for Structure Inventory and Appraisal of the Nation's Bridges (Coding Guide)*. SI&A data includes most of the NBI information required by FHWA.

2.2 BRIDGE INSPECTION PROGRAM REQUIREMENTS AND OBJECTIVES

The primary objective of the structure inspection program is to protect the safety and welfare of the motoring public and safeguard the public's investment. The bridge inspection program identifies deficiencies which are critical to public safety as well as non-critical deficiencies (known in South Carolina as repair recommendations) which need to be corrected to extend the structure's service life and reduce total maintenance costs. An inspection will:

1. Provide for immediate action to limit the use of or close any structure which is revealed by inspection to endanger public safety;
2. Establish a chronological record of periodic inspections, listing structure components, component condition at the time of each inspection, thus allowing detection of progressive changes;
3. Determine the extent of any deficiency resulting from deterioration or any other cause;
4. Enable maintenance, repair and rehabilitation to be programmed more effectively through early detection of structure deficiencies by which the public investment in the highway system will be safeguarded and repair costs minimized;
5. Collect data on frequently occurring deficiencies to support a change in design and/or construction practices to eliminate the cause of the deficiency;
6. To collect, record, and store bridge inventory and inspection data required to support the BMS, and;

7. Comply with FHWA National Bridge Inspection Program Assessment Metrics.

2.2.1 Bridge File Requirements

The release of bridge plans and information shall be done in accordance with the procedures outlined in ED Memorandum 18. ED 18 also references the direction included in Appendix Q of the BIGD for SCDOT's Critical Security Bridges (CSB).

The BMO is responsible for upkeep of the bridge records of SCDOT owned bridges. The bridge file should be kept and maintained electronically in accordance with the SCDOT Bridge File Policy (BFP). The BMO is responsible for the complete bridge records, which will be electronic, for the life of the structure. The BMO maintains electronic records for SCDOT owned structures taken out of service.

The BMO may keep electronic records for non-qualifying bridges (such as state owned pedestrian bridges or non-NBI bridges).

Districts may keep their own files (hard-copy form) as needed to perform their duties of bridge inspection and to assist with maintenance. However, if inspectors believe the bridge's electronic files need to be updated, the documents shall be updated in the bridge file by the inspectors or the BMO. Inspectors shall not only update local, hard-copies since are they "*offline*".

Specific bridge inventory and inspection records are listed in Section 2.2.1.1. However, the BFP should be referenced for specific document type and folder location requirements pertaining to design, construction, load rating and maintenance records.

The BFP contains the requirements for retention of electronic copies of bridge inspection records. The requirements for retention of hard copies of bridge inspection records are listed in Section 2.2.1.2.

2.2.1.1 *Bridge Inventory Information and Field Inspection Records*

The files which relate to bridge inspection and shall be included in the Bridge File are:

- Inspection Reports
- Critical Findings and Critical Findings Actions Taken
- Bridge Inspection Procedures
    - Inspection Procedures for Bridges with FCMs
    - Inspection Procedures for Bridges with Complex Components
    - Inspection Procedures for Underwater Inspections
- Inventory Photographs (in original, high-resolution or native form), updated every 10 years
- Applicable Quality Documentation
- Locations of AASHTO Fatigue Prone Details, if any (See Appendix H)
- Scour Documentation (Assessment and Plan of Action, when required), also may include hydrology and hydraulics reports, hydraulic studies, scour calculations and flood data
- Border bridge agreement with Georgia or North Carolina (if bridge is listed in Appendix D)

The files which relate to bridge inspection and may be included in the Bridge File are:

- Video of inspection highlighting the bridge site and/or bridge conditions
- DT and NDT Results including both Material Testing and Load Testing
- Inspection Related Correspondence

2.2.1.2 *Hard Copy Inspection Record Retention Policy*

2.2.1.2.1 SCDOT Performed Inspections

For bridges in service, hard copies of inspection and maintenance records older than 10 years may be destroyed by

SCDOT personnel.

For bridges which are replaced, hard copies of all inspection and maintenance records shall be kept for 5 years after a bridge is replaced. After this period, hard copies of records may be destroyed. The BFP includes requirements for the electronic filing of bridge records for replaced bridges.

2.2.1.2.2 Consultant Performed Inspections

Consultants under contract to perform inspections on behalf of SCDOT shall maintain the following documents for a period of five years after contract term:

- All consultant-prepared inspection reports;
- Daily diaries or inspection notes;
- Native (original, high resolution) photographs;
- Any other documents required to be retained in accordance with the consultant's QC Plan.

During the five-year retention period, SCDOT or their designee will be granted access to those documents upon reasonable notice. At any time during the five-year period, SCDOT will have the option of taking custody of the documents. The consultants shall obtain a written release from the BIPM prior to destroying the records after the five-year retention period.

2.3 BRIDGE INSPECTION REQUIREMENTS

The bridge inspectors shall perform the inspection for each bridge according to:

- This document and according to all applicable laws, procedures and guidelines,
- Standards produced by FHWA, AASHTO, OSHA, EPA, SCDOT or SCDHEC, and.
- Any bridge-specific inspection procedures (BSIP) and bridge maintenance manuals.

2.3.1 SCDOT Owned Bridge Inspection Requirements

SCDOT is directly responsible for the inspection of all bridges on the state highway system. Border bridges on highways connecting South Carolina with neighboring states shall be inspected according to agreements between the North Carolina and Georgia's Departments of Transportation; see Appendix D for a list of border bridges.

The primary function of a bridge maintenance program is to prevent or reduce deterioration of the structure. This protects the safety of the public and safeguards the State's investment by extending the structure's useful life. A thorough documented inspection is essential for determining maintenance requirements and making practical recommendations to correct or preclude bridge defects or deficiencies. Each district is responsible for the maintenance and repair of the bridge structures in the district's inventory. The DME or designee is responsible for the preparation of work orders and plans for bridge maintenance and repair. All bridge maintenance work orders shall be entered into Bridge Deficiency Module of the HMMS. Work beyond the capabilities of the district should be handled by the BMO.

The DBIS and the DME are responsible for ensuring load limit signs are posted for bridge structures requiring weight restrictions in accordance with the procedures outlined in ED Memorandum 11.

It is the responsibility of the SBME to assist in or provide guidance on developing the bridge repair and replacement bridge list with the assistance of the DME, for SCDOT owned bridges within his or her jurisdiction. The prioritization of all bridges for replacement will be done in accordance with the process outlined in ED 68 and 70.

2.3.2 Municipality/County Owned Bridge Inspection Requirements

SCDOT or consultants under contract with SCDOT are to perform inspections of bridges owned by municipalities or counties. At completion of inspection, a letter will be sent to local agency providing a copy of the report and information documenting repair recommendations or Critical Findings for resolution, if any are found. The letter will request the local agency to respond once an action plan to address Critical Findings has been developed and once the Critical Findings have been addressed. If, after 15 days from notification, there has been no response by the local agency, a reminder memorandum shall be sent. If Critical Findings are not addressed in 30 days from notification, a second letter will be sent to the local agency notifying them of non-compliance, this second letter may include any action which may have been taken by SCDOT.

SCDOT performs inspections and load ratings, but will not maintain or repair local agency bridges. The local government is responsible to maintain, repair, rehabilitate or replace the bridges in its jurisdictions. FHWA holds SCDOT responsible to be sure all qualified bridges in the State of South Carolina are inspected. The SCDOT must report to the FHWA that all publicly owned bridges are inspected in accordance with these standards. To coordinate efforts on local agency bridges, Attachment 2.7 is used to inform counties and municipalities of bridges known to SCDOT and their current status in the BMS.

In the event of non-compliance with the statutes and procedures, the BIPM will notify, in writing, the local government of the non-compliance. This notification will include the consequences of the non-compliance and will request the local government to bring its program into full compliance. The DBIS or DME shall inform the BIPM of instances of non-compliance with the state's bridge maintenance program.

The following attachments to this BIGD are applicable to the release of inspection findings to municipalities or counties to take appropriate measures to safeguard the public:

- Attachment 2.1 – Municipality-County Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings)
- Attachment 2.2 – Municipality-County Bridge Inspection Report Release Letter with Repair Recommendations (No Critical Findings)
- Attachment 2.3 – Municipality-County Bridge No Longer Being Inspected Letter
- Attachment 2.4 – Municipality-County Bridge Critical Finding Memorandum
- Attachment 2.5 – Municipality-County Bridge Critical Finding Reminder Memorandum
- Attachment 2.6 – Municipality-County Bridge Critical Finding Action Taken by SCDOT
- Attachment 2.7 – Municipality-County Bridge Inventory List and Status

Repair recommendations shall be provided to the bridge owner following the inspection; see Section 8.8. The Critical Findings Form (Attachment 5.5) must also be completed with both an action plan and resolution by the bridge owner as required by Section 8.2 if any Critical Findings are discovered.

2.3.3 Non-NBI Bridge Inspection Requirements

There are SCDOT owned structures across South Carolina which are not included in the NBI but are included in the state bridge database. These bridges are classified differently since they are shorter than the minimum NBI length (20 feet) but exhibit characteristics of a bridge such as a foundation and/or piles and are not pipes or culverts. SCDOT does not inspect non-NBI bridges owned by any entity other than SCDOT. The inspection procedure and reporting process shall follow other requirements of the NBIS as defined in the BIGD with the exception of the load rating requirements. The non-NBI bridges shall be load rated at the direction of the SBME as the SBME is responsible for the state's load rating program.

2.3.4 SCDOT Owned Non-Qualifying Bridges

Culverts and pipes which are not considered bridges are the responsibility of the RME and shall be inspected as part of the roadway work in accordance with ED 8. Figure 6.1 includes a schematic clarification for determination of culverts which may classified as bridges.

2.3.5 Railroad or Mass-Transit Bridges

SCDOT's Rail Office is responsible for ensuring railroad or mass transit structures are inspected.

SCDOT does not notify, schedule, inspect, or collect data on Railroad or Mass Transit Bridges other than checking vertical clearances of these bridges at SCDOT owned roads as described in Section 5.3.8.2.

2.3.6 Pedestrian and Bikeway Bridges

SCDOT builds and maintains pedestrian and bikeway overpasses over major highways. These SCDOT owned structures shall be assigned Asset ID Numbers and, if qualified, these structures shall be inspected in accordance with this document.

SCDOT does not notify, schedule, inspect or collect data on pedestrian and bikeway bridges, which are not owned by SCDOT, other than checking vertical clearances at SCDOT owned roads as described in Section 5.3.8.2.

2.3.7 Federal Government Bridges

The federal government owns and maintains bridges in South Carolina. The appropriate federal agency is responsible for providing SI&A data to FHWA to record and maintain.

2.3.8 Temporary Bridges

The inspection reports, including any repair recommendations, for temporary bridges which are not owned by SCDOT but are inspected by SCDOT or consultants under contract with SCDOT will be provided to the bridge owner in accordance with the reporting durations outlined in this document. The DBIS is responsible for submitting reports for SCDOT performed temporary bridge inspections. Consultant inspection reports for temporary bridges shall be submitted to the BMO.

If Critical Findings are discovered, they shall be reported directly to the owner by the BITL in accordance with Chapter 8. If the BITL does not have direct contact with the owner, the RCE and BMO shall both be contacted by the BITL in the event that Critical Findings are discovered on a temporary bridge.

If the temporary bridge or if the permanent bridge are under construction, the inspectors shall follow the requirements of Section 5.2.7 regarding the required procedures for inspecting during construction.

2.3.8.1 Initial Inspection of Temporary Bridges

All temporary bridges require an initial inspection and a load rating prior to opening to traffic. The load rating documentation shall be placed in the bridge file. This requirement applies to contractor-built temporary bridges and agency-built (including SCDOT) temporary bridges. See Section 4.1 for the requirements of an initial inspection.

2.3.8.2 Temporary Bridges Open to Traffic for Less Than 24 Months

For a temporary bridge being used to carry public traffic while the permanent bridge is closed or being rehabilitated, both bridges are to be inspected together if the temporary bridge will be open or has been open to traffic for less than 24 months. If it has been less than 24 months and the temporary bridge will be open longer than 24 months, inspect per Section 2.3.8.3 and **not** this section. This section is solely for temporary bridges open for a short period of time (less than 24 months).

The temporary bridge is **not required** to have its own Asset ID and is not required to have its own individual SI&A data in the BMS. The permanent bridge which is being rehabilitated or replaced remains in the inventory and appropriate SI&A data, Items 10, 41, 47, 53, 54, 55, 56, 70, 103 and 422, are to be coded for the temporary bridge. Coding requirements for temporary bridges are included in Section 7.3.6.

2.3.8.3 Temporary Bridges Open to Traffic for 24 or More Months

Any temporary bridge which is expected to remain in place or has been in place for 24 or more months shall be **inspected as a permanent bridge** and shall not be considered temporary. These temporary bridges will be expected to be treated with the same requirements of bridges in this document.

The temporary bridge must have an Asset ID if the bridge is expected to remain in place or has been in place for 24 or more months. RDS can provide an Asset ID if one is requested; see Section 5.4.3. The temporary bridge may not assume the Asset ID of the permanent bridge. If the permanent bridge is closed and cannot carry public traffic, the permanent bridge does not require inspection. Coding requirements for temporary bridges are included in Section 7.3.6.

Following the removal of a temporary bridge with an Asset ID, the Asset ID shall be retired; see Section 5.4.3.8.

2.3.9 Bridges with Phased Construction

Components involved in phased construction will require initial inspection prior to the components carrying live load which were previously not carrying live load. The term “phased construction” means building a bridge’s cross section in stages and opening, sometimes partially, traffic as such until the final cross section is completed. Phased construction projects over bridges are common on projects with shifting traffic patterns. An example of a bridge with phased construction would be a four lane bridge reduced to two lanes while one half is rehabilitated. Prior to traffic shifting onto the rehabilitated half, an initial inspection is required. For bridges involved in several phases, an initial inspection shall be performed for each new stage of construction which involves placing live load on newly constructed bridge components. See Section 4.1 for the requirements of an initial inspection. Temporary bridges involved in phased construction shall be inspected per Section 2.3.8.

2.4 TUNNEL INSPECTION REQUIREMENTS

Tunnels, as defined in Section 1.6.1, are inspected according to the National Tunnel Inspection Standards (NTIS). The NTIS were first established in 2015 to set national policy regarding tunnel inspection frequency, inspector qualifications, report formats, and inspection and rating procedures. The NTIS require tunnel owners to establish a program for the inspection of highway tunnels, to maintain a tunnel inventory, to report the inspection findings to FHWA, and to correct any Critical Findings found during these inspections. The NTIS, which can be found in 23 CFR 650 Subpart E, and October 2015 FHWA Memorandum Guidance on Structures Subject to the NTIS, may be used during classification.

SCDOT's inventory currently contains no tunnels; however, in the event that a tunnel is newly constructed, re-classified or discovered, the inspector shall notify the SBME via email within seven days of the field discovery/re-classification. The SBME, or designated Tunnel Program Manager (TPM), is responsible for determining if the structure is a tunnel and establishing appropriate procedures and requirements for subsequent inspection in accordance with the NTIS.

CHAPTER 3 BRIDGE INSPECTION PERSONNEL QUALIFICATIONS AND RESPONSIBILITIES

This guidance document is intended to outline polices to be used by the bridge safety inspectors of the SCDOT and their consultants. Bridge inspectors are the first line of defense in maintaining the state's investment in bridge infrastructure, and therefore protecting and preserving billions of dollars of capital investment. The information they provide through inspections and the detailed records they keep help to ensure the safety of the traveling public and the longevity of the states' bridges. This information also provides data for the NBIS and state programs to determine funding allocation.

3.1 GENERAL REQUIREMENTS

Bridge inspection personnel qualifications and responsibilities are codified into federal law by 23 CFR 650 Subpart C, otherwise known as the NBIS. Within the NBIS, minimum requirements and qualifications are specified for BIPMs and BITLs, including mandatory training. Approved training courses are provided by the National Highway Institute (NHI) and are listed within this section. In addition, a brief description of the requirements set forth by the AASHTO MBE is provided, including descriptions of the roles and responsibilities of key inspection personnel.

3.1.1 Federal Requirements – 23 CFR 650 Subpart C NBIS

The purpose of the NBIS is to provide regulation setting standards for the proper safety inspection and evaluation of all highway bridges in accordance with 23 U.S.C. 151. The NBIS apply to all structures defined as highway bridges located on all public roads; see Section 1.6.1 for the definition of a bridge.

Inspection personnel must meet the definitions and requirements from the NBIS outlined below.

3.1.1.1 Bridge Inspection Program Manager (BIPM) – § 650.309(a)

The BIPM shall be the individual in charge of the unit which has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, or inventory. The program manager provides overall leadership and is available to BITLs to provide guidance.

A BIPM must possess, at a minimum, the following qualifications:

1. Be a registered professional engineer, or have ten years bridge inspection experience; and,
2. Successfully completed a FHWA approved comprehensive bridge inspection training course prior to or within 6 months of becoming a Program Manager. Previous FHWA approved comprehensive bridge inspection training is also acceptable.

As stated in Section 1.3.1.4, the ASBME shall serve as the BIPM for SCDOT.

3.1.1.2 Bridge Inspection Team Leader (BITL) – § 650.309(b)

A BITL is the individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge. The BITL shall be present on-site, throughout the duration of the bridge inspection and shall oversee the work of inspectors.

There are five ways to qualify as a BITL. A BITL must possess, at a minimum, the following qualifications:

1. Meet qualifications required for Program Manager;
2. Have all of the following:
    - A bachelor's degree in professional engineering from a college or university accredited by the Engineering Accreditation Committee of the Accreditation Board for Engineering and Technology (EAC/ABET);
    - Successfully passed the National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering examination;
    - Two years of bridge inspection experience; and

  - o Successfully completed a FHWA approved comprehensive bridge inspection training course;

3. Have all of the following:
    - o An associate's degree in engineering or engineering technology from a college or university accredited by the EAC/ABET;
    - o Four years of bridge inspection experience; and
    - o Successfully completed a FHWA approved comprehensive bridge inspection training course;
4. Have five years bridge inspection experience and have successfully completed a FHWA approved comprehensive bridge inspection training course; or
5. Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Certification in Engineering Technologies (NICET) and have successfully completed a FHWA approved comprehensive bridge inspection training course.

3.1.1.2.1 Minimum Bridge Inspection Experience Level

Per FHWA, the predominant amount of required experience for a BITL, or more than fifty percent, should come from NBIS bridge inspection experience. Other experience in bridge design, bridge maintenance or bridge construction may be used to provide the additional required experience. If at least fifty percent of experience comes from NBIS bridge inspection experience, additional approval is not needed from the BIPM or FHWA.

If less than fifty percent of experience comes from NBIS bridge inspection experience, the BIPM may evaluate and approve an appropriately varied combination of bridge experience as an acceptable amount of required experience to become a BITL. As stated above, bridge experience in bridge design, bridge maintenance or bridge construction may be used to provide the additional required experience. Since some NBIS bridge inspection experience is necessary to become familiar with inspection, safety and data collection practices and procedures, NBIS bridge inspection experience shall be at least part of the experience required. The BIPM may approve remaining experience other activities that enable an individual to develop skills that are directly applicable to the leadership of a bridge safety inspection team. If less than fifty percent of experience comes from NBIS bridge inspection experience, additional approval, in writing, is required from the BIPM. FHWA concurrence is not required for individuals with the experience required.

Lastly, in other situations, the BIPM may have a highly qualified individual with less than the required amount of experience. The BIPM, in concurrence with the local FHWA Division Office or FHWA Federal Program Manager, may determine the individual meets the intent of the regulation and certify the individual as a BITL. This determination should be the exception, rather than the rule. This determination shall be documented with Attachment 3.2, the Exemption for BITL Status Form.

3.1.1.3 Individual charged with overall responsibility for Load Rating Bridges – § 650.309(c)

The individual charged with the overall responsibility for determining load ratings of bridges must be a registered professional engineer licensed in South Carolina. In South Carolina, the SBME is charged with the responsibility for the state's load rating program.

While the SBME is responsible for the load rating program, anyone who is part of the state's bridge maintenance program may request a load rating using Attachment 3.1.

3.1.1.4 Underwater Bridge Inspection Diver – § 650.309(d)

An underwater bridge inspection diver must complete an FHWA approved comprehensive bridge inspection training course or other FHWA approved underwater bridge inspection training course.

Inspection divers must be certified divers by having formal diver training meeting the minimum requirements of the Occupational Safety and Health Administration (OSHA) Commercial Diving Operations standard. In addition, at least three inspection team divers, including the BITL, shall be certified through the Association of Diving Contractors International (ADCI); see Section 3.1.3.4.

3.1.2 AASHTO Requirements – AASHTO Manual for Bridge Evaluation (MBE)

The AASHTO MBE is the industry standard reference for bridge inspection, bridge record keeping, material testing, load rating, fatigue evaluation of existing bridges and non-destructive load testing. Adherence to the MBE provides uniformity in the policies and procedures for determining the physical condition, maintenance needs, and load capacity of the nation's highway bridges. The manual was developed to assist bridge owners by establishing inspection procedures and evaluation practices to meet the NBIS. At the time of writing, the current version of the AASHTO MBE is the third edition, dated 2018.

The AASHTO MBE expands upon the roles of the BIPM and BITL as described in the NBIS.

According to the AASHTO MBE, Section 4.2.2, regarding the BIPM:

"The individual responsible for all bridge inspection activities, including reporting and maintaining an inventory. The program manager provides overall leadership and is available to inspection program staff to provide guidance. The program manager establishes consistent policies and practices for the state or federal agency."

According to the AASHTO MBE, Section 4.2.2, regarding the BITL:

"The individual in charge of an inspection team responsible for planning, preparing, and performing the on-site inspection of the bridge. Ensure that a qualified inspection team leader is at the bridge site at all times during each initial, routine, in-depth, fracture-critical member, and underwater inspection."

3.1.3 SCDOT Requirements

In addition to the federal requirements for the bridge inspection program. South Carolina has additional requirements for SCDOT and consultant inspectors.

3.1.3.1 Fracture Critical Member (FCM) Inspections

BITLs who perform field inspections of bridges with FCMs shall complete the NHI Course 130078 "*Fracture Critical Inspection Techniques for Steel Bridges*". For consultant inspectors, an approved refresher course shall be taken, or the NHI Course 130078, shall be retaken (in its entirety) by the BITL at intervals no greater than ten years apart. Some bridges may have specific requirements for the BITL on FCM inspections; these requirements are listed in the BSIP.

3.1.3.2 Mechanical and Electrical Inspections

The BITL for mechanical and electrical inspections on bridges shall be experienced with applicable codes and understand the relationships between all portions of the structure. The inspection team working under the BITL shall include structural, electrical, hydraulic and mechanical inspectors, as applicable to each bridge inspection. A single individual may serve as an inspector in more than one of the areas if he/she has the necessary experience. The BITL for inspection of movable bridges in South Carolina shall:

- Have completed NHI Course 130055 and subsequent refresher (NHI Course 130053) classes, if needed, and
- Have at least five years of experience performing mechanical and electrical inspections bridge inspections.

3.1.3.3 Inspections of Bridges with Complex Components

At a minimum, the BITL for the inspection of a bridge with complex components shall have either:

- A minimum of five years bridge inspection experience as a BITL or
- Bridge experience on a minimum of five similar type bridges with complex components as deemed acceptable to the BIPM.

In addition, BITLs who perform inspections on bridges with complex components shall follow requirements stated in the bridge procedure for that particular bridge. Requirements may vary from bridge procedure to bridge procedure. SCDOT may require additional inspector training and experience may be required by the BIPM to inspect bridges with complex components. Depending on the inspection assigned, the BIPM may also require a BITL be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer (NSPE)'s program for NICET. Per Section 9.2.2.4, the Quality Control Reviewer (QCR) shall have the same qualifications as the BITL for all bridges including bridges with complex components.

3.1.3.4 Underwater Inspections

The underwater BITL shall be an ADCI-certified commercial diver and must have successfully completed the NHI comprehensive bridge inspection course and as required by the NBIS, an approved refresher course completed within the last five years. However, the underwater inspections may be led by an ADCI-certified diver who has five (5) years' experience in structural inspection assignments and has completed a NHI comprehensive bridge inspection training course with a current refresher course within the last five years, provided on-site supervision is furnished by a South Carolina Registered Professional Engineer. Certifications, including professional registrations and appropriate NHI certificates for all team leaders, shall be provided and updated prior to any field work and included in the dive plan; see Section 5.2.1.7.

The dive team shall consist of one air-diving supervisor who shall possess the proper ADCI supervisor certification.

Some bridges may have specific requirements for the BITL on UW inspections; these requirements are listed in the BSIP.

3.2 BRIDGE INSPECTION TRAINING COURSES

The following training courses were developed by the FHWA and are offered by the NHI. Training courses are approved by FHWA and SCDOT to meet the training requirements outlined in 23 CFR 650 Subpart C NBIS. More information, including information on course changes or new course offerings can be found at the NHI website. The descriptions below were compiled from FHWA and the NHI website.

3.2.1 NHI Course 130055 "Safety Inspection of In-Service Bridges"

This course is a two week classroom-based course and is FHWA-approved to meet the NBIS requirement for bridge inspection training for BITLs. The emphasis of the training is on inspection application, inspection procedures, uniform coding and rating of bridge elements and bridge components. The course also includes lessons on understanding bridge behavior, inspection of culverts, identification of defects for common bridge types and identification and reporting of Critical Findings. An introduction to the inspection of FCMs, underwater inspections, and non-destructive evaluation is included though each of these topics have their own courses. **This course is a requirement for all SCDOT BITLs.** Participants shall have successfully completed one of the following three prerequisites: NHI Course 130054 "*Engineering Concepts for Bridge Inspectors, NHI Course 130101*", "*Introduction to Safety Inspection for In-Service Bridges*" or NHI Web Based Assessment 130101a "*Prerequisite Assessment for Safety Inspection of In-Service Bridges*".

An abbreviated one week course meeting the NBIS requirements is available for Professional Engineers. Reference Section 3.2.4.1, NHI Course 130056 "*Safety Inspection of In-Service Bridges for Professional Engineer*".

These courses qualify as FHWA-approved comprehensive bridge inspection training courses, as required under Section 3.1.1.1, 3.1.1.2 and 3.1.1.4.

3.2.2 NHI Course 130078 "Fracture Critical Inspection Techniques for Steel Bridges"

This course provides an understanding of FCMs and builds upon the materials taught in NHI Course 130055 "*Safety Inspection of In-Service Bridges*", which is a prerequisite. Participants will participate in lessons in FCMs identification, failure mechanics, and fatigue and fracture in metal with an emphasis on inspection procedures, reporting, and non-destructive evaluation methods most often associated with highway bridges. All BITLs conducting the inspection of FCMs shall have successfully completed this course.

3.2.3 NHI Course 130053 "Bridge Inspection Refresher Training"

This course serves as refresher training for NHI Courses 130055 "*Safety Inspection of In-Service Bridges*". For compliance with the NBIS, Program Managers and BITLs must complete this training course every five years. The training is three days. However, a three and a half day option is available with the option to include additional case studies.

3.2.4 Additional Training Courses

The additional training listed below is offered by the NHI and has been incorporated into the BIGD. More information, including information on course changes or new course offerings, can be found at the NHI website. The descriptions below were compiled from FHWA and the NHI website.

3.2.4.1 *NHI Course 130056 "Safety Inspection of In-Service Bridges for Professional Engineers"*

The course is a five-day adaptation of FHWA-NHI 130055 "*Safety Inspection of In-Service Bridges*". This course is intended for Professional Engineers and streamlined to provide NBIS required bridge inspection training for BITLs and Program Mangers. Participants must be certified Professional Engineers and have completed one of the three following as prerequisites: NHI Course 130054 "*Engineering Concepts for Bridge Inspectors, NHI Course 130101*", "*Introduction to Safety Inspection for In-Service Bridges*" or NHI Web Based Assessment 130101a "*Prerequisite Assessment for Safety Inspection of In-Service Bridges*".

3.2.4.2 *NHI Course 130087 "Inspection and Maintenance of Ancillary Highway Structures"*

This course provides training in the inspection and maintenance of ancillary structures, such as structural supports for highway signs, luminaries, and traffic signals. Its goal is to provide agencies with information to aid in establishing and conducting an inspection program in accordance with the FHWA "*Guidelines for the Installation, Inspection, Maintenance, and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals*". The duration of this course is two days.

3.2.4.3 *NHI Course 130091 "Underwater Bridge Inspection"*

This course provides an overview of diving operations aimed at inspection personnel responsible for managing underwater bridge inspections. The course is approved to meet the requirements of the NBIS, which requires bridge inspection training for all divers conducting underwater inspections. The course is offered in both a four and five day format.

This course meets the requirement for a FHWA-approved underwater bridge inspection training course, as outlined in Section 3.1.1.4.

3.2.4.4 *NHI Course 130099A "Bridge Inspection Nondestructive Evaluation Seminar (BINS)"*

This one-day course allows bridge inspectors to identify the components of handheld Non-Destructive Testing (NDT) inspection tools and techniques, inspection strategies, and NDT techniques. Inspection tools include eddy current, ultrasonic, infrared thermography, impact echo and ground penetrating radar.

CHAPTER 4 GENERAL TYPES, SCOPE AND FREQUENCY OF INSPECTIONS

Various types of inspections are performed by SCDOT inspectors and consultants on the bridges and structures in the state. This chapter describes the general types of inspections and the scope of said inspections. The chapter also defines the frequency of inspections required for bridges in South Carolina, Table 4.0 lists the types of inspection and the required frequencies. Specific requirements for bridge inspection and reporting procedures, culvert inspection and reporting procedures and for evaluation procedures are described in Chapters 5, 6 and 7, respectively.

Table 4.0 Inspection Types and Frequencies

	Inspection Type	Frequency	Section
Frequency Inspections	Initial	Once	4.1
	Routine	24 Months *Unless abbreviated frequency is suggested*	4.2
	Underwater*	60 Months *Unless abbreviated frequency is suggested*	4.3
	Fracture Critical Member (FCM)*	24 Months *Unless abbreviated frequency is suggested*	4.4
	Bridges with Complex Components, including Movable Bridges*	24 Months *Unless abbreviated frequency is suggested*	4.5 4.6
	Special (including pin, pin and hanger and intermediate fatigue)	Frequency required but varies	4.7
Non-Frequency Inspections	Maintenance	As directed by bridge owner	4.8.1
	Damage	As soon as possible after the occurrence	4.8.2
	Scour	As directed by bridge owner following a triggering event or as dictated by the Plan of Action (POA)	4.8.3
	Safety	As directed by bridge owner	4.8.4
	Miscellaneous	As directed by bridge owner	N/A

* BSIPs are required for these inspection types.

4.1 INITIAL INSPECTIONS

An initial inspection is the first inspection of a bridge which becomes a part of the bridge inventory. However, the elements of an initial inspection may also apply when there has been a change in the configuration of the bridge due to widening, lengthening, rehabilitation, the shifting of traffic during phased construction, the addition of supplemental bents/piers, the changing of bridge clearances or if there has been a change in the bridge ownership.

This inspection is the initial data collection and baseline assessment of the condition of the bridge and provides a basis for future inspections. Initial inspections provide SI&A data along with bridge element information. Initial inspections usually begin in the office with the review of construction plans and route information, then proceed to the field for verification of the as-built conditions.

4.1.1 Coordination for Initial Inspections with Contractor Construction

Coordination between the DBIS, the RCE and contractor is critical in keeping the state's bridges safe and limiting delays impacting the traveling public. The RCE shall notify the DBIS via email of any relevant preconstruction meetings for new construction bridges, temporary bridges, phased construction projects over bridges where traffic may shift and bridge rehabilitation projects. If the DBIS is unsure of who should be responsible for this coordination, the DBIS shall contact both the DME and the BMO.

At least four weeks prior to opening any new, widened, phased constructed, or rehabilitated bridge or bridge component to traffic, the contractor is required to notify the RCE. Immediately, the RCE shall notify the DBIS via email to allow the initial inspection to be performed prior to the opening of the bridge to traffic.

For construction on a municipality or county bridge (not owned by SCDOT), the owner’s representative shall be responsible for notification to the DBIS four weeks prior to the potential date for the inspection.

4.1.2 Coordination for Initial Underwater Inspections

If an initial underwater inspection is needed for a new bridge, the DBIS shall complete Attachment 4.1, the Consultant Inspection Request Form (CIRF) to request the initial underwater inspection as soon as possible.

The initial underwater inspection for each new, replaced or rehabilitated bridge shall be performed within 6 months of the bridge being open to traffic.

4.1.3 Coordination for Initial Inspections with Agency Construction

Requirements listed in Section 4.1.1 and 4.1.2 are also applicable to bridge construction self-performed by SCDOT, counties, municipalities or other agencies. The RCE, RME or agency designee is responsible for notification to the DBIS at least four weeks prior to opening any new, widened, phased constructed, or rehabilitated bridge or bridge component to traffic.

4.1.4 Preparation for Initial Inspections

For new bridges, with original construction or as-built plans, much of the required inventory record information can be obtained from plans which can be requested from the RCE or Preconstruction. During this office procedure, bridge elements and components may be identified and quantified. Any information not known or which cannot be determined from the plans can be left blank until site inspection. During the inspection, the inspector must verify the inventory information which has already been coded and the inspector must document any information not known.

4.1.5 Immediate Initial Inspection Findings

Within two business days of the completion of the inspection, the DBIS shall provide the RCE with repair recommendations and/or preliminary results via email. If a consultant performs an initial inspection, the consultant PM shall provide via email the DBIS with repair recommendations and/or preliminary results on the same day the inspection was completed. The contractor, and not the district’s maintenance forces, should perform all repairs necessary to correct deficiencies noted by the DBIS.

For bridge construction self-performed by SCDOT, counties, municipalities or other agencies, repair recommendations and/or preliminary results shall be sent from the DBIS to the same agency designee following the initial inspection.

4.1.6 Initial Inspection Reporting Requirements

The NBIS require inventory information from the initial inspection to be entered into the database within 90 calendar days after the bridge is placed in service (begins carrying live load). For non-SCDOT owned bridges, the NBIS require inventory information from the initial inspection to be entered into the database within 180 calendar days after the bridge is placed in service (begins carrying live load).

4.1.6.1 Initial Underwater Inspection Reporting Requirements

Inventory information from initial underwater inspections shall be entered into the State’s database within 90 days of the initial underwater inspection for SCDOT owned bridges and within 180 days of the initial underwater inspection for non-SCDOT owned bridges.

4.2 ROUTINE INSPECTIONS

A routine inspection is a regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of a bridge, to identify any changes from the initial inspection or previously recorded conditions and to ensure the structure continues to satisfy present service requirements. The purpose of the routine inspection is to determine the bridge's current structural and hydraulic adequacy, and condition of the bridge. Additionally, the routine inspection is used to verify previously recommended repairs have been made, to monitor known deficiencies, and determine if further analysis or investigation of the structure's adequacy or condition is needed.

A routine inspection shall be performed at intervals no greater than 24 months. BITLs may recommend shorter durations for bridge routine inspections. This recommendation is documented on the SCDOT Bridge Inspection Report Form (BIRF). NBI Item 90 shall be entered in by the BITL to recommend the date of the next routine inspection. NBI Item 91 shall be entered in by the BITL to recommend the duration (in months) from when the inspection report is submitted until the next routine inspection. If the BITL changes the frequency of the next routine inspection (up or down), this change and a reason for the change shall be noted in the Bridge Element Group Textual Data (BEGTD) on the inspection report under the **Miscellaneous** heading. The term inspection report in this document generally refers to the Routine Inspection Report, including reports following an initial inspection. The term inspection report may also be applicable to other reports as defined in Section 5.4.4.

The NBIS does recognize age, traffic considerations and known deficiencies may require establishing criteria to perform routine inspections at less than 24 months, and it is left to the individual state or Federal bridge inspection agencies to determine the criteria. **In South Carolina, any bridge which has at least one NBI Condition Rating (NBI Items 58, 59, 60, 61 or 62) of 4 or less shall have a routine inspection performed at intervals no greater than 12 months.** All bridges with a load posting or weight restriction shall be evaluated for a reduction of the inspection duration.

While the inspection of non-NBI bridges is not mandated by the FHWA, they should be inspected on intervals no greater than 24 months. Scheduling priority within districts will always be for NBI bridges. Non-NBI bridges should be scheduled for inspection as staffing levels and workloads permit. Scheduling prioritization should consider average daily traffic (ADT), age and condition of the structure. However, the frequency for the inspection of a non-NBI bridge **shall never exceed six years**.

4.3 UNDERWATER INSPECTIONS

See Section 4.1 for the requirement for initial underwater inspection.

An underwater inspection is used to inspect structural members which cannot be inspected visually or by wading during the initial or routine inspection. If members of a bridge cannot be visually evaluated during periods of low flow or examined by feel for condition, integrity and safe load capacity due to excessive water depth or turbidity, then an underwater inspection is required. Generally when the depth of water is less than four feet, an underwater inspection will not be required unless the inspector cannot properly examine substructure or channel components. These inspections are performed by a certified commercial diver and they often require inspection by tactile probing methods.

Additional inspector training and experience is required for underwater inspections as stated in Section 3.1.1.4.

Due to their nature, underwater inspections require more extensive planning and preparation while following the BSIP for the UW inspection for the bridge. See Chapter 5 for applicable inspection procedures. BSIPs for UW inspections may be revised with BMO approval.

The BIPM or designee is responsible for overseeing the inventory of all public bridges which require underwater inspections. The list of bridges requiring underwater inspections is included in Appendix E.

Underwater inspections may be required for scour critical bridges as part of their POAs. Applicable POAs for scour critical bridges shall be included in the Bridge File.

An underwater inspection shall be performed at intervals no greater than 60 months. BITLs may recommend shorter durations for bridge underwater inspections. This recommendation is documented on the SCDOT BIRF. NBI Item 93B shall be entered in by the BITL to recommend the date of the next underwater inspection. NBI Item 92B shall be entered in by the BITL to recommend the duration (in months) when the inspection report is submitted until the next underwater inspection. Occurrences which could result in a decision to perform underwater inspections at intervals less than 60 months are known instances of structural damage; scour and erosion due to water movement; streambed load; ice loading; navigation traffic collision; deleterious effects of water movement; and effects of drift or elements in the water. If the BITL changes the frequency of the next underwater inspection (up or down), this change and a reason for the change shall be noted in the Bridge Element Group Textual Data (BEGTD) on the inspection report under the **Miscellaneous** heading.

4.4 FRACTURE CRITICAL MEMBER (FCM) INSPECTIONS

A FCM inspection is required on any member which is fracture critical. A FCM inspection consists of a hands-on inspection of FCMs or FCM components including visual and other NDT. Additional inspector training and experience is required for FCM inspections as stated in Sections 3.1.3.1 and 3.2.2.

A FCM is defined as a steel tension member or steel tension component of a member, of a bridge whose failure would be expected to result in the partial or total collapse of the bridge. For this member to be considered a FCM, there must be no redundancy in the member or the bridge. There must be no other structural elements able to carry the load of the member if the given member fails.

There are three types of redundancy — load path, structural, and internal. Only load path redundancy is evaluated to determine whether a member is a FCM. Load path redundancy is the number of supporting elements, usually parallel, such as girders or trusses. AASHTO neglects structural and internal redundancies in determining whether a member is a FCM. For a bridge to be non-redundant, it must have two or fewer load paths.

The FCM inspection procedure, which is required by the NBIS for any bridge with a FCM, is to ensure FCMs are identified and are then inspected with increased scrutiny. Requirements for a FCM inspection procedure are included in Section 5.3.2.14.

The BIPM or designee is responsible for overseeing the inventory of all public bridges which have a FCM. The list of bridges requiring FCM inspections is included in Appendix F.

A degree of caution must be exercised during the inspection; this is largely due to the manner in which FCM problems manifest themselves. By the time a hairline fracture is visible on the surface of a steel member, over 95 percent of the life of the member has expired. This hairline fracture can spread and widen within a short time until the member fractures and there is a sudden and catastrophic collapse.

SCDOT requires all bridges with FCMs (if NBI Item 92A = Y) to have a hands-on FCM inspection be performed at intervals no greater than 24 months. The FCM inspection of a bridge may take place in conjunction with a bridge's routine inspection.

4.5 INSPECTIONS OF BRIDGES WITH COMPLEX COMPONENTS

NBIS define bridges with complex components as movable, suspension, cable-stayed and other bridges with unusual characteristics. The AASHTO MBE, Section 4.3.6 "Complex Bridge Inspections", provides guidance on bridge inspection requirements for bridges with complex components such as movable bridges, suspension bridges, and cable-stayed bridges. Bridges with complex components are structure types with unusual characteristics. SCDOT has identified the following structures and inspection types as complex. All bridges with complex components require BSIPs.

- Suspension,
- Stayed Girder,
- Movable – Lift,
- Movable – Bascule,
- Movable – Swing,
- Segmental Box,
- Long Span Steel (LSS) Bridges, which are steel bridges with at least one span greater than 200 feet,
- Long Span Concrete (LSC) Bridges, which are concrete girder bridges with at least one span greater than 150 feet,
- Multi-Span Main (MSM) Bridges, which are bridges with at least 25 main spans of any length or type, and
- Multi-Span Approach (MSA) Bridge, which are bridges with at least 25 approach spans of any length or

type.

Bridges with complex components are subject to particular inspection procedures and additional inspector training and experience may be required to inspect bridges with complex components. Under the NBIS regulations, SCDOT is required to identify bridges with complex components and develop the inspection procedures and additional inspector training and experience requirements for these structures. Bridges with complex components are inspected according to those procedures. All procedures and requirement for additional inspector training and experience shall be included in the applicable Bridge File. If no plan is present, the BMO shall be notified and a qualified engineer will need to develop them prior to the inspection, taking place. BSIPs for bridges with complex components may be revised with BMO approval.

The BIPM or designee is responsible for overseeing the inventory of all public bridges with complex components. The list of bridges with complex components is included in Appendix C.

The inspection of a bridge with complex components may follow the frequency requirements for routine inspections regarding the frequency date of the next inspection or the inspection of a bridge with complex components may be scheduled separately for defined segments of the bridge or for designated groups of elements, connections or details which can be efficiently addressed by the same or similar inspection techniques. If the latter option is chosen, each defined bridge segment and/or each designated group of elements, connections or details shall be clearly identified in the BSIP and recorded as a separate special inspection. If separated, the routine and each scheduled special inspection shall be assigned a frequency using the BIRF.

4.6 MOVABLE BRIDGE INSPECTIONS (MECHANICAL & ELECTRICAL)

See Inspections of Bridges with Complex Components, Section 4.5.

4.7 SPECIAL INSPECTIONS

A special inspection is an inspection scheduled at the discretion of the bridge owner or the responsible agency. It is used to monitor a particular known member condition or suspected deficiency and it must be performed by a qualified BITL available to accommodate the assigned frequency of investigation. If the overall deterioration of the whole structure is accelerating, the routine inspection interval may be shortened by the BITL. However, if just a single component warrants inspection prior to the next routine inspection, a special inspection could be scheduled. The individual performing the special inspection shall be carefully instructed regarding the nature of the known deficiency and its functional relationship to satisfactory bridge performance. In this instance, guidelines and procedures on what to observe or measure must be provided, and a timely process to interpret the field results shall be in place.

During special inspections, the entire bridge does not require inspection. Only the specific components which are the subject of the special inspection shall be inspected. Only inspection and document requirements associated with the subject components are applicable.

During a routine inspection, a BITL may recommend special inspections before the next routine inspection. A special inspection should be scheduled when:

1. Deterioration of a member is progressing at a rate which warrants inspection more frequently than 24 months.
2. Channel degradation or channel movement is progressing at a rate which warrants inspection more frequently than 24 months.
3. Temporary supports are in place.
4. Fatigue cracks have been found in a redundant steel structure.
5. Fatigue cracks have been found in a FCM.

A special inspection may be performed as needed at the discretion of the BIPM, the DME or a BITL or his or her designees.

The routine bridge inspection date shall not be changed due to a special inspection.

The date of the special inspection shall be documented using the BIRF with NBI Items 92C and 93C.

Specific types of special inspections include pin inspections, pin and hanger inspections and intermediate fatigue inspections. A Special Inspection Report shall be used for these various special inspections. Special inspections require a scheduled frequency and shall not be used for one-time inspections.

4.7.1 Pin or Pin and Hanger Inspections

Pin or pin and hanger inspections are one type of inspection which could be required for steel bridges with pinned elements. This might include steel truss bridges pinned at their joints; steel arch bridges pinned at their supports or at their crown; and steel girder, steel stringer, or steel truss bridges with spans suspended by pin and hanger systems. 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). 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.

Some pin and hanger members are considered FCMs. If the pin and hangers are considered FCMs, a hands-on, visual inspection of all elements of the connection is required as part of a regularly scheduled FCM inspection. However, because the ultrasonic pin testing usually requires specialized access, such as a 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 and hanger connections not considered FCMs shall be inspected with ultrasonic testing methods at a 60 month frequency.

Findings from a pin or pin and hanger inspection shall be documented on the BIRF. Pin or pin and hanger inspections are considered special inspections and the date of the inspection shall be documented on NBI Items 92C and 93C. A duration until the next suggested inspection shall also be entered. The BITL shall enter "*Pin Inspection*" or "*Pin and Hanger Inspection*" and the date of the inspection in the BEGTD on the inspection report under the **Miscellaneous** heading.

4.7.2 Intermediate Fatigue Inspections

For bridges which have FCMs or have fatigue-prone details (FPDs), an intermediate fatigue inspection may be scheduled. The purpose of an intermediate fatigue inspection is to monitor FPDs. AASHTO fatigue specifications classify commonly used steel bridge details 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.

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

Good practice for intermediate fatigue inspections 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. Photographs of fatigue details shall be included in the inspection report.

Frequency for intermediate fatigue inspections range from 6 months to 24 months depending on the detail. The details are inspected at intervals no greater than 24 months during the FCM inspection but an increased frequency can be recommended by the BITL.

Findings from an intermediate fatigue inspection shall be documented on the BIRF. Intermediate fatigue inspections are considered special inspections and the date of the inspection shall be documented on NBI Items 92C and 93C. A duration until the next suggested inspection shall also be entered. The BITL shall enter "*Intermediate Fatigue Inspection*" and the date of the inspection in the BEGTD on the inspection report under the **Miscellaneous** heading.

4.8 NON-FREQUENCY INSPECTIONS

While most inspections occur on established, federally required frequencies, some inspections are unscheduled or only happen occasionally during a bridge's life. The non-frequency inspections in this section do not necessarily require the collection of NBI data; however, some form of reporting is required. Each type of non-frequency inspection has a reporting format as indicated below. In addition to the types of inspections below, a miscellaneous inspection may occur. For these inspections, the BITL shall determine an appropriate report format. In some cases, an email summary may be appropriate and placed in the Bridge File.

4.8.1 Maintenance Inspections

Following the completion of specific work on Critical Findings and repair recommendations by SCDOT bridge maintenance, a BITL performs a maintenance inspection to confirm the work was completed.

See Section 5.4.4.9.2 for the specific requirements for reporting during a maintenance inspection. See Section 8.9.4 for the process needed to remove maintenance needs from a bridge following a maintenance inspection.

4.8.2 Damage Inspections

A damage inspection is an unscheduled inspection used to assess structural damage as the result of unforeseen environmental factors or human actions. Such inspections may be warranted due to events such as an unexpected overload of the bridge; a vehicle-bridge collision; a bridge being struck by an over-height vehicle; a bridge being struck by a boat or vessel; a reported deficiency by the public or maintenance personnel; or flood-induced damage from floating flood debris, bridge buoyancy conditions, wash-out of a bridge approach, or scour damage/bridge settlement.

A damage inspection may be required at any time during a bridge's service life. Unusual occurrences, such as hurricanes, floods, earthquakes, fires, explosions, and accidents have the potential to adversely affect the condition of bridges and other structures. In the case of multiple structures affected by the event, the SBME or designee shall prioritize the structures for inspection based on engineering judgment considering susceptibility to damage and traffic levels. Inspections shall be made of these structures as soon as possible after the occurrence.

A thorough examination of the damaged areas shall be made, along with an assessment of any residual damage to other bridge components. The amount of time and effort required to make this assessment will depend upon the extent and severity of the damage.

If damage has occurred, the inspector may need to:

- Identify any damaged members
- Determine any loss of foundation or substructure support
- Compute the amount of any diminished section remaining
- Measure the amount any member is out-of-alignment

See Section 5.4.4.9.3 for the specific requirements for reporting during a damage inspection. Several attachments are available to document damaged inspections. See Attachments 5.8, 5.9 and 5.10.

4.8.3 Scour Inspections

A scour inspection is an inspection used to assess an existing bridge's vulnerability to scour and stream instability. In addition, a scour inspection allows for documentation of scour changes since the previous inspection.

A scour inspection shall be performed as determined to be needed at the discretion of the DBIS, BITL or BMO or per the bridge's POA. Scour inspections may also occur during hurricanes or other storms; see Section 4.11. The Scour Inspection (Post Storm Inspection) Form (Attachment 4.5) may be used to document findings.

The visual inspection shall document the existing condition of the bridge, including, but not limited to:

- Pier and abutment type;
- Foundation depth (based on existing plans or physical probing in the field);
- Substructure location and alignment relative to the stream;
- Scour depth at abutments and piers;
- Bridge skew;

- Effectiveness, condition or absence of scour countermeasures;
- Stream aggradation or degradation;
- Upstream and downstream channel stability;
- Potential or presence of debris;
- Lateral movement of stream; and
- Bed and bank soil material.

The scour inspection can be used in conjunction with the scour analysis to identify and verify potential harmful effects of scour to the bridge. A channel survey is likely to be taken during the scour inspection; see Section 5.3.4.1 for the requirements for the channel survey.

If a scour criticality re-evaluation is recommended, then the Bridge Scour - Item 113 Re-evaluation Form will be filled out and submitted to the BIPM; see Attachment 4.2.

The BIPM or designee is responsible for overseeing the inventory of all public bridges which are scour critical. The list of bridges which are scour critical is included in Appendix G.

See Section 5.4.4.9.4 for the specific requirements for reporting during a scour inspection.

4.8.4 Safety Inspection

A safety inspection is performed on bridges under construction. These bridges may require inspection for the safety of the traveling public prior to substantial construction completion. These inspections are planned at the discretion of the BIPM, DME, District Construction Engineering (DCE), RCE or DBIS. These inspections must also be closely coordinated with construction personnel and district personnel.

See Section 5.4.4.9.5 for the specific requirements for reporting during a safety inspection.

4.9 NON-BRIDGE INSPECTIONS

4.9.1 High-Mast Light Pole Inspections

Inspection of high-mast light poles is not performed by SCDOT bridge inspectors or its consultants. The inspection of these items is not covered by this document. If, during the course of bridge inspections, deficiencies are discovered on high-mast light poles, the applicable DME or RME shall be contacted via email by the bridge inspectors.

4.9.2 Overhead Span Type Sign Support Inspections

Inspection of overhead span type sign supports is not performed by SCDOT bridge inspectors or its consultants. The inspection of these items is not covered by this document. If, during the course of bridge inspections, deficiencies are discovered on overhead span type sign supports, the applicable DME or RME shall be contacted via email by the bridge inspectors.

4.9.3 Cantilever Sign Inspections

Inspection of cantilever signs is not performed by SCDOT bridge inspectors or its consultants. The inspection of these items is not covered by this document. If, during the course of bridge inspections, deficiencies are discovered on cantilever signs, the applicable DME or RME shall be contacted via email by the bridge inspectors.

4.9.4 Retaining Wall Inspections

Inspection of retaining walls (not supporting bridge live or dead load) is not performed by SCDOT bridge inspectors or its consultants. The inspection of these items is not covered by this document. Limits of retaining walls included in bridge inspection are stated in Section 5.3.5.2. If, during the course of bridge inspections, deficiencies are discovered on other retaining walls, the applicable DME or RME shall be contacted via email by the bridge inspectors.

4.10 INSPECTION FREQUENCY

SCDOT policy is to inspect all bridges within their established frequency. The responsibility for performing inspections within their established frequencies has been delegated to the appropriate DBIS or consultant Project Manager (PM). Table 4.0 at the beginning of this chapter summarizes the inspections and the related inspection frequencies. The BMQE monitors the conformance of inspection dates with the required inspection intervals.

If a bridge inspection is completed out of frequency, the procedure in Section 4.10.3 shall be followed.

The DBIS or consultant PM is allowed to move bridges within an established frequency (i.e. forward or earlier) for a number of reasons, for example, water flow conditions, access restrictions, special requests, etc.

The DBIS is required to evaluate the upcoming workload from month to month in their district and request consultant services to help, when needed, to meet the frequencies. When scheduling inspections, the DBIS must take into account the type of inspections required. Consultant PMs are also required to review their own workload and communicate any concerns with the BIPM.

4.10.1 Bridge Inspection Frequency Increases

SCDOT does not allow routine bridge inspection intervals to exceed twenty-four months.

4.10.2 Bridge Inspection Scheduling

BMS shall output lists of inspections to be performed in each district in any given month. If the BMS fails to distinguish between which bridges will be inspected by SCDOT and which bridges will be inspected by consultants, the BMO shall produce a list at least 15 days prior to the first of the month.

Each DBIS or consultant Project Manager (PM) will assign the bridges to be inspected in any given month to available BITLs. The DBIS or consultant PM should attempt to evenly distribute the bridges to the available BITLs while attempting to schedule a BITL who has not inspected the bridge in its previous routine inspection. Rotating BITLs improves overall quality of the program.

If the number and/or complexity of the bridges to be inspected exceed the capabilities of the district's inspection staff, then the DBIS shall request consultant assistance by completing and submitting a CIRF; see Attachment 4.1. The CIRF shall be submitted to the BIPM for review and concurrence. CIRFs shall be submitted to the BIPM no later than the 15^{th} of the month for inspections due in the following month. For example for bridges requiring inspection by September 30, the CIRF shall be submitted by August 15.

Consultant inspection requests to be performed over active railroads, inspections which require specialized inspection equipment, inspections which require significant traffic control or inspections which have some other unique requirements must be submitted at least eight months prior to their due date. This will allow for the time needed to properly prepare and plan for inspection.

Bridges with complex components and any associated approach bridges are generally assigned to consultants on a regular schedule by the BMO. Some of these bridges are identified in Appendix C; however, the BMO is responsible for executing consultant contracts for these bridges.

A CIRF for the inspection of the bridges which are already assigned to consultants is not required. The BIPM and the DBIS shall coordinate on bridges which shall be assigned to consultants. If a consultant is requesting another type of inspection using the CIRF, it shall be sent to the DBIS for review and concurrence prior to sending to the BMO. An example would be if a consultant recommends an underwater inspection for a bridge not currently receiving an underwater inspection. The consultant PM is responsible for completing the CIRF, sending it to the DBIS for concurrence, ensuring the CIRF is reviewed by the DBIS and (if warranted) sending it to the BIPM.

4.10.3 Out-of-Frequency

Bridge inspections must be completed either before or during the month in which the inspection is due. The due month is determined by the date of the previous inspection and the frequency for the inspection type. SCDOT is evaluated annually by the FHWA and frequency compliance is a critical metric.

For any out-of-frequency occurrence, Attachment 4.3 shall be used. Attachment 4.3 requires the BIPM to sign the attachment noting out-of-frequency occurrence. At a minimum, FHWA must acknowledge receipt of the form. FHWA may not approve the out-of-frequency occurrence. In some instances, FHWA may approve an out-of-frequency occurrence. This approval may be granted depending on circumstances, but advanced notice is required and sufficient reasoning is needed. An example of a reason for an out-of-frequency occurrence which gets approval from FHWA would be if the bridge is not accessible due to an unforeseen weather event.

If a bridge or portion thereof cannot be accessed in order to complete an inspection during the month it is due, the BITL shall conduct as much of the inspection as possible and complete an inspection report depicting the areas and elements inspected. For areas and components not accessible, a visual inspection from as close as possible shall be done to ensure there are no obvious safety issues. The report shall also clearly indicate areas of the bridge which were not inspected and provide the reason. The BITL shall then return to the bridge to complete the inspection when access is granted and/or possible. The BITL, in coordination with the DBIS, shall establish a schedule which shall be targeted for the inspection to be completed. After the inspection is fully completed, the BITL shall determine the frequency for the next inspection based on when the first inspection was attempted to keep the bridge on cycle. In addition, when the inspection is complete, the completed Attachment 4.3 shall be attached to the inspection report.

4.10.3.1 *Out-of-Frequency Checks*

Out-of-frequency checks shall be performed in order to monitor compliance with the NBIS. The BMQE shall monitor all inspection frequency compliance. At the beginning of each month, the BMQE shall run an Out-of-Frequency Check within the BMS. The out-of-frequency check shall determine all bridge inspections due in the second most recent month which were not performed. For example, on March 1, any inspections overdue which should have been completed in January will be reviewed.

For any bridge which is discovered being out-of-frequency during the check, the BMQE shall inform the DBIS or consultant PM of the non-compliance. Once the status of the inspections has been determined, then required documentation (Attachment 4.3, the Inspection Out-of-Frequency Form) can be initiated, if not already started. This form shall be placed in the Bridge File and attached to the inspection report when performed. The BMQE shall be responsible for confirming that the form is completed for each bridge. The completed form shall include the reason for bridge falling out-of-frequency and the estimated date for completing overdue inspection.

4.11 HURRICANE PREPARATIONS AND SCOUR INSPECTIONS

4.11.1 Safety

As with all activities, safety must be at the forefront of our pre-event planning and preparation activities. Inspectors may be briefed by BMO, a district office or other SCDOT offices on hazards they may encounter and will follow established safety guidelines.

4.11.2 Pre-Event Planning

In the event of an impending storm, SCDOT inspection teams and consultant inspection teams shall take the necessary precautions to secure their homes, offices, and equipment. Equipment shall be maintained at all times, vehicles and boats shall be fueled and inspectors shall maintain a supply of batteries for cameras, fathometer, and flashlights.

4.11.3 Communications

It is essential lines of communications stay open between BMO in Columbia and all inspection teams. With the threat of inclement weather, all the DBISs and BITLs will take their cellular phones home with them. Cellular phones shall be turned on if home or office service is interrupted.

All bridge inspection and selected maintenance personnel are considered essential employees.

If an inspector lives in the affected area and has to evacuate, he or she shall let the DBIS, DME and BMO know where he or she is, via email or a phone call, as soon as he or she has seen to the safety of his or her family.

4.11.4 Staging Area

The BMO will determine the initial staging area for inspection teams at least 48 hours ahead of landfall for hurricanes or at least 24 hours ahead of forecasted peak storm intensity for other storms. Inspection teams and/or maintenance teams from outside the affected area will assemble at the staging area to receive assignments prior to being deployed to the affected areas. Assignments, arrangements and accommodations shall be made, with the assistance of the BMO, when the storm path forecast is more defined.

As soon as the danger has passed and it is safe to proceed, teams will be deployed to the affected areas if needed by the BMO. The DBIS and local inspection teams will be consulted as to the number of teams needed and location of these teams. All directives to the inspection teams will come from the BMO. Most bridges will receive scour inspections and some bridges will receive damage inspections. Reporting requirements are included in Chapter 5.

Some bridges may require an underwater inspection even if an underwater inspection has not been performed on this bridge before. In this case, Attachment 4.1, the CIRF, shall be used to request the underwater inspection.

Inspectors may be briefed by BMO, a district office or other SCDOT offices on what hazards they may encounter, and will follow established safety guidelines. If the BMO in Columbia is in the affected area, SCDOT will notify all members of the inspection program of a new staffing area.

4.11.5 Procedures

When arriving at site, the BITL shall determine immediate needs to evaluate the condition of the structure with emphasis added to safeguard the public.

The Scour Inspection (Post Storm Inspection) Form (Attachment 4.5) may be used to document inspection findings. Critical Findings shall be reported and repair recommendations recorded in accordance with Chapter 8.

If the bridge requires closure because of high water, damage or some other issue, the bridge closing procedure in Chapter 8 shall be followed. If any of these bridges are recommended for closure, then the maintenance should barricade these bridges for temporary closure as evaluations, repairs or replacement will be performed. Bridges will be closed if underwater (over topped) and/or in a pressure flow condition. Superstructures and substructures will be evaluated for displacement and/or damages. Also, if substantial scour is noted in reference to previous inspection reports, the bridge could be closed after review of the pile logs or as-built drawing by the responsible party (see Chapter 8).

4.11.6 Bridge Priority

Bridges across the state will be evaluated to determine priority based on bridge criticality. As soon as the storm subsides and it is safe to begin recovery inspections, these bridges will be evaluated as a priority for scour damage of the bents or piles. Additionally, the bridge’s scour assessment will be utilized for inspection prioritization. Appendix G, which contains a list of scour critical bridges, shall be used in determining bridge inspection prioritization. Bridges on the scour critical list shall be inspected per their POAs. The POAs include requirements for inspection and for special consideration. POAs are included in the Bridge File for bridges which are scour critical.

CHAPTER 5 BRIDGE INSPECTION PROCEDURES

Chapter 5 outlines general procedures including planning, execution and completion of bridge inspections. This chapter also includes reporting requirements. Specialty procedures for culverts are included in Chapter 6. Evaluation requirements for structures are included in Chapter 7.

5.1 SAFETY REQUIREMENTS FOR BRIDGE INSPECTION

For safety, all bridge inspections shall have at least two inspectors present during the time of inspection. It is the responsibility of each person involved in the inspection process to be familiar with the *SCDOT Employee Safety Manual*, *Work Zone Traffic Control Manual* and all applicable Administrative Memorandums.

The most hazardous condition at any bridge site is vehicular traffic. All work zones are to follow the guidelines in the work zone safety guidelines published by SCDOT. All SCDOT bridge inspection vehicles shall be fitted with flashing lights. Inspection vehicles used by consultants shall also be fitted with flashing lights if the vehicles are to remain on the roadway.

By its nature, bridge inspection includes inherent dangers. Inspection staff are often working from elevated heights and often over water; they are working in and around active traffic; they are often working in challenging weather conditions; in working around the abutments of bridges, they are often working along steep, slippery slopes where foot grip can be difficult. They must constantly focus on gathering the pertinent information required for a bridge inspection while also keeping their own safety and the safety of their coworkers and the traveling public in mind. Each bridge inspector shall remember he or she is responsible for his or her own personal safety as well as the safety of others impacted by his or her work. To this end, some policies and procedures are needed to protect staff from the dangers of bridge inspection, to help them recognize hazards, implement controls, and to give them the ability to select, use, and maintain tools and equipment in their work to minimize and, if possible, eliminate accidents, injuries, and near misses.

Generally, causes of accidents can be traced to two root causes: human error and equipment failure. Human errors can, in turn, be broken down into a number of factors, which may include improper attitude, horseplay, personal limitations, physical impairments, boredom, thoughtlessness, and taking shortcuts. Therefore, bridge inspectors must practice good work habits to minimize dangers they may encounter on the job. Inspectors first and foremost must practice common sense when performing bridge inspection activities.

Environmental factors can also be a source of injury. Stinging insects, spiders, snakes and nesting animals can startle or surprise a bridge inspector causing injury or sudden unexpected movements which could result in a fall. The presence of poison ivy, poison oak and electric cattle fences can cause on-the-job injury or, at best, discomfort. In some cases, bridge configurations constituting confined spaces could have limited access entrances, poor oxygen content or toxic gases.

With the physical demands of bridge inspection activities, proper work habits and mental attitude are important. Inspectors also need to be well-rested and alert for their job assignments, maintain good physical health and shall not be under the influence of drugs or alcohol on the job. Even over-the-counter medications can cause impairments which can affect balance or cause drowsiness and shall be used with caution. Good work practices also include common sense activities such as keeping a clean, uncluttered work environment and using tools and equipment properly and for only their intended use. Inspectors who are controlling the basket of a MEWP shall be trained in the operation of the particular type of equipment so movement of the basket is performed smoothly without sudden movements which could surprise a coworker in the basket. Training in the operation of the particular access equipment will also minimize the potential for damaging the equipment or members of the bridge being inspected.

OSHA applies different regulations depending on the nature of the work activity. The *SCDOT Employee Safety Manual* includes requirements for adherence to OSHA regulations. The general industry standards (OSHA CFR 1910) apply to activities like bridge maintenance or inspection, surveying, or wetland assessments. The Construction standards (OSHA CFR 1926) apply to new work on bridges, roadways or other structures. Work, including bridge inspections, will be considered to be a maintenance activity when it meets the following criteria: It is work done for the purposes of making or keeping a structure, fixture or foundation (substructure) in proper condition in a routine, scheduled, or anticipated fashion – work is done to keep a structure in its existing state, preventing failure or decline. Inspections related to the monitoring of work performed by a construction contractor or engineering consultant will be considered construction activity.

The BITL's responsibilities include supervising job procedures and ensuring safe practices are being followed. The BITL not only needs to set a good example for the inspection staff but also shall enforce safety policies and institute corrective actions when these policies are not followed.

Safety is planned into every bridge inspection. The BITL and the inspection team shall discuss the bridge sites, the work to be done during the day and the equipment to be used at a safety briefing; see Section 5.1.10.

5.1.1 Inspection Personnel

Personnel must be physically and emotionally capable of performing inspection duties. They must be well-rested and alert when reporting to work, not be taking any drugs which cause dizziness, drowsiness, or otherwise impair motor skills and decision making abilities or any drugs containing alcohol. They must be properly trained, possess common sense, good judgment and a good attitude. A systematic approach to the inspection process and safety aspects is vital to a good, safe performance.

5.1.2 Personal Protective Equipment (PPE)

Inspection personnel shall use appropriate protective clothing and Personal Protective Equipment (PPE) when performing bridge inspection activities. Clothing worn shall be properly sized (neither too loose nor too tight) and appropriate for the weather conditions. Loose fitting clothing can get caught on members of the bridge, surrounding vegetation and vehicular traffic which presents a safety hazard to personnel on the site. Similarly, clothing which is too tight may restrict movement and personnel's ability to maneuver safely around the bridge site. Well-fitting clothing, which is appropriate for the working conditions, is central to a safe and comfortable working environment. Chapter 8 of the *SCDOT Employee Safety Manual* includes requirements of work attire and protective clothing.

The most common hazards are slips and trips and falls from a ladder or elevated platform. The area around a bridge has small unseen holes or roots which can twist an ankle or cause a fall to the ground. The ground is often wet or has unstable rock which must be walked carefully over. High-top, leather work boots with traction lug soles shall be worn. Safety shoes or boots with toe-impact protection meeting the requirements of ASTM F 2413 or ANSI 241 are required to be worn in work areas where personnel may be carrying or handling materials such as parts or heavy tools which could be dropped and where objects might fall onto the feet or equipment could run over the feet.

Work gloves shall be worn to protect against sharp edges and excessively hot or cold steel. A tool belt or pouch may be worn to provide ready access to frequently used tools but the tools also need to be secured to prevent them from falling on passing vehicular traffic.

Inspection crews on the active roadway shall wear ANSI 107 high visibility safety vests to warn the traveling public.

Hard hats shall meet the requirements of ANSI Z89.1. Bridge inspectors, while exposed to overhead hazards, flying objects, electrical contact and other potential head injury hazards, shall wear a hard hat at all times. All persons in the active roadway and all other designated areas shall wear a hard hat.

Safety goggles or glasses with side shields shall be worn whenever chipping concrete or hammering on bridge members.

Ear protection shall be worn if working around loud pneumatic or power equipment.

A dust mask or properly fitted respirator shall be worn when working in particularly dusty conditions or in the presence of bird droppings to prevent contracting Histoplasmosis, a disease contracted from contact with microscopic fungi borne from decomposing biological fluids such as bird droppings. Dust mask and respirator use shall be in accordance with OSHA regulations: 29 CFR 1910.134.

5.1.3 Advance Work Signs and Safety Cones

Work signs and cones, sufficient to mark the operation with good sight distance for adequate warning, shall be carried in each inspection vehicle. See Section 5.1 for the requirement of flashing lights in inspection vehicles.

For higher volume highways, BITLs shall engage the DTE or the district maintenance office, and consultants will likely need to engage traffic control. At a minimum, consultants shall coordinate traffic control with the DTE; see Section 5.2.5.5. The BITL shall review traffic data, including the ADT and average daily truck traffic (ADTT), when preparing for an inspection to determine what traffic control is needed.

5.1.4 Bridge Deck Walking

Bridge decks must be walked **facing traffic**. The following conditions shall be considered before judging if a bridge deck is safe for walking:

- Shoulder and sidewalk width
- Traffic volume and speed
- Weather conditions (rain, fog, ice, ambient light, visibility)
- Time of Day (peak vs. low traffic volumes)
- Bridge length
- Length of time required on deck for inspection

In the event the bridge deck is deemed unsafe for walking, the deck shall either be walked with appropriate traffic control, mitigation or be walked at another time when safe to do so.

5.1.5 Inspection Equipment

SCDOT inspectors shall maintain their equipment inventory at all times; Table 5.1.5.1 indicates required equipment. Consultant inspectors shall retain all equipment listed in both Tables 5.1.5.1 and 5.1.5.2 (if performing underwater inspections) as they are performing inspections for SCDOT and accessible while under contract.

Tables 5.1.5.1 is included on Attachment 9.4, the District Quality Meeting Form. As part of the district quality meeting, the DBIS will indicate that all equipment listed is in the inspection inventory. Consultants are not required to complete Attachment 9.4. Consultants shall indicate their process for maintaining equipment in their QC Plan; see Section 9.2.3.1.2.2. The BMQE will review compliance with this requirement as part of their role for QA.

Any special inspection equipment not included in Tables 5.1.5.1 and 5.1.5.2 which is needed during an inspection shall be recorded on Attachment 5.4, Inspection Access, Procedures and Equipment Form.

Depending on the size of the bridge and its height above ground level, inspection access could be as simple as ground-level observations. However, determining access methods requires consideration of exact needs, including:

- The topography and features crossed by the bridge which might limit access options; whether traffic interruptions can be tolerated,
- Any load restrictions on the bridge,
- The geometry of the bridge and its sidewalks,
- Bridge rails and fencing and
- A review of whether certain access methods may provide a cost advantage by saving time and labor even at the expense of the equipment costs or rental.

Table 5.1.5.1 Standard Inspection Equipment

General Access	Inspection	Measuring
Hip Wader	Camera	6-Foot Rule Ruler
Chest Wader	Hammer	Probing Rod
Brush Hook – Sickle	Scraper	Level
Extension Ladder	Flashlight/Headlamp	100-Foot Tape
Machete	Wire Brush	Thermometer
Magnifying Glass	Binoculars	Length Measuring Wheel
	Inspection Mirror	Plumb Bob/Protractor
	Shovel	Vertical Clearance Device
	Screwdriver	Crack Gauge
	Drill, Sealant and Caulk	Calipers
	Sounding Chain	D-Meter
	Incremental Borer	Sonar Depth Finder/Fathometer
	Probing Rod	Compass

Table 5.1.5.1 Standard Inspection Equipment (continued)

Note Taking	Personal Protection	Miscellaneous
Inspection Forms	Hard Hat	Drinking Water
Extra Paper	High Visibility Vest	Sunblock
Laptop/Tablet Computer	Safety Glasses / Goggles	Insect Repellent
Field Binder	First Aid Kit	Knee Pads
Clip Board	Safety Shoes/Boots	Extra Batteries
Calculator	Work Gloves	Utility Belt or Tool Belt
Writing Instruments	Ear Protection	Utility Bag
Keel	Dust Mask / Respirator	Eye Wash Bottle
Sharpie / Paint Stick	Two Way Radio	Chargers
Spray Paint	Harness/ Lanyard	Reference Manuals
Plans / Labeling Diagrams	Life Jackets	Phone Numbers

Table 5.1.5.2 Standard Underwater Inspection Equipment

Underwater Inspection
Wetsuit
Drysuit
Facemask
Helmet
Breathing apparatus
Self-Contained
Surface Supplied
Weight belt
Swim fins
Knife
Wristwatch
Buoyancy compensator
Depth gauge
Pressure gauge
Surface Communication

5.1.5.1 *Ladders*

Except where either permanent or temporary stairways or suitable ramps or runways are provided, ladders described in this subsection may be used to give safe access to most elevations. Ladders can be used for inspecting the underside of a bridge or for inspecting substructure units. A ladder shall be used only for those portions of the bridge which can be reached comfortably, without undue leaning.

The use of ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction is prohibited. When ladders with such defects are discovered, they shall be tagged defective and immediately withdrawn from service. Inspection of metal ladders shall include checking for corrosion of interiors of open end hollow rungs.

Portable ladder feet shall be placed on a suitable base, and the area around the top and bottom of the ladder shall be kept clear.

Portable ladders shall be used at such a pitch so that the horizontal distance from the top support to the foot of the ladder is about 1/4 of the working length of the ladder (the length along the ladder between the foot and the top support). Ladders shall not be used in a horizontal position (unless it is specifically designed to be used in a horizontal manner) as platforms, runways, or scaffolds.

Unless protected by the required traffic control measures, ladders shall not be placed in median shoulders, sidewalks, driveways, railroads or any location where they may be displaced by traffic or maintenance activities.

The side rails of the ladder shall extend not less than 36 inches above the landing, wherever possible.

Portable ladders in use shall be tied, blocked or otherwise secured to prevent movement. In most cases, the second inspector holds the bottom of the ladder to ensure the stability of the ladder.

Ladders made of fiberglass or other non-conducting material shall be used where there is any chance the inspector or the ladder shall come in contact with electrical conductors. Portable metal ladders will not be used at these locations. Commercial grade fiberglass ladders must be used near wires. Assume all wires carry a lethal current and treat them accordingly.

A hook-ladder refers to a ladder used to climb down to access components of the bridge.

5.1.5.2 *Scaffolding*

Scaffolds generally provide more mobility than rigging. They provide an efficient access alternative for structures which are less than 40 feet high and over level ground with little or no traffic below. The erection of scaffolding must be performed in strict compliance with manufacturer's instructions. Unstable objects such as barrels, boxes, loose brick, or concrete blocks, shall not be used to support scaffolds or planks. The scaffold shall be tied off at the top to prevent tipping. Personnel using scaffolding must be tied off to an independent external surface.

5.1.5.3 *Safety Harness and Lanyards*

When walking or working on an unprotected surface 6 feet or more from the ground or a lower level, when working from the basket of a MEWP or using assisted climbing techniques, the inspector shall wear a properly adjusted full-body harness, shock absorbing lanyard with double locking snap hooks, and (if needed) a cross-arm strap with a D-ring. The harness shall meet the requirements of ANSI A10.14, ANSI/ASSE Z359, or the current version of 29 CFR 1910.66, 1926.104 or 1926.502.

Safety harnesses and lanyards will be used only for employee safeguarding. Any safety harnesses or lanyards actually subjected to service loading, as distinguished from static load testing, shall be immediately removed from service and will not be used again for employee safeguarding. The recommended service life of the equipment shall not be exceeded.

5.1.5.4 *Rigging*

Rigging of a structure with cables and platforms is used to gain access to floor systems and the underside of main load-carrying members in areas where access by other means is not feasible, or where special inspection procedures like NDT and pin inspection are required. Rigging is typically used on bridges over water, over busy highways and railroads where there is sufficient clearance and for structures which are over 40 feet high.

5.1.5.5 *Climbers*

Climbers are mobile inspection platforms which climb steel cables and are capable of supporting two or more inspectors. They are ideal for inspecting high piers or hangers of suspension bridges. Climbers are regulated by OSHA Standard 29 CFR 1926 Subpart L as a form of scaffolding.

5.1.5.6 *Floats*

Floats are wooden-plank work platforms suspended by ropes to provide access to bridge components. A float is typically used in operations where the bridge inspector will be at a particular location for a relatively long period, performing a FCM inspection, monitoring or performing a NDT. Floats are also regulated by OSHA (1926.451) as a form of scaffolding.

5.1.5.7 *Boatswain's Chairs*

Boatswain's chairs (also known as Bosun's chairs) are suspended from cables or ropes and carry only one bridge inspector at a time. The chair is raised and lowered with a block and tackle device. Boatswain's chairs are regulated by OSHA (1926.552) as a form of scaffolding.

5.1.5.8 *Waders*

Certain inspection locations may require the use of waders to comfortably and safely access elements of the bridge to be inspected. Personnel must be aware of the water depth in which the work is taking place. If the wearer wades into water deeper than the waders, the water can fill the inside of the waders and become a drowning hazard. Prior to and after each use, the waders shall be inspected for defects which would compromise the unit's ability to keep out water. Defective units shall not be used.

5.1.5.9 Life Jackets or Buoyant Work Vests

Workers exposed to a risk of falling into the water from a height of 6 feet or more, that are not protected by railings, netting or OSHA-approved fall arrest system (lanyard or harness; see Section 5.1.5.3), must be provided with United Stated Coast Guard (USCG) approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used.

Where inspectors must work without being tied off, these additional safety devices must be available: a ring buoy and a skiff. The ring buoy must have at least 90 feet of line readily available for emergency rescue operations. A lifesaving skiff shall be immediately available (depending on situation) at locations where inspectors are working over or adjacent to water.

5.1.5.10 Boats or Barges

Boats or barges may be used for bridges over water. A boat can be used for visual inspection with binoculars or for taking photographs. A barge can be used as a work platform for cranes with buckets or high-reach manlifts. Boats and barges are also used as work platforms for staging underwater inspections.

A safety boat with life jackets and a ring buoy on board shall be in the water at the approximate location beneath the inspectors. However, do not place the boat directly beneath the inspectors.

5.1.5.11 Underwater Inspection Safety

All diving operations shall be conducted in accordance with the current applicable OSHA standards. The consultant performing the underwater inspection shall be responsible for providing and inspecting all diving equipment necessary to safely and properly conduct the inspections. Diving operations may be conducted with either SCUBA or surface supplied equipment. During the dive, equipment with surface to water voice communication shall be used to ensure thorough and accurate reporting of underwater conditions.

5.1.5.12 Mobile Elevating Work Platforms (MEWPs)

The following types of mobile elevating work platforms are commonly used by bridge inspectors. If it is determined an aerial or UBIU is required to access the bridge components for inspection, advanced planning is required to either schedule the equipment, if state owned, or to determine availability and rent the equipment from an outside source.

The use and operation of MEWPs shall be in accordance with the following:

- ANSI/SAIA A92.22-2018 Safe Use of MEWPs,
- ANSI/SAIA A92.24-2018 Training Requirements for the Use, Operation, Inspection, Testing and Maintenance of MEWPs,
- OSHA 29 CFR 1926.453 –Aerial Lifts and
- OSHA 29 CFR 1910.67 – Vehicle-Mounted Elevating and Rotating Work Platforms

These standards include requirements with respect to MEWP inspection, required classroom/on-line training, hands-on training and unit familiarization. Inspectors shall have their year of training, training company and level of training indicated on the Inspection Team Qualification Tracking Log (Attachment 9.1). Level of training shall be either occupant, operator or supervisor. Only qualified personnel shall occupy, operate or supervise the use of a MEWP.

Tying off to an adjacent pole, structure or equipment while working from MEWPs shall not be permitted. A safety harness shall be worn with a lanyard attached to the equipment when in use. MEWP load limits specified by the manufacturer shall not be exceeded. The MEWPs shall be inspected and serviced regularly and kept in good repair. Operators shall avoid moving a MEWP with the lift or bucket extended unless (as the UBIU) it is intended for this type of operation. Extreme caution shall be exercised.

5.1.5.12.1 Manlift

A manlift is a MEWP with a work platform or bucket with capacity for one or more bridge inspectors. The bucket is attached to a hydraulic boom mounted on a carriage. An inspector drives the carriage using controls mounted in the bucket. This type of vehicle is usually not licensed for open road use on highways. Some manlifts are equipped for all-terrain use and can operate on unimproved surfaces below bridges.

5.1.5.12.2 Bucket Truck

A bucket truck is similar to a manlift; however, a bucket truck can be driven on a highway and the bridge inspector controls only the bucket, not the movement of the truck. The reach varies typically from 25 to 50 feet. The turning range or rotational capability of the turret varies with each type of vehicle. Bucket trucks offer extended reach and turning range and have outriggers which are lowered from the truck chassis to increase stability. Bucket trucks equipped with telescoping booms are capable of extending and retracting, providing for greater flexibility and reach from a given truck location. Some vehicles can move along the bridge during inspection activities, either without outriggers or with wheeled outriggers.

5.1.5.12.3 Under-Bridge Inspection Unit (UBIU)

An UBIU is a specialized bucket truck with three or more booms designed to reach under a bridge while positioned on the deck. Standard features include a one-person or two-person bucket on the end of the final boom; a rotating turret to provide maximum flexibility; outriggers with wheels to allow for moving the unit during inspection activities; and a telescoping third boom to extend and contract, allowing for greater reach under the bridge. Optional features available include a telescoping second boom to extend and retract for greater vertical movement; an additional fourth boom to allow even greater vertical reach, (especially on bridges with deep superstructure members); a multiple-person work platform on the third boom with an access ladder on the second boom; and models offering the capability of interchanging a bucket and a platform on the third boom, as desired.

5.1.6 Tools

All hand and power tools and similar equipment shall be maintained in a safe condition. Impact tools such as chisels shall be kept free of mushroomed heads. The wooden handles of tools shall be kept free of splinters or cracks. When a power tool is used, all safety rules recommended by the manufacturer shall be followed.

Misuse of tools is the major cause of accidents on the job. Each tool is designed for a particular function and shall be used accordingly. Keep tools in good repair, sharpened if required, and clean. Use tools as intended only. Use the right tool for the task. Avoid injury due to tool slippage, which could cause a fall.

Tools for cleaning bridge members shall be present during relevant inspections. Tools for cleaning may include:

- Wisk broom - used for removing loose dirt and debris
- Wire brush - used for removing loose paint and corrosion from steel members
- Scrapers - used for removing corrosion or growth from member surfaces
- Flat bladed screwdriver - used for general cleaning and probing
- Shovel - used for removing dirt and debris from bearing areas

5.1.7 Testing

5.1.7.1 Non-Destructive Testing (NDT)

NDT can be used to augment visual inspection. Generally, NDT is not practical for large scale use on a bridge unless a defect has first been detected by visual means. NDT can be used to highlight or define the extent of the defect. Some BSIPs may require NDT.

Since most types of NDT require special equipment and detailed instructions to perform the various tests and correctly interpret the results, it is essential to have the NDT performed and interpreted by qualified personnel.

The BIPM or another designee is responsible for coordinating of specialty NDT by consultants or by the SCDOT material laboratory. If, during the course of inspection, a BITL recommends specialty NDT, the recommendation shall be made by email to the BIPM using NDT Request Form; see Attachment 4.4.

5.1.7.2 Destructive Testing (DT)

DT can be used in evaluating bridge materials. This requires taking samples from the various bridge components. Samples from low stress areas of steel beams can help the inspector determine the type and strength of the steel. Taking samples out of concrete members can be useful for identifying hidden defects as well as determining the strength of the concrete. Taking small samples from timber members using an incremental borer may help detect the presence of interior voids; however, this destructive process may cause damage to the timber element.

DT is not usually recommended except in cases where it is necessary to evaluate the structure before major rehabilitation or to determine material properties for analysis. It is imperative sample holes be appropriately patched or plugged to prevent future deterioration. Some BSIPs may require material testing.

DT may only be performed with the approval of the DBIS for SCDOT performed inspections. For consultant performed inspections, the BITL of the inspection shall contact the DBIS in the applicable district where the inspection is taking place and request approval, via phone or email, prior to performing DT. If approval is given via phone, the consultant shall recap the phone conversation in an email to the DBIS. The only exception to the requirement for consultants to contact the DBIS is if the DT requirement is specifically stated in the bridges' inspection procedure or in the consultant's scope of work for a particular bridge.

5.1.8 Other Access Means

5.1.8.1 Permit-Required Confined Space

Inspectors who are required to enter into confined or enclosed spaces must have been trained so they are appropriately cautioned as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. Refer to Subsection 2.2.5 of the FHWA's Bridge Inspector's Reference Manual (BIRM). Inspection of locations where toxic fumes or lack of sufficient oxygen may be hazardous falls into this category.

5.1.8.2 Catwalks

Caution shall always be used. If accessible, inspection of the catwalk system shall be performed prior to the use of the catwalk. It shall be viewed as a bridge component; the catwalk system is subject to deterioration.

5.1.8.3 Climbing

On some structures, if other access methods are not practical, inspectors may climb the bridge components. Climbing can be divided into two categories. The first category is assisted climbing, in which the bridge inspector climbs while connected to a safety lifeline or cross-arm strap secured to the structure. The second category, rope access inspections, uses rappelling or other rock climbing techniques and safety equipment; see Section 5.1.8.5. OSHA prohibits free climbing on roadway bridges in which the inspector is not secured to the bridge. The CFR Title 49 Part 214 allows free climbing on railroad bridges under certain conditions.

5.1.8.4 Rigging and Staging

Rigging and staging require a support staff with a qualified rigger to insure adequacy and safety.

5.1.8.5 Industrial Rope Access

The use of industrial rope access shall require a support staff with qualified and certified riggers and climbers to insure adequacy and safety. Unless waived by the BIPM, rope access bridge inspectors are to be certified to Society of Professional Rope Access Technicians (SPRAT) Level I (Worker), Level II (Technician) and Level III (Supervisor).

5.1.9 First Aid, Emergency Contacts and Accidents

If an incident occurs which results in a personal injury, the other crew member must be able to provide first aid. All inspectors are required to attend a first aid and CPR class at intervals no greater than two years. In the event of an accident, **9-1-1** shall be called immediately if needed. Then, the DBIS, DME, BMO or consultant PM shall be called. If leaving the bridge, the inspectors must also follow a route plan so they can be located if cell service is lost.

First aid and CPR training is tracked on the Inspection Team Qualification Tracking Log which is detailed in Section 9.2.1. Each inspection vehicle shall be equipped with a first aid kit with periodic replenishment of contents as they are used or expired. The first aid kits shall be inspected annually for periodic replenishment.

5.1.10 Safety Briefing

It is good practice for the BITL to perform a safety briefing prior to the start of inspection work or when conditions change. The BITL shall perform the safety briefing on the morning of the first day of inspection for a bridge or on subsequent days when work conditions or personnel working on the bridge may change. Topics to be discussed at the safety briefing might include:

- Individual worker assignments,
- Use of the buddy system,
- Any special considerations for the particular bridge being inspected, including potential electrical hazards from power facilities on the bridge or from overhead power lines,
- Safety procedures for work over water, other roadways, or railroads,
- Weather conditions,
- The types of traffic control which shall be used
- Methods of bridge access which shall be used, such as ladders, MEWPs and waders,
- Safe working zones,
- Location and phone number of nearest first responders or medical services and
- Communication protocol, including two-way radios and cell phones with cell phone numbers for all staff on the job and for the DBIS, DME, BMO or consultant PM.

5.2 PLANNING AND SCHEDULING

Prior to inspecting a bridge, the BITL must plan and prepare in order to use time efficiently, to have adequate knowledge of the bridge and to obtain the necessary equipment. Bridge inspections are conducted to determine the condition and functionality of the bridge elements and to provide a continuous record of the bridge condition and the rate of deterioration. A successful bridge inspection program is dependent on proper planning and techniques, adequate equipment, understanding the properties of bridge materials, and the types of defects and their locations.

In particular, the BIRM describes the general inspection procedures to be followed for inspecting any concrete, steel or timber bridge, and the BSIPs to follow for inspecting a given bridge. These steps can be used by the inspector as a checklist to help accomplish the inspection and to help spot particular types of problems to which a given bridge or bridge element will be prone. Following these procedures shall help ensure a thorough and comprehensive inspection is achieved.

Some bridges have BSIPs, specific access or equipment requirements. These bridges shall have a copy of Attachment 5.4 “Inspection Access, Procedures and Equipment Form” in their Bridge File. This form shall be reviewed prior to an inspection. The form does not require an update every inspection or site visit unless something on the form needs updating. If the procedure is detailed, documentation of the BSIP using the template available in Attachment 5.28 and Attachment 5.4 may be required.

Some bridges may be located in one district but another district is responsible for the inspection. State Bridge Inventory (SBI) Item 312 (Inspection District) is used to determine which district is responsible for inspecting the bridge. Likewise, some bridges may be located in one county but another county is responsible for maintenance. SBI Item 311 (Maintenance County) is used to determine which county is responsible for maintaining this bridge. The DBISs are responsible for coordinating inspections and requesting maintenance for any bridges where SBI Item 312 does not match NBI Item 02 (District) or where SBI Item 311 does not match NBI Item 03 (County).

5.2.1 Review Past Inspection Reports, Bridge-Specific Inspection Procedures, Bridge Database, Existing Bridge Plans and Bridge Repair Plans

The BITL shall review previous reports, structure plans, maintenance and repair records and initial inspection reports. This review shall familiarize the inspector with the structure and areas which require special attention. The inspector shall determine any special equipment or maintenance of traffic needed for the inspection. Coordination of equipment and additional manpower are required for an orderly and complete inspection.

A good inspection method is essential in order to protect the safety of the public and to safeguard the public’s investment in bridge structures. The field investigation of a bridge shall be conducted in a systematic and organized manner so it will be efficient and minimize the possibility of any item being overlooked.

Some structure and roadway information which would be helpful for inspection preparation is maintained by RDS. Attachment 5.1 may be used to request any structure and roadway information from RDS.

5.2.1.1 Bridge File

The Bridge File is detailed in Section 2.2.1 and in the BFP. The Bridge File may contain existing plans and shop drawings. The Bridge File should also contain past inspection reports. Reviewing these past reports not only helps the inspector identify problem areas of the bridge previously documented, but they may also document the progression of damage or deterioration over the course of multiple inspections, thus allowing the inspector to identify trends or problem areas worsening over time. The inspection reports may also include past photographs and field sketches documenting the condition of the bridge.

5.2.1.2 Existing Plans

If as-built plans and/or plans of any repairs or rehabilitation projects are available, they shall be reviewed to help the inspector gain an understanding of the bridge configuration and structure type as well as allow the inspector to plan ahead for bridge inspection access. Typically, if existing plans are available, they would be available from SCDOT Plans Online. Another helpful resource is any available set of shop drawings produced by the contractor or the contractor's fabricators at the time the bridge was originally built or rehabilitated

5.2.1.3 Load Rating

The load rating summary shall be reviewed for information on a posting requirement or other considerations which need to be taken into account from the load rating. The review of the full load rating is not required by the inspection team. The first load rating shall be performed during the design phase of a project through the Preconstruction Office. Considerations for load rating including dead load assumptions and the level of deterioration on primary structural members should be reviewed. Additional information on the requirements for bridge load rating is included in the LRGD. At a minimum, the BITL shall review the following items prior to conducting an inspection:

- The Load Rating Summary Form (LRSF),
- The Posting Form (if required) and
- The labeling diagram included with the load rating; see Section 5.2.1.3.1, located in the Bridge File

The BMO shall be notified via email when no load rating documentation exists in the Bridge File.

5.2.1.3.1 Labeling Diagram

To promote uniformity in reporting inspection data, all bridge components shall be oriented using the standard conventions included on the labeling diagram outlined in Chapter 5 of the LRGD. Inspectors shall notify the BMO if the labeling diagram is missing or incorrect.

5.2.1.4 Scour Assessment

If the structure is over water, the scour assessment summary shall be reviewed for information regarding the waterway or channel which needs to be taken into account during inspections. The review of the full scour assessment is not required by the inspection team. The first scour assessment shall be performed during the design phase of a project through the Preconstruction Office. At a minimum, the BITL shall review the following items prior to conducting an inspection for a bridge over a waterway:

- NBI Item 113 Numerical Code
- Scour Assessment Summary (including previous assumptions and/or conditions used)
- Scour Plan of Action if bridge is scour critical
- Previous Inspection Report with waterway information (if a basic channel survey was performed), which includes the Scour Stream Ground Profile
- Previous Underwater Inspection Report (if a detailed channel survey was performed)

The BMO shall be notified via email when no scour assessment documentation exists in the Bridge File for any bridge over water or if no Scour Plan of Action exists for a scour critical bridge.

5.2.1.5 Preparation for FCM Inspections

The BSIP for the FCM inspection shall be located in the Bridge File. If a BSIP for the FCM inspection is not present, the BMO shall be notified via email and a qualified engineer will need to develop them prior to the inspection taking place.

The BSIP for the FCM inspection shall:

1. Be placed in the Bridge File. If missing, notify the BMO as stated above.
2. Include a checklist for use by inspectors in the field during a FCM inspection.
3. Indicate proper advanced planning which must be done prior to inspection. This work is usually based in the office and includes a review of plans or the BSIP for the FCM inspection. See Items 6 and 7 below.
4. Identify FCMs. The BSIP for the FCM inspection shall identify, by photograph, diagram or sketch, which parts of the bridge require hands-on inspection and the location of each FCM. Table 5.2.1.5 shows a list of the types of bridges in which FCMs may be found.

Table 5.2.1.5 Bridge Types and Fracture Critical Members

Bridge Type	Component(s) which may be Fracture Critical Members
Two-Beam / Two-Girder System	<u>Simple Spans</u>: Each beam or girder shall be considered a FCM as failure of either one could cause the bridge to collapse.
	<u>Continuous Spans</u>: In general, at the midpoint of the span, the bottom of the girder shall be considered FCM, and over the pier, the top of the girder shall be considered FCM. A professional engineer may need to assess the bridge to determine the actual redundancy and presence of FCM elements.
	<u>Cantilever-Suspended Span</u>: In addition to the bottom of the girder at mid-span and the top of the girder over the pier, the top flange and adjacent portion of the web in the area of the cantilevered support shall be considered a FCM.
	<u>Floor beams</u>: To define a floor beam as a FCM, one or more of the following conditions must exist: • Flexible or hinged connection to support girders, • Floor beam spacing greater than 14 feet, • No stringers connected to the floor beams supporting the deck, or • Stringers not continuous over floor beams
Truss Systems	<u>Lower Chords</u>: Lower chords of trusses are usually FCMs. This determination is based on the fact most truss bridges are simple-span and employ only two trusses and thus are considered bridges with FCMs. The analysis of a professional engineer may be required to evaluate the bridge for FCMs if it is not simple span.
	<u>Truss Members (Tension)</u>: For inspectors, all truss members in tension shall be regarded as FCMs. The exception is, when a detailed analysis by a professional engineer verifies loss of a member would not result in collapse of the bridge or major component.
	<u>Other Elements within Truss Bridges</u>: • Pin-connections: Pin connections on truss bridges shall be considered FCMs. • Fatigue-critical details.
Tied Arches	The tied arch is a variation of the through arch with one significant difference. In a through arch, the horizontal thrust of the arch reactions is transferred to large rock, masonry, or concrete foundations. A tied arch transfers the horizontal reactions through a horizontal tie which connects the ends of the arch together, like the string on an archer's bow. The tie is a tension member. If the string of a bow is cut, the bow will spring open. Similarly, if the arch tie fails, the arch will lose its compression and will collapse. The tie girder which keeps the supports from spreading apart is in tension and shall be considered a FCM.
Other FCM Bridge Details	<u>Steel Cross Beams</u>: At mid-span, the lower portion of the I-section or box beam is in tension and shall be considered a FCM. Where steel cap girders and continuous longitudinal beams are framed together, the flanges and webs may be considered FCMs.

Table 5.2.1.5 Bridge Types and Fracture Critical Members (continued)

Bridge Type	Component(s) which may be Fracture Critical Members
Other FCM Bridge Details	Steel Bent Caps: The majority of steel bent caps are considered FCMs. In general, at the midpoint of the span between supporting columns or piles, the bottom of the bent cap shall be considered a FCM, and over the supporting columns or piles, the top of the bent cap shall be considered a FCM. The exceptions are those where support columns or piles provide load path redundancy; i.e. if a support column or pile is directly beneath each supporter girder. A structural engineer may need to assess the bent to determine the actual redundancy and presence of FCMs. For additional clarification on load path redundancy bridges; see *NCHRP Report 458 Redundancy in Highway Bridge Substructures*.
	Pin and Hanger Supports: The pin and hanger connection used to support a suspended span from a cantilever span shall be considered a FCM if the member is non-redundant. The pin connection and hanger support in a two-girder or three-girder system is a FCM as the bridge has no built-in redundancy. The same connections in a multi-beam system (more than 3 beams) are not FCMs as the bridge has a high degree of redundancy. Pin connections in such bridges shall be inspected with the same techniques and methods as FCM pins.
Note regarding secondary members as FCMs: Secondary members such as diaphragms and stiffeners are rarely considered FCMs since they are seldom used in a manner where failure would lead to a structure collapse. However, use caution in evaluating certain truss members which may appear to be secondary when, in fact, their attachment to FCMs can provide a starting place for the main member failure. As an example, diaphragms used in horizontally curved FCM units are almost always FCM units. These elements are almost always classified as primary members due to the forces they are carrying, and they may be considered FCMs.	

5. Note any particular or unique members in the structure which may require special field attention, such as built-up tension members composed of individual pieces.

6. Include necessary access to the FCMs including special equipment needs. This will also include lighting adequate to identify small defects. It is required to keep a list of the equipment needed for the FCM inspection in the BSIP. **The equipment will need to be sufficient to provide hands-on access to 100% of the FCM.** The inspector shall be no further than 24 inches from the surface being inspected and shall work with a light source of at least 50 foot to 100 foot candles. The best viewing angle is at approximately 120°.

7. Identify necessary special tools and equipment which may be required to inspect and evaluate the FCM once access is gained in addition to the normal inspection gear.

    - A high-pressure washer is often useful in cleaning areas where a large accumulation of debris, bird nests, or bird droppings might obscure view or inhibit inspection access of FC areas.
    - Some BSIPs for the FCM inspection may require the use of NDT or material testing, such as an ultrasonic thickness gauge on box-type bent caps.

8. Discuss the FCM inspection workflow required. The BITL is required to discuss the workflow with all the members of the inspection team so they understand their role in the inspection.

9. Include any unique aspects of a bridge which belong in the BSIP for the FCM inspection. This may include:

    - FCMs which are in high stress areas or are fatigue-prone details (include fatigue classification); see Section 5.4.4.2 which includes needs for required photographs of FCMs and FPDs,
    - Any narrative describing what types of flaws and the locations of the flaws noted in previous inspection reports and if the narrative needs to appear in the FCM inspection report, and
    - Any fabrication, transport, erection, construction and accident damage or defects (scrapes, dings, flaws, tack welds, plug welds, etc.) in the FCMs and the locations of these members.

10. Discuss any specific documentation requirements beyond the requirements for FCM inspection report included in Section 5.4.4.7.
11. Discuss process to update the BSIP for the FCM inspection, if needed.

5.2.1.6 *Preparation for Inspections of Bridges with Complex Components*

Some bridges in South Carolina require special consideration prior to and during inspection. SCDOT defines bridges with complex components as bridges that fall into at least one of the following categories as stated in Section 4.5 of this guidance document.

A completed copy of Attachment 5.4, Inspection Access, Procedures and Equipment Form, shall be placed in the Bridge File noting any BSIPs for bridges with complex components. Procedures for bridges with complex components shall include the following: identification of complex features, needed access, required equipment and qualification for inspecting personnel. Some inspection procedures for bridges with complex components may require NDT or material testing. Material testing may include advanced inspection methods defined in the MBE. If there is not a BSIP for a bridge which requires one, the BMO shall be notified via email. Refer to Appendix C for a list of bridges meeting the above criteria.

5.2.1.6.1 *FHWA Complex Bridges*

Bridges that meet the FHWA Complex Bridge definition are included in the list of complex bridges, but have components that may require special training.

5.2.1.6.2 *LSS and LSC Bridges*

These bridges may require special access requirements due to the length of the span. Special traffic control considerations may result. See applicable sections from Chapter 5 for more information and requirements. LSS and LSC bridges likely require a MEWP for the inspection of the long spans.

5.2.1.6.3 *MSM and MSA Bridges*

These bridges require special planning due to the overall bridge length and number of components to be inspected. Many of these bridges are causeways over water and other wetlands. It is likely that special traffic control consideration will be necessary to efficiently inspect the bridge. The BITL should develop an inspection plan to effectively manage the workload. A larger inspection team should be considered to minimize lane closures and other impact to the public. See applicable sections from Chapter 5 for more information and requirements.

5.2.1.7 *Preparation for Underwater Inspections*

Per ADCI, the minimum amount of personnel comprising a dive team is never less than three. Certification requirements for dive team members are included in BIGD Sections 3.1.1.4 and 3.1.3.4.

Prior to mobilization for every underwater inspection, the consultant performing the inspection shall provide the BIPM (or designee) with a copy of their dive plan. The dive plan shall include ADCI certification for at least three dive team members, including the BITL. This document shall be added to the Bridge File. The dive plan is unique for each mobilization. The dive plan shall be uploaded to the Bridge File according to the BFP.

The BSIP for an UW inspection should include a checklist of action items for use in the field during the inspection. BSIPs for UW inspections shall include, but are not limited to, identifying all underwater elements, physical scour countermeasures, needed access, inspection equipment, structural details, hydraulic features and characteristics, risk factors, inspection methods and required certifications of inspecting personnel, if different from certifications listed in BIGD Sections 3.1.1.4 and 3.1.3.4.

The BSIPs for UW inspections shall be located in the Bridge File. The BSIP for the UW inspection is different from the dive plan required during every underwater mobilization; the BSIP for the UW inspection may not change from inspection to inspection. If BSIPs for UW inspections are not present, the BMO shall be notified and a qualified engineer will need to develop them prior to the inspection taking place.

5.2.2 Determine Required Inspection Documentation and Preparing Needed Sketches

In reviewing the available information for the bridge, the inspector will begin to develop an understanding of the bridge. In preparation for the upcoming bridge inspection, it may be necessary to prepare sketches or tables in advance to be used for documenting current conditions to be more efficient in the field and to more clearly record crucial inspection findings. For example, prior to going out into the field for the bridge inspection, a table may be prepared to record bearing and expansion joint movement data or sketches may be prepared for use in recording crack locations and sizes for the underside surface of the bridge deck or for individual piers or abutments. Inspectors with tablets or portable computers which may be used during the inspection are encouraged to download all inspection documentation in the office prior to inspection mobilization.

5.2.3 Arrange for Access and Other Inspection Equipment

A critical component of any bridge inspection preparation is determining how the bridge components will be accessed during the inspection. In addition, depending on the nature of the bridge components, such as whether the bridge includes FCMs requiring hands-on access to 100% of the FCM, the access requirements may require more rigorous planning. Attachment 5.4, Inspection Access, Procedures and Equipment Form shall be placed in the Bridge File noting any special equipment, inspection procedures and access or bridge location requirements.

5.2.4 Arrange for Advanced Vegetation Control or Advanced Bridge Washing

It is important bridge components are free of vegetation, debris, animal nesting materials and bird droppings to allow the most efficient use of the inspection team's time in the field. Therefore, coordinating with maintenance personnel in advance of the inspection is important to ensure required vegetation management and bridge cleaning activities are completed before the inspection team arrives at the bridge site. Additionally, some environmental regulations may limit periods when active nests of migratory birds, such as swallows, may be removed.

If, from prior experience or from reviewing the previous inspection report, a BITL anticipates a bridge inspection will be hindered if vegetation control is not performed or if a portion of a bridge is not washed, the BITL shall formally notify the RME of upcoming inspections. Attachment 5.2 may be used to send notification to the RME.

Attachment 5.2 does not have to be completed for each bridge. All bridges in a single county which will be inspected and required vegetation control or advanced bridge washing should be included to limit the number of correspondences.

This notification shall be sent at least 60 calendar days before the potential date of bridge inspections. If a consultant BITL has a similar request, it shall be sent to the DBIS at least 75 calendar days before the potential date of bridge inspections to allow for the DBIS to properly send the notification to the RME. The consultant shall prepare the letter for the DBIS to send. If they wish to do so, the DBIS can combine requests for SCDOT and consultant inspections for a single county.

Inspectors should directly coordinate with county or municipal maintenance, if possible, for municipality and county owned bridges for advanced vegetation control or bridge washing. Consultants shall discuss with the DBIS if Attachment 5.2 for bridges owned by a county or municipality is needed depending on the owner.

5.2.5 Execute Required Agency Notifications and Permits

Many bridges cross facilities requiring advanced notification or permits with other agencies. If coordination is required, notes on the coordination required shall be placed in the Bridge File for future inspections. Coordination required shall be noted using Attachment 5.4, Inspection Access, Procedures and Equipment Form. Contact information (name, phone number or email address) shall be placed in Attachment 5.4. **<u>Do not</u>** place contact information in inspection report under the **Miscellaneous** heading.

5.2.5.1 Coordination with USCG

Bridges over navigable waterways, such as the Cooper, Ashley, Stono and Waccamaw Rivers and the Intercostal Waterway, may require advanced notice to the USCG so waterway operators can be advised of the inspection activities, especially if the inspection will require the arms of a UBIU to be extended below the bridge where it could conflict with waterway traffic or if the inspection interferes with the operation of the movable bridges.

5.2.5.2 Coordination with Railroad Entities

Bridges over railroads may require notification of the railroads so inspection activities do not conflict with active train traffic. In addition, the use of a railroad flagger may be required to control train movement during bridge inspection activities. If railroad right-of-way must be crossed or used to provide bridge access:

- The bridge inspector may need to have a railroad flagger present,

- A right-of-access permit may need to be obtained and/or,
- Railroad insurance may need to be obtained.

The railroad shall be notified far enough in advance to allow time to schedule a flagger for the inspection and to obtain the access permit. The BITL is responsible for coordinating with the various railroad companies in South Carolina. Appendix I contains a list of railroad companies in South Carolina and a state rail map. SI&A data (NBI Items 05 and 06) may include a railroad name that is outdated if a railroad ownership status has changed. If an incorrect railroad name is included in SI&A data, the BITL shall inform RDS via email using Attachment 5.1.

The BITL will need to determine the need for the following which all pertain to potential coordination with railroad entities:

- Right of Entry (ROE) or Right of Way (ROW) permits which may be required to access railroad property. Training (either safety and/or security training) may be required for ROE and/or ROW permits to be issued or for inspectors to access railroad property and
- Any railroad insurance.

If, during the course of inspection activities, inspectors or equipment may foul the track, a ROE or ROW permit may be required. Federal requirements for on-track work and on-track safety shall be followed by inspectors in accordance with 49 CFR Part 214 Railroad Workplace Safety. Various railroads may have different requirements. Generally if the inspection process requires work in a pre-established access zone then a flagger is likely needed since the work may foul the track. A sample access zone where work may foul the track is shown in Figure 5.2.5.2.

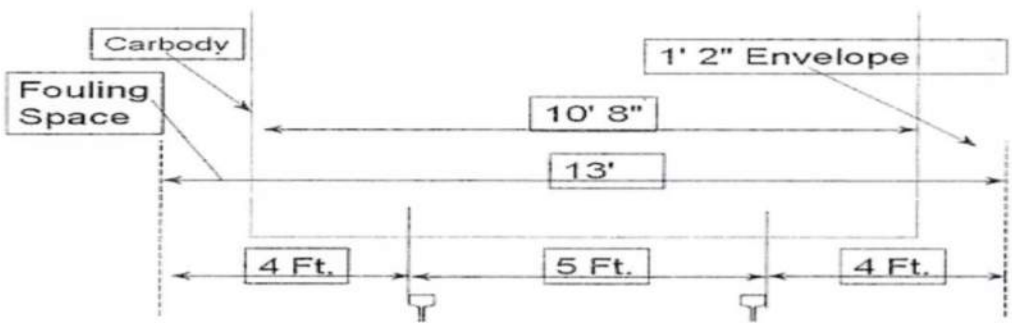


Figure 5.2.5.2 Zone where Inspection Work may foul a Railroad Track

5.2.5.2.1 Procedures on Obtaining Railroad Flaggers

The necessity of railroad flagging services will be determined by the BITL responsible for inspection. When a bridge has been defined as a bridge requiring railroad flagging support, the BITL shall insure this notation is included in the Bridge File using Attachment 5.4.

5.2.5.2.2 Scheduling Railroad Flaggers

When a bridge requiring railroad flagging support is due for inspection over the tracks, the BITL or his/her designee shall schedule, in advance, requests for flagging services so the frequency of inspection will be maintained. The lead time for railroad permits may be over eight months.

The BITL or his/her designee shall:

1. Determine status (ownership) of the ROW involved with the bridge; see Appendix I.
2. Establish the type of inspection required, type of equipment and how it will affect the railroad's operation.
3. Contact the appropriate railroad to schedule a flagger.
4. Inform railroad contact of the following:
   - Bridge inspection for SCDOT (by what consultant if appropriate),
   - Type of inspection required,

- Location of bridge to be inspected by town, road name, and railroad milepoint (if available),
- Date and time you would like to perform inspection,
- Number of hours (days) your inspection will take and
- Method of reimbursement to railroad.

5. Leading up to the inspection, confirm date(s) of inspection, bridge(s) to be inspected, time(s) and meeting place(s) with the railroad and/or flagger.
6. Coordinate with the railroad to determine training and security requirements for inspectors within the railroad ROW. This coordination should be completed well in advance of mobilizations to allow time for required trainings.

In the event the railroad will not provide a flag person within a reasonable time, the BITL shall keep a record of refusal indicating the name of the railroad company, contact person who refused to provide a flag person, date and the reason for refusal.

5.2.5.2.3 Payment to Railroad Entities

During and immediately after the inspection, the BITL will complete the Flagging Service Form (Attachment 5.3).

When a railroad flagging service invoice is received, the BITL shall verify the invoice is for the flag protection requested by the inspectors. The invoice should match the completed Attachment 5.3.

If the invoice received includes various bridge inspection flagging services, the BITL shall maintain a copy of all the flagging service forms.

Invoiced costs for any safety training and security reviews for railroads should also be tracked.

For SCDOT performed inspections, the DBIS will review invoices paid on the district level and submit to the BMO for review and approval.

For consultant performed inspections, the consultant PM will review and submit to the BMO costs invoiced to the consultant. The cost shall appear as a direct cost on the consultant’s invoice to SCDOT.

Invoices not properly submitted with backup will not be approved for payment. The files shall be kept in such a manner so a report of the costs can be readily made annually.

5.2.5.2.4 Records of Work with Railroads

The DBIS shall insure railroad flagging service support documents are filed in the Bridge File using Attachment 5.4. Contact information for bridges requiring coordination with a railroad entity shall be placed in the Bridge File using Attachment 5.4. A copy of all infraction documentation shall be forwarded to the BMO.

5.2.5.2.5 Safety Coordination with Railroad Entities

The BITL shall determine if any of the railroad entity specific safety requirements shall apply to the inspection. Some railroad entities may require safety training and adherence to regulations while on railroad property.

General railroad safety tips include the following and should be followed whenever a bridge inspection occurs around railroads:

- Avoid stepping on the rail,
- Unless otherwise stated in a safety plan, keep your flagger visible while working on the railroad,
- Determine a muster point prior to start work for where to clear out of the way of passing trains and
- Determine if specialty footwear or other PPE apply while on railroad property.

5.2.5.3 Coordination with Utility Entities

If there are any utilities mounted on the bridge or crossing the bridge which could cause safety concerns (for example, an overhead high voltage line which needs to be de-energized to avoid conflict with the mechanical arm of a MEWP), advanced coordination with the utility may be needed.

5.2.5.4 Coordination with Other Entities

Some bridges located in District 7 require advanced coordination with representation from the Savannah River Site (SRS). The SRS is a nuclear reservation owned by the United States Department of Energy.

Some bridges may require advanced coordination or notification to SCDOT's Environmental Office. If an inspector believes there is evidence of endangered species activity (such as bats) on a bridge, he/she shall notify the BMO.

5.2.5.5 Traffic Control and/or Police Detail

South Carolina work zone mobility requirements known as *Rule on Work Zone Safety and Mobility: The Policy for South Carolina Department of Transportation* and *Rule on Work Zone Safety and Mobility: Implementation, Maintenance, and Safety Guidelines* shall apply to inspection work.

These requirements apply to consultants, all subconsultants or subcontractors, all the SCDOT staff and designated representatives acting on behalf of SCDOT performing duties with responsibilities relative to a work zone, including but not limited to contract management, inspection, operation and maintenance activities. In addition, the consultants and all subconsultants or subcontractors shall conform to the hourly lane restriction policy for each District. Lane restriction policies are available online; see Section 1.6.2. Different policies are listed for interstates, primary and secondary routes. The need for traffic control to perform an inspection shall appear in the BSIP.

All consultants are required to coordinate any proposed lane restrictions with the DTE. Consultants are encouraged to begin coordination early as approval from the DTE may take time.

If requested by the DTE, the consultant may be required to design, develop, implement and maintain a set of coordinated strategies to manage the work zone impacts of the contract designated as the Transportation Management Plan (TMP). The TMP may include a temporary traffic control plan, a transportation operations component and a public information component. The TMP and the anticipated work zone impacts may determine the level of detail, content and scope.

The primary component, the temporary traffic control plan, should address traffic control and safety throughout and adjacent to the project site. A secondary component, the transportation operations plan, should address management of traffic operations at each site and all adjacent areas impacted by the contract. The final component, the public information plan, should address communications with the public and entities impacted by the inspection.

Consultants should ensure the TMP and its components comply with the requirements of the current edition of the MUTCD. TMPs produced by consultants should also comply with SCDOT policies, standard specifications, all addendums to the standard specifications, the typical traffic control standard drawings and current procedures.

5.2.6 Adjusting Work Schedules for Weather

As practicable, but still maintaining compliance with required inspection frequencies, bridge inspections shall be performed when weather conditions will have minimal impact on workflow. If possible, inspections for bridges over rivers and streams shall periodically be scheduled during low-flow months to allow the best view of components above the waterline. For effective inspections, periods of extreme temperature or high winds shall be avoided.

The BITL shall also use his or her best judgment to determine if inspection activities shall be suspended due to changing weather conditions. For example, potential exposure to lightning, particularly when working on steel bridges, could be justification for suspending inspection operations to ensure crew safety.

5.2.7 Bridge Construction

5.2.7.1 Inspection of Existing Bridge during Construction Project

Prior to the inspection of an existing bridge included in a construction project, the DBIS must notify the RCE for coordination of the inspection activities and construction operations. The inspection will be conducted in accordance with the RCE's instructions to minimize disrupting the contractor's operations. If possible, the inspection should be scheduled before the start of the construction project or after the completion of the construction project.

When an existing bridge is within the workzone, the contractor shall not interfere with scheduled inspections. The DBIS or SCDOT designee will provide the RCE and the contractor with three weeks' notice of upcoming inspections. The RCE shall provide the contractor with at least two weeks' notice of upcoming inspections to ensure that the contractor's operations can be scheduled such that they do not interfere with bridge inspections.

5.2.7.2 Construction Projects on an Existing Bridge

If a scheduled inspection (including underwater inspections) must occur when a construction project is underway on all or part of a bridge, a complete inspection must be performed on all existing bridge components including any which are part of the project if they are carrying live load. Consultants under contract to perform inspections are required to coordinate bridge availability for inspection access before the inspection is due; this coordination shall be performed by the consultant PM through the DBIS.

If construction operations prevent inspection of certain existing components, then this shall be noted in the inspection report.

Components added as a result of repair, widening or rehabilitation projects will not require initial inspection until the substantial construction completion occurs. Components involved in phased construction which were previously not carrying live load will require initial inspection prior to the components carrying live load. See Section 4.1 for the requirements of an initial inspection.

5.3 INSPECTION PROCEDURES AND METHODS

All surface areas of each bridge member must be examined. To ensure no surface is overlooked, each inspection team shall develop a standard and methodical order for examining the surfaces of each member. Requirements for hands-on inspection or other specialized requirements shall appear in the Bridge File's BSIP. Areas like midspan portions of prestressed girder bridges in good condition can typically be inspected from the ground. As the condition of the structure worsens, the effort required for the inspection will increase.

All components of the bridge shall be inspected during every inspection. If, for any reason, a specific component or member cannot be inspected, it must be noted in the inspection report. Features not of a structural nature such as approach guard rails, lighting and signs shall also be inspected since they have a significant impact on the performance of the bridge and on public safety. The elements listed in the inspection report shall be used as a guide to assure complete inspections. The inspectors are cautioned there are also items which are incidental to the elements which need to be inspected.

When significant deterioration, as determined by the BITL, is found, it shall be dimensioned, documented, and, if needed, photographed in the inspection report. Loss of section to steel members shall also include a remaining section measurement or dimension after all rust is removed.

As described in Chapter 8 of the BIGD, use the applicable process to note immediate safety issues and other repair recommendations. Inspection findings shall appear in the inspection report. Critical Findings shall appear on the Critical Findings Form, and repair recommendations shall be logged into HMMS.

A Blank Inspection Sketch Sheet is included as Attachment 5.26 to the BIGD. This sketch sheet can be used for any bridge elements where the standard sketch sheets provided in this document are not applicable. Any specialty sketch sheets created during the inspection shall be placed in the Bridge File for future use.

5.3.1 Deck Inspection

All inspection notes regarding decks shall be placed in BEGTD on the inspection report under the **Decks/Slabs** heading. If the bridge has no deck, as seen in culverts, the BEGTD shall state "*N/A*" or "*None*". If the NBI Condition Rating (Item 58) for a deck is 5 or lower, one of the following is required:

- Sketch sheet noting deficiencies shall be attached to the report or
- Photograph (with a detailed caption noting deficiencies) shall be attached to the report.

5.3.1.1 Concrete Deck

Concrete decks shall be inspected for cracking, pattern cracking, spalling, potholes, efflorescence, leaching, delamination, corrosion, exposed reinforcing steel and full or partial depth failures. The top of the concrete deck shall be inspected for rutting of the riding surface and/or ponding of water. The underside of the concrete deck (or soffit) shall be inspected for dampness. Cracks in the top and bottom surfaces shall be noted especially midspan transverse cracking in the tension zone. Photographs of individual deck cracks are generally not needed, but if included, they should include a scale, crack gauge or a common item like a pencil for reference. Cracks over 0.1875" are considered wide and should be inspected and given consideration for inclusion in the report.

By establishing the approximate extent of cracking, corrosion, delamination, and spalling (and by having evidence of other deterioration), the bridge owner can determine if a more extensive inspection or repair is warranted.

Given concrete decks are the most common deck a bridge inspector may encounter, a Deck Sketch Sheet is provided in Attachment 5.11 for use, if needed. As stated in Section 5.3.1, if the NBI Condition Rating (Item 58) for a concrete deck is 5 or less, a sketch sheet or photograph shall be included in the report. Attachment 5.11 may be used.

If the concrete deck consists of partial-depth or full-depth pretensioned panels, it shall also be inspected for failures at the pretension and post-tension anchor zones, failures of grout-fill joints between panels and failures of bearing edges along supporting beams.

Chapter 7 of the LRGD includes requirements for the load rating of reinforced concrete decks. Inspectors shall be aware of levels of deterioration which may warrant a deck rating or re-rating.

5.3.1.1.1 Sounding Concrete Decks

If the NBI Condition Rating (Item 58) for a deck is 4 or lower because of deterioration on the top side of the deck, the deteriorated areas or areas subjected to deterioration (hollow areas) **shall be sounded** during routine inspections and during special inspections for which the deck is a subject of the special inspection.

A sounding is performed by use of one of several methods. Chain drag, hammer tapping or steel rod/pipe tapping are the three typical methods used to sound a deck for delaminations. These methods can be used separately or together to gather the data needed to make a determination of the area of the deck which is delaminated. When using a hammer or steel rod/pipe, taps shall be approximately 2 feet apart and shall cover the deteriorated areas or areas subjected to deterioration (hollow areas). The chain drag will generally be used in a sweeping motion with passes which are approximately 2 feet apart and cover the deteriorated areas or areas subjected to deterioration (hollow areas).

When recommended by the BITL, advanced methods of determining deteriorated areas of concrete can be utilized. These include vibration reading, ground penetrating radar, impact echo and ultrasonic surface wave. If the inspector is not able to perform these advanced inspection methods without assistance, Attachment 4.4 (NDT Request Form) shall be completed by the BITL.

Areas around deck cracks 1/16 inches or wider shall be given closer attention due to the higher probability of a delaminated area developing. Discolored areas of the deck shall also be sounded more vigorously.

The total area of delamination on a deck shall be calculated and included in the inspection report in accordance with Section 7.2 for the evaluation of National Bridge Elements (NBEs).

5.3.1.1.2 Extensive Concrete Deck Testing

Sections 23.2.4.2.3 and 23.2.4.2.4 of the BDM lists two additional options for extensive concrete deck testing. These testing procedures shall only be performed during special inspections and are not expected to be performed during routine inspections without direction from the SCDOT BMO. If the inspector is not able to perform this testing without assistance, Attachment 4.4 (NDT Request Form) shall be completed by the BITL.

5.3.1.1.2.1 Coring

To establish strength, composition of concrete, crack depth and positioning of reinforcing steel, 2-inch or 4-inch diameter cylindrical cores are taken. In decks with large amounts of reinforcement, it is difficult to avoid cutting steel if 4-inch diameter cores are used. The choice of core locations can have a significant impact on the findings.

5.3.1.1.2.2 Chloride Analysis

To determine the chloride content profile from the deck surface to a depth of about 3 inches or more, a chemical analysis of pulverized samples of the bridge deck concrete extracted from the deck or by in-place drilling can be performed. An inspector shall take chloride samples at three to five locations per span from each span 100 feet or less in length. Increase the number of samples for longer spans.

5.3.1.2 *Decks with Concrete Overlays*

Concrete overlays may vary in thickness. Older structures and structures not conforming to the Bridge Design Manual may have other types of concrete overlay including low slump concrete and high performance concrete.

Spalling, scaling, and patching of the overlay shall be documented with sketches and photographs at all inspections. Photographs of typical or the most severe deterioration are recommended.

5.3.1.2.1 Sounding Decks with Concrete Overlays

If the NBI Condition Rating (Item 58) for a deck is 4 or lower because of deterioration of the deck, the deteriorated areas or areas of the soffit subjected to deterioration (hollow areas) shall be sounded during routine inspections and during special inspections for which the deck is a subject of the special inspection.

Because overlays may hide deterioration areas, the BITL shall use his or her discretion to determine if sounding is needed even if the NBI Condition Rating (Item 58) for a deck is 5 or higher. The following items should be considered by the BITL for decks with concrete overlay to determine if sounding is needed:

- Approximate age of the deck and the amount of time the overlay has been placed
- Amount and patterns of cracking in the overlay
- Amount and patterns of cracking on the deck soffit
- Amount of spalling of the deck soffit
- Decks with epoxy injections or patching

If it is not possible to sound the deck or if the BITL determines it necessary, the BITL shall request NDT be used to determine deck deterioration under overlays; see Section 5.3.1.1.1.

5.3.1.3 Steel Decks

Steel grid decks shall be inspected for corrosion, broken welds, broken or damaged bearing bars or cross bars, and diminished section remaining. Concrete-filled steel grid decks shall be checked for spalling or scaling of the concrete infill, water ponding, corrosion of steel grid members and leakage on the underside of the deck. Corrugated metal decks shall be checked for evidence of rust-through and open cracks in the wearing surface. Orthotropic steel decks also need to be checked for evidence of rust-through; cracks in the steel plate, web elements, or welded connections; and debonding of the overlay. See Section 5.3.1. If the NBI Condition Rating (Item 58) for a steel deck is 5 or less, a sketch sheet or photograph shall be included in the report.

Timber decks shall be inspected for splits; checks; broken planks; crushing; excessive wear; rot; and loose, broken, or missing fasteners. Areas exposed to traffic shall be examined for weathering, wear and impact damage. Drainage deficiencies can manifest themselves as rot or stained lumber on the top or bottom of the deck or on the outside edges of the deck. Laminated timber decks shall be checked for loose or delaminating members, and if the laminated members are post-tensioned together, post-tensioning anchorages shall be checked for corrosion, crushing, decay, or signs of anchor failure. The boring and probing of timber decks with a thin wire probe may help detect the presence of interior voids. This destructive process may cause extensive damage to the member. DT of timber decking may only occur with the approval of the DBIS; see Section 5.1.7.2. See Section 5.3.1. If the NBI Condition Rating (Item 58) for a timber deck is 5 or less, a sketch sheet or photograph shall be included in the report.

5.3.1.4 Bridge Joints

Bridge joints are designed to accommodate deck and superstructure expansion and contraction caused by temperature changes. The inspection shall confirm the joints are functioning properly and shall document any deterioration to the joints. Condition of the joint shall be noted on the BEGTD on the inspection report under the **Expansion Joint** heading. If the bridge has no expansion joints, the BEGTD shall state "*N/A*" or "*None*". Attachment 5.22 is available for use of documenting the movement and condition of bridge joints. Attachment 5.22 is to be used at the discretion of the BITL. Condition state requirements for joints are listed in Sections 7.2.

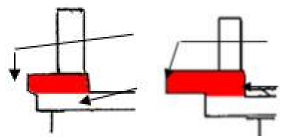
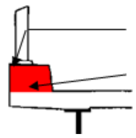
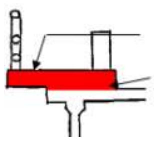
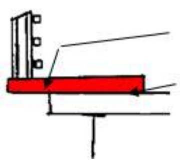
5.3.1.5 Curbs

Condition of the curb may be noted on the BEGTD on the inspection report under the **Curbs** heading. If the bridge roadway has no curb, the BEGTD shall state "*N/A*" or "*None*".

5.3.1.5.1 Cantilevered Curb

A cantilevered curb refers to a curb which overhangs the edge of the deck. The concern with this type of curb is corrosion of the tension reinforcing along the gutter line. Table 5.3.1.6.1 shows examples of non-cantilevered and cantilevered curbs.

Table 5.3.1.6.1 Cantilevered Curb Table

Type	Figure	Inspection Requirements
Curb with Retro Rail		Cantilever Curb = YES The area shown in red is considered the curb.
Bridge Rail on Curb		Cantilever Curb = YES The area shown in red is considered the curb.
Jersey Barrier		Cantilever Curb = NO No curb; BEGTD shall state "*N/A*" or "*None*".
Sidewalk (Divided from Traffic)		Cantilever Curb = YES The area shown in red is considered the curb.
Sidewalk (Undivided from Traffic)		Cantilever Curb = YES The area shown in red is considered the curb.
Curb on Bracket		Cantilever Curb = NO The area shown in red is considered the curb.

A barrier rail on a thin concrete deck supported by steel channels or steel cantilevers is not considered a cantilevered curb.

5.3.1.6 Bridge Railing/Parapets and/or Median Barriers (Barrier or Railing)

The overall condition of barrier or railing shall be examined, including the alignment and the height of the rails. Sighting down the line of a barrier or railing can be a quick way to identify obvious problems and may also highlight other structural problems, such as substructure settlement. The height of the barrier or railing, especially for bridge decks which have been overlaid, shall be checked to determine if it meets current design standards. Any damage due to traffic impact shall be noted as well as any rotation of the barrier or railing. Damaged concrete barrier and broken steel or timber railing elements shall be noted as well as structural defects which may affect the intended function of the barrier or railing. For precast concrete bridge barriers, any apparent anchorage failures or separation from the bridge deck shall also be noted. All inspection notes regarding barrier or railing shall be placed in BEGTD on the inspection report under the **Bridge Railing/Parapets and/or Median Barriers** heading.

The following identifies three typical SCDOT forms of usage for bridge barrier or railing:

1. 32-inch Concrete Barrier. SCDOT typically uses this barrier on all bridges which do not include sidewalks. The 32-inch concrete bridge barrier meets the performance criteria for a TL-4.
2. 42-inch Concrete Barrier. SCDOT typically uses this barrier where sidewalks are present on the bridge. The 42-inch concrete barrier is vertical, and its height conforms to the Load and Resistance Factor Design

(LRFD) requirements for pedestrian rails; therefore, its use where sidewalks are present avoids the need to extend the height of a 32-inch concrete bridge barrier to meet the height requirements of a pedestrian rail.

3. Metal Beam Railing. SCDOT strongly discourages the use of any metal beam bridge rail system. Its use may only be considered where aesthetics or dead loads are very important. When compared to the concrete bridge barrier, a metal beam rail's advantages include lower dead weight and providing a more open view of the surrounding scenery.

The barrier or railing on the bridge is appraised as part of NBI Item 36A; see Section 7.1.1.3.1.

The LRSF included in the load rating documentation may indicate that the stiffness of the traffic barrier was used in posting considerations. If this was the case, the inspector shall be aware that the condition of the traffic barrier may have an impact on bridge load rating. If any condition is present which conflicts with the existing rating, a re-rating may be warranted; see Section 19.2.4 of the LRGD.

5.3.1.7 Approach Guardrail and Surrounding Guardrail

The approach guardrail and surrounding guardrail installations shall be inspected using the following guidelines. All inspection notes regarding guardrails shall be placed in BEGTD on the inspection report under the **Bridge Railing/Parapets and/or Median Barriers** heading.

- Approach guardrails shall be inspected to the limits of the end terminal. In some installations, the approach guardrails continue for long distances past the bridge structures. In these instances, the inspectors shall inspect a minimum of 75 feet upstation and/or downstation from the end of the bridge. The transition from the bridge rail to the approach guardrail is appraised as part of NBI Item 36B; see Section 7.1.1.3.2. The approach guardrail is appraised as part of NBI Item 36C; see Section 7.1.1.3.3. The guardrail end treatment is appraised as part of NBI Item 36D; see Section 7.1.1.3.4.
- Guardrails surrounding piers and along the toe of berms must be inspected if they are **physically attached** to the substructure. Any deterioration found shall be photographed and described using the appropriate substructure BEGTD section.
- Guardrails surrounding piers and along the toe of berms not attached to the substructure shall be given solely a visual inspection. Significant damage which may cause a hazard to the public or to the bridge shall be considered a Critical Finding reported per Chapter 8. The BITL will determine the limits of the inspection of guardrails under the bridge surrounding bents, pier and/or abutments.

The inspection does not require digging down around posts to search for rot. The August 2010 Guardrail Identification Manual, which is included in SCDOT ED 42, shall be used to identify the end, rail, and transition types.

5.3.1.8 Drains

Inspection notes regarding the overall condition of the drains shall be placed in BEGTD on the inspection report under the **Miscellaneous** heading. Drainage scuppers shall be inspected for functionality and condition. As described in Chapter 8, use HMMS to note repair recommendations if drains need to be cleaned out to promote drainage from the bridge deck. Drains shall also be inspected for corrosion or material deterioration. The condition of the drains shall not be considered in the overall deck condition evaluation.

5.3.1.9 Wearing Surface

All inspection notes regarding the wearing surface shall be placed in BEGTD on the inspection report under the **Decks and/or Slabs** heading unless they are directly applicable to **Roadway Alignment**. 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. The wearing surface may be measured directly if possible given the layout of the overlay. Otherwise, the reveal shall be measured. Wearing surface thickness is critical to determine dead load applied to the bridge.

5.3.1.9.1.1 Measuring Wearing Surface Thickness

If the wearing surface is measured directly, it shall appear in the BEGTD on the inspection report under the **Decks and/or Slabs** heading. If the wearing surface is inconsistent across the bridge, the deepest wearing surface thickness shall be recorded. Wearing surface thickness is critical to determine dead load applied to the bridge.

If necessary to obtain realistic depths, safely drill a small diameter hole in locations as needed (measuring the drill bit penetration to concrete). Plug hole with adequate sealant.

5.3.1.9.1.2 Measuring Reveal

The reveal is defined as the vertical face or vertical portion of the curb measured from the top of the bridge wearing surface to the top of the curb or barrier. This information is important for load rating analysis calculations to determine if the bridge sidewalks and/or median are mountable and if wearing surface thickness has changed. If the reveal is measured, it shall appear on the inspection report under the **Curbs** heading. Reveal shall be measured at the four corner quadrants of the bridge:

- Beginning of Bridge at Left Side (BEG LT)
- Beginning of Bridge at Right Side (BEG RT)
- End of Bridge at Left Side (END LT)
- End of Bridge at Right Side (END RT)

The reveal shall be measured from the top of the concrete curb or concrete barrier/parapet to the top of the riding surface. Figure 5.3.1.9.1.2-1 gives an example of proper input for the **Curbs** section. If the bridge has a barrier or other structure, other than a conventional curb, those measurements shall still be taken and it shall be noted the reveal measurements were taken from top of riding surface to top of barrier or some other known point of reference. See Figure 5.3.1.9.1.2-2 for a schematic showing measuring reveal from the top of a barrier.

Curbs:

12" REINFORCED CONCRETE SAFETY CURB SLAB

-CURB REVEAL:
BEG LT - 12"
BEG RT - 12"
END LT - 12"
END RT - 12"

Figure 5.3.1.9.1.2-1 Curbs Section of BEGTD

Figure 5.3.1.9.1.2-2 Reveal Measurement at Barrier

5.3.2 Superstructure Inspection

Superstructure members shall be inspected for signs of distress, which may include horizontal or vertical displacement of components affecting structural stability, cracking, deterioration, diminished section remaining, collision damage or overload damage.

All inspection notes regarding slabs shall be placed in BEGTD on the bridge inspection report under the **Decks and/or Slabs** heading. All inspection notes regarding stringers, girders, beams, floor beams and/or arches shall be placed in BEGTD on the inspection report under the **Girder/Floor Beams/Stringers and/or Beams** heading. All inspection notes regarding truss members shall be placed in BEGTD on the inspection report under the **Truss Members** heading. If the bridge has no superstructure, as seen in culverts, the BEGTD shall state "*N/A*" or "*None*".

Due to their common use, standard sketches are available as attachments for use by bridge inspectors. The use of these sketches are not required except as noted below.

If the NBI Condition Rating (Item 59) for a superstructure is 5 or lower, one of the following is required:

- A sketch of at least one typical, controlling member may be included; these sketches include:
  - Blank Inspection Sketch Sheet (Attachment 5.26)
  - Prestressed Concrete Member Deterioration Sketch Sheet (Attachment 5.12)
  - Reinforced Concrete Member Deterioration Sketch Sheet (Attachment 5.13)
  - Steel Member Deterioration Sketch Sheet (Attachment 5.14)
  - Rigid Frame Standard Sketch Sheet (Attachment 5.15)
- Photograph (with a detailed caption noting deficiencies) shall be attached to the report.

If the water level (due overwater clearance under the bridge superstructure, not necessarily temporary high water levels) prevents inspection of the underside of the bridge, the inspection of the superstructure shall be completed by an underwater bridge inspection. If an underwater inspection is required to complete the superstructure inspection, Attachment 4.1 shall be completed and sent to the BMO.

5.3.2.1 *Flat Slabs (Reinforced Cast-in-Place Concrete Slabs)*

The flat slab is frequently used because of its suitability for short spans and low clearances and its adaptability to skewed and curved alignments. The most common applications of the flat slab are over small creeks and swamps and as approaches to large main spans. SCDOT Bridge Drawings and Details, listed as a reference in Section 1.6.2, contains typical flat slab details.

Deterioration of the slab can have a greater impact on the load capacity of this type of bridge than a typical girder bridge; therefore, high stress areas shall be inspected. Cracking and rust staining in high stress areas, along with the rest of the member, shall be documented during the element-level assessment according to the guidance in Appendix L, as summarized below.

- Condition State 2 if the cracks are narrower than 0.05 inches
- Condition State 3 if the cracks are wide (0.05 inches) or if there is rust staining

Inspection reports shall include photographs to convey the extent and location of CS3 defects.

5.3.2.2 *Cored Slabs (Precast Concrete Cored Slabs)*

Prestressed concrete cored slabs (cored slabs) are an alternative to flat slabs when the bridge designer anticipates the necessity of an accelerated construction schedule. Cored slab bridges consist of longitudinal, precast voided concrete slab members placed against each other to form a self-supported bridge deck. Cored slab details are available in span lengths of 30 feet, 40 feet, 50 feet, 60 feet, 70 feet and 80 feet. SCDOT Bridge Drawings and Details, listed as a reference in Section 1.6.2, contains typical cored slab details.

Deterioration of the cored slab can have a greater impact on the load capacity of this type of bridge than a typical girder bridge. Cracking of the cored slab, specifically at midspan and end regions, shall be inspected. Cored slab deterioration shall be inspected at bearing areas. Cracking and deterioration in bearing, midspan and end region areas, along with the rest of the member, shall be documented during the element-level assessment according to the guidance in Appendix L, as summarized below.

- Condition State 2 if the cracks are narrower than wide 0.009 inches or if the area of delamination is less than 1” deep or less than 6” in diameter
- Condition State 3 if the cracks are wide (0.009 inches) or if the area of delamination is more than 1” deep or more than 6” in diameter and does not warrant structural review.

Inspection reports shall include photographs to convey the extent and location of CS3 defects.

5.3.2.3 Prestressed Concrete Beams

Prestressed concrete beam bridges are typically I-beam, bulb tee beam, channel beam, double tee beam or box beam structures. In all of these types of bridges, stressed strands or bars induce compressive forces into the concrete to give the beam increased load carrying capacity. This load carrying capacity can be compromised by concrete deterioration around these strands or bars. The most common area for concrete deterioration or spalling is at the ends of the beams where salt-laden water can leak onto the beam ends through open or leaking bridge joints and contaminate the concrete, thus causing corrosion to begin in the strand or bar. Prestressed steel is more susceptible to corrosion and will corrode faster than mild steel reinforcing.

The second most common reason for loss of prestress capacity is due to impact loads by overheight vehicles traveling under the bridge. Impacts can cause spalling around the strands or bars so the compressive force applied to the concrete is lost in the impacted area. If a strand or bar is severed because of impact, this also causes a loss in prestress force.

Cracking and deterioration in prestressed concrete beams shall be documented during the element-level assessment according to the guidance in Appendix L as summarized in Section 5.3.2.2.

If there is exposed prestressing strands from either deterioration or impact damage, defects shall be documented during the element-level assessment according to the guidance in Appendix L, as summarized below.

- Condition State 2 if prestressing strands are exposed.
- Condition State 3 if prestressing strands are exposed with section loss that does not required structural review.

Inspection reports shall include photographs to convey the extent and location of CS3 defects.

5.3.2.4 Reinforced Concrete Beams

A reinforced concrete beam bridge is a cast-in-place concrete structure. The beams are placed monolithically with the deck in most cases. The deck may contain more reinforcing than a conventional deck on a girder bridge. Deterioration of the deck can have a greater impact on the load capacity of this type of bridge than a typical girder bridge. Inspection of reinforced concrete beams shall include examination of bearing areas and high positive moment areas.

Cracking and rust staining shall be documented during the element-level assessment according to the guidance in Appendix L, as summarized in Section 5.3.2.1. Delamination or spalling shall be documented during the element-level assessment according to the guidance in Appendix L, as summarized in Section 5.3.2.2.

5.3.2.5 Steel Beams and Girders

Steel beam or girder bridges are made up of two or more beam lines of I-shaped members. Inspection of steel superstructure elements shall include checking steel members for paint failure, corrosion, diminished steel section remaining, evidence of fatigue or fracture, evidence of overload, collision damage, connection damage and possible damage from excessive heat.

Inspection procedures typically include visual methods to find defects as well as physical methods such as hammer sounding, cleaning to remove rust scale and measuring remaining steel thickness. Non-destructive test equipment such as an ultrasonic thickness gauge may be advantageous in this situation.

The following areas or members shall be inspected:

- High stress zones,

- Areas vulnerable to drainage run-off and/or corrosion (under bridge joints, on surfaces where water collects, in places where dissimilar materials meet),
- Areas where there is a change in the bridge cross section, where stress is concentrated, or which show out-of-plane bending,
- Areas exposed to traffic,
- Previous repair locations,
- Previously noted defects,
- Web stiffeners (especially at the ends),
- Coped sections and/or re-entrant corners,
- FPDs,
- Eye bars,
- Shear connectors,
- Punched holes,
- Rivet and bolt heads or
- Tack welds and field welds (especially at weld ends or returns).

Properly performing paint coatings shall be free of chalking, pitting, rust, or rust staining. The overall paint condition shall be assessed based on the condition of the majority of the surface, not just localized areas of rusting.

For weathering steel members, the typical oxide colors that can be expected for properly performing weathering steel include a yellow-orange color for new steel or a purple-brown color for members in service for many years. Weathering steel members exhibiting a black or yellow color could indicate a failed condition of the protective oxide and may show small flakes (approximately ¼ inch in diameter) or laminar sheets of loose oxide film. When inspectors are checking for section loss due to corrosion, the member shall be scraped to remove rust scale and the member thickness shall be measured to determine the section remaining. The overall condition of the weathering steel shall be rated according to the scale shown in Table 5.3.2.5. Conditions for excellent, critical, imminent failure and failure are not included.

Table 5.3.2.5 Condition Assessment of Weathering Steel

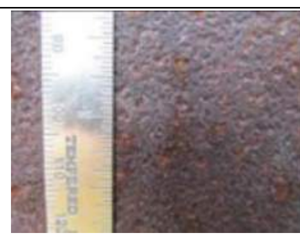
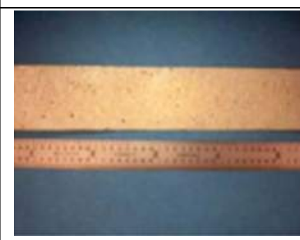
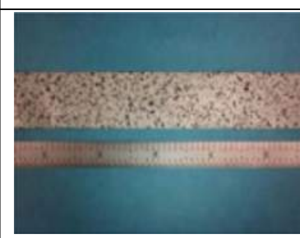
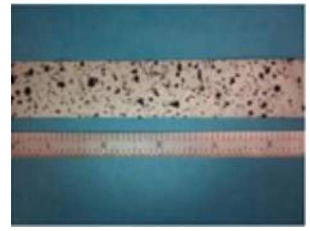
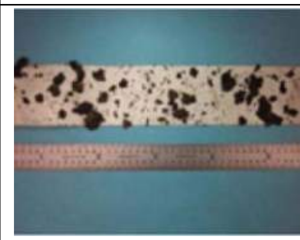
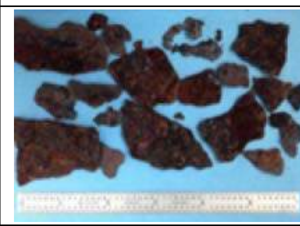
Patina Rating	Condition Description	Example Condition in Field	Example Tape Test Specimen
8 Very Good	Uniform color pattern, generally dark brown with some lighter reddish-brown, metallic and purple-brown spots. May be difficult to see small rust product clusters. Texture may be dimpled or rough but uniform in pattern. Patina layer is thin but dense and very adherent, indicate of very good protective properties. Superior adherence; tape test sparse with only small flakes (<1 mm).		
7 Good	Uniform color pattern, generally dark brown with some lighter reddish-brown, metallic and purple-brown sports. Individual rust product clusters visible. Texture is dimpled or rough but uniform in pattern. Patina layer is thin but dense and adherent, indicative of good protective properties. Tape test easily removes very small (<1 mm) flakes.		

Table 5.3.2.5 Condition Assessment of Weathering Steel (continued)

Patina Rating	Condition Description	Example Condition in Field	Example Tape Test Specimen
6 Satisfactory	Dark brown coloration, but begins to show minor variation. 1-5 mm flakes loose on surface, easily removed with tape test. Underlying layer adherent, still relatively dense, thin and protective. Texture more granular and loose flakes may be less-protective, holding water and salts. Chalky poultice layer may be present, but not significantly affective performance (i.e. flake size).		
5 Fair	Dark brown with black and some color variation. Blotchy with some salty or rusty stains. Medium (5-25mm) flakes over most of area loose and non-protective, easily removed with test tape. Layer beneath flakes thicker and more permeable, with some pitting beginning. Non-protective; contaminants penetrating. Elements with poultice may show significant associated flaking.		
4 Poor	Color is dark brown and black but non-uniform with widespread blotchiness and staining. Non-protective. Large (>25 mm) flakes or layered delamination beginning in some areas. Thickness permeability of rust increased, with pitting and section loss. Poultice areas have thin delamination sheets or very large flakes. Layer below loose poultice may appear similar, but still somewhat adherent.		
3 Serious	Blackish, stained and blotchy appearance. Formation of laminar sheets with deeply pitted semi-adherent layers beneath; chunks and sheets of rust product removable by hand. Aggressive advancement of pitting and section loss; can be up to 50%. Complete failure of patina to protect base steel.		

The weathering steel patina rating shall be documented in the NBEs for the steel girders. In addition, all inspection notes regarding the paint system on steel bridges shall be placed in BEGTD on the inspection report under the **Paint System(s)** heading. If the bridge has no paint system, the BEGTD shall state "*N/A*" or "*None*". An additional reference is SSPC-VIS 2, Standard Method of Evaluating Degree of Rusting on Painted Steel Surface.

Any tape test strips shall be photographed and included in the documentation of the inspection.

If any cracks, blemishes, or other irregularities are found, the inspector will need to evaluate these further, which may include the use of a magnifying glass. Smaller cracks are not likely to be detected visually unless the paint, mill scale, and dirt are removed by carefully cleaning the suspect area. If the confirmation of a possible crack is to be conducted by another inspector, it is advisable not to disturb the suspected crack area so that re-examination of the actual conditions can be made. A dye penetrant kit can be used to establish the limits of a crack. Use of magnetic or ultrasonic testing devices may be required to detect internal problems not apparent to the eye. Some of these devices will provide more accurate and dependable information than others. Contact the BIPM or SBME to determine which devices will be the most cost effective and reliable for the given situation.

The inspector will need to record the location and size of any cracks found. Mark and date the crack ends with a permanent marker for follow up on the structure. Take a photograph of such cracks to provide visual documentation.

Bolted or riveted connections shall be inspected for loose or missing bolts or rivets, section loss to the bolt or rivet heads, and corrosion of the connecting parts. Pack rust can build up between the connection plate and the girder element, which can cause bending in the connection plate and unanticipated tensile stress in the bolts or rivets.

Instances of overload to a steel structure will usually be manifested in high stress zones. Therefore, if overload is suspected, particular attention shall be paid to bearing areas where the load would be transferred from superstructure to substructure; high shear zones adjacent to member supports and points of concentrated loads; and high moment regions, including the middle third of a span for positive moment and the end fourths at intermediate supports for negative moment in continuous spans.

Areas of collision damage shall be carefully inspected for signs of fracture or member cracking; distortion due to collision over 1" shall be documented and quantified in the inspection report. If cracks or gouges in the steel members have occurred due to collision damage, dye penetrant or magnetic particle testing may be required to accurately determine the extent of the defect.

The removal of paint can be done using a wire brush depending on the size and location of the suspected deficiency. The inspector shall take care in cleaning when the suspected deficiency is a crack. When cleaning steel surfaces, the inspector shall avoid any type of cleaning process, such as blasting or excessive grinding, which may tend to close the crack. The use of degreasing spray before and after removal of the paint may help in revealing the deficiency.

5.3.2.6 *Timber Structures*

Timber beams shall be inspected for checks, splits, knots, rot and damage. Knots in timber stringers can be detrimental to the stringers' capacity. The area around a knot shall be closely examined for splits.

Portions of the timber superstructure shall be inspected for localized crushing, shakes, vegetation growth and misalignment. Locations around connections, such as lag bolts, shall be inspected for rot and decay.

Where areas of severe decay are noted, the element should be inspected for interior decay and shelling. Drill a small hole in the element and probe the interior of the beam for areas of rot. Any drilled hole made should be plugged with treated hardwood dowels. The boring and probing of timber members with a thin wire probe may help detect the presence of interior voids. This destructive process may cause extensive damage to the member. DT of timber beams may only occur with the approval of the DBIS; see Section 5.1.7.2.

5.3.2.7 *Trusses*

Some procedures from Section 5.3.2.5 are applicable to steel truss bridges.

Truss bridges typically have FCMs. The truss tension members and floor beams spaced at 14 feet or more are the most common FCMs. Gusset plates may also be considered FCMs. The BSIPs for the FCM inspections are required to include identification of FCMs and fatigue details.

All pins on the truss must have ultrasonic testing to check for fatigue cracks and measure the pin lengths. All forged bars must also have ultrasonic testing to check for fatigue cracks. In addition, inspectors shall measure pin length readings, forging, and thickness of the bar fashioned around the pins. Pins and forged bars not considered FCMs shall be inspected with ultrasonic testing methods at a 60 month frequency as a special inspection as required in Section 4.7.1. Pins and forged bars which are considered FCMs shall be inspected as FCMs.

All truss bridges with gusset plates shall be inspected to be compliant with 2010 FHWA guidelines as referenced in FHWA Publication No. FHWA-HRT-12-071 concerning Application of Radiographic Testing to Multilayered Gusset Plate Inspection; see Section 1.6.2. All truss bridges that have single gusset plates which can be visually inspected and measured and/or have NDT performed if required.

5.3.2.8 *Arches*

An arch can be constructed with concrete, masonry or steel. Arches are designed to be mainly in compression but may experience tension under certain loadings. A tied arch bridge has a main arch tied to a bottom chord at both ends of the arch. The bottom chord is in tension and is usually a FCM.

5.3.2.9 *Cable Supported Structures*

The primary types of cable supported superstructures are cabled stayed and suspension bridges. Arch and tied arch bridges may also use cable members as hangers to connect the deck framing system to the arch. Cable jacketing shall be inspected for signs of oil or rust staining which could indicate a failure of the system protecting the cables.

5.3.2.10 Steel Tubs

Tub girder bridges give high rotational inflexibility, which makes these frameworks perfect when high torsional loadings may occur. Similarly, tub girder bridge frameworks have favorable span range, durability and aesthetics contrasted with different types of steel girder bridges.

Because of the potential for internal connections and internal structural elements, the complexity of tub girder bridges may make them difficult to inspect.

Steel tubs which are considered FCMs may require NDT included in this section. The BSIP shall include specific requirements if the steel tub is considered a FCM. If any cracks, blemishes, or other irregularities are found, the inspector shall follow the requirements listed for Section 5.3.2.5 for steel member inspections.

5.3.2.11 Segmental Concrete

For post-tensioned segmental box bridges, special attention shall be given to the profile of the roadway surface. This can be accomplished by sighting along the top of the barrier rail.

For long bridges utilizing post-tensioned segmental boxes, the BITL may recommend via an email to the BIPM a survey of the profile. The results of this survey are to be compared against any previous surveys in order to determine if movement has occurred. If subsequent surveys show movement outside of the allowable range, such that there is cause for concern, a special inspection of the affected areas shall be scheduled to determine if localized issues with the units exist. Surveying may be included in a BSIP if needed.

5.3.2.12 Rigid Frames

A rigid frame structure has the main superstructure girders integrally connected to the substructure to form a moment connection. Deterioration of the frame can have a greater impact on the load capacity of this type of bridge than a typical girder bridge. The midspan, corners, and mid-height of the frame legs are locations of high stress and shall be given special attention for the presence of cracks. A Rigid Frame Standard Sketch Sheet is included as Attachment 5.15.

Concrete culvert-like structures (concrete walls, apron, etc.) where the deck or top slab supports live load traffic over a depression or an obstruction **other than water** shall be considered a rigid frame and not a culvert.

5.3.2.13 Bearings

Bearings transfer the load from the superstructure to the substructure. They are designed to accommodate movement and/or rotation due to temperature and live load forces. There are four types of movement which could occur: 1) rotational, 2) longitudinal, 3) lateral, and 4) vertical.

All bearings can accommodate rotational movement, but bearings are also designed to either accommodate or restrain longitudinal movement. Thus, bearings are defined on a plan set as either fixed or expansion. Fixed bearings accommodate rotation only, while expansion bearings accommodate rotation along with longitudinal movement. Special bearing types can accommodate lateral movement as well.

Typical bearing types are shown in Figures 5.3.2.13-1 through 5.3.2.13-5.

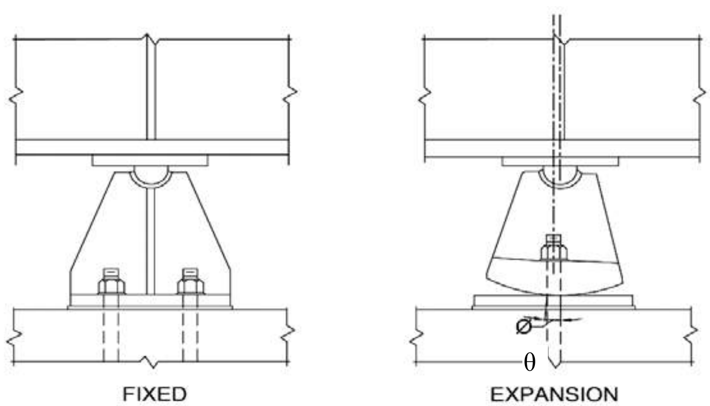


Figure 5.3.2.13-1. Steel Fixed Bolster and Steel Rocker Bearings

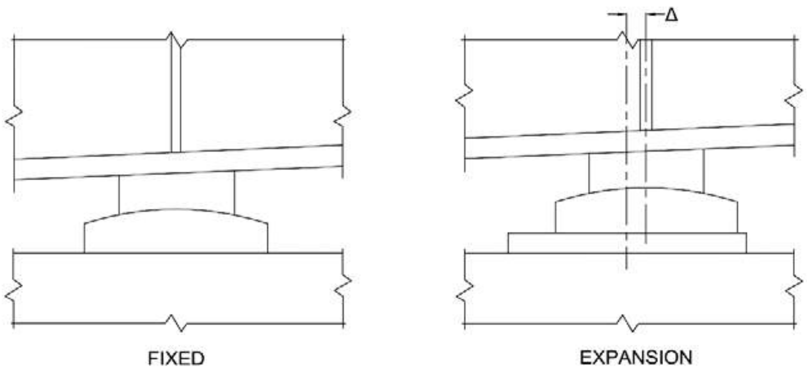


Figure 5.3.2.13-2. Steel Sliding Plate Bearings

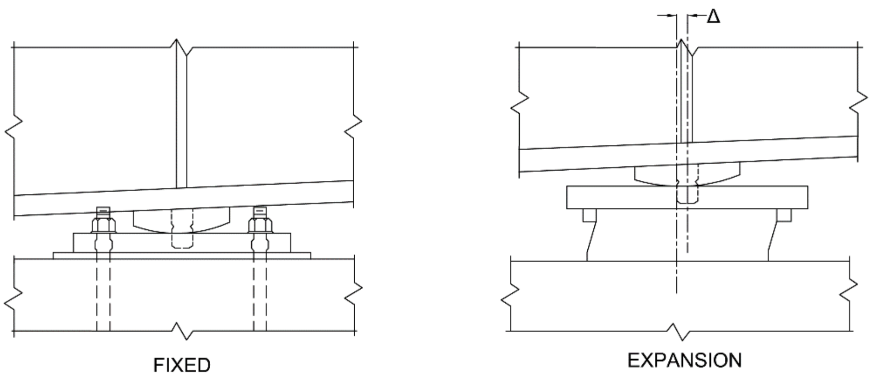


Figure 5.3.2.13-3. Pintle Plate & Pintle Plate with Elastomeric Pad Bearings

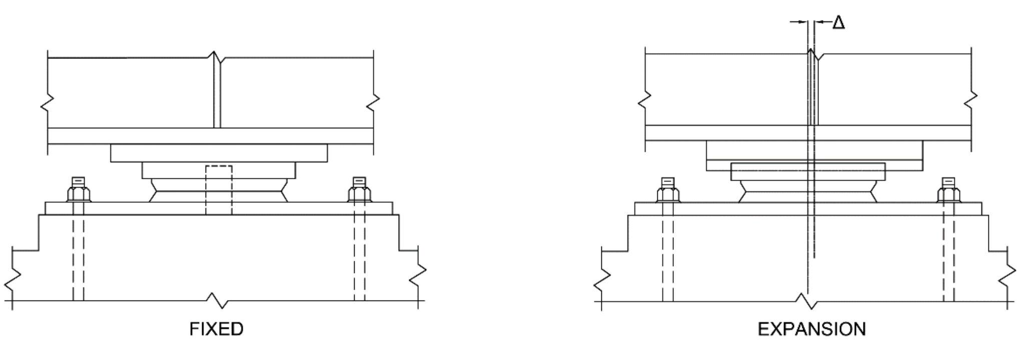


Figure 5.3.2.13-4. Disc Bearings

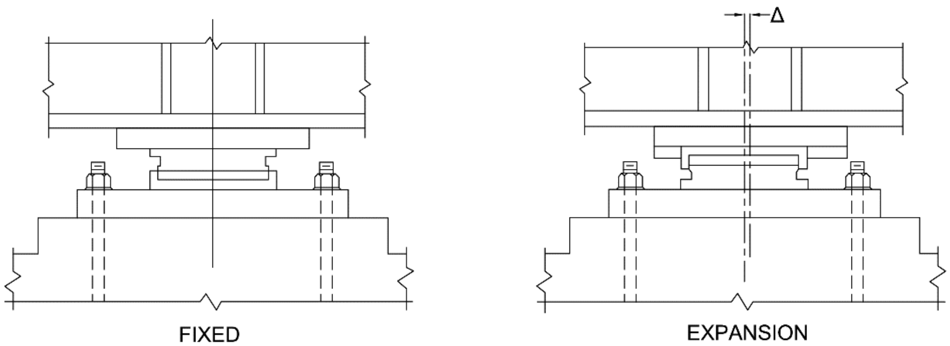


Figure 5.3.2.13-5. Pot Bearings

Expansion bearings are set at construction to a certain position according to the ambient temperature. This setting may or may not correspond to the temperature during the inspection. Movement shall be generally expansion during the summer months and contraction during the winter months. Movement may be measured and noted at any time if the BITL determines it should be documented for comparison during future inspections. However, when movement is seen which does not correspond to the temperatures of the season, measurement of the bearing setting and the temperature of the superstructure must be documented. Measurement locations for expansion bearings can be found in the figures of the bearing types shown above.

Any damage or deterioration of a bearing shall be documented by photographs and notes in the inspection report. Pack rust which may be limiting the ability of the bearing to move properly shall be noted. Bearings under bridge joints are more susceptible to corrosion and pack rust because of joint leakage.

All inspection notes regarding the bearings shall be placed in BEGTD on the inspection report under the **Bearings** heading. If the bridge has no bearings, the BEGTD shall state "*N/A*" or "*None*". The expansion bearings in Figures 5.3.2.13-1 through 5.3.2.13-5 show the likely direction of movement. The θ or Δ symbols may be referenced in the inspection report. For clarification, the likely direction of movement depicted in Figures 5.3.2.13-1 through 5.3.2.13-5 is further detailed in Table 5.3.2.13. Expansion bearings in CS3 or CS4 shall have movement measured at every inspection for which the bearings are the subject only if Defects 2210 (Movement) or 2220 (Alignment) are used for the CS3 or CS4 assessment during the bearing element-level evaluation.

Table 5.3.2.13 Typical Direction of Movement for Expansion Bearings

Bearing Type	Movement Type	Figure
Steel Rocker Bearings	Rotational (θ) – Steel rocker bearings rotate about the centerline of the bearing under the superstructure member.	5.3.2.13-1
Steel Sliding Plate Bearings	Longitudinal or Transverse (Δ) – Plate slides in the direction of movement. Measurement from centerline of bearing in the direction of movement.	5.3.2.13-2
Pintle Plate with Elastomeric Pad Bearings	Longitudinal or Transverse (Δ) – Plate or pad slides or angles in the direction of movement. Measurement from centerline of bearing in the direction of movement.	5.3.2.13-3
Disc Bearings	Longitudinal or Transverse (Δ) – Superstructure moves on top of disc. Measurement from the center of bearing in the direction of movement.	5.3.2.13-4
Pot Bearings	Longitudinal or Transverse (Δ) – Superstructure moves on top of pot. Measurement from the center of bearing in the direction of movement.	5.3.2.13-5

5.3.2.14 Requirements During a FCM Inspection

During a FCM inspection, the following requirements shall be met:

1. The BITL shall follow and refer to the BSIP for the FCM inspection; see Section 5.2.1.5. If a procedure is not located in the Bridge File, contact the BMO.
2. Perform a hands-on inspection to visually inspect the FCMs for deterioration, defects, damage and cracks. If required, perform a hands-on inspection of all fatigue-prone details. A hands-on inspection is defined as the inspector being able to touch all surfaces of the tension-carrying regions of FCMs. Access methods are included in the BSIP for the FCM inspection.
3. Clean suspect locations for better visual assessment and use appropriate NDT methods to verify potential crack locations and member thickness in deteriorated areas. Cleaning and testing requirements are included in BSIP for the FCM inspection.
4. Photograph and sketch locations where deficiencies are found. Include appropriate dimensions and perspectives on all sketches. If needed, close-up photographs shall be taken before and after any cleaning, paint removal, or testing. Include a photograph of the general location so others can understand exactly where close-up photographs were taken. See Section 5.4.4.2 for the required documentation for FCMs during both bridge inventory and subsequent inspections. A current condition photograph of each unique FCM shall be placed in the Bridge File. A photograph of every FCM is not required if the photographs in the Bridge File accurately capture the condition of the FCMs unless required by the BSIP. The photograph in the Bridge File is considered the benchmark condition of the FCM until changed. Additional photographs will not be taken during subsequent inspections unless required by the BSIP or the condition on the FCM has changed from benchmark.
5. All FCMs and their conditions shall be noted on the FCM Inspection Form, which is available as Attachment 5.16. Only FCMs shall be included on Attachment 5.16; all bridge members do not need to be listed. A condition evaluation for each FCM is required.
6. Confirm all FCMs were inspected; a checklist is included in the BSIP for the FCM inspection.
7. Significant damage or failure of FCM is a Critical Finding as defined in Chapter 8.
8. The BSIP for the FCM inspection discusses the process to update the BSIP for the FCM inspection, if needed.

When inspecting the FCMs, it is always best to err on the side of conservatism. The consequences of dismissing or failing to note a blemish on a FCM are too great. Therefore, the inspection shall be conducted carefully and thoroughly. Such close inspection of single members can be tedious; however, the inspector shall work in a manner which ensures the same degree of care and attention to the last area inspected as the first.

5.3.2.15 Fatigue Details

Fatigue details include, but are not limited to, the following:

- Welded cover plates, particularly the end terminations
- Web gap area at diaphragm stiffeners when out-of-plane bending is possible
- Welded gusset plate connections to girder webs, flanges or truss members
- Weld terminations of longitudinal stiffeners
- Coped areas in a floor beam or cross beam
- Tack welds in tension areas
- Intersecting welds

Fatigue is the tendency of a member to fail at a stress level below yield stress when subjected to cyclical loadings. Fatigue details require additional attention. If fatigue cracks or fractures are noted, NDT methods, such as dye penetrant testing or magnetic particle testing, may be required to determine the extents of cracks in steel members. Ultrasonic methods are typically used to test pin members for defects. Thickness gauges (D-Meters) or calipers can be used to determine the thickness of steel remaining for a particular member.

Triaxial constraint is a 3-dimensional stress state which reduces the ductility of a material. Under triaxial constraint, steel is unable to deform, and brittle fracture can occur under service conditions where ductile behavior is normally expected. Due to the nature of these unique conditions, the chance for member failure is greater for these conditions and they warrant added emphasis during inspection. Finally, the ability of inspectors to recognize conditions of triaxial constraint is important to guard against brittle failure.

AASHTO prioritizes fatigue details into categories from A (least critical) to E' (most critical). The inspector shall be familiar with the various fatigue categories and be able to classify the categories encountered in the field to determine the seriousness of the detail. Details which fall into Categories D, E and E' shall be considered as Fatigue-Prone Details (FPDs). FPDs shall be identified and noted in the BSIP so details can be monitored for cracks in inspections.

See Section 5.4.4.2 for the required documentation for FPDs during both bridge inventory and subsequent inspections. A current condition photograph of each unique FPD shall be placed in the Bridge File. A photograph of every FPD is not required if the photographs in the Bridge File accurately capture the condition of the FPDs unless required by the BSIP. The photograph in the Bridge File is considered the benchmark condition of the FPD until changed. Additional photographs will not be taken during subsequent inspections unless required by the BSIP or the condition on the FPD has changed from benchmark.

5.3.3 Substructure Inspection

Substructure members shall be inspected for deterioration, as described below, due to specific material characteristics, as well as for signs of foundation settlement, rotation (tipping), lateral movement, overstress due to poorly functioning bridge bearings, scour and undermining damage. During inspection for scour and undermining, areas surrounding the footings shall be probed to find areas of loose backfill or areas where scour action has removed streambed material from around the footings. Footings not located in areas influenced by stream flow may also experience undermining from bridge drainage outletting near substructure foundations. High stress zones of substructure members shall be examined for localized failure at bearing pedestals and high shear and flexural zones.

Substructures shall be examined for signs of atypical movement. Settlement of footings can cause tipping. Any unusual movement shall be documented with vertical alignment measurements if over 1".

If the NBI Condition Rating (Item 60) for a substructure is 5 or lower, one of the following is required:

- A sketch of at least one typical, controlling member may be included; these sketches include:
    - Bent Cap and Bearing Sketch Sheet (Attachment 5.17)
    - Pile Section Sketch Sheet***** (Attachment 5.18)
- Photograph (with a detailed caption noting deficiencies) shall be attached to the report.

* If the NBI Condition Rating (Item 60) for **any pile supported structure** (a substructure where piles are exposed for potential deterioration) is 5 or lower, the **Pile Section Sketch Sheet** (Attachment 5.18) **shall** be completed. Photographs may not be used to satisfy the documentation requirement for pile supported structures.

5.3.3.1 End Bents

End bents (or abutments) are located at the ends of the bridge and support the superstructure at the transition between bridge and pavement. End bents can be supported by spread footings or piles. An end bent may be spill-through, integral, semi-integral, stub, semi-stub or full height type.

Inspectors shall examine the end bent seat and backwall concrete for spalling, scaling and cracking. Inspectors shall also search for undermining of the end bent. Undermining extending under the end bent to the point where the approach fill may be washing out from under the abutment is significant. Investigation of a possible void under the approach pavement is necessary in these instances and bridge maintenance should be recommended; see Chapter 8.

If exposed, piles shall be examined for deterioration as is practical. **Exposed timber piles require sounding.** Section loss or decay at the interface between the pile and cap is common. Section remaining on piles shall be documented on the Pile Section Sketch Sheet which is available in Attachment 5.18; see Section 5.3.3. The use of this Sketch Sheet may be required. If only the top of the pile can be inspection, the Pile Section Sketch Sheet shall note that only the top of the pile was inspected.

All inspection notes regarding end bents, abutments and/or headwalls shall be placed in BEGTD on the inspection report under the **Abutments and/or Headwalls** heading.

5.3.3.1.1 Spill-Through End Bent

A spill-through end bent is used where an additional span may be added at a later date. It is essentially a pier functioning as an abutment. The main problems with this type of abutment are compaction of embankment around the abutment, early settlement and erosion. Spill-through end bents are also called open end bents.

5.3.3.1.2 Integral End Bent

An integral end bent is connected to the superstructure in a way which makes the abutment flex with the expansion and contraction of the superstructure. This flexing will often displace soil and create a trough in front of the cap and a void under the approach pavement at the paving notch. These conditions are not detrimental to the structure. The void under the approach shall be monitored to make sure it does not grow too large due to water erosion.

5.3.3.1.3 Semi-Integral End Bent

A semi-integral end bent can be a retrofit or an original design. Leaching of subsurface drainage from the approach fill occurring between the cap and the backwall may be present, which may indicate a non-functioning sub-drain.

5.3.3.1.4 Stub (Seat-Type) End Bent

The backwall shall be examined for signs of crushing or cracking from deck pressure against the backwall. The joint opening can be measured between the deck and backwall on the underside of the joint. The joint opening on top of the backwall may not be comparable to the gap between the deck and backwall underneath the joint.

The bridge seat shall be examined for spalling, scaling, and hollow areas. Spalling or scaling which has caused bearing loss must be documented.

5.3.3.1.5 Semi-Stub End Bent

A semi-stub end bent is constructed somewhere between the top and bottom of an embankment, and its height is between height of full and stub abutment.

5.3.3.1.6 Full Height End Bent

A full height end bent is constructed at the lower level roadway and should support the entire embankment. This end bent is costly and is generally used in congested urban and metropolitan areas where structure depth is critical.

5.3.3.2 Interior Bents

There are many types of interior bents. They can be timber, concrete, steel or a combination of all three. Steel bent caps can be FCMs. Types of interior bents include hammerhead, column, trapezoidal and wall types.

Flood debris against a bent shall be documented. Flood debris can cause scour, which may lead to undermining of the bent footing.

Section loss at the interface between the pile, footing and/or waterline is the most common place for this to occur. Section remaining on piles should be documented on the Pile Section Sketch Sheet which is available in Attachment 5.18; see Section 5.3.3, the use of this Sketch Sheet may be required.

All inspection notes regarding bents and/or piers shall be placed in BEGTD on the inspection report under the **Bents and/or Piers** heading. If the bridge has no bents and/or piers, the BEGTD shall state "*N/A*" or "*None*".

5.3.3.2.1 Timber Bents

All exposed timber piles shall be sounded with a hammer. Deteriorated areas typically have a hollow or dull sound which may indicate internal decay. Care must be taken to not confuse the sound associated with high moisture content pile with decay. Timber shall be inspected for checks, splits, weathering and impact damage. Deterioration and location of pile splices shall be documented with photographs or written descriptions.

Where areas of severe decay are noted, the element should be inspected for interior decay and shelling. Drill a small hole in the element and probe the interior of the bent cap for areas of rot. Any drilled hole made should be plugged with treated hardwood dowels. The boring and probing of timber members with a thin wire probe may help detect the presence of interior voids. This destructive process may cause extensive damage to the member. DT of timber bent caps may only occur with the approval of the DBIS; see Section 5.1.7.2.

If more than 10% of the member section of timber pile is decayed, the decayed pile shall be placed in Condition

State 3 as required by CS Table Number 4 in Appendix L. If a load rating for timber pile deterioration is recommended; see Section 5.5.1.

5.3.3.2.2 Concrete Bents

Inspectors shall inspect concrete bents for spalling, scaling, cracking and hollow areas. Inspectors will inspect high stress areas of concrete piles for cracking.

5.3.3.2.3 Steel Bents

Steel bents shall be checked for impact damage from flood debris. In addition, steel bent components and steel piles shall be checked for fatigue cracking, pack rust and section loss (see below) due to corrosion. Connections between primary vertical members and secondary bracing members shall be checked for cracked welds, loose connections, or section loss at gusset plate connections.

If significant deterioration is observed on steel sheet piles and steel H-piles, section remaining measurements shall be performed. Measurements shall be taken at three locations: at the waterline, between the waterline and mudline, and at the mudline. At a minimum, measurements shall be taken at 10% of piles with deterioration. When selecting piles, the inspector shall include the pile in the worst condition at several bents, when practical. Where measurements are taken, marine growth or opaque substances shall be removed from the outside flange faces and one side of web. Calipers or thickness gauges shall be used to measure section remaining and pitting measurements.

5.3.3.2.4 Integral Steel Bent Caps

Integral steel bent caps shall be checked for signs of overstress at high shear or flexural zones. For FCM integral steel bent caps, hands-on access to 100% of the FCM shall be conducted.

5.3.4 Channel Inspection

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

All inspection notes regarding the waterway and scour shall be placed in BEGTD on the inspection report under the **Waterway and Scour** heading. If the bridge does not feature a water crossing, the BEGTD shall state "*N/A*" or "*None*". Debris or obstructions can be noted in the BEGTD or on the Scour Stream Ground Profile but they shall NOT be noted in both places.

At a minimum, for all bridges over waterways, photographs showing the upstream and downstream elevations of the bridge from bank to bank shall be taken at each routine, underwater inspection and any other inspection where the channel is a subject of the inspection. See Section 5.4.4.2 for required photographs. If the NBI Condition Rating (Item 61) for the channel is 5 or less, a photograph of the controlling channel defect shall be included in the report.

5.3.4.1 Stream Bed Profile, Surveys and Soundings

During the inspection of a public bridge over a waterway for which the channel is a subject, a stream bed profile shall be performed. For all channel surveys, the elevation of the mudline must be determined and referenced to a known elevation on the bridge.

The basic channel survey is completed for all bridges over water.

5.3.4.1.1 Basic Channel Survey

The completion of the Scour Stream Ground Profile, which is available as Attachment 5.7, shall be considered a **basic channel survey**.

It will be necessary to take stream bed profiles at both the upstream and downstream fascia to obtain an as-built profile during an initial inspection and to update the profile during subsequent inspections. This could be used in the future to determine if scour is occurring and re-evaluation of Item 113 is required. In some cases the measurements can be taken with drop lines from the bridge deck. If stream flow is too swift for drop lines, the use of a fathometer or sonar depth finder may be required. Whatever method is chosen for use, it is important for it be repeatable from cycle to cycle. The method of documentation shall be noted on the Scour Stream Ground Profile.

If any of the measurements are not able to be taken due to high water height, high water flow or some other reason, it should be noted on the inspection report which channel measurements were able to be obtained and which were not. The inspector shall either return to the bridge to complete the inspection within the month the inspection is due when water levels or flow lessen or request an underwater inspection using Attachment 4.1.

The inspector may use a weighted tape to determine the depth to top of water and a depth finder to determine the mudline. The two dimensions can be combined to complete the basic channel survey.

The scour measurements shall be plotted along with the previous scour measurement date. Historic scour measurements are available in the Bridge File. In addition, measurements shall be taken at midstream for water surface and channel bottom at both the upstream and downstream fascia.

Points of measurement and elevation references must be clearly stated. On this sketch, the inspector shall note the location and depth of the streambed at each point where a scour measurement was taken. The measurement to the low chord shall also be documented on the sketch sheet.

5.3.4.1.2 Detailed Channel Survey

An underwater inspection provides a complete and detailed description of all activities, procedures and findings from the inspection including scour evaluations, if the bridge is considered scour critical.

When performing an underwater inspection, scour can vary significantly from one end of a footing to the other. Therefore, multiple readings should be taken along the length of the footings to properly assess the bridge substructure. Particular attention should be given to foundations on spread footings where scour or undermining can be more critical. In addition, scouring and undermining should be carefully evaluated for deep foundations since these deficiencies can greatly affect the horizontal stability. This situation is especially of concern when scour has occurred on only one face of the substructure unit, causing asymmetrical horizontal loading of the substructure unit.

For channels, multiple readings should also be taken to account for local extremes that may not otherwise be apparent when determining the waterway opening cross section, which is critical in completing the bridge scour assessment.

For bridges which have underwater inspections, the stream bed profiles will be obtained by the consultant performing underwater inspection. The detailed channel survey and sounding is more in-depth than a basic channel survey. Measurements and locations where the stream bed profiles shall be taken during an underwater inspection are listed in Table 5.3.4.1.2. These soundings can made with a continuous reading depth sounder or other sounding methods determined by the BITL. The method of sounding shall be included in the inspection report. The soundings shall be made on the upstream and downstream faces as parallel to the centerline of the structure as possible. The soundings shall be plotted in the underwater inspection report along with the previous measurement (if available) and original groundline (if available). If significant scour is noted, which may affect the structure’s load carrying capacity, notification of a Critical Finding is required; see Chapter 8.

A common benchmark may be used by the underwater inspectors to determine distance from the structure to the waterline but waterline measurements must be taken from the waterline to the channel bottom according to Table 5.3.4.1.2 and included in the underwater inspection report for each bridge.

For additional requirements for underwater inspection; see Section 5.3.7.

Table 5.3.4.1.2 Measurements & Locations for Profile (Structure to Channel Bottom) (Underwater Inspection Only)

Span Length	Locations of Measurements
Greater than 75 feet	At every bent and at 1/4 points along span length
30 feet to 75 feet	At every bent and at 1/2 point along span length
Less than 30 feet	At every bent

Water velocities (measured in feet per second) are required to be taken for bridges over a non-tidal waterway (listed in Section 5.3.8.8) where an underwater inspection is being performed and if any of the following criteria are met:

- Water velocity is required to be measured per the bridge's POA or scour assessment,
- NBI Item 61 (Channel and Channel Protection) is less than 5,
- NBI Item 113 (Scour Critical Bridges) is less than 5, or
- If recommended by the underwater inspection BITL.

If required, water velocities shall be taken at the center of each span within the channel. In each span, the measurements are taken along the water column at 20 percent of the water depth, 60 percent of the water depth and 80 percent of the water depth.

If not required, the approximate water velocity shall be included in the underwater inspection report. Tidal waterways have varying velocities during the tide cycle. The maximum water velocity during a tide cycle should be approximated by the BITL. Other non-tidal waterways which receive an underwater inspection but do not require water velocity measurement per the criteria above should have the approximate water velocity determined by the BITL.

5.3.4.2 *Field Inspection for Scour Inspections*

For bridges which have been determined to be scour critical, it may be necessary to take channel surveys (either basic or detailed) to comply with the bridge's POA. Scour critical bridges have a numerical coding for Item 113 of 3 or less. POAs shall be kept in the Bridge File and evaluated as needed. If NBI Item 113 is 4 or less, the condition evaluation for NBI Item 60 Substructure may require revision; see Section 7.1.2.1.3.

A scour inspection shall be performed as determined as needed at the discretion of the DBIS, BITL or BMO or per the POAs. Documentation that the POAs were followed after triggering events shall be included in the inspection report. The format of the scour inspection report shall also be outlined in the POAs.

5.3.4.3 *Request for Re-Evaluation of Item 113 – Scour Critical Bridges*

Per Section 5.2.1.4, the scour summary shall be reviewed prior to the bridge inspection. If any of the assumptions used in the scour summary are no longer valid, a request for an Item 113 re-evaluation shall be submitted.

The BITL must be aware, able to recognize and document changes which are occurring in the channel in the vicinity of the structures. These changes, documented by inspections, are to be used to assist in determining if the request for a re-evaluation of Item 113 - Scour Critical Bridges is necessary. A re-evaluation does not just apply to structures with Item 113 less than or equal to a numerical rating of 3. A re-evaluation may be necessary for structures with Item 113 greater than a 3. If a re-evaluation is required, then the Bridge Scour - Item 113 Re-evaluation Form will be filled out and submitted to the BIPM; see Attachment 4.2.

A request for an Item 113 re-evaluation shall be submitted for the following cases:

- When a structure over water has been replaced
- Substructure scour repairs performed and/or streambed scour countermeasures have been installed on a structure which is scour critical
- Significant changes have occurred which impact the stream bed or flow characteristics of the waterway
- Significant changes from assumptions which were part of the bridge's scour assumption

5.3.4.3.1 *Structure over Water Which Has Been Replaced*

When a structure over water has been replaced, the Preconstruction Office shall place an updated scour assessment, POA and/or hydrographic report in the new bridge's Bridge File.

While preparing for an inspection, the BITL is required to review any scour assessments in accordance with Section 5.2.1.4. If the BITL discovers that NBI Item 113 needs to be updated based on bridge replacement, they shall submit a request for an Item 113 re-evaluation.

5.3.4.3.2 Substructure Scour Repairs Performed and/or Stream Bed Scour Countermeasures Installed

When a structure is scour critical and has had scour repairs performed on the substructure and/or stream bed scour countermeasures have been installed, the BITL shall submit a request for an Item 113 re-evaluation following the bridge inspection, if warranted.

5.3.4.3.3 Stream Bed or Waterway Changes

The BITL shall compare channel condition (including basic or detailed channel surveys) and waterway changes to what was documented in past inspections. The loss of the stream bed material or change in flow characteristics may warrant the re-evaluation of Item 113 to ensure proper coding and structural stability.

Some concerns the BITL shall be aware of are listed below. All of the concerns mentioned below could result in a request for a re-evaluation.

- Channel changing course
- Evidence of erosion or scour around footings and embankments
- Large amounts of debris around the substructure
- Evidence of rip rap or bank protection removed or altered
- Stream work performed by others which might change the hydraulic characteristics at the bridge

The BITL will submit the new inspection report with the documented findings on the streambed changes and shall submit a request for an Item 113 re-evaluation following the bridge inspection, if warranted.

5.3.5 Structure Appurtenances

5.3.5.1 Encroachments

Lights, signs, utilities and fences which are physically attached to bridge structures are inspected by bridge inspectors during inspections. For overhead signs which are physically attached to the bridge, only the connection to the structure shall be inspected during the bridge inspection.

All inspection notes regarding approach bridge signs, bridge end signs, load posting signs and other signs shall be placed in BEGTD on the inspection report under the **Traffic Signs** heading.

All inspection notes regarding other structure attachments and/or encroachments shall be placed in BEGTD on the inspection report under the **Encroachments** heading. If the bridge has no encroachments, the BEGTD shall state "*N/A*" or "*None*".

Navigation lights on bridges are often placed over navigable waterways. The operation of navigational lights **must** be checked during inspection. If specialized access is needed to inspect or maintain these lights, a note shall be made using Attachment 5.4 and maintained in the Bridge File. Bridge inspectors may be required to assist maintenance to make minor repairs on lights if access is challenging. BMO coordination may be required if deeded necessary.

5.3.5.2 Retaining Walls

Retaining walls are subject to inspection during a structure's inspection if the BITL determines the retaining walls transfer some loads from the superstructure to the foundation material. Not all retaining walls require inspection and the BITL will make this determination. To make this determination, the BITL is encouraged to look for expansion joints or some other physical attribute which marks a separation point along the retaining wall. If existing bridge plans are available, the BITL may be able to determine the extent (if any) of retaining wall which must be inspected during a structure's inspection. Limits of retaining wall inspection shall be included in the inspection report to ensure consistency for future inspection. It is also recommended to document via photograph the limits of the retaining wall inspection for retention in the Bridge File for future use, using Attachment 5.4.

If a BITL is unsure about the limits of retaining wall to be included in a bridge inspection, first review previous inspections; if still unknown or opinion contradicts previous inspections, then he or she shall contact the DBIS.

Retaining walls which are not inspected by the bridge inspection teams are the responsibility of the RME.

5.3.6 Movable Bridge Inspection

Movable bridges, such as swing, lift or bascule spans, are those which open and close to increase the navigational clearance. These structures may require special monitoring and NDT on critical members. They may have FCMs depending on the type of structure. Movable bridges are considered bridges with complex components and have BSIPs which shall be followed.

Machinery inspection reports for the bridge inspection have special items assessed, which other bridges do not have. Previous inspection reports shall be taken along on current inspections for reference. These reports must have detailed drawings and readings from past cycles. They can be cross-examined at the time of inspection for loss or wear of movable items.

Trunnions are the pivot points of the spans. The span rotates up and down over these points much like a fulcrum. The lift span has the weight on one side and is counter balanced in the back to pivot on the trunnion. The anchor bolts have ultrasonic testing each cycle to verify bolt length. The trunnions also have ultrasonic testing for cracks and problem areas. Trunnion alignment is determined by measuring and recording tooth wear and backlash on the pinion and rack gear sets and by observing grease patterns.

Inspection limits for movable bridges also include the entire bridge, including bridge related slope, approach slabs, walkways under and walkways to the bridge tender houses, fender systems above water and dolphins.

Diagrams or charts of gears for lifting machinery, locks, trunnions, bearings, buffers and brakes must be included in these reports. Each of these items are examined and assessed accordingly.

Calipers, flashlights, scrappers and all other types of specialty tools are used for such inspections. The diagrams are likely drawn from the plans when the bridge was new and in pristine working order. The measurements over the years may have declined or worn down but still may be in acceptable condition.

5.3.7 Underwater Inspection

A routine underwater bridge inspection normally includes a 100% Level I inspection and a 10% Level II inspection. It may also include additional Level II inspections and Level III inspections if necessary to determine the structural condition of the submerged substructure elements with certainty. Exact requirements for each bridge are included in the BSIPs for underwater inspections, which are located in the Bridge File. Per FHWA, three diving inspection intensity levels have evolved as follows:

- Level I: Visual, tactile inspection
- Level II: Detailed inspection with partial cleaning
- Level III: Highly detailed inspection with NDT or partially NDT

The previous underwater inspection report shall be used during the execution of an underwater inspection. A detailed channel survey is required for all bridges which receive underwater inspections; see Section 5.3.4.1.2.

Like other bridge inspectors, underwater bridge inspectors can find Critical Findings during their inspections; see Chapter 8.

5.3.7.1 *FHWA Level I Inspection*

Level I intensity inspection consists of a close visual inspection at arm's length with minimal cleaning to remove marine growth of the submerged portions of the bridge. This intensity level of inspection is used to confirm the continuity of the members and to detect any undermining or elements that may be exposed that would normally be buried. Although the Level I intensity inspection is referred to as a "*swim-by*" inspection, it needs to be detailed enough to detect obvious major damage or deterioration. A Level I intensity inspection is normally conducted over the total (100%) exterior surface of each underwater element, involving a visual and tactile inspection with limited probing of the substructure and adjacent streambed. In areas where light is minimal, handheld lights may be needed. If the water clarity is poor enough that the inspector cannot inspect the member visually, a tactile inspection may be performed by making a sweeping motion of the hands and arms to cover the entire substructure.

5.3.7.2 *FHWA Level II Inspection*

Level II intensity inspection is a detailed inspection that requires that portions of the structure be cleaned of marine or aquatic growth. In some cases, cleaning is time consuming, particularly in salt water, and needs to be restricted to critical areas of the structure. However, in fresh water, aquatic coatings can be removed by just wiping the structural element with a glove. Generally, the critical areas include the list below:

- Near the low waterline,
- Near the mud line and
- Midway between the low waterline and the mud line.

On pile structures, horizontal bands, approximately 6 to 12 inches in height, preferably 10 to 12 inches, need to be cleaned at designated locations:

- Rectangular piles - the cleaning includes at least three sides
- Octagonal piles - at least six sides
- Round piles - at least three-fourths of the perimeter
- H-piles - at least the outside faces of the flanges and one side of the web

On large elements, such as piers and abutments, clean areas at least 1 square foot in size at three or more levels on each face of the element. For a structure that is greater than 50 feet in length, clean an additional three levels on each exposed face. It is important to select the locations to clean to help minimize any potential damage to the structure and to target more critical locations. Measure and document any deficient areas, including both the extent and severity of the damage. It is intended to detect and identify high stress, damaged and deteriorated areas that may be hidden by surface growth.

Deterioration, judged significant by the BITL or the supervising South Carolina Registered Professional Engineer, such as cracking shall be noted and traced to termination or mudline. For all bridges receiving an underwater inspection, a FHWA Level II Inspection is required. This type of inspection shall occur to a minimum of 10% of underwater elements.

5.3.7.3 FHWA Level III Inspection

If a FHWA Level II Inspection does not permit a complete determination as to the safety and/or structural integrity of the bridge, then a FHWA Level III shall be initiated. A FHWA Level III Inspection consists of extensive cleaning, detailed measurements, material sampling and testing and NDT.

A FHWA Level III Inspection is a highly detailed inspection of a critical structure or structural element, or a member where extensive repair or possible replacement is contemplated. The purpose of this type of inspection is to detect hidden or interior damage, or loss in cross-sectional area, and to evaluate material homogeneity.

This level of inspection includes extensive cleaning, detailed measurements, and selected non-destructive and partially DT techniques such as ultrasonic testing, sample coring or boring, physical material sampling, and in-situ hardness testing. The use of testing techniques is generally limited to key structural areas, areas which are suspect, or areas which may be representative of the entire underwater structure.

DT shall be approved by the DBIS in the district where the bridge is located prior to the performance of the work.

5.3.7.4 Underwater Inspection Photographic Documentation

The dive team shall be equipped with a digital camera and a clear water box for use in low visibility water. Underwater still photography shall be used to document significant areas of distress. Video photography shall be provided upon request by SCDOT.

5.3.7.5 Special Testing and Measurements during Underwater Inspection

As part of any underwater inspection (FHWA Level I, Level II or Level III), the following special testing and measurements requirements shall be performed.

If footings are exposed, the corner of each exposed corner shall be inspected. In addition to noting exposed footings, the underwater inspection report shall also note if the cofferdam seal coat concrete or footing piles are exposed. The condition of these components shall be noted in the underwater inspection report.

As part of the inspection, the underwater inspection team shall perform soundings with equipment deemed suitable by the BITL. The soundings shall be made on the upstream and downstream faces as parallel to the centerline of the structure as possible. If riprap and/or some other form of scour protection exist, their size, location, and extent shall be documented, mapped out, and effectiveness noted. This does not include embankment protection. Section 5.3.4.1.2 contains requirements for sounding measurements during channel inspection.

If significant scour is noted, which may pose a risk to the public, SCDOT shall be notified of the Critical Finding; see Chapter 8.

5.3.7.5.1 Concrete Piles

On concrete piles, the inspector shall search for irregularities including cracks and spalls. While all piles must be inspected, general defects may be applied for cracks up to 0.1875” wide. All cracks larger than 0.1875” wide must be identified by the inspector in the report.

5.3.7.5.2 Steel Piles

Steel piles during an underwater inspection are subject to the same requirements listed in Section 5.3.3.2.3.

5.3.7.5.3 Timber Piles

The boring and probing of timber piles with a thin wire probe may help detect the presence of interior voids. This destructive process may cause extensive damage to the pile. DT of timber piles may only occur with the approval of the DBIS in the district where the bridge is located; see Section 5.1.7.2. The DBIS should consider that generally only one timber pile should be bored over the lifespan of the structure. Unless significant deterioration has occurred, no more than 25% of the piles in a bent may be bored over the lifespan of the structure. The piles shall be bored at the waterline, mudline and midway between the waterline and mudline. The bore holes shall be plugged with treated hardwood dowels after inspection. Any timber bent pile which is spliced or has a stud-up repair shall be marked as such on the Pile Section Sketch Sheet.

5.3.7.5.4 Scour Protection

If riprap and/or some other form of scour protection exists, its size, location, and extent shall be documented, mapped out and effectiveness noted. This does not include embankment protection which is gathered during the channel inspection.

5.3.8 Other Information Gathered at Inspections

5.3.8.1 Travel Direction

During inspections, inspectors shall determine the travel direction at bridges. The travel direction may be obtained from SI&A data, plans in the Bridge File, a compass, a web-based application produced by SCDOT (websites linked in Section 1.6.2) or the labeling diagram. Consistency from inspection to inspection is required when using travel direction.

5.3.8.2 Vertical Clearance Measurements and Vertical Clearance Signage Verification

Prior to measuring vertical clearances, see Section 5.3.8.1 for the requirement to determine travel direction.

Inspection teams are required to check the low point vertical height clearances under a bridge. In addition, if the bridge is a through truss or similar structure, the clearance through the truss from the roadway shall be measured. As stated in Section 2.3 of this document, vertical clearances shall also be measured on Railroad or Mass Transit Bridges or Pedestrian and Bikeway Bridges over SCDOT owned roads.

The low point clearance is taken within the traveled way. The travel way is defined as the roadway lane which is allowing travel on a regular basis. BITLs shall use their judgment when accessing a roadway traveled way. For example, if a roadway has a breakdown lane which travel is permitted on a regular basis, then the clearance will need to be verified at the outer limits of the breakdown lane. Stabilized shoulders shall not be used for vertical clearance measurements in South Carolina unless the stabilized shoulder is regularly used by traffic. BITLs shall not adjust clearance measurements because the travel way is being altered for the convenience of a construction project.

Vertical clearances shall be taken during every routine or damage inspection performed. However, it is understood it shall not be different unless a change condition has occurred to the wearing surface below the structure or on the structure as in the case of a thru truss bridge. This verification frequency will ensure accuracy of the data being recorded at the time of the inspection.

BITLs are not expected to request traffic control solely to measure vertical clearance. In the event a low point is unable to be measured from the roadway under the structure, the BITL may use other methods to determine vertical clearance such as a "*top down*" measurement from the deck of the structure or a measurement adjacent to the low point and an adjustment for bridge slope. These methods may require the use of bridge plans to determine the vertical clearance at the low point. Other methods are acceptable except if the clearance is 14'-6" or less. If there is no way to measure the vertical clearance, BITLs shall place a note in the BEGTD on the inspection report under the **Miscellaneous** heading when they do not verify the vertical clearance, the reason why, and when the BITL will return to the bridge to obtain the measurement.

Requirements for coding vertical clearances (NBI Item 54) are included in Section 7.3.8. Coded vertical clearances may be different than the posted vertical clearance due to district maintenance vertical clearance posting policies and procedures.

There are no South Carolina General Law requirements for installing clearance posting signs; however, in order for a bridge to be considered properly clearance posted, an "*At Bridge*" clearance posting sign must be either within visible distance of the structure or attached to the structure and be erected facing each direction of traffic. If there is an intersecting street between the sign and the bridge, an additional sign should be erected immediately adjacent to the bridge. These additional signs should be in place in order for the bridge to be considered properly posted at the recommendation of the BITL or district maintenance.

When the inspection team field verifies the vertical clearance height is less than 14'-6", then the team shall verify the placement of any clearance posting signs in the field during the inspection. If the clearance is 14'-6" or less, the vertical clearance shall be taken at the low point during the inspection. A photograph of existing vertical clearance signs shall be taken and included in the inspection report during the first inspection after the sign is installed. Note if any of the advanced clearance posting signs or "*At Bridge*" clearance posting signs are missing, then the BITL shall note the missing signs including the location as a repair recommendation, Priority A (or "*A Flag*").

If the clearance is more than 14'-6", clearance signs could still be posted. The determination is at the discretion of district maintenance. Missing, incorrect or illegible signs for clearances over 14'-6" should be recommended for repair as a Priority B (or "*B Flag*") if deemed necessary by district maintenance.

Requirements for clearance signs are included in SCDOT's supplement to the MUTCD (W12-2 and OHB Series Signs). These requirements shall be reviewed by inspectors. The sign posting terms are defined as:

- ***"At Bridge"* Clearance Posting Signs**: Signs erected immediately in advance of, or on the bridge being clearance posted.
- **Advance Clearance Posting Signs**: Signs placed at approach road intersections or other points where a vehicle which exceeds the clearance posted limits must detour or turn around.

5.3.8.3 *Lateral Clearance Measurement*

Prior to measuring lateral clearances, see Section 5.3.8.1 for the requirement to determine travel direction.

Inspection teams are required to check the minimum lateral clearance. Lateral clearances shall be taken during every routine or damage inspection performed. However, it is understood it shall not be different unless a change condition has occurred. This verification frequency will ensure accuracy of the data being recorded at the time of the inspection. As stated in Section 2.3 of this document, lateral clearances shall also be measured on Railroad or Mass-Transit Bridges or Pedestrian and Bikeway Bridges over SCDOT owned roads.

Lateral clearance shall be measured from the left and right edge lines of the roadway (excluding shoulders, turn lanes, acceleration or deceleration lanes) in the travel direction to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers.

BITLs shall place a note in the BEGTD on the inspection report under the **Miscellaneous** heading when they do not verify the lateral clearance, the reason why, and when the BITL will return to the bridge to obtain the measurement.

Requirements for coding lateral clearances (NBI Item 55 and NBI Item 56) are included in Section 7.3.8.

5.3.8.4 *Weight Posting or Weight Limit Verification & Posting Weight Limit Signage Verification*

The BITL shall review the current load rating documentation of the structure to be inspected so as to obtain any recommended posting for the structure. The BITL shall verify the actual weight posting for the structure in the field and compare it to the recommended weight posting contained in the load rating documentation. The actual and recommended weight posting values shall be stated in the Posting Form. If a discrepancy exists between the actual and recommended weight posting recommendation, then the BITL shall recommend the correct posting sign is placed in HMMS or on the Repair Recommendations Form (Priority A (or "*A Flag*")). A photograph of existing posting signs shall be taken and included in the inspection report during the first inspection after the sign is installed. Chapter 19 of the LRGD contains requirements for posting bridges and includes images of the signs for R12-6-48, R12-7-60 and R12-9-36.

5.3.8.5 *Traffic Count*

The need for the bridge inspection team to obtain a traffic count is very unlikely and depends on information kept by RDS. ADT is reportable structure information, which is part of SI&A data. If a manual traffic count is needed for a bridge, see Appendix N for additional information.

5.3.8.6 *Component Description for Bridges without Bridge Plans*

Section 5.2.1 of this document discusses the use of bridge plans prior to, during and after bridge inspections.

In the event a bridge does not have bridge plans, a brief description of deck thickness and superstructure and substructure members shall be included in the BEGTD in the applicable entry field. The brief description shall include quantity of member, type of member and size of members.

A brief description of all other members (curb, bridge rail, etc.) is recommended but not required.

In addition, the Bridge File will include a labeling diagram, as well as documentation resembling schematic drawings (developed for load rating) for use by inspectors. Chapter 5 of the LRGD contains guidance on labeling diagrams. The labeling diagrams shall be used by inspectors for bridge orientation, cardinal direction, member identification and when documenting inspection findings.

This brief description shall be reported during the initial inspection and confirmed during subsequent routine and special inspections (as applicable). Figures 5.3.8.6-1 and 5.3.8.6-2 include examples of a brief description of superstructure members.

Girders/Floor Beams/Stringers and/or Beams:

25"X8"X3/4"X19' STEEL FLOOR BEAMS; RC DECK ON FLOOR BEAM DESIGN

Figure 5.3.8.6-1. Sample 1 of a Brief Description of Superstructure Members

Girders/Floor Beams/Stringers and/or Beams:

MAIN: 2-72 INCH STEEL GIRDERS WITH FLOOR BEAM SYSTEM.
APPROACH: 4-14X28 INCH REINF. CONC. T-BEAM PER SPAN.
BENT 136 PIER A, BOTH OUTSIDE GIRDERS HAVE 3/8" REMAINING TO BOTTOM FLANGE AT BEAM END CONDITIONS.

Figure 5.3.8.6-2. Sample 2 of a Brief Description of Superstructure Members

5.3.8.7 Weather and Air Temperature

The BITL shall enter the weather and temperature at the time of the inspection in the BEGTD on the inspection report under the **Miscellaneous** heading.

In the event of a multiple day inspection, the weather will be taken and reported for each day of the inspection.

The temperature shall be the shade temperature (in Fahrenheit degrees) taken by the inspector at the bridge site.

The description of the weather can be any one of the following:

- Cloudy
- Rain
- Sunny
- Windy
- Snow

5.3.8.8 Tidal Waterways

For bridges over tidal waterways, the BITL may need to review information available from the South Carolina Department of Health and Environmental Control (DHEC) regarding tidal charts. A list of tidal waterways is included in Table 5.3.8.8. The BITL shall include the date and time when the Scour Stream Ground Profile, Culvert Profile Sketch Sheet or detailed channel survey (underwater inspections only) were performed so it can later be determined what the tides were at the particular point in time so it can be related to mean high water and mean low water. In addition, the BITL shall enter the time at which the water surface was measured in the BEGTD on the inspection report under the **Miscellaneous** heading and the applicable, approximate tide status under the **Miscellaneous** heading from the options below.

- Slack Tide
- Falling Tide
- Low Tide
- Rising Tide
- High Tide

Since water height under bridges over tidal waterways may change between routine and underwater inspections, noting time and tide information may be important when reviewing multiple reports.

Per guidance from the United States Army Corps of Engineers, Table 5.3.8.8 shall be used to determine tidal rivers by river mile posts. Tributaries and branches from these rivers below these mile posts towards the Atlantic Ocean should be considered tidal. For example, the Ashley River and Wando River are tributaries of the Cooper River which is tidal; therefore, both the Ashley and Wando Rivers shall be considered tidal below the mile post listed for the Cooper River towards the Atlantic Ocean. The Intercostal Waterway (ICWW) is not included below but is considered tidal in its entirety.

Table 5.3.8.8 Tidal Waterways of South Carolina

River Basin	Counties	District	River Mileage of Tidal Influence from Outlet
Black River	Georgetown and Williamsburg	5	40 Miles
Combahee River	Beaufort and Colleton	6	37 Miles
Cooper River	Berkeley and Charleston	6	40 Miles
Coosawhatchie River	Jasper	6	9 Miles
Edisto River	Charleston, Colleton and Dorchester	6	37 Miles
Great Pee Dee River	Georgetown and Horry	5	33 Miles
Santee River	Berkeley, Charleston and Georgetown	5 and 6	37 Miles
Waccamaw River	Georgetown and Horry	5	60 Miles

5.3.8.9 *Narrow Bridge Signs and One Lane Bridge Signs*

Narrow bridges on roadways shall be identified using the Narrow Bridge sign (W5-2) in accordance with MUTCD Section 2C.20. A Narrow Bridge sign should be placed in advance of a bridge (or culvert) if it meets at least one of the following conditions:

- The structure carries two-way traffic and has a roadway width less than 18 feet and this width is less than the approach roadway width; or
- The roadway clearance on the bridge is less than the width of the approach travel lanes (the approach shoulder width is not included).

One lane bridges on roadways shall be identified using the One Lane Bridge sign (W5-3) in accordance with MUTCD Section 2C.21. A One Lane Bridge sign should be placed in advance of a bridge (or culvert) if it is on a low-volume, two-lane roadway if it meets one of the following conditions:

- Having a clear roadway width of less than 16 feet;
- Having a clear roadway width of less than 18 feet when commercial vehicles constitute a high proportion of the traffic; or
- Having a clear roadway width of 18 feet or less where the approach sight distance is limited on the approach to the structure.

5.3.8.10 *Additional Traffic Signs*

Both the MUTCD and the SCDOT Supplemental to the MUTCD include requirements for additional signs at and around bridges. These requirements shall be reviewed by inspectors to increase familiarity. Signs which may be included around bridges include signs in Table 5.3.8.10; the list in Table 5.3.8.10 is not all-inclusive.

Table 5.3.8.10 Common Traffic Signs for Bridge Inspections

Sign Number	Name of Sign
R20-1-18	No Fishing From Bridge
R20-1A-18	No Fishing From Road
R20-1C-24	No Diving and Jumping From Bridge

Table 5.3.8.10 Common Traffic Signs for Bridge Inspections (continued)

Sign Number	Name of Sign
W8-13	Bridge Ices Before Roadway (See ED 43)
W8-41-48	Shoulder Narrows
W8-18-30, W8-18-36 & W8-18-48	Strong Winds Possible
I-3 & I-3.2	River & Creek Signs
OM-3.5L-24 & OM-3.5R-24	Bridge Pier or End Markers
OM-3.6, 3.7 and 3.8 Series	Guardrail End Treatments
W8-16	Metal Bridge Deck

5.3.9 Photographs

Inspectors will use tablet computers or digital cameras to take photographs of bridge elements. Photographs capture member conditions in the field and support justification of resulting ratings. For larger inspections, photo logs are encouraged to be created for each inspection occurrence and added to the inspection report as an attachment or addendum. Required photographs are identified in Section 5.4.4.2 of the BIGD. All photos must be captioned. Generally, only the worst case photographs shall be included in the report to document the controlling condition. One photograph may capture more than one required photograph or required deficiency so long as it is captioned appropriately. The Photograph Form, which is Attachment 5.20, may be used as needed.

5.3.10 Guidance on Measurement

Sufficient dimensions shall be provided of any deficiencies observed. The dimensioning shall provide actual size measurements and depth measurements to capture the scale of the defect. These measurements shall then be referenced to a fixed and definable reference point on the structure. It is desirable for all reference points to refer from the centerline of bearings for the structure. All units of measurement shall be stated in English Units.

5.3.10.1 Structure Movement

Inspectors encounter bridge components, often substructure elements, which have settled or rotated from the original positions shown on the as-built drawings. Superstructure elements may move vertically or longitudinally over a bent. Whenever possible, the inspectors shall quantify the movement to relay the degree of movement observed.

For example, if a wingwall stem is observed to have rotated, the inspector shall take measurements to report the magnitude of the rotation. Acceptable methods of measurement would be using a plumb-bob to determine the horizontal movement of the top of the wall in relation to the base of the wall. Additionally, in horizontal applications, for example, the degree of settlement can be quantified by using a stringline to establish the proper plane in which the member should exist and measure the distance from the stringline to the face of the element being investigated.

Typically, movement of vertically oriented elements is quantified by the total horizontal movement from the bottom to the top of the element. Settlement in the horizontal plane is often quantified by the drop in elevation over the horizontal length of the affected portion of the element.

The magnitude of the reported rotation and/or settlement is critical in tracking the movement over subsequent inspections and determining the severity/criticality of the findings. The magnitude of these measurements can identify immediate risks to the structure for which remedial action can be prioritized. No matter what the circumstances, structure settlement over 1" shall be photographed for future comparison. The photograph shall include a tape measure for scale. Spray paint may be used to mark locations of measurement for future use.

In the event joint, deck or slab movement is the subject on an inspection note, the temperature shall be recorded in accordance with Section 5.3.8.7.

5.3.10.2 Crack Measurements

Inspectors shall measure and record crack sizes larger than 0.1875” in reinforced concrete or 0.009” in precast concrete found during inspections unless a BSIP exists with a more stringent requirement. This may be the case for bridges with FCMs or certain members depending on material or member type. They shall record the lengths, widths and depths were possible and reference the locations of the cracks to a fixed point on the structure.

5.3.10.3 Steel Section Remaining

When inspectors discover diminished section remaining on structural steel elements (i.e.; girders, stringers, truss elements, 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.

5.3.10.4 Concrete Spalls

Inspectors shall use element-level requirements for measuring and photographing spalls. Spalls which are visibly less than 1 inch deep or less than 6 inches in diameter do not require measurement or photographs as these spalls are classified as CS2. Once a spall is severe enough to be classified in CS3 during the element-level assessment of a concrete member, a photograph or sketch sheet shall be included in the inspection report per Section 7.2.3.

5.3.11 Supplemental Inspection Information

The NBIS requires information on inspection equipment needs and maintenance history be maintained for all bridges. Supplemental inspection information that may be noted by inspectors includes, but is not limited to:

- Special equipment requirements for inspection,
- Traffic control needs during inspection,
- Time requirements for inspection,
- Presence of a FCM, FPD or fatigue vulnerability,
- Over height and impact damage from vehicles,
- Flood monitoring and past flood inspections,
- New construction and bridge maintenance/rehabilitation and/or
- Items notified by the public to SCDOT.

5.4 RECORDING PROCEDURES

Inspection findings shall appear in the inspection report created in Bridge Inspection Online (BIO) or the Bridge Inspection Application (BIA). Critical Findings shall appear on the Critical Findings Form. Repair recommendations shall be logged into HMMS.

5.4.1 Bridge Inspection Online (BIO) Application

Bridge inspection findings for inspections performed by both SCDOT and consultant inspectors will be recorded in BIO. This program also has a version for tablet computers called BIA.

5.4.2 Critical Findings

Reporting of Critical Findings is required under the NBIS. Critical Findings are structural or safety related deficiencies requiring immediate follow-up inspection or action. Chapter 8 contains procedures for Critical Findings.

5.4.3 SCDOT Asset ID Number System

5.4.3.1 Asset ID Number

The purpose of assigning an Asset ID Number is to maintain a statewide inventory by incorporating a unique number for each structure inspected through the BMS.

Each structure entered in the BMS shall have a unique Asset ID number assigned.

RDS will assign Asset ID Numbers. For a new structure, an Asset ID number shall be assigned during the design phase and included on the design plans and the initial bridge load rating. This process is coordinated through Preconstruction.

All new bridges which replace existing structures, regardless of the nature of their replacement, need a new Asset ID Number. Numbers shall not be reused. If a number was reused, the procedure in 5.4.3.4 shall be followed.

5.4.3.2 Structure Number

Structure numbers are no longer solely used to identify structures for the purpose of bridge inspection.

5.4.3.3 Structures without Asset ID Number

Inspectors may come across structures which do not have an Asset ID Number yet appear to be subject to NBIS requirements of a bridge. In the event of this, the inspectors shall perform an initial inspection of the bridge. Without an Asset ID Number, the inspectors shall use the road name or GPS coordinates to temporarily identify the bridge.

Following the inspection, the BITL, DBIS or consultant PM shall inform (via email) RDS of the undocumented structure and request an Asset ID Number using Attachment 5.1. The BIPM and BMQE shall also be included on the correspondence to RDS.

5.4.3.4 Structures with Multiple or Incorrect Asset ID Numbers

Inspectors may come across structures which have multiple or incorrect Asset ID Numbers. This may occur if two bridges are replaced with a single bridge and a new number was not assigned. This practice is not acceptable and a new number should have been assigned as Asset ID Numbers may not be reused. In the event of this, the inspectors shall still perform the inspection of the bridge. If needed, the inspectors shall use the road name or GPS coordinates to temporarily identify the bridge.

Following the inspection, the BITL, DBIS or consultant PM shall inform (via email) RDS of the errors and request corrections using Attachment 5.1. The BIPM and BMQE shall also be included on the correspondence to RDS.

5.4.3.5 Asset ID Number for Parallel Structures

Where twin, sister or parallel structures exist in close proximity, unique Asset IDs should be assigned to each structure if it is clear the structures are acting independently of one another (i.e. a longitudinal joint or larger physical separation) and opposing traffic is physically separated by a barrier or median, as to prevent traffic from crossing from one structure to the other. In lieu of an obvious structure separation or absence of details, engineering judgment should be used.

If the separated superstructures share a substructure (i.e. the end bents are continuous and support both superstructures), substructure and/or foundational elements are a part of two unique Asset IDs but should be labeled as if they were one structure. The labeling diagram shall include numbering which continues sequentially from the labeling diagram of the first Asset ID to the next. On the labeling diagrams of both Asset IDs, add a note stating, "*For continuation of substructure, see Asset [#####]*." See LRGD requirements for labeling diagrams.

Currently, if these independent structures unacceptably share an Asset ID, the Asset ID should be assigned to one of the structures and a new one should be requested as detailed in Section 5.4.3.3.

Alternatively, if one structure was previously assigned two Asset IDs (possibly due to the appearance of a separation, such as two-way traffic), but current engineering judgment determines it is one structure, then one of the two Asset IDs should be retired as detailed in Section 5.4.3.8.

5.4.3.6 Asset ID Number Placement on Bridge

An Asset ID Number placard shall appear on all bridges. If a bridge does not have an Asset ID Number posted or if it has an incorrect number posted, it shall be replaced.

Any member of the County or District Maintenance Office may place an Asset ID Number placard on bridges. The district bridge inspectors shall discuss the importance of the placement of the Asset ID Number placard on the bridge with maintenance staff to make sure placards are located at the Bent 1 end (for bridges) or at Barrel 1 (for culverts) per direction from the SBME correctly on bridges to assist with bridge orientation.

If consultants discover an Asset ID Number placard missing on a bridge, the consultant shall recommend the placard be installed using Attachment 5.6, the Repair Recommendations Form.

5.4.3.7 *Asset ID Number Placement on Non-NBI Bridge*

Asset ID Number placards shall appear on all non-NBI bridges. Per Section 2.3.3, culverts and pipes which are not considered bridges are the responsibility of the RME and shall be inspected as part of the roadway work in accordance with ED 8.

Any member of the County or District Maintenance Office may place an Asset ID Number placard on bridges. If an Asset ID Number placard is not placed on a structure, it will be considered as the responsibility of the County or District Maintenance Office; therefore, SCDOT inspectors shall recommend one is installed via HMMS or install the placard themselves.

If consultants discover an Asset ID Number placard missing on a non-NBI bridge, the consultant shall recommend the placard be installed using Attachment 5.6.

5.4.3.8 *Retirement of Asset ID Number*

To retire an Asset ID, the inspector shall use Attachment 5.1 to retire the old Asset ID Number and request a new Asset ID Number. Asset ID Numbers shall be retired only if the bridge is closed to traffic permanently (with no plans to reopen) or a bridge is demolished.

If the retirement of an Asset ID has an associated inspection or if an inspection prompted the retirement of an Asset ID, the inspection must still be documented with a report in BIO and the Bridge File. To document the inspection which took place along with the retirement of the Asset ID, the completed Attachment 5.1 shall be attached to the inspection report when submitted.

5.4.3.9 *Structure Number Placement on Bridge*

Bridge structure numbers are no longer actively placed on bridges. However, bridges are identified by Asset ID Number and at the time of this document's release, Structure Number, within bridge maintenance.

Structure number placards may appear on bridges. If the structure number located on a bridge is correct, the sign may remain.

However, if the Structure Number placard is incorrect, it may be removed by the inspector or by any member of the County or District Maintenance Office. Consultant inspectors may not remove structure numbers. A repair recommendation shall not be made for incorrect placards by consultants.

5.4.4 Inspection Report Format

An inspection report must be completed for every bridge inspection performed. This report is essential as it provides specific details about the inspection and about the bridge itself. This section includes the requirements for the various inspection reports completed.

The term inspection report in this document generally refers to the Routine Inspection Report, including reports following an initial inspection. The term inspection report may also be applicable to other reports as defined below.

All inspection reports shall be a stand-alone document and must include all elements inspected during the inspection event. When submitting the inspection report, the inspector shall **combine all components (including photographs) into one flattened Portable Document Format (PDF)**. The report shall be placed in the Bridge File in accordance with the BFP. The BFP contains requirements for how the PDF shall be named when placed in the Bridge File.

For inspection reports created in BIO (routine, fracture critical, underwater and special), the BIRF shall be included as the first page of the report. The BIRF, currently developed by BIO, serves as the SCDOT’s SI&A Page. This BIRF provides a means for recording standard information pertinent to all bridges and special information unique to the particular bridge.

BIO also allows inspectors to add textual notes under the BEGTD headings listed in Table 5.4.4 and to input bridge element-level data. Photographs, sketches and other documents can be included as attachments to the report.

Reports in BIO shall be submitted to the BMQE for QA Review; see Section 9.3. Following the QA of selected reports, the BMQE will transmit SI&A data from BIO into RIMS. Other reports not created in BIO will not have

SI&A data and will need to be inputted into RIMS.

Table 5.4.4. BEGTD Headings in BIO

BEGTD Headings	
Abutments and/or Headings	Bridge Railing/Parapets and/or Median Barriers
Bents and/or Piers	Paint Systems
Bearings	Waterway and Scour
Girders/Floor Beams/Stringers and/or Beams	Fender System
Truss Members	Roadway Alignment
Expansion Joints	Traffic Signs
Decks and/or Slabs	Encroachments
Curbs	Miscellaneous Notes

Per the requirements of the BIGD, the inspection report shall contain some or all of the following:

- BIRF (**Required**),
- BEGTD (**Required**),
- Bridge Element Level Data (**Required**),
- Photographs with captions (**Required**),
- Bridge Inspection QC Form (**Required**)
- Textual Data – Written Description Form (if necessary, see below),
- Sketches (if necessary),
- Critical Findings Form (if necessary),
- HMMS Entry Confirmation (if necessary, for SCDOT performed inspections only),
- Signed/Completed Repair Recommendations Form (if necessary, for consultant performed inspections only),
- Inspection Out-of-Frequency Form (if necessary, for any bridge inspected out-of-frequency),
- Attachment 5.1 (if necessary, for inspections which prompted Asset ID retirement) and/or
- Addendum or Attachments (if necessary).

The Textual Data – Written Description Form is available as Attachment 5.19 in the event the space included in BIO's BEGTD is insufficient. If the form is used, the inspection report shall include a note referring to the form such as "*See Attached Textual Data – Written Description Form*". Text shall not appear in both the BEGTD and the form.

5.4.4.1 General Guidelines for Written Descriptions

In general, describe permanent and long-term features of the bridge, such as overlays, retrofitted barrier rails, beam replacements, paint, abutment backwall rebuilds, paving notch rebuilds, riprap installations and articulated block mat installations. When describing a change, retrofit or addition, include the year when the new feature was first included. The descriptions are not intended to describe maintenance features, such as concrete patches to the deck or epoxy injection of the deck since these items shall be included in the bridge's maintenance file. If bridge maintenance items are not included, they shall be listed in the inspection report for the inspection which occurs after the maintenance activity occurs.

When noting bridge hits or significant damage, include the year when the impact occurred (if known) in the inspection report. The bridge hit or significant damage note should continue to be included in each inspection report until it is repaired to a pre-impact condition.

If impact damage is new to a bridge and it does not appear in the inspection report, it shall be noted in the inspection report for the inspection after the damage occurs.

5.4.4.1.1 Date of Inspection

When inspections are performed over multiple days, the **start date of the inspection** shall always be used for the report and SI&A coding. The start date is the date which elements are actually inspected (a reconnaissance of a structure shall not be considered as a start date). This is especially important when inspections are started in one month but completed in the next month.

When inspections are delayed for access issues such as construction operations or ROE permit acquisition, the inspection team shall complete as much of the inspection which is physically possible and complete an inspection report depicting the areas and elements inspected. The report shall clearly state the limits of the inspection and explain which areas were not inspected and why. When access for the other areas is granted and/or possible, the BITL shall then return to the bridge to complete the inspection.

After the inspection is fully completed, the BITL shall determine the frequency for the next inspection based on when the first inspection was attempted to keep the bridge on cycle.

5.4.4.1.2 Inspection Defects

During the inspection of a structure, the BITL may discover faults, flaws and imperfections. These defects shall be identified and described by their type, size and location according to the requirements of this document. The BITL shall document the defect and describe the seriousness of the defect in the body of the inspection report according to the requirements of this document. Recommended corrective actions shall be considered defects and included in the inspection report, reported Critical Findings (if needed) or logged as repair recommendations in HMMS.

5.4.4.2 Photographs

A list of all required photographs to be taken during a routine inspection is included in Section 5.9 in the On-Site Inspection Checklist Table (Photographs). Generally, only the worst case photographs shall be included in the report to document the controlling condition. If an inspector is able to capture multiple required items in one photograph, only one photograph needs to be submitted in the inspection report provided the photograph is captioned appropriately.

For a bridge not over a waterway, at least **three** photographs shall be included in every routine bridge inspection report showing the typical condition of the three main bridge elements (deck, superstructure and substructure).

For a bridge over a waterway, at least **five** photographs shall be included in every routine bridge inspection report showing the typical condition of the three main bridge elements (deck, superstructure and substructure) and the upstream and downstream elevations of the bridge from bank to bank.

For a culvert, at least **four** photographs shall be included in every routine bridge inspection report showing the typical condition of the top of the roadway, the culvert and the upstream and downstream elevations of the bridge from bank to bank.

The **required** photographs for routine inspections are summarized below:

- Bridge (Not Over a Waterway)
    - Typical Top of Deck
    - Typical Superstructure Condition
    - Typical Substructure Condition
- Bridge (Over a Waterway)

  - Typical Top of Deck
  - Typical Superstructure Condition
  - Typical Substructure Condition
  - Upstream Elevation
  - Downstream Elevation
- Culvert
  - Top of Roadway
  - Typical Culvert Condition
  - Upstream Elevation
  - Downstream Elevation

Elevation photos are taken when standing away from the bridge, upstream and downstream from the bridge and looking at the bridge. Upstream and downstream elevation photos can be taken while standing in the water or standing on river banks. If it is not possible to get a bank-to-bank picture, several pictures shall be included in the report.

Other **possible** inspection photographs are listed below (list is not all-inclusive); they **may be required**:

- Component with NBI Condition Rating of 5 or less (if not captured with sketch)
- Significant Change from Previous Inspection (if applicable)
- Significant Change from Inventory Photos (if applicable, see below)
- Critical Findings (if applicable)
- Repair Recommendations (consultant performed inspection only, if applicable)
- Any Elements with Condition States 3 or 4 (if applicable)
- FPDs (if condition has changed from the inventory photograph of the FPD or as stated in the BSIP, see Section 5.3.2.15)
- FCMs (as stated in the BSIP, but likely if the condition has changed from the previously known condition of the FCM, see Section 5.3.2.14)
- Vertical Clearance Sign(s) (if applicable, first inspection after placed or if not previously photographed)
- Posting or Weight Limit Sign(s) (if applicable, first inspection after posted or if not previously photographed)

5.4.4.2.1 Required Inventory Photographs

During the initial inspection, a series of photographs shall be taken to document the structure for inventory purposes. If during review of a Bridge File, the BITL discovers required inventory photographs are missing, they shall be taken during the next routine inspection. Inventory photographs shall be updated whenever the bridge is altered and at a minimum at intervals no greater than ten (10) years.

The BITL shall review initial inspection photographs and photographs from the previous inspection. If the condition depicted in those photographs has changed, replacement photographs shall be taken and included in the inspection report. An example of the change would be bridge barrier replacement.

At a minimum, the following photographs are considered **inventory photographs** and **shall be taken**, if needed:

- Two Photographs: Feature intersected by the bridge in both directions (including waterways meaning that a photo looking upstream and looking downstream shall be taken),
- Four Photographs: Both approaches (one photo looking at bridge and away from bridge on each approach),

- Two Photographs: Both elevations of the bridge,
- One photograph for each component (deck, superstructure and substructure for bridges or a culvert and top of roadway for culverts),
- Typical bridge joint conditions,
- Typical transitions between the bridge and the approach guardrail (only different types need to be shown),
- Typical handrails, fenders and barriers (bridge rail, approach rail, and pier protection require photography per Section 5.3.1.7 of the BIGD) and
- If the bridge has any unusual features or characteristics,
- If the bridge has FCMs or FPDs, a photograph of each unique member shall be taken during the initial inspection (a photo is not required of every member; only one photograph showing typical condition member),
- If the bridge has a memorial sign, geodetic survey marker, benchmark or other state landmark, a photograph of each shall be taken during the initial inspection and/or
- If the bridge has a commemorative plaque or multiple commemorative plaques attached to the structure, a photograph of each plaque shall be taken and included in the inventory photos. The photo shall be taken directly perpendicular to the plaque with a measured scale, such as a tape measure or folding ruler, placed adjacent to the plaque within the photograph so its true size can be obtained in case it needs to be duplicated in the future.

5.4.4.2.2 Videos

In some cases, a deficiency is only apparent when under traffic. For example, the longitudinal joint between butted precast beams may have failed so the beams are deflecting independently of each other. This situation could only be documented during a live action video of a vehicle going over the bridge. In such cases, the video segment shall be shot showing the deficiency in action. The video shall be properly focused, well lit and the view shall be framed such that the entire action is kept within the view of the camera without having to move the camera to follow the action. If at all possible, a ruler shall be used to establish the scale of the view and deficiency. The video will then be uploaded to the Bridge File per the BFP and a reference to the video included in the inspection report.

5.4.4.3 Photograph Annotation Convention

BIO does not permit captions to be added to photos themselves. However, **all photos must be captioned**. Inspectors may use field whiteboards to caption photographs while taking them or inspectors may manually edit photos, adding captions to the electronic photograph file.

Another option is the use of the Photograph Form. This form may be attached to the inspection report when it is uploaded to the BIO. This form is available as Attachment 5.20.

The captions for all photographs shall include a description of the photograph. The caption for each photograph shall include specific words so photos of unique circumstances can be found in future queries. These key words do not have to be used in any specific order or consecutively. Common key words which may be used to find photographs of a particular issue are shown in Attachment 5.20.

5.4.4.4 Inspection Sketches

Sketches made during inspections are helpful in quantifying deterioration found on members of the bridge. Sketches from previous inspections shall be used in preparation for planned inspections to familiarize the inspection team with the bridge and any known issues. Comparing sketches between separate inspections is a good method to tracking deterioration growth and severity across multiple inspection cycles. Any sketches or plan markups made by the inspection shall be included in the Bridge File. Table 5.4.4.4 lists sketches which may be required for including in the inspection report. Though many sketches may be made during the course of an inspection, the sketches listed in Table 5.4.4.4 may be required where applicable during inspections.

Table 5.4.4.4 Inspection Sketches for Inspection Report

Sketch Sheet Name	When Sketch is Required	Attachment Number / BIGD Reference Section
Scour Stream Ground Profile	Routine or Special Inspections (when the channel is the subject for all bridges over a waterway. Underwater inspections require a detailed channel survey. Attachment 5.7 shall not be used.	Attachment 5.7 Section 5.3.4.1.1
Deck Sketch Skeet	If NBI Item 58 Rating is Coded 5 or lower and there are no photographs of the concrete deck.	Attachment 5.11 Section 5.3.1.1
Culvert Profile Sketch Sheet	Routine, Underwater or Special Inspections for all culverts.	Attachment 5.21 Section 6.1
FCM Inspection Form	Fracture Critical Inspections, See BSIP for the FCM inspection in Bridge File	Attachment 5.16 Section 5.3.2.14
Bent Cap and Bearing Sketch Sheet	If NBI Item 60 Rating is Coded 5 or lower and there are no photographs of the component(s))	Attachment 5.17 Sections 5.3.3.1 & 5.3.3.2
Pile Section Sketch Sheet	Required for all pile supported substructures if NBI Item 60 is 5 or lower	Attachment 5.18 Sections 5.3.3.1 & 5.3.3.2
Prestressed Concrete Member Deterioration Sketch Sheet	If NBI Item 59 Rating is Coded 5 or lower and there are no photographs of the component(s))	Attachment 5.12 Section 5.3.2.3
Reinforced Concrete Member Deterioration Sketch Sheet	If NBI Item 59 Rating is Coded 5 or lower and there are no photographs of the component(s))	Attachment 5.13 Section 5.3.2.4
Rigid Frame Standard Sketch Sheet	If NBI Item 59 Rating is Coded 5 or lower and there are no photographs of the component(s))	Attachment 5.15 Section 5.3.2.12
Bridge Joint Sketch Sheet	If expansion joint element is in CS3 or CS4, unless condition captured with photograph.	Attachment 5.22 Section 5.3.1.4
Steel Member Deterioration Sketch Sheet	If NBI Item 59 Rating is Coded 5 or lower and there are no photographs of the component(s))	Attachment 5.14 Section 5.3.2.5

5.4.4.5 *Inspector Recommendations*

All recommendations for maintenance shall be done in accordance with Chapter 8. All recommendations for bridge load rating shall be done in accordance with Section 5.5.

5.4.4.6 *Report Addendum and Attachments*

As stated in Section 5.4.4, all addenda and attachments shall be included when one flattened PDF is uploaded to the Bridge File.

If report addenda or attachments are used, a note should be added to the BEGTD on the inspection report under the applicable heading stating addenda or attachments exist for the inspection report and they have been uploaded to BIO.

BIO does have a file size capacity. If a report addenda or attachment is larger than the capacity to attach a file in BIO, the file shall be separated into several files and attached to the inspection report in BIO.

Reports which have an addendum shall have a closed numbering system for the main portion of the report and a separate closed numbering system for the addendum. Each separate addendum or attachment will have its own numbering system.

5.4.4.7 *FCM Inspection Report*

The FCM Inspection Report shall be submitted in BIO. The inspector shall write "*See Attached FCM Inspection Form*" in BEGTD on the inspection report under the **Girder/Floor Beams/Stringers and/or Beams** heading or under the **Truss Members** heading. For some truss bridges, "*See Attached FCM Inspection Form*" may need to be placed under **both** headings.

At the conclusion of the FCM inspection, a FCM Inspection Form, which is available as Attachment 5.16, shall be prepared to provide detailed inspection findings of FCMs. The report shall provide qualitative and quantitative information concerning the FCM. This information is important for a number of reasons: it can offer insight about the condition of the member; it can provide a history of the bridge; and it can be used to substantiate the thoroughness of the inspection effort in the event of litigation arising from a bridge failure. Only the bridge's fracture critical members shall appear on the FCM Inspection Form. Not all bridge members need to be placed on the form. The inspection report (on the FCM Inspection Form, in the BEGTD or with an attachment) shall:

- Describe the procedures followed to inspect the FCMs,
    - The procedures must follow the procedures included in the Bridge File. The requirements for a BSIP for the FCM inspection are located in Section 5.2.1.5.
    - If the procedures require revision, a qualified engineer shall be engaged through the BMO to properly update the files. Notify BMO if a revision is needed.
- Describe the condition of the FCM,
- Update element-level conditions for FCMs,
- Provide the following details about any defects found,
    - What the defect is and
    - Where the defect is located (using a sketch from the BSIP for the FCM inspection to illustrate its location)
- Summarize the inspection findings by addressing how individual defects affect the member's overall condition, and
- Make any appropriate recommendations, which may include:
    - Recommend Bridge or Lane Closure (Critical Finding) (Sections 8.1 and 8.2)
    - Recommend to Repair or Rehabilitate the FCM (Section 8.6)
    - Recommend Structure Load Rating (Section 5.5)

5.4.4.8 Underwater Inspection Report

The Underwater Inspection Report shall be written outside of the BMS and attached in BIO and submitted; see Section 5.4.4.6. Because of the limitations of BIO, the same report is written over itself repeatedly. See the bullet points below regarding the requirements for the use of BIO for underwater inspection reports. Like other reports, the Underwater Inspection Report shall be placed in the Bridge File.

When the Underwater Inspection Report is attached in BIO, the following shall be updated by the underwater bridge inspectors:

- Condition or appraisal ratings for the following NBI Items shall be recorded or updated in BIO, after reviewing conditions entered during the latest routine inspection:
    - NBI Item 58/59 (Deck/Superstructure, only if requested by BMO),
    - NBI Item 60 (Substructure),
    - NBI Item 61 (Channel and Channel Protection),
    - NBI Item 71 (Waterway Adequacy) and
    - NBI Item 92B/93B (Underwater Inspection Frequency Code)
- Bridge element condition data, after reviewing element-level data entered during the latest routine inspection. Underwater bridge inspectors **shall not** remove element-level data already included in BIO which they did not inspect. Underwater bridge inspectors shall only revise element-level data which they inspected or add additional elements which they inspected. In addition, bridge element condition status **shall also be included** in the Underwater Inspection Report as stated below. The underwater inspectors may have to combine element data with element data already in BIO, for example Element #515 Steel Protective Coating. If elements are combined, the underwater inspection report needs to contain combination summaries as required below. Some elements may not require combination; see Section

7.2.5.3.

- Underwater bridge inspectors shall not update text included in the in BEGTD on the inspection report under any heading with the exception of the **Waterway and Scour** heading. Underwater bridge inspectors shall add to any text already included in that heading: "*Underwater Inspection Performed XX/XX/XXXX; see Underwater Bridge Inspection Report.*"; see Figure 5.4.4.8. The date of the inspection shall be included for "*XX/XX/XXXX*".

Waterway and Scour:

Minor scour at Barrels 2 and 3 on the upstream side.

Underwater Inspection Performed 03/31/2020; see Underwater Bridge Inspection Report.

Figure 5.4.4.8 Required Language for Waterway and Scour Heading of BEGTD (Underwater Inspections)

When the Underwater Inspection Report is attached in BIO, the following shall also be attached in BIO, if required, by the underwater bridge inspectors:

- Bridge Scour - NBI Item 113 Re-evaluation Form, if necessary; see Attachment 4.2
- Repair Recommendations Form, if necessary; see Attachment 5.6

The Underwater Inspection Report shall include a brief technical engineering summary of the inspection results, shall be prepared including inspection photographs and/or sketches indicating areas of deterioration (as necessary) and shall also include the following:

- An evaluation of conditions encountered,
- Describe the procedures followed to perform the underwater inspection,
  - The procedures must follow the procedures included in the Bridge File.
  - If the procedures require revision, a qualified diver shall be engaged through BMO to properly update the files. Revisions include any recommendations for access and areas for inspection for future underwater inspections.
- Any required documentation (sketch or photograph with detailed caption) if NBI Items coded by the underwater inspectors are below 5; see Section 5.4.4.4,
- Identification of the elements inspected during the underwater inspection and bridge element-level condition data including a listing of combined elements and the existing (or previous) quantities from other inspections which were combined by the underwater inspectors,
- Recommendations for access and areas for inspection for future underwater inspections,
- The detailed channel survey according to Section 5.3.4.1.2,
- Water velocity according to Section 5.3.4.1.2, and
- Maximum water depth.

Underwater bridge inspectors are responsible for recommending when the next underwater bridge inspection should occur by updating NBI Item 92B/93B on the BIRF. If there is a change in the frequency, the reason for the change shall be included in the Underwater Inspection Report.

The underwater bridge inspectors will also determine if a scour or hydraulic analysis is needed. If such an analysis is recommended, the completion of the Bridge Scour – Item 113 Re-Evaluation Form (which is available in Attachment 4.2) shall be submitted to the BIPM. The completed attachment shall also be attached in BIO when the report is submitted. The BIPM or designee is responsible for a change in the coding of NBI Item 113.

The underwater bridge inspectors will also determine if a load capacity rating is needed. If such an analysis is recommended, the completion of the Load Rating Request Form (which is available in Attachment 3.1) shall be submitted. Significant steel section loss or hollow timber piles may warrant a load rating. If a load rating for timber pile deterioration is recommended, see Section 5.5.1. The Load Rating Request Form does not need to be attached in BIO.

5.4.4.9 *Other Inspection Reports*

Other inspection reports by either SCDOT inspectors or by consultants shall be written for the inspection being performed (such as special, damage, scour, etc.)

If time permits, an inspection report shall be uploaded to the Bridge File. The use of BIO is not always required. However, if the inspection findings warrant a change in data (including condition rating and element-level data), the report shall be documented via BIO to ensure data gets updated. Previous requirements listed such as sketch sheets, photographs and report content **are not applicable** for the other inspection reports listed below.

Given the rapid need for information and distribution of an inspection findings for some inspections, the BITL may not need to write a full inspection report. Upon written direction from the BIPM (or designee), the BITL may produce a brief inspection summary and upload the report into the Bridge File. A formal inspection report is not always required. These rapid inspections are likely to occur following a collision or following a flood.

5.4.4.9.1 Special Inspection

Unless directed otherwise by the BIPM or designee, Special Inspection Reports shall be completed using BIO. The BITL shall write the following in the BEGTD under the **Miscellaneous** heading. All headings which were changed as a result of the special inspection shall be listed below the required text "*Special Inspection Performed on XX/XX/XXXX. Language in the following textual sections is applicable for this special inspection.*" Figure 5.4.4.9.1 includes the **Miscellaneous** heading following a special inspection where the inspector updated text under the **Bents and/or Piers** heading.

Miscellaneous Notes:

SPECIAL INSPECTION PERFORMED ON 10/6/19.

LANGUAGE IN THE FOLLOWING TEXTUAL SECTIONS IS APPLICABLE FOR THIS SPECIAL INSPECTION:
-BENTS AND/OR PIERS

ALL OTHER TEXTUAL SECTIONS ARE NOT APPLICABLE.

Figure 5.4.4.9.1 Language for BIO for Special Inspections

Condition rating and element-level data shall be updated as needed for a special inspection and included in the Special Inspection Report. Some Special Inspection Reports shall have addendum and attachments, see Section 5.4.4.6.

For special inspections, documentation in the Special Inspection Report is required only for the subject components; see Section 4.7. For example, if NBI Items 58 and 60 are both coded as 5 for a bridge and an inspector conducts a special inspection for the substructure, documentation is not needed for the deck, but the Special Inspection Report shall include a sketch or photograph of the substructure component as required by Sections 5.4.4.2 or 5.4.4.4.

5.4.4.9.2 Maintenance Inspections

As a BITL performs the maintenance inspection and completes the Critical Findings Form (Attachment 5.5), the completed form, along with any inspection notes or information gathered shall be attached to the Critical Findings Form and be considered the Maintenance Inspection Report and placed into the Bridge File.

If a BITL is requested to review actions on repair recommendations, the printouts from the HMMS Bridge Deficiency Report shall be included in the bridge file. These printouts are considered the Maintenance Inspection Report and placed into the Bridge File.

The use of BIO is **not** required for maintenance inspections unless a change to NBI information is needed on the

BIRF. If BIO is used for maintenance inspections, language similar to the language presented in Figure 5.4.4.9.1 shall be used in the BEGTD under the **Miscellaneous** heading. The text shall read: "*Maintenance Inspection Performed on XX/XX/XXXX. Language in the following textual sections is applicable for this maintenance inspection.*" The frequency of scheduled inspections (routine, FCM, underwater and/or special) should not be modified unless deemed necessary by the BITL. As required by this document, if there is a change in the frequency, a note explaining the reason shall also be included in the **Miscellaneous** heading.

5.4.4.9.3 Damage Inspections

If significant damage has occurred, a report shall be produced which highlights the damage to the bridge, and this report shall include repair recommendations (reported as Critical Findings and/or repair recommendations). Findings from damage inspection may be documented in form of a detailed technical report.

At a minimum, the Damage Inspection Report shall be provided to the DME and uploaded to the Bridge File. Submittal to the BMO is not required. The Damage Inspection Report shall include following, if issued:

- Accident Patrol / Police Report
- Critical Findings Form
- HMMS Entry Confirmation or Repair Recommendations Form
- Photographs
- Date of Impact
- Time of Impact
- Weather at Impact
- Number of Lanes Closed on Bridge
- Number of Lanes Closed under Bridge
- Parties Contacted by SCDOT
- Controlling Minimum Vertical Clearance (with location and additional pertinent information)

Attachment 5.8 is included for inspectors to document all required information during a damage inspection.

A typical damage inspection is for impact to the steel superstructure of an overpass bridge. Damage may occur to the girders or diaphragms. For this occurrence, the BITL is encouraged to use the Steel Superstructure Damage Inspection Form, which is available as Attachment 5.9. The use of Attachment 5.9 is not required.

Attachment 5.10 can be used for concrete superstructures. This form is the Concrete Superstructure Damage Inspection Form. The use of Attachment 5.10 is not required.

The use of BIO is not required for damage inspections unless a change to NBI information is needed. If BIO is used for damage inspections, language similar to the language presented in Figure 5.4.4.9.1 shall be used in the BEGTD under the **Miscellaneous** heading. The text shall read: "*Damage Inspection Performed on XX/XX/XXXX. Language in the following textual sections is applicable for this damage inspection.*" The frequency of scheduled inspections (routine, FCM, underwater and/or special) should not be modified unless deemed necessary by the BITL. As required by this document, if there is a change in the frequency, a note explaining the reason shall also be included in the **Miscellaneous** heading.

5.4.4.9.4 Scour Inspections

The format of the Scour Inspection Report shall be outlined in the POAs. Some bridges receive a scour inspection with no POA during extreme storms or floods. At a minimum the Scour Inspection Report shall include both a summary of the damage (location and extent via pictures and written descriptions) and a new scour field evaluation and recommendation for scour countermeasures (see below). This report shall also include the following:

- Flood stage and approximate water flow or velocity at which the bridge was visited and the time of the visit
- Location and extent of any damage to the bridge

- Any recommendations for scour countermeasures, bank protection, channel protection, etc., which may protect the bridge from damage during future flooding or reduce the potential for future flooding

Documentation that the POAs were followed after triggering events shall be included in the Scour Inspection Report. If deemed acceptable by the POA or by BMO, the Scour Inspection (Post Storm Inspection) Form is acceptable as a Scour Inspection Report.

The use of BIO is not required for scour inspections unless a change to NBI information is needed. If BIO is used for scour inspections, language similar to the language presented in Figure 5.4.4.9.1 shall be used in the BEGTD under the **Miscellaneous** heading. The text shall read: "*Scour Inspection Performed on XX/XX/XXXX. Language in the following textual sections is applicable for this scour inspection.*" The frequency of scheduled inspections (routine, FCM, underwater and/or special) should not be modified unless deemed necessary by the BITL. As required by this document, if there is a change in the frequency, a note explaining the reason shall also be included in the **Miscellaneous** heading.

5.4.4.9.5 Safety Inspections

No element coding is required for a safety inspections, findings can be directly reported to the party requesting the inspection in an email or in a technical report. The email or technical report shall be considered the Safety Inspection Report and the report shall be uploaded to the Bridge File.

5.4.5 Inspection Report Submittal

The team members who assisted in the evaluation of the structure may review and audit the report before being sent to the QC Reviewer (QCR) for the QC review.

5.4.5.1 Quality Control Review

A quality control review is required for all initial, routine, underwater, fracture critical and special inspection reports. The QCR shall perform a QC review of the report; see Chapter 9. Following resolution of QC comments, the BITL performing the inspection will submit the report in BIO by routing to HQ.

For SCDOT performed inspections, the BITL will provide the identified QCR with the inspection report for a QC review within 15 calendar days of the inspection. For consultant performed inspections, the BITL will provide the identified QCR with the inspection report for a QC review prior to submission in BIO.

5.4.5.2 Submittal to SCDOT Headquarters

Unless the SCDOT BMO requests an expedited submittal, the quality checked inspection report must be submitted to the SCDOT BMS **and** uploaded to the Bridge File by the last day in the month following the month when the inspection occurred. Submittal in BIO is performed by routing the report (and attachments) to SCDOT HQ for QA.

Emergency situations are reported immediately. All Critical Findings are tracked separately; see Chapter 8.

Routine, Fracture Critical, Underwater and Special Inspection Reports are submitted in BIO where they are subject to a quality audit by the BMQE.

All inspection reports, including those submitted in BIO and other reports not submitted in BIO, require submission to the Bridge File. When submitting the inspection report, the inspector shall **combine all components (including photographs) into one flattened PDF**. The report shall be placed in the Bridge File in accordance with the BFP.

5.4.5.3 Final Data Entry

The report and applicable data must be entered into the database within 90 calendar days of the date of inspection for State or Federal agency bridges and within 180 calendar days of the date of inspection for all other bridges. Within 30 days of receiving bridge reports for QA and following the completion of a QA review, the BMQE will transfer data in the BMS (data from BIO into RIMS and BrM). Quality hold notices shall be used if the BMQE is unable to download data within the 30 day requirement because of a quality issue; see Section 5.4.5.4.

5.4.5.4 Quality Hold Notices

If further review is necessary during the quality assurance review, then the report is temporarily held pending a final approval. A quality hold on an inspection report is normally generated by the BMQE. The quality hold notice shall be in the form of two emails. A reason for a quality hold notice may include clarification, consensus, correction or additional inspection. The first quality hold notice email shall include:

- What the reason or issue behind the quality hold notice is.
- Bridge Information (Asset ID, District, etc.)
- Inspection Information (Inspection Date, QC Date, BITL, QCR, etc.)

Not every question or clarification need from the BMQE should be a quality hold. Quality hold items should only be items which may cause a significant delay in uploading final data entry or which should be discussed during the annual quality assurance meeting. For example, a quality hold notice should be issued if it will take over 90 days from the inspection to get bridge data into RIMS. Per Section 5.4.5.3, the BMQE has 30 days to perform the quality assurance review and transfer data in the BMS.

Once the quality hold is lifted, a second email shall be sent by the BMQE with a notification that the hold was lifted. The second quality hold notice email shall include:

- Description of resolution.
- If there was a need for an additional site visit to the bridge needed?
- Length of time the issue was on hold for.
- Date the hold was issued and the date the data was entered into RIMS.

Copies of both emails regarding quality holds shall be placed in the QA Section of SCDOT's Bridge File. The figure below (Figure 5.4.5.4) depicts the responsibilities for notifying those involved in the submission of the reports of temporary holds.

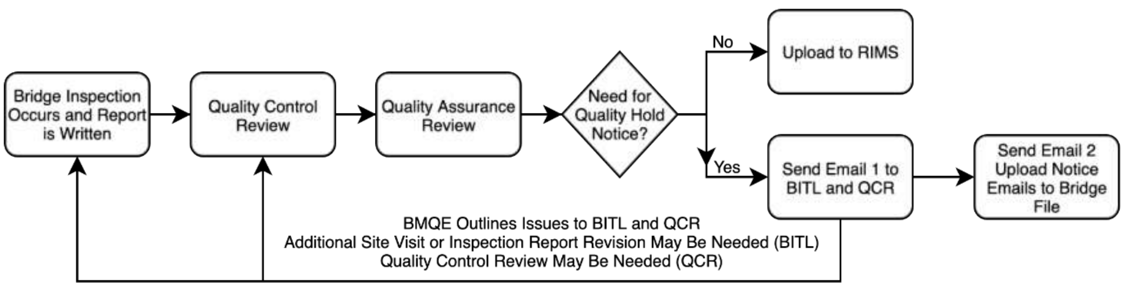


Figure 5.4.5.4 Flowchart for Temporary Holds used during Inspection Report Submission

5.4.6 Condition Information

To ensure a comprehensive condition inspection and as a part of the requirements of record keeping and documentation, an inspector shall record the type, size, quantity, severity and location of deterioration and deficiencies for each applicable element in a given component. The BIRM and the MBE are the inspectors' guide for identifying the members and the deficiencies on a variety of structure types.

The condition rating guidelines contained in the *Coding Guide* are to be used in the evaluation of the deck, superstructure, substructure, culvert and channel. During the inspection, the inspector shall be aware of items in the SI&A which must be verified and updated.

The outcome of the inspection shall always be to provide a clearly presented narrative description of the conditions. Inspectors shall note the following: all signs of distress, failure, or defects with sufficient accuracy so another inspector at a future date can make a comparison of condition or rate of deterioration; load, speed, or traffic restrictions on the bridge; information about high water marks and unusual loadings, the presence of any negative camber (i.e. sagging) on any elements, and section losses to beam ends. Negative camber can indicate a problem with a structure such as wear and tear, deformation from an impact or deterioration.

All work or repairs to the bridge since the last inspection shall be documented. If work is undertaken on a structure which improves the physical condition of a structure and results in the BITL increasing the numerical value of an element, the BITL must explain what work was undertaken to improve the condition. Verify or obtain new dimensions when maintenance or improvement work has altered the dimensions of the structure.

The end result of the inspection performed is to ensure the public a safe structure is in place to carry traffic. The data collected on defects found helps with the determination of the safe load carrying capacity of the structure. The documentation will assist the custodian of the structure with important information for the proper maintenance and rehabilitation information. Consistency in coding, data collection and documentation is discussed in subsequent sections.

5.4.7 Inconsistences in Bridge Data

Inspectors may discover inconsistences or errors in existing bridge data. In the event of this, inspectors may note inconsistences or errors during the inspection. Appendix J identifies bridge data which may be corrected by inspectors and which data cannot be modified by inspectors.

For both SCDOT performed and consultant performed inspections, the BITL shall inform RDS via email using Attachment 5.1 for inconsistences or errors in existing bridge data which cannot be updated by the inspectors.

5.4.8 Maintenance and Repair

The primary function of a bridge maintenance program is to prevent or reduce deterioration of the structure. This protects the safety of the public and safeguards investment by extending the structure’s useful life. A thorough documented inspection is essential for determining maintenance requirements and making practical recommendations to correct or prevent bridge defects or deficiencies. Each district is responsible for the maintenance and repair of the bridge structures in the District’s inventory. The District Maintenance Office is responsible for the preparation of work orders and plans for bridge maintenance and repair. Following the inspection, all bridge maintenance work orders shall be entered into Bridge Deficiency Module of the HMMS. Work beyond the capabilities of the District Maintenance Office shall be handled by the BMO under the supervision of the SBME; see Chapter 8.

Maintenance and repair recommendations which take place on initial inspections (and underwater initial inspections) shall be provided to the RCE or construction designee and not the District Maintenance Office. Maintenance and repair on these bridges is the responsibility of the contractor for 90 days after opening the bridge to traffic.

5.4.9 Structure Inventory and Appraisal (SI&A) Data

The SI&A is a compilation of NBI data submitted annually to FHWA. Each state is able to format data as needed.

5.4.9.1 Inspection Data

For routine, FCM, underwater, initial and special inspections, enter the SI&A data into the State or Federal agency inventory within 90 calendar days of the date of inspection for State or Federal agency bridges and within 180 calendar days of the date of inspection for all other bridges.

5.4.9.2 Existing Bridge Modifications

For existing bridge modifications which alter previously recorded data and for new bridges, enter the SI&A data into the BMS within 90 calendar days after the completion of the work for State or Federal agency bridges and within 180 calendar days after the completion of the work for all other bridges.

5.4.9.3 Changes in Load Restriction or Closure Status

For changes in load restriction or closure status, enter the SI&A data into the BMS within 90 calendar days after the change in status of the structure for State or Federal agency bridges and within 180 calendar days after the change in status of the structure for all other bridges.

5.4.9.4 Quality Assurance for SI&A Data

The BMQE is responsible for reviewing at least 10% of the structure records annually to assure the inventory process is being correctly executed and SI&A data is properly being downloaded from the BMS for submission to FHWA.

5.5 STRUCTURE LOAD RATING

BITLs shall review existing load rating documentation prior to the inspection of a structure.

All bridges (excluding non-NBI bridges, see Section 2.3.3) shall have a load rating which reflects the current configuration and condition of the bridge. A new load rating is required if the bridge has been reconstructed and the work changes the bridge's roadway width, load carrying capacity, structural or geometric configuration, or generally any change requiring a South Carolina Registered Professional Engineer to sign and seal plans. Examples of reconstruction would include deck alterations which effectively increase the dead load (deck overlays); addition of new spans; converting pin and hangers to a continuous design; converting simple spans to continuous; substructure modifications including new pile spacing or configurations or cap alterations; modifications to FCMs or FPDs; substructure replacement; replacement of deck; stringer replacement; superstructure replacement; or bridge widening. Some emergency bridge repairs such as girder end repairs, emergency repairs or Critical Findings may also trigger the need for a new load rating.

Following the inspection of a structure, the load rating of the bridge may need to be updated based on the findings of the inspection teams. The inspection teams will note changes in the structure's condition since the time of the last inspection, and based on these changes, evaluate the need for a new load rating.

If existing bridges are observed to have minimal member section remaining or damage affecting section properties as compared to past inspections, they shall be assessed for possible re-rating. This would include deterioration or damage identified during any type of inspection. The need for a load rating may be as a result of a fire, impact by an over-height vehicle, flood, hurricane or other natural or man-made disaster. New load ratings are required unless the current load rating can be determined to be adequate by engineering judgment.

Concrete decks on bridges are typically not load rated unless a deteriorated condition warrants a load rating. Chapter 7 of the LRGD includes requirements for the load rating of reinforced concrete decks. Inspectors shall be aware of levels of deterioration which may warrant a rating or re-rating.

Additionally, bridges shall be assessed to determine if re-rating is warranted for the following reasons:

- 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 below 7 (Good Condition) and drops 2 points or more below when the original load rating was performed.
- If a structural element (an element in the deck, superstructure, substructure or culvert) is placed in Condition State 4, it may warrant a structural review to determine the effect on strength or serviceability of the element or of the bridge. If the BITL cannot perform the capacity determination using engineering and industry knowledge, a load rating shall be recommended. The load rating is only required for the bridge component which is in CS4; for example if a beam is in CS4, a deck rating may not be required. If the element placed in CS4 can be repaired, rehabilitated or replaced through a work request submitted via HMMS or to the bridge owner for non-SCDOT owned bridges and if the BITL believes the work on the element may improve the element's CS, a load rating is not necessarily required.
- If the existing bridge is found, during inspection, to be supporting an increased dead load, such as a thicker layer of gravel overlay, or if the bridge did not previously have an overlay and has received an overlay of the existing deck since the previous inspection. Note: If the controlling Rating Factor of a bridge is large enough to accommodate an added overlay or increased overlay thickness, sound engineering judgment may be used to determine if a new load rating is not needed. However, the changed condition to reflect the current overlay shall be documented in the Bridge File and the rationale for not requiring a new load rating shall be provided. Sound engineering judgment is especially encouraged on culverts where additional overlay may not warrant a new load rating depending on existing conditions.
- If the BITL determines a load rating is required.

If a load rating is requested by the BITL or if a load rating is required based on the above criteria, the BITL shall complete the Load Rating Request Form (which is available in Attachment 3.1), and it shall be submitted via email and placed in the Bridge File.

5.5.1 Timber Pile Load Rating

Per Section 16.2 of the LRGD, the following criteria is used to determine when the substructure should be rated:

1. Per Section 5.5, if a timber substructure Condition Rating for NBI Item 60 is at 5, Fair Condition, it shall be load rated.
2. Substructures shall be rated when there is deterioration, tipping, or damage present that is determined to be detrimental to the substructure's load carrying capabilities. Examples of distress that could trigger a load rating of substructure components include: a high degree of rot or section loss, changes in timber pile end conditions due to deterioration, changes to timber pile bracing conditions.
3. Piles should be rated if a significant amount of soil has been lost by scour or other means around the pile that could cause a buckling issue, if there is significant pile deterioration (decay or brooming of timber piles) that could affect their load carrying capability, or if loss of soil around the piles would preclude adequate geotechnical support of the piles for piles deriving their load in friction.
4. Pier caps shall be rated if there is deterioration or other structural issues present that would have an effect on the capacity of the cap. Consideration shall also be given to the structural geometry present and its impact on the load rating. For example, load rating of timber bent caps may govern when the pile spacing is excessive or when there is loss of support by individual timber piles due to rot or decay that would increase the effective span of the timber bent cap.

5.6 MEDIA AND PUBLIC RELATIONS

SCDOT maintains an Office of Communications, which has the responsibility of dealing with the media and other interested public agencies and/or parties. SCDOT inspectors and consultants working on behalf of SCDOT shall respond to the public/media in a courteous manner. Any questions which arise during the course of an inspection shall be referred to the BIPM. It will be their responsibility to deal with the question or to refer the question to the Office of Communications.

The checklist tables included in Sections 5.7, 5.8, 5.9, 5.10 and 5.11 are not required for use and only included for reference.

5.7 PRE-INSPECTION CHECKLIST TABLES

Table 5.7.1 Pre-Inspection Checklist Table (Routine and All Other Inspections)

√	Task	Notes	BIGD Ref.
	Safety Equipment	*Prior to inspection, review bridge plans or previous inspection to check that inspectors have proper equipment to safely perform work.*	5.1
	Advance Work Sign, Safety Cones and Traffic Control	*When inspecting bridges with higher volumes, confirm proper traffic management for inspection.*	5.1.3
	Testing	*NDT and DT can be used in evaluating bridge materials. Review previous testing and if more may be requested.*	5.1.7
	Previous Inspection Report	*The previous inspection reports shall be reviewed. Attention shall be focused to any deficiencies noted.*	5.2.1
	Review Contents of Bridge File	*Prior to inspection, the contents of the Bridge File can be reviewed.*	5.2.1.1
	Existing Plans or Schematic Drawings	*Review available plans to gather understanding of the bridge configuration and structure type.*	5.2.1.2
	Load Rating	*Review the LRSF, Posting Form (if available) and the Labeling Diagram included with the load rating.*	5.2.1.3
	Labeling Diagram	*Review Labeling Diagram to determine general structure orientation.*	5.2.1.3.1
	Scour Assessment	*Review the NBI Item 113 rating, scour assessment, POA (if one), previous inspection report with waterway information and any assumptions regarding the waterway which went into the most recent assessment.*	5.2.1.4
	Determine Required Inspection Documentation and Prepare Needed Sketches	*Inspector must review available information in order to develop an understanding of the bridge.*	5.2.2
	Arrange for Access / Other Inspection Equipment	*Coordinate as needed to arrange for any/all inspection equipment.*	5.2.3
	Advanced Bridge Washing	*Coordinate with maintenance personnel in advance to ensure required bridge cleaning is completed.*	5.2.4
	Advanced Vegetation Control	*Coordinate with maintenance personnel in advance to ensure required vegetation management activities are completed.*	5.2.4
	Notifications and Permits	*Coordinate required advanced notification and permits with other agencies if applicable. (USCG, Railroad Entities, Utility, etc.)*	5.2.5
	Traffic Control and/or Police Detail	*Determine if traffic control and/or police detail will be needed and coordinate as needed.*	5.2.5.5
	Weather	*As practicable, but still maintaining NBIS compliance with required inspection frequencies, bridge inspections shall be performed when weather conditions will have minimal impact on workflow*	5.2.6
	Inspection of Existing Bridge during Construction Project	*The inspection will be conducted in accordance with the construction office's instructions to minimize disrupting the contractor's operations. Three weeks' notice shall be given by inspectors.*	5.2.7.1
	Photographs	*Previous inspection photos are placed in the Bridge File. Inventory photographs shall be updated whenever the bridge is altered, and at a minimum at intervals no greater than ten (10) years.*	5.4.4.2
	Maintenance and Repair	*All bridge maintenance shall be included in the Bridge File. Any "Incomplete" deficiencies shall be reviewed in advance of the inspection.*	5.4.8

Table 5.7.2 Pre-Inspection Checklist Table (Initial Inspections)

√	Task	Notes	BIGD Ref.
	Determine Responsible Construction Personnel (RCE)	*If the DBIS or consultant PM is unsure of who should be responsible for this coordination, he/she shall contact both the DME and the BMO.*	4.1.1
	Participate in Relevant Preconstruction Meetings	*DBIS or consultant PM should participate in any relevant preconstruction meetings for new construction bridges, temporary bridges, bridges involved in phased construction or bridge rehabilitation projects.*	4.1.1
	Obtain Design (As-Let) Plans	*Plans from RCE (or responsible personnel) should be obtained.*	4.1.2
	Document Inventory SI&A Data		4.1.2
	Document Inventory Element Information	*Bridge element quantities and their condition states are recorded, which are normally coded as new.*	4.1.2

Table 5.7.3 Pre-Inspection Checklist Table (Inspections of Bridges with FCMs)

√	Task	Notes	BIGD Ref.
	Review FCMs Procedure in Bridge File	*NBIS requires bridges with FCMs to have procedures which include identification of all FCMs.*	5.2.1.5
	Identify Possible FCMs on Plans	*FHWA required FCMs to be identified on a plan; also see Table 5.2.1.5.*	5.2.1.5
	Note Members that Require Special Attention	*Such as built-up tension members composed of a few individual pieces*	5.2.1.5
	Plan Necessary Access to Members	*Include special equipment such as a MEWP, ladders, air monitoring device or climbing gear.*	5.2.1.5
	Discuss Workflow with Inspection Team	*Workflow must be documented and kept in the Bridge File in the BSIP for the FCM inspection.*	5.2.1.5
	Review Previous FCM Inspection Reports	*Sketches, photographs, etc.*	5.2.1.5

Table 5.7.4 Pre-Inspection Checklist Table (Inspections of Bridges with Complex Components)

**Refer to Appendix C for a list of bridges which classify as a bridge with complex components*

√	Task	Notes	BIGD Ref.
	FHWA Complex Bridges	*Contain components that require special training and have unique inspection procedures (maintained in the Bridge File). These procedures shall be reviewed.*	5.2.1.6.1
	LSS and LSC Bridges	*May require special access requirements due to the length of span. Likely to require a MEWP for the inspection. Any BSIP shall be reviewed.*	5.2.1.6.2
	MSM and MSA Bridges	*Require special planning due to length and number of components to be inspected. Any BSIP shall be reviewed.*	5.2.1.6.3

Table 5.7.5 Pre-Inspection Checklist Table (Underwater Inspections)

√	Task	Notes	BIGD Ref.
	Review Underwater Inspection Procedure in Bridge File	*SCDOT requires bridges with underwater inspection to have a BSIP.*	5.2.1.7
	Identify FHWA Level (I, II or III) needed for the Underwater Inspection	*At a minimum, 100% of the underwater inspection shall be Level I and 10% of the underwater inspection shall be Level III unless otherwise noted in specific procedure.*	5.3.7
	Develop Specific Checklist	*Include special equipment for underwater inspection*	5.2.1.7
	Inspect Dive Equipment	*Equipment needed to safely and properly conduct the inspection (SCUBA or surface supplied)*	5.1.5
	Discuss Workflow with Inspection Team	*Dive plan must be developed for each inspection.*	5.2.1.7
	Review Previous Underwater Inspection Reports	*Sketches, photographs, etc.*	5.2.1.7

5.8 INSPECTION ON-SITE CHECKLIST TABLE

√	Task	Notes	BIGD Ref.
	Safety Briefing	*Performed daily, BITL responsible*	5.1.10
	Inspection Procedure	*Required for Bridges with FCM, Underwater Inspection Bridges and Bridges with Complex Components. Procedure shall be placed in Bridge File*	5.2
	Review Inspection Prep Materials	*Review previous inspection report, previous load rating (assumptions), previous scour assessment (assumptions) and previous repair recommendations (if applicable.)*	5.2.1
	Deck – Inspect		5.3.1
	Deck – Sounding	*Required when NBI Item 58 Condition Rating <= 4*	5.3.1.1.1
	Deck – Document with Sketch/Photo	*Deterioration sketch or photographs required when NBI Item 58 Condition Rating <= 5*	5.3.1
	Bridge Joints – Inspect and Document		5.3.1.4
	Bridge Joints – Sketch	*Bridge Joint Sketch Sheet (required if CS3 or CS4 and no photo taken)*	5.3.1.4
	Curb – Inspect and Document	*Notes and Photo, as needed*	5.3.1.5
	Bridge Rail – Inspect and Document	*Notes and Photo, as needed*	5.3.1.6
	Approach Rail – Inspect and Document	*Notes and Photo, as needed*	5.3.1.7
	Pier Protection – Inspect and Document	*Notes and Photo, as needed*	5.3.1.7
	Drains – Inspect and Document	*Notes and Photo, as needed*	5.3.1.8
	Wearing Surface – Inspect and Document	*Notes and Photo, as needed*	5.3.1.9
	Wearing Surface Thickness	*Measure wearing surface thickness or curb reveal.*	5.3.1.9
	Superstructure – Inspect		5.3.2
	Superstructure – Document with Sketch/Photo	*Deterioration sketch or photographs required when NBI Item 59 Condition Rating <= 5*	5.3.2
	Bearings – Inspect	*Notes and photos if damaged or if movement is noted.*	5.3.2.13
	Bearings – Document	*Movement on expansion bearings may be required if CS3 or CS4*	5.3.2.13
	End Bents – Inspect		5.3.3.1
	End Bents – Document/Sketch/Photo	*Deterioration sketch or photographs required when NBI Item 60 Condition Rating <= 5*	5.3.3.1, 5.4.4.4
	End Bents with Pile Substructure – Sketch	*Pile Section Sketch Sheet required when NBI Item 60 Condition Rating <= 5*	5.3.3.1, 5.4.4.4
	Interior Bents – Inspect		5.3.3.2
	Interior Bents – Document/Sketch/Photo	*Deterioration sketch or photographs required when NBI Item 60 Condition Rating <= 5*	5.3.3.2
	Interior Bents with Pile Substructure – Sketch	*Pile Section Sketch Sheet required when NBI Item 60 Condition Rating <= 5*	5.3.3.1, 5.4.4.4
	Channel – Inspect		5.3.4
	Channel – Basic Channel Survey	*Scour Stream Ground Profile*	5.3.4.1.1
	Channel – Document	*Notes*	5.3.4
	Appurtenances – Inspect and Document	*Notes and photos, as needed*	5.3.5
	Vertical Clearance – Measure		5.3.8.2
	Vertical Clearance – Document	*Reporting requirements for clearance in BEGTD and BIRF.*	7.3.8
	Weather and Air Temp – Document		5.3.8.7
	Tidal Waterways – Document	*Time, as needed*	5.3.8.8

5.9 INSPECTION ON-SITE CHECKLIST TABLE (PHOTOGRAPHS)

√	Photograph	Notes	BIGD Ref.
	NBI Condition Rating <= 5	*Any component with NBI Condition Rating <=5 (if not captured with sketch)*	5.4.4.2
	Top of Deck/Roadway	*Typical deck condition (all bridges and culvert)*	5.4.4.2
	Superstructure	*Typical superstructure condition (all bridges)*	5.4.4.2
	Substructure	*Typical substructure condition (all bridges)*	5.4.4.2
	Culvert	*Typical culvert condition (culverts only)*	5.4.4.2
	Elevation Photos	*2 Photos (bridges over waterway and culverts)*	5.4.4.2
	Any Change from Inventory Photos or Previous Inspection	*Any significant change from the previously documented condition shall have a photo taken of it.*	5.4.4.2
	Critical Findings	*Any Critical Findings shall be documented with a photograph*	5.4.4.2
	Repair Recommendations	*Repair recommendations (consultant inspections only) should be documented with photo*	5.4.4.2
	Any NBE (element) with CS3 or CS4	*Any deterioration causing an NBE (element) to have a condition state of 3 or 4 shall be documented with a photograph*	5.4.4.2
	FPDs	*As stated in the BSIP or if changed from previously photographed condition (benchmark).*	5.4.4.2
	FCMs	*As stated in the BSIP or if changed from previously photographed condition (benchmark).*	5.4.4.2
	Posting/Weight Limit Sign	*Photo of signage (if installed between previous inspection and subject inspection)*	5.4.4.2
	Vertical Clearance Sign	*Photo of signage (if installed between previous inspection and subject inspection)*	5.4.4.2

5.10 INSPECTION ON-SITE CHECKLIST TABLE (INVENTORY PHOTOGRAPHS)

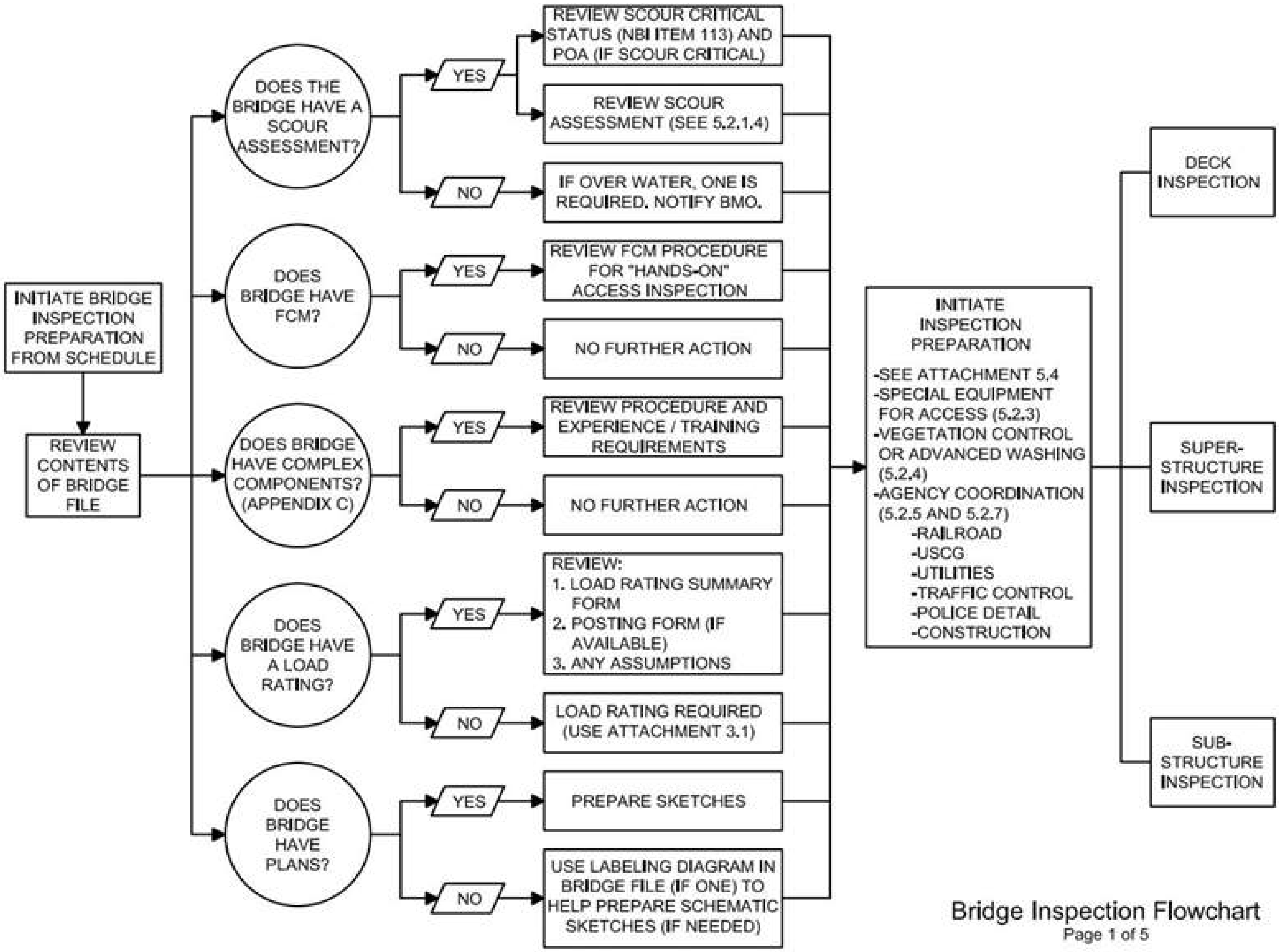
√	Photograph	Notes	BIGD Ref.
	Feature Intersected	*2 Photos - Feature intersected by the bridge in both directions (including waterways, looking upstream and looking downstream)*	5.4.4.2.1
	Approaches	*4 Photos (for both approaches to the bridge, one photo looking at the bridge and one photo looking away from the bridge)*	5.4.4.2.1
	Bridge Joints	*Typical bridge joint conditions*	5.4.4.2.1
	Elevation Photos	*2 Photos – Regardless of what the bridge crosses*	5.4.4.2.1
	Top of Deck (Bridge) and Top of Roadway (Culvert)	*1 Photo – Top of deck condition around mid-bridge. Additional photos required if structure type changes.*	5.4.4.2.1
	Bridge (Superstructure and Substructure)	*2 Photos – General photographs for the superstructure and substructure. Additional photos required if structure type changes.*	5.4.4.2.1
	Culvert	*1 Photo – General underside of the culvert. Additional photos required if structure type changes.*	5.4.4.2.1
	Rail Transitions	*Typical transitions between the bridge and the approach guardrail (only different types need to be shown)*	5.4.4.2.1
	Barriers	*Typical handrails, fenders and barriers (bridge rail, approach rail, and pier protection require photography)*	5.4.4.2.1
	FPDs	*If bridge has a FPDs, one photo of each unique detail during the initial inspection*	5.4.4.2.1
	FCMs	*If bridge has any FCMs, one photo during the initial inspection per each unique FCM*	5.4.4.2.1
	Unique Features	*As needed*	5.4.4.2.1
	Memorial Signs, Markers or Benchmarks	*As needed*	5.4.4.2.1
	Commemorative Plaque	*Section 5.4.4.2.1 contains specific requirements for photographs of commemorative plaques*	5.4.4.2.1

5.11 ROUTINE INSPECTION REPORT SUBMISSION CHECKLIST

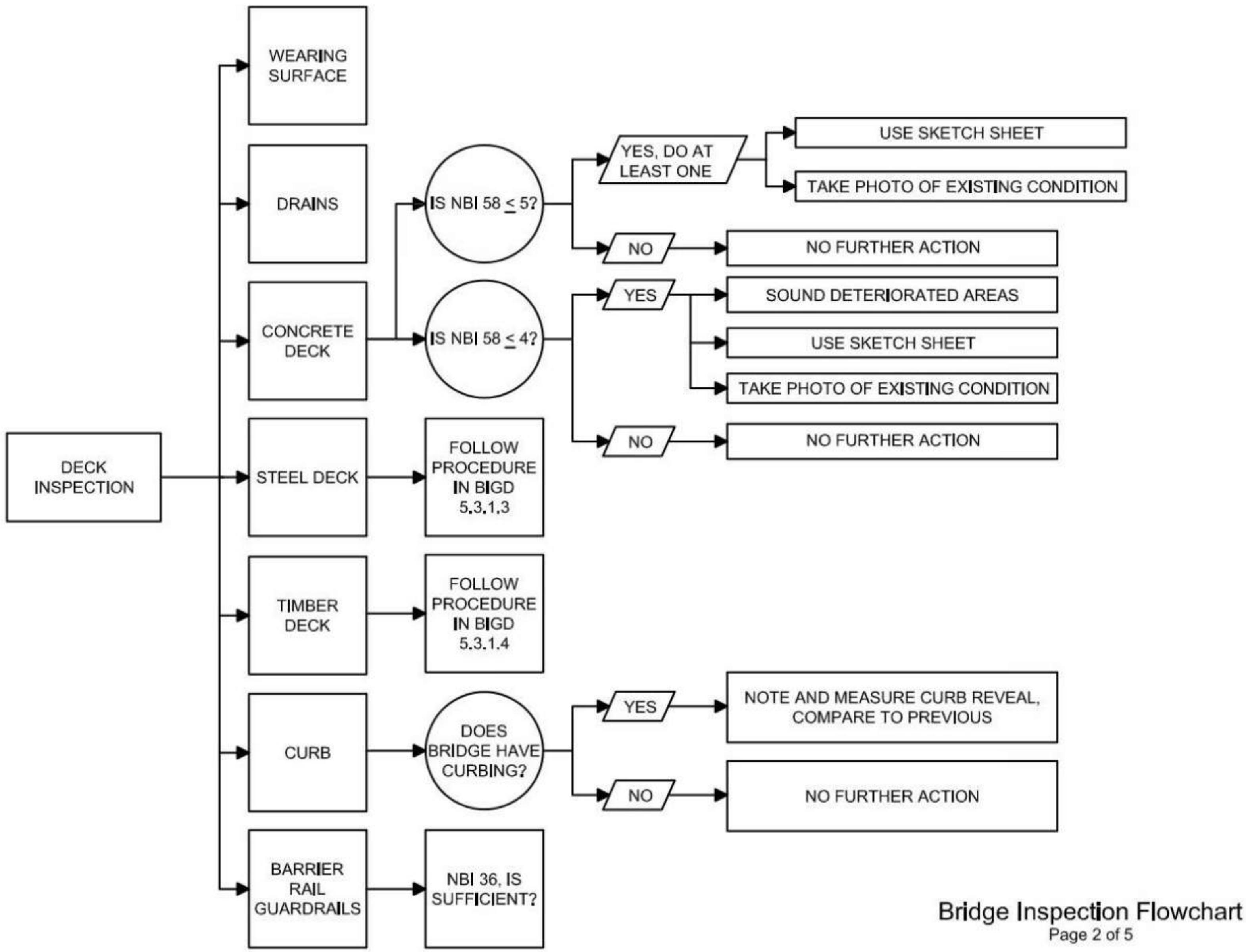
√	Task	Notes	BIGD Ref.
	Update information in BIO	*BIRF is filled (SI&A, etc.), Textual Data (BEGTD) and Bridge Element Level Data*	5.4.4
	All attachments in BIO:		
	Photographs with Captions	*For all bridges; see Section 5.9*	5.9 & 5.4.4.2
	Scour Stream Ground Profile	*For all bridges over a waterway*	5.3.4.1
	Deck Sketch Skeet	*If NBI Item 58 Rating is 5 or lower and there are no photographs with captions of the element(s))*	5.3.1.1
	Culvert Profile Sketch Sheet	*For all culverts*	6.1
	Bent Cap and Bearing Sketch Sheet	*If NBI Item 60 Rating is 5 or lower and there are no photographs with captions of the element(s))*	5.3.3
	Pile Section Sketch Sheet	*Required for pile supported substructure if NBI Item 60 is 5 or lower*	5.3.3
	Superstructure Sketch Sheet	*If NBI Item 59 Rating is 5 or lower and there are no photographs with captions of the element(s))*	5.3.2
	Bridge Joint Sketch Sheet	*If expansion joint element is in CS3 or CS4, unless condition captured with photograph.*	5.3.1.5
	Critical Findings Form	*If Critical Findings are reported, upload current status of the Form*	8.1 to 8.3
	HMMS Entry Confirmation	*If a repair is recommended for maintenance by SCDOT*	8.6 to 8.9
	Consultant Repair Recommendations	*If a repair is recommended for maintenance by consultant inspector. Form must be completed and returned from district inspection.*	8.6 to 8.9
	Bridge Inspection QC Form	*For all bridges*	9.2.2.4
	Out-of-Frequency Form	*For a bridge inspection completed out-of-frequency*	4.10.3
	Attachment 5.1 (Asset ID Retirement)	*For an Asset ID which has been retired as prompted by an inspection.*	5.4.3.8
	Addendum or Attachments	*Varies*	Varies

5.12 UNDERWATER INSPECTION REPORT SUBMISSION CHECKLIST

√	Task	Notes	BIGD Ref.
	Cover Page of Report is BIRF	*The cover page of the underwater inspection report is the BIRF, no special cover page is needed.*	5.4.4
	Update information in BIO	*BIRF is filled (SI&A, etc.) and Bridge Element Level Data.* *Under the BEGTD Waterway and Scour heading, the following is stated: "Underwater Inspection Performed XX/XX/XXXX; see Underwater Bridge Inspection Report."* *Element information updated per Section 5.4.4.8 (including any element combination from other inspections).*	5.4.4 & 5.4.4.8
	Diagrams / Plans / References	*All references or diagrams are consistent with labeling diagram or plans. UW Inspectors are required to review Bridge File prior to inspection.*	5.2.1.1
	Water Velocity Included	*Water velocity included (if needed)*	5.3.4.1.2
	Tidal Information Recorded	*Tidal Information recorded in report (if needed)*	5.3.8.8
	All attachments in BIO:		
	Photographs with Captions	*For all bridges; see Section 5.9*	5.9 & 5.4.4.2
	Detailed Channel Survey	*For all bridges over a waterway where an underwater inspection is performed.*	5.3.4.1.2
	Attachment 4.2 Bridge Scour - Item 113 Re-evaluation Form	*Form is to be completed (if needed)*	5.3.4.2
	Critical Findings Form	*Upload current status of the Form (if needed)*	8.1 to 8.3
	Consultant Repair Recommendations	*Completed spreadsheet is to be completed (if needed)*	8.6 to 8.9
	Bridge Inspection QC Form	*For all bridges*	9.2.2.4
	Out-of-Frequency Form	*Form is to be completed (if needed)*	4.10.3
	Addendum or Attachments	*Varies* *The UW Inspection Report shall include all required information listed in BIGD Section 5.4.4.8.*	Varies



Bridge Inspection Flowchart
Page 1 of 5


DECK INSPECTION
WEARING SURFACE
DRAINS
CONCRETE DECK
STEEL DECK
TIMBER DECK
CURB
BARRIER RAIL GUARDRAILS
IS NBI 58 ≤ 5?
YES, DO AT LEAST ONE
USE SKETCH SHEET
TAKE PHOTO OF EXISTING CONDITION
NO
NO FURTHER ACTION
IS NBI 58 ≤ 4?
YES
SOUND DETERIORATED AREAS
USE SKETCH SHEET
TAKE PHOTO OF EXISTING CONDITION
NO
NO FURTHER ACTION
FOLLOW PROCEDURE IN BIGD 5.3.1.3
FOLLOW PROCEDURE IN BIGD 5.3.1.4
DOES BRIDGE HAVE CURBING?
YES
NOTE AND MEASURE CURB REVEAL, COMPARE TO PREVIOUS
NO
NO FURTHER ACTION
NBI 36, IS SUFFICIENT?
Bridge Inspection Flowchart
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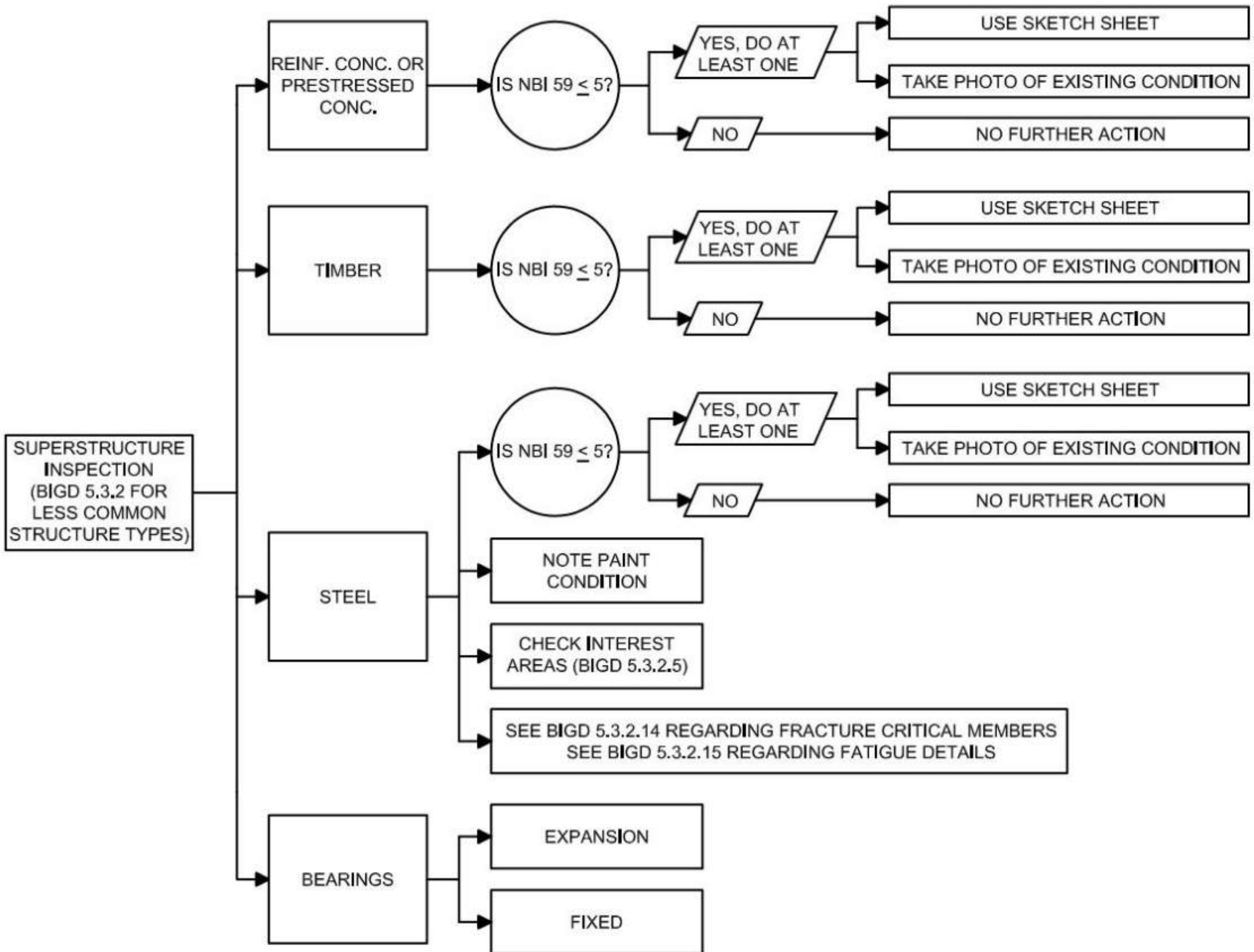

Bridge Inspection Flowchart
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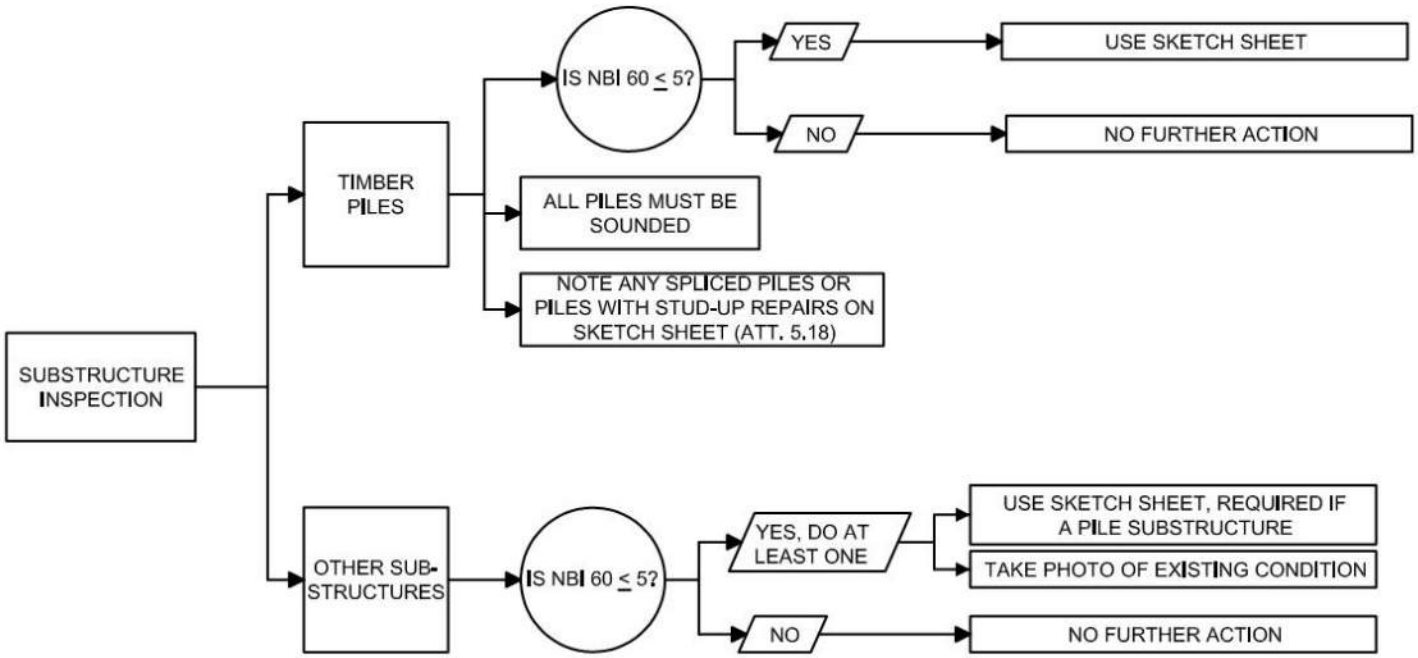

Bridge Inspection Flowchart
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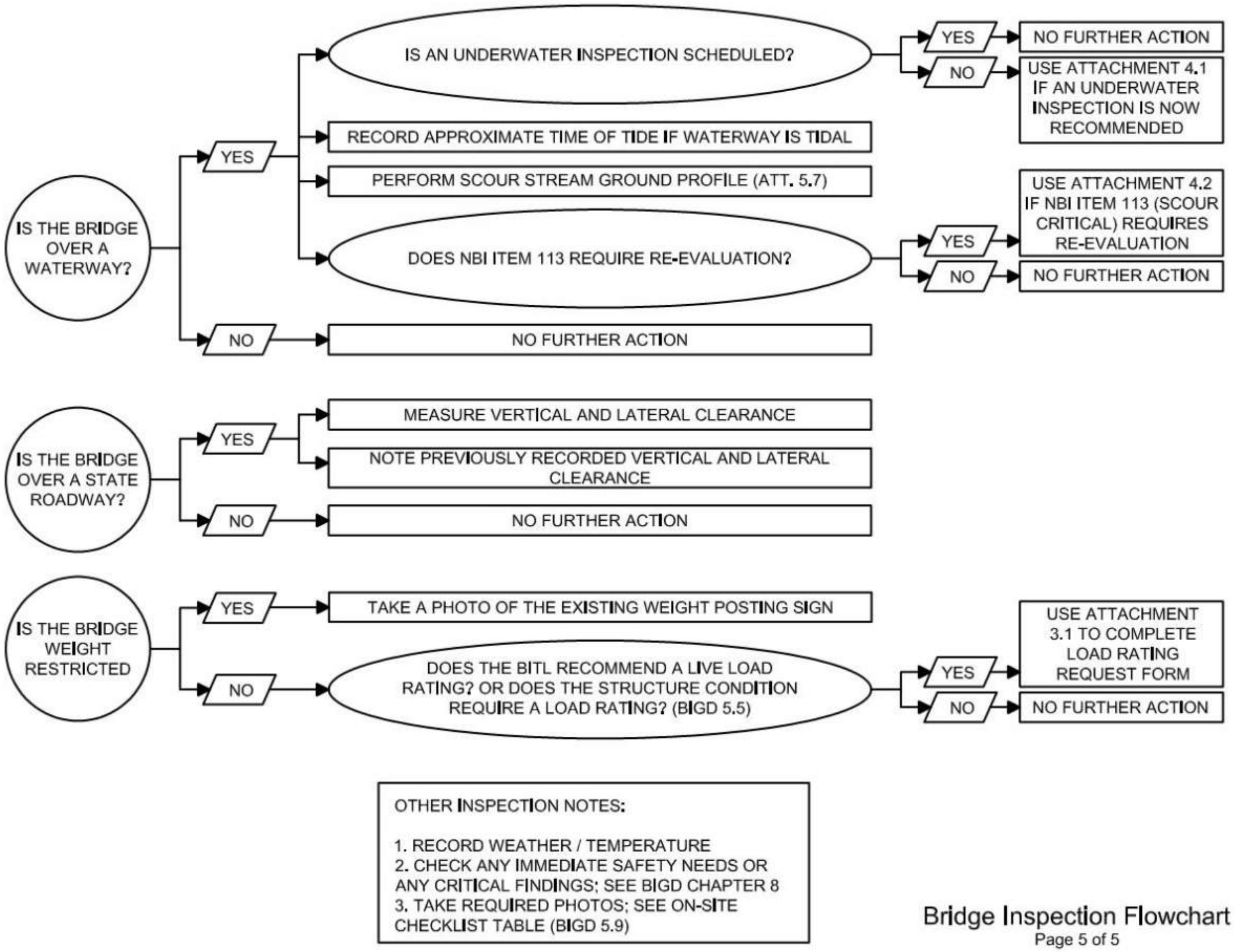
IS THE BRIDGE OVER A WATERWAY?
YES
IS AN UNDERWATER INSPECTION SCHEDULED?
YES
NO FURTHER ACTION
NO
USE ATTACHMENT 4.1 IF AN UNDERWATER INSPECTION IS NOW RECOMMENDED
RECORD APPROXIMATE TIME OF TIDE IF WATERWAY IS TIDAL
PERFORM SCOUR STREAM GROUND PROFILE (ATT. 5.7)
DOES NBI ITEM 113 REQUIRE RE-EVALUATION?
YES
USE ATTACHMENT 4.2 IF NBI ITEM 113 (SCOUR CRITICAL) REQUIRES RE-EVALUATION
NO
NO FURTHER ACTION
NO
NO FURTHER ACTION
IS THE BRIDGE OVER A STATE ROADWAY?
YES
MEASURE VERTICAL AND LATERAL CLEARANCE
NOTE PREVIOUSLY RECORDED VERTICAL AND LATERAL CLEARANCE
NO
NO FURTHER ACTION
IS THE BRIDGE WEIGHT RESTRICTED
YES
TAKE A PHOTO OF THE EXISTING WEIGHT POSTING SIGN
NO
DOES THE BITL RECOMMEND A LIVE LOAD RATING? OR DOES THE STRUCTURE CONDITION REQUIRE A LOAD RATING? (BIGD 5.5)
YES
USE ATTACHMENT 3.1 TO COMPLETE LOAD RATING REQUEST FORM
NO
NO FURTHER ACTION
OTHER INSPECTION NOTES:
1. RECORD WEATHER / TEMPERATURE
2. CHECK ANY IMMEDIATE SAFETY NEEDS OR ANY CRITICAL FINDINGS; SEE BIGD CHAPTER 8
3. TAKE REQUIRED PHOTOS; SEE ON-SITE CHECKLIST TABLE (BIGD 5.9)
Bridge Inspection Flowchart
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CHAPTER 6 CULVERT INSPECTION PROCEDURES

6.1 INTRODUCTION

Culverts are structures which are designed hydraulically to take advantage of submergence to increase water carrying capacity. Culverts are usually covered with embankment and are composed of structural material around their entire perimeter. Culverts shall only carry water. A culvert is considered a bridge and needs to be inspected and load rated per the NBID if any of the following conditions are met.

- The culvert has a hydraulic opening greater than 20 feet as measured along the center of the roadway.
- A grouping of culverts with a total length greater than 20 feet as measured along the roadway centerline, and where the clear distance between openings is less than half the smaller contiguous opening.

Whether a culvert has a floor or not does not matter when determining if a culvert is considered a bridge or not. Figure 6.1 can be used to determine if a culvert or a group of culverts may be considered a bridge. Note that Figure 6.1 can only be used for culvert structures and not structures with bridge features such as a foundation and/or piles; see Section 2.3.3 for language regarding non-NBI Bridges.

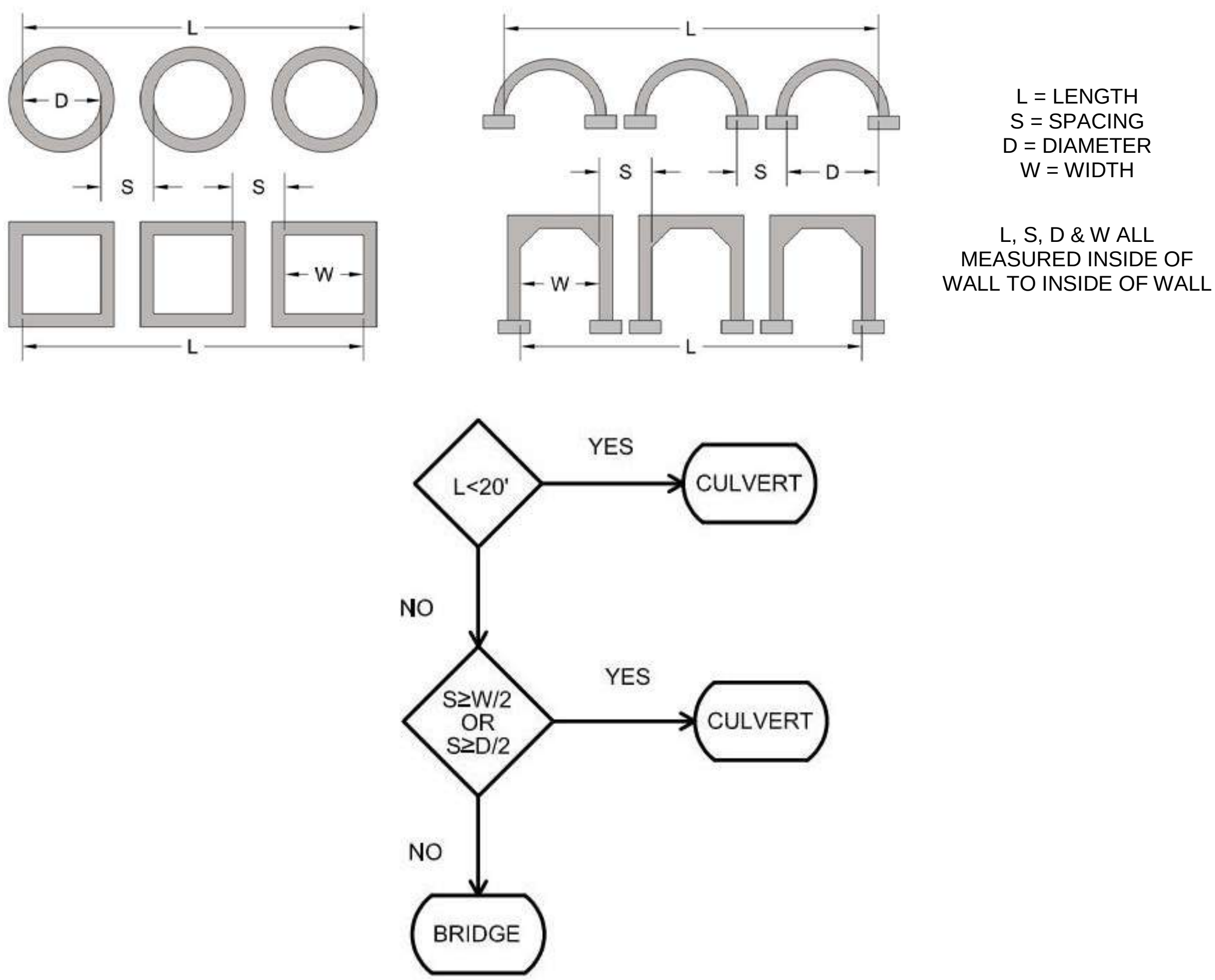


Figure 6.1 Culvert Identification Flow Chart

There are several bridges in South Carolina which include a culvert supporting the roadway above but slabs, beams and/or bents were installed at the inlet and/or outlet to support embankments or roadway fill. These bridges shall be considered as culverts and coded with NBI Item 62 **since the culvert is supporting the roadway**. NBI Item 58, NBI Item 59 and NBI Item 60 cannot be used if NBI Item 62 is used. Inspection notes for these components (slabs, beams and/or bents) shall still appear in the inspection report but do not impact the condition coding of NBI Item 62. Element-level quantities and conditions for these slabs, beams and bents **shall** be collected.

As stated in Section 1.6.1, culverts must carry water. Any culvert-like structures which carry live load over a depression or an obstruction other than water shall **not** be considered a culvert. They shall be considered rigid frames.

Culverts shall be inspected for their overall condition, any approach roadway and embankment settlement, the condition of their end treatments (headwalls, parapets, and wingwalls), and the condition of their appurtenance structures (such as aprons, weirs, and energy dissipaters). The inside of a culvert shall be inspected for any damage or deterioration. Weep holes shall be checked to determine if they are functioning or if they are plugged. Joints shall be checked for deterioration, spalls, or signs of backfill migration into the culvert.

All culverts shall be documented using the Culvert Profile Sketch Sheet, which is available in Attachment 5.21. The Culvert Profile Sketch Sheet includes measurements of horizontal blockage, vertical blockage, the top of water, culvert elevations, plan view of undermining and culvert fill. The Culvert Profile Sketch Sheet shall note measurements during the current inspection and also the measurements at the same location from the previous inspection of the structure. The following deficiencies and findings are applicable to culverts.

The lists included in Sections 6.1.1 to 6.1.4 are suggested and are not all-inclusive.

6.1.1 Concrete Headwalls

For concrete headwalls, the following items shall be reviewed at each inspection:

1. Wall condition – wall tipping, settlement, loss of backfill, cracking and concrete scaling
2. Apron condition – concrete scaling, settlement and cracking
3. Curtain wall – stream bottom elevation, piping of water under or around the curtain wall and riprap present

6.1.2 Concrete Barrels

For concrete barrels, the following items shall be reviewed at each inspection:

1. Wall condition – cracking, spalling, scaling, bulging, leaching and joint openings permitting backfill loss
2. Slab condition – cracking, spalling, scaling, leaching and joint openings permitting loss of backfill
3. Floor condition – sediment depth, spalling, scaling, settlement and heaving

6.1.3 Metal Culverts

For metal culverts, the following items shall be reviewed at each inspection:

1. Corrosion – surface rust and diminished section remaining
2. Erosion – potential piping around the culvert
3. Distortion – unusual defections or alignment
4. Connections – loose or missing bolts, cracks, diminished section remaining and joint openings permitting loss of backfill

6.1.4 Concrete or Stone Masonry Arches

For concrete or stone masonry arches, the following items shall be reviewed at each inspection:

1. Footings – scour, cracking, spalling and pile exposure
2. Arches – spalling, scaling, leaching, exposed reinforcing, shifted blocks and conditions at the springline
3. Wingwalls – wall tipping, settlement, loss of backfill, cracking and concrete scaling
4. Fill – signs of settlement, sink holes and pavement settlement

6.1.5 Fill Depth

The fill depth at different locations along the length of a culvert must be measured for all culvert types during initial inspections and confirmed during all other inspections. This information is needed for both live and dead load calculations used for the load rating. The fill depths shall be documented on the Culvert Profile Sketch Sheet. The following shall have a fill depth on the Culvert Profile Sketch Sheet:

1. Culvert Inlet
2. Edge of Roadway on Inlet Side of Roadway
3. Edge of Roadway on Outlet Side of Roadway
4. Culvert Outlet

In addition, the maximum fill shall be noted on the Culvert Profile Sketch Sheet. Depending on the level of fill and the cross-section of the roadway, fill depths may be the same across the different locations to be measured; not all five depth measurements are required to be recorded for this reason.

If the fill on top of a culvert is 6 feet or more, the fill depth can be estimated by the inspector. At this depth, there is less live load impact on the culvert. Though estimated, it still must be recorded on the Culvert Profile Sketch Sheet.

If the headwalls of the culvert are over 15 feet from the edge of the roadway, the fill depth can be estimated by the inspector. Though estimated, it still must be recorded on the Culvert Profile Sketch Sheet.

6.1.6 Revetment

Revetment mats and other bed or slope armoring materials (riprap, crushed stone, geotextile, etc.) shall be reviewed at each inspection for signs of erosion, scour, or deterioration.

6.1.7 Coding of NBI Item 62 (Culvert Condition Rating)

The rating for NBI Item 62, Culvert, shall evaluate culvert condition. The rating code is intended to be an overall condition evaluation of the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. Table 7.1.2.3 in the following chapter contains culvert general conditions rating descriptions.

CHAPTER 7 STRUCTURE EVALUATION PROCEDURES

7.1 GENERAL PROCEDURES FOR CONDITION EVALUATION FOR NATIONAL BRIDGE INVENTORY ITEMS

The inspection report will include applicable elements for the bridge along with element condition states, defects and environmental factors for condition states. The element condition is evaluated by the inspector and this evaluation is reported in the inspection report. Deficiencies shall be described in the BEGTD in enough detail to allow rates of change to be monitored over consecutive inspections. Defects and environmental factors should correlate to any deficiencies discovered in the field and written notes in the BEGTD.

Element-level data is provided to the BMO for record keeping. The BMO is responsible for maintaining element-level data in BrM. Element-level data is not maintained in RIMS.

7.1.1 Appraisal Evaluations

A number of NBI items for bridges are inspected and evaluated for comparison to acceptable standards. For example, various components of bridge approach guardrail are to be inspected to determine if they meet currently accepted standards. Although deterioration or damage shall be noted as part of the inspection report, the actual appraisal evaluation of the particular component is based **only** on whether the configuration and geometry of the component meets current standards.

7.1.1.1 Coding NBI Item 71 (Waterway Adequacy)

Waterway Adequacy (NBI Item 71) calls for the appraisal evaluation of the waterway adequacy; therefore, this item appraises the waterway opening with respect to the passage of flow through the bridge. Appraisal ratings take into account the functional classification of the roadway, the expected frequency of overtopping and potential traffic delays as a result of overtopping. Table 7.1.1.1 summarizes appraisal evaluation values for NBI Item 71.

Table 7.1.1.1 Appraisal Values for Waterway Adequacy

Functional Classification			Description
Principal Arterials – Interstates, Freeways, or Expressways	Other Principal and Minor Arterials and Major Collectors	Minor Collectors, Local Roads	
Code			
N	N	N	Bridge not over a waterway.
9	9	9	Bridge deck and roadway approaches above flood water elevations (high water). Chances of overtopping remote.
8	8	8	Bridge deck above roadway approaches. Slight chance of overtopping roadway approaches.
6	6	7	Slight chance of overtopping bridge deck and roadway approaches.
4	5	6	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with insignificant traffic delays.
3	4	5	Bridge deck above roadway approaches. Occasional overtopping of roadway approaches with significant traffic delays.

Table 7.1.1.1 Appraisal Values for Waterway Adequacy (continued)

Functional Classification			Description
Principal Arterials – Interstates, Freeways, or Expressways	Other Principal and Minor Arterials and Major Collectors	Minor Collectors, Local Roads	
Code			
2	3	4	Occasional overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	3	Frequent overtopping of bridge deck and roadway approaches with significant traffic delays.
2	2	2	Occasional or frequent overtopping of bridge deck and roadway approaches with severe traffic delays.
1	1	1	This value of rating code is not used for NBI Item 71.
0	0	0	Bridge closed.

7.1.1.2 *Coding NBI Item 72 (Approach Roadway Alignment)*

Approach Roadway Alignment (NBI Item 72) calls for the appraisal evaluation of the approach roadway alignment; therefore, this item identifies bridges which do not function properly or adequately due to the alignment of the approaches. It is not intended the approach roadway alignment be compared to current standards but rather to the **existing highway alignment**; therefore, this appraisal differs from other appraisal evaluations. The basic criterion is how the bridge approach alignment relates to the general highway alignment for the section of highway on which the bridge is located. The rating guidelines are correctly applied by determining if the vertical or horizontal curvature of the bridge approaches differs from the section of highway the bridge is on, resulting in a reduction of vehicle operating speed to cross the bridge. The approach roadway alignment will be rated per Table 7.1.1.2.

Table 7.1.1.2 Appraisal Values for Approach Roadway Alignment

Code	Description	Code	Description
9	This value of rating code is not used for NBI Item 72.	4	(Considered poor): A reduction in speed from the speed on the highway section. The approach roadway alignment is barely tolerable.
8	(Considered very good): A reduction in speed from the posted limit for the given section of highway is not required.	3	(Considered serious or intolerable): If horizontal or vertical curvature requires **substantial reduction** in operating speed from that on the highway section.
7	This value of rating code is not used for NBI Item 72.	2	(Considered critical or intolerable): The roadway alignment requires a **substantial reduction** in operating speed from that on the highway section. The roadway alignment should be subject to corrective action or bridge replacement.
6	(Considered satisfactory): A very minor reduction in speed from the speed on the highway section.	1	This value of rating code is not used for NBI Item 72.
5	(Considered fair): A minor reduction in speed from the speed on the highway section.	0	Bridge closed.

To aid inspectors, the following guidelines indicate a means of determining the difference between the terms used in Table 7.1.1.2. The codes in Table 7.1.1.2 are applied at the inspector's discretion.

- Very Minor Reduction: ≤ 5 mph
- Minor Reduction: > 5 and ≤ 9 mph
- Reduction: > 9 and ≤ 15 mph
- Substantial Reduction > 15 mph

A narrow bridge does not affect NBI Item 72. A narrow bridge would be accounted for in NBI Item 68 (Deck Geometry). Items affecting sight distance at the bridge, unrelated to vertical and horizontal curvature of the roadway, such as vegetation growth and substructure units of an overpass structure, do not affect NBI Item 72.

7.1.1.3 Coding NBI Item 36 (Traffic Safety Features, Bridge Railing and Approach Guardrail)

Traffic safety features (NBI Item 36) calls for appraisal evaluations of four traffic safety features associated with the bridge railing and approach guardrail. Although collision damage and deterioration of the components evaluated in traffic safety features (NBI Item 36) shall be noted in the inspection report, the appraisal evaluations for the following items shall evaluate **only** whether they meet current design standards. The BITL is responsible for confirming the inspection team is aware of current design standards including FHWA, AASHTO and SCDOT requirements. Effective in 2016, the *AASHTO Manual for Assessing Safety Hardware, Second Edition* (MASH) defines the standards for approved traffic safety features and establishes six test levels (TL) for traffic safety features based on speed and type of facility. In addition, SCDOT standard bridge and roadway drawings shall be used.

The three possible codes which may be entered for each of the traffic safety features (NBI Items 36A – 36D) are shown in Table 7.1.1.3.

Table 7.1.1.3 Appraisal Values for Traffic Safety Features

Code	Description
0	Inspected feature does not meet currently acceptable standards for safety, or a safety feature is required and none is provided.
1	Inspected feature meets currently acceptable standards.
N	Not applicable, or a safety feature is not required.

Materials for traffic safety features include concrete, metal, timber or a combination thereof. Traffic safety features shall provide a smooth, continuous face of rail on the traffic face, with posts (if applicable) set back from the face of the rail. Structural continuity of the rail members, including anchorages, is essential. The railing system shall be able to resist the applied loads at all locations. Careful attention must be given to the treatment of the railing at the bridge ends. Exposed rail ends, posts and sharp changes in the geometry of the railing shall be rated a zero. The heights of bridge railing shall be measured relative to the reference surface, which shall be the top of roadway, top of future overlay (if future resurfacing is anticipated), or the top of curb (if the curb projection is greater than 9 inches from the traffic face of railing).

TL-1 and TL-6 have no application in South Carolina. TL-2 is widely used across the state (pre-MASH conditions) and may only be coded as acceptable on local roads and low-speed highways (secondary routes) with little truck or heavy vehicle traffic. The following identifies the general test level application for TL-3, TL-4, and TL-5 which are all used in current design standards.

1. TL-3 (Test Level 3). Generally acceptable for a wide range of high-speed arterial highways (primary routes) with very low mixtures of heavy vehicles and with favorable site conditions. Performance crash testing is at 60 mph with a 1.55-kip passenger car and a 4.5-kip pickup truck.
2. TL-4 (Test Level 4). Generally acceptable for the majority of applications on high-speed highways, freeways, and expressways (interstates and some primaries) with a mixture of passenger cars, trucks, and other heavy vehicles. Performance crash testing is at 60 mph with a 1.55-kip passenger car and a 4.5-kip pickup truck plus an 18-kip single-unit truck at 50 mph.
3. TL-5 (Test Level 5). Generally acceptable for the same applications as TL-4 (interstates and some

primaries) plus where large trucks make up a significant portion of the vehicular mix.

As described above, **NHS routes are required** to have TL-3 bridge railings **at a minimum**. Bridge railings and traffic portions of combination railing have required heights based on their application, see Table 7.1.1.3.1.

SCDOT Bridge Design Drawings and many SCDOT standard drawings detail various barrier designs, guardrail-to-bridge rail transitions, guardrails and end treatments used on newer bridges in South Carolina. SCDOT BDM Section 17.6.1 contains additional information on SCDOT barrier rails. All components are subject to the SCDOT MASH Transition Plan and the AASHTO/FHWA Joint Implementation Agreement for MASH.

7.1.1.3.1 Bridge Railings (NBI Item 36A)

Minimum barrier heights are shown in Table 7.1.1.3.1. The heights are measured from the top of the reference surface to the top of the barrier.

Table 7.1.1.3.1 Barrier Heights depending on Test Level (TL) Application

Test Level	Route Type	Approximate Route Speed	Minimum Height of Barrier (Wearing Surface to Top of Barrier)
TL-5	Interstates with heavy truck traffic.	> 60 mph	42”
TL-4	Interstates and high-speed primary routes.	> 60 mph	32”*
TL-3	Primary routes and high-speed secondary routes.	45 – 60 mph	29”
TL-2	Secondary routes and local roads (non NHS).	< 45 mph	27”

* A 32” high barrier is not acceptable if the bridge is over 60 feet in length, if the wingwalls are perpendicular to the centerline of the end bent or if there are no sidewalks or bikeways on the bridge.

7.1.1.3.2 Guardrail-To-Bridge-Rail Transitions (NBI Item 36B)

The transition section, which extends from the approach guardrail to the bridge railing, acts to stiffen the flexible guardrail as it connects to the rigid bridge railing, and it must be firmly attached to the bridge railing. The gradual stiffening of the guardrail system could be done by decreasing the post spacing, increasing the post size, embedding the posts in concrete bases, increasing the guardrail depth (W-beam to Thrie-beam), or a combination of these methods. Transitions must be present to be deemed acceptable on all highways other than secondary routes and local roads. The ends of curbs and safety walks need to be gradually tapered out or shielded. Note that wood blocks are no longer allowed to meet the TL-3 requirement and the height to the top of the transition is very important. The transition shall be at least 27” tall (with a tolerance of 2 inches). Wood blocks shall only be permitted on TL-2.

SCDOT Bridge Design Memorandum (DM) 0309 discusses guardrail-to-bridge rail transitions on newer bridges in South Carolina. Generally, most bridges will have standard guardrail-to-bridge rail transitions. However, the bridge plans shall be examined in the event non-standard guardrail-to-bridge rail transitions are used.

7.1.1.3.3 Approach Guardrail (NBI Item 36C)

The approach guardrail must be of adequate length and have the structural qualities to shield motorists from the hazards at the bridge site in addition to being capable of safely redirecting an impacting vehicle without snagging or pocketing an impacting vehicle. These hazards include the approach or side slopes to the bridge if they are steeper than 4:1, trees larger than 4 inches in diameter, large signs and other permanent structures. Consecutive sections of overlapping guardrail shall be configured with overlaps facing away from the traffic direction. Note that wood blocks are no longer allowed to meet the TL-3 requirement and the height to the top of the guardrail is very important. Wood blocks shall only be permitted on TL-2. Guardrail shall have a nominal height of at least 27 inches above the reference surface (with a tolerance of 2 inches).

The length of approach guardrail shall be inspected in full until the approach guardrail end treatment unless the end treatment is over 75 feet from the bridge. The BITL shall keep in mind the bridge approach guardrail shall be long enough to shield motorists of the hazards at the bridge site. If there is no end treatment, the BITL shall determine when to end the inspection of the guardrail for the purpose of the bridge inspection and document where the inspection of the approach guardrail ends in BEGTD on the inspection report under the **Bridge Railing/Parapets and/or Median Barriers** heading.

SCDOT ED 42 discusses district engineering's responsibility to inspect and repair guardrail, cable barrier and crash attenuators. Bridge inspectors shall keep in mind the responsibility of other maintenance staff.

7.1.1.3.4 Approach Guardrail Ends (NBI Item 36D)

The ends of approach guardrail shall be flared, buried, shielded (by means of an impact attenuator), or made to break away. Buried guardrail ends are only acceptable on secondary routes and local roads (TL-2). If the end of an approach guardrail is buried, it must extend outside the lateral clear zone limits before turning down so as not to launch an errant vehicle. The end treatment shall not be inspected if it is over 75 feet from the bridge. An exceptionally long approach rail could be considered an acceptable end treatment provided that the approach guardrail is acceptable.

7.1.1.3.5 Traffic Safety Features on Culverts

If the traffic safety features are attached to the culvert, the inspector shall assess NBI Item 36A and NBI Item 36B in accordance with Section 7.1.1.3. If the traffic safety features are not attached to the culvert record NBI Item 36A and NBI Item 36B shall be coded as "*N*". If approach rail and end treatments are present, the inspector shall assess NBI Item 36C and NBI Item 36D in accordance with Section 7.1.1.3. If the approach rail and end treatment is not present, record NBI Item 36C and NBI Item 36D shall be coded as "*N*".

While NBI Item 36 may be used for culverts, as stated in Section 7.2.5.2, bridge railing elements shall not be used (quantified or accessed) on culverts.

7.1.2 General Condition Rating Codes

Condition ratings are used to describe the existing physical state of bridge components as compared to their original as-built conditions. In order to promote uniformity between bridge inspectors, the condition codes used to rate bridge components shall characterize **the overall condition of the entire component being rated** and are not intended to rate localized defects or nominally occurring instances of deterioration or disrepair. Correct assignment of a condition code must, therefore, consider both the severity of the deterioration or disrepair and the extent to which it is widespread through the component being rated. If there are localized defects, the bridge owner shall be notified (by means of the inspection report) with recommendations for possible repair, rehabilitation, or retrofits.

The **load carrying capacity of the component is not to be used in evaluating condition items**. The fact a bridge was designed for less than the current legal loads, and the bridge may even be posted, shall have no influence on the condition ratings.

The Deck (NBI Item 58), Superstructure (NBI Item 59), Substructure (NBI Item 60), Channel and Channel Protection (NBI Item 61), and Culvert (NBI Item 62) are the items used to describe the general condition ratings of bridges and culverts and are to be updated after each inspection cycle. Therefore, the condition of these items provides a simple snapshot of the current overall condition of a bridge or culvert.

Descriptive conditions used within the text of an inspection report or descriptive labels used in the BEGTD on the inspection report shall correlate to the numerical rankings described below for NBI Items 58, 59, 60 and 62 based on the deficiencies found for the individual components. The guidelines presented in Table 7.1.2 shall be used to group the descriptive conditions for the various components.

A supplemental guide to the NBI Condition Ratings for bridge components is available as Appendix K.

Table 7.1.2 Grouping of Descriptive Conditions

Code	Descriptive Condition	Description
7, 8, 9	GOOD	Component defects are limited to only minor problems.
5, 6	FAIR	Structural capacity of the component is not affected by minor deterioration, section loss, spalling, cracking, or other deficiency.
0, 1, 2, 3, 4	POOR	Structural capacity of the component is affected or jeopardized by significant deterioration, section loss, spalling, cracking, or other deficiency.

7.1.2.1 Coding NBI Items 58, 59 and 60: Deck (NBI Item 58), Superstructure (NBI Item 59), and Substructure (NBI Item 60)

The general condition ratings shown in Table 7.1.2.1 shall be used as a guide in evaluating the Deck (NBI Item 58), Superstructure (NBI Item 59) and Substructure (NBI Item 60).

Table 7.1.2.1 General Condition Ratings for Deck, Superstructure, and Substructure

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

7.1.2.1.1 Coding NBI Item 58 (Deck Condition Rating)

The overall condition of a bridge deck shall be coded as shown in Table 7.1.2.1 for NBI Item 58, Deck. For culverts or other structures without a deck, such as a corrugated metal structural plate arch bridge, code N (not applicable) shall be used for NBI Item 58. Decks integral with the superstructure, such as for a cast-in-place box girder bridge or a concrete tee-beam bridge, shall be rated for the deck only, and the superstructure condition of the integral deck-type bridge shall not influence the deck rating.

The condition of supplemental wearing surfaces, joints or expansion devices, curbs, sidewalks, parapets, railings, and drainage scuppers shall not be considered in the overall deck evaluation. However, their condition shall be noted in the BEGTD.

7.1.2.1.2 Coding NBI Item 59 (Superstructure Condition Rating)

The overall condition of a bridge superstructure shall be coded as shown in Table 7.1.2.1 for NBI Item 59, Superstructure. For culverts, code N (not applicable) shall be used for NBI Item 59. See Section 7.1.2.1.1 for deck integral with the superstructure.

A superstructure with at least one saddle may not be evaluated greater than satisfactory condition. Superstructures with saddles which have **deterioration but have no observed movement** may be considered in satisfactory condition (6). Saddles with **increased movement and/or deterioration** may be considered in fair condition (5) or worse.

7.1.2.1.3 Coding NBI Item 60 (Substructure Condition Rating)

The process for the re-evaluation of NBI Item 113 – Scour Critical Bridges is outlined in Section 5.3.4.3. The rating given by NBI Item 113 – Scour Critical Bridges, shall have a significant effect on NBI Item 60 if scour has substantially affected the overall condition of the substructure as stated below:

- Whenever a rating factor of 4 or below is determined for NBI Item 113, the rating factor for NBI Item 60 shall be analyzed to reflect the severity of actual scour and resulting damage to the bridge.

- If a rating factor of 2 or below is determined for NBI Item 113, the rating factor for NBI Item 60 shall not be more than 2.

A substructure with spliced piles or piles with stud-ups may not be evaluated greater than satisfactory condition (6). Timber substructures with a **minor quantity (less than 25%) of spliced piles or piles with stud-ups** may be considered in satisfactory condition (6). Timber substructures with **over 25% of timber piles spliced or piles with stud-ups** may be considered in fair condition (5) or worse. Timber substructures with **over 75% of timber piles spliced or piles with stud-ups** may be considered in poor condition (4) or worse.

On some bridges, a substructure condition rating may be determined by the BITL from the inspection occurring on the top side of the bridge and from an underwater inspection. In this case, the BITLs are required to review previous inspection reports and update the most recent substructure condition rating accordingly.

7.1.2.2 Coding NBI Item 61 (Channel and Channel Protection)

The general condition ratings shown in Table 7.1.2.2 shall be used as a guide in evaluating channel and channel protection (NBI Item 61). Channels shall be inspected for the physical condition associated with the flow of water through the bridge, such as stream stability, and the condition of the channel, riprap, slope protection, or stream control devices, including spur dikes.

The rating for NBI Item 61 shall reflect the general condition of the channel in relation to the following:

1. Bank vegetation – Vegetation protects the banks from erosion by normal water flow.
2. River control devices – Devices include spur dikes, jetties, retards, and other control systems.
3. Debris in channel restricting flow – Debris could cause scour to occur around substructure elements.
4. Trees and brush restricting the channel – Trees and brush could cause a restriction accelerating the flow and the potential for stream degradation or scour.
5. Degradation or aggradation of the streambed – Streambed elevations significantly different than the as-built condition may cause unexpected problems during high water events.
6. Channel movement away from the as-built condition – Channel movement may encroach on the substructure or approach pavement, causing undermining and potential failure of the bridge or roadway.
7. Aquatic grasses – These natural grasses shall be treated as debris in the channel as they cause a potential for snagging floating bushes, trees, sediment, etc. that may accumulate and restrict channel flow. As depicted in the table below, the presence of the aquatic grasses shall directly affect the condition ratings.

An NBI rating of 5 or less requires one of the following:

- Photograph noting deficiencies shall be attached to the report, or
- Detailed notes discussing deficiencies shall be included in or attached to the report.

Table 7.1.2.2 General Condition Ratings for Channel and Channel Protection

Code	Description
N	Not applicable. Use when bridge is not over a waterway (channel).
9	There are no noticeable or noteworthy deficiencies that affect the condition of the channel.
8	Banks are protected or well vegetated. River control devices such as spur dikes and embankment protection are not required or are in a stable condition.
7	Bank protection is in need of minor repairs. River control devices and embankment protection have a little minor damage. Banks and/or channel have minor amounts of drift. Minimal aquatic grass upstream and downstream of bridge, not restricting the channel.
6	Bank is beginning to slump. River control devices and embankment protection have widespread minor damage. There is minor streambed movement evident. Debris is restricting the channel slightly. Between 0-25% of the channel (upstream and downstream) is covered in aquatic grass.

Table 7.1.2.2 General Condition Ratings for Channel and Channel Protection (continued)

Code	Description
5	Bank protection is being eroded. River control devices and/or embankment have major damage. Trees and brush restrict the channel. Between 26-50% of the channel (upstream and downstream) is covered in aquatic grass.
4	Bank and embankment protection is severely undermined. River control devices have severe damage. Large deposits of debris are in the channel. Between 51-75% of the channel (upstream and downstream) is covered in aquatic grass.
3	Bank protection has failed. River control devices have been destroyed. Streambed aggradation, degradation, or lateral movement has changed the channel to now threaten the bridge and/or approach roadway. Between 76-99% of the channel (upstream and downstream) is covered in aquatic grass causing streambed aggradation that has changed the channel to now threaten the bridge and/or approach roadway.
2	The channel has changed to the extent the bridge is near a state of collapse. Dense aquatic grasses cover 100% of the channel from upstream to downstream.
1	Bridge is closed because of channel failure. Corrective action may put it back in light service.
0	Bridge is closed because of channel failure. Replacement is necessary.

7.1.2.3 Culvert (NBI Item 62)

The general condition ratings shown in Table 7.1.2.3 shall be used as a guide in evaluating a Culvert (NBI Item 62).

Table 7.1.2.3 General Condition Ratings for Culvert

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

Table 7.1.2.3 General Condition Ratings for Culvert (continued)

Code	Description
2	Integral wingwalls collapsed; severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.
1	Either road or culvert has caused the road to be closed. Corrective action may put it back in light service.
0	Either road or culvert has caused the road to be closed. Replacement is necessary.

7.2 EVALUATION OF NATIONAL BRIDGE ELEMENTS

The proper assessment of bridge elements is a key aspect of sound bridge management. In the early 1990s, the introduction of element-level inspection methods and evaluation became a significant advancement in the bridge inspection practice nationwide. Coupled with the refinement of bridge management systems, AASHTO developed the Guide for Commonly Recognized (CoRe) Structural Elements to define a system to record the condition of bridge elements. With the 2013 *AASHTO Manual for Bridge Element Inspection* (*MBEI*), the CoRe system has been replaced, and improvements have been made to more fully capture the condition of bridge elements by reconfiguring the element language to utilize multiple distress paths within the defined condition states. MAP-21, the Federal transportation funding bill authorized in 2012, requires element-level data to be reported for all bridges on the NHS within 2 years of enactment of the bill. In South Carolina, all applicable bridge inspections will include element-level evaluations including but not limited to initial, routine, FCM, underwater and some special inspections.

The *MBEI* provides a set of bridge elements designed to be flexible in nature to satisfy the needs of all agencies. The element set presented in the *MBEI* includes two element types identified as either National Bridge Elements (NBEs) or as Bridge Management Elements (BMEs). All of the elements, whether NBE or BME, have the same four possible standard condition states (Condition State 1 = Good, Condition State 2 = Fair, Condition State 3 = Poor, or Condition State 4 = Severe). Using these condition states, the defect definitions and appropriate quantity summaries for elements provided in the *MBEI*, the element-level documentation has the ability to define the amount of a particular element in each of the four possible condition states.

The NBEs are a refinement of the deck, superstructure, substructure, and culvert condition ratings defined in the *Coding Guide*. Additional elements included in this section are bridge rail and bearings. The NBEs are designed to remain consistent from agency to agency in order to facilitate the capture of bridge element condition at the national level.

Typically, quantities for each bridge element shall be calculated during the initial inspection. Ideally, the quantities will be calculated from the as-built plans.

At each inspection where an element-level assessment is needed, the BITL is to identify the quantity of each bridge element which can be categorized as being in each of the four condition states. Guidelines for the assessment of conditions for each condition state can be found in the *MBEI*.

A supplemental guide to the element-level condition states is available as Appendix L to the BIGD. Appendix L shall be used to assign proper condition states; care should be taken to make sure element-level condition states correlate to NBI Conditions for the general components of the bridge.

Quantities for steel surface condition may be obtained through the use of the *AISC Manual for Steel Construction* to determine the surface area of commonly used steel shapes.

For bridges which have an underwater inspection, the BITL is to also include element-level bridge data collected by the dive team. It is of the utmost importance element-level inspection data mirrors the NBI condition ratings for each inspection report submission; see Section 5.4.4.8 regarding element-level reporting requirements for underwater inspections.

To assist in the determination of quantities for an element-level inspection, an AASHTO Element Table Worksheet is available as Attachment 5.23.

7.2.1 Condition State 1

The element has either no deterioration or the deterioration is insignificant to the management of the element, meaning a portion of the element has no condition-based preventative maintenance needs or repairs. Areas of an element have received long lasting structural repairs which restore the full capacity of the element with an expected life equal to the original element may be coded as good condition.

7.2.2 Condition State 2

The element has minor deficiencies which signify a progression of the deterioration process. This portion of the element may need condition-based preventative maintenance. Areas of the element that have received structural repairs that improve the element, but the repair is not considered equal to the original member, can be coded as fair.

7.2.3 Condition State 3

An element that has advanced deterioration but does not warrant structural review can be coded as poor. Areas of the element that have been repaired but the repair has not significantly improved the capacity of the member can be coded as poor. This portion of the element may need condition-based preventative maintenance or other remedial action.

When an element has defects in CS3, the inspector shall add more about the defect than just the square footage or quantity. This additional information includes:

a. Inspection reports shall include photographs to convey the extent and location of defects which are in CS3.

b. If a defect cannot be completely described with a photo, such as a banging joint or a bearing which moves under load, additional description shall be included in the BEGTD on the inspection report. Short descriptive locations of CS3 defects in the BEGTD field may be helpful, such as "*Bearing Loss at Pier 1*" or "*Spalling in Beam 3, See Photo #*".

7.2.4 Condition State 4

The element warrants a structural review to determine the effect on strength of serviceability of the element or of the bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge; OR a condition where a portion of the element is no longer effective for its intended purpose.

If the BITL cannot perform the capacity determination himself or herself using engineering and industry knowledge, a load rating shall be recommended; see Section 5.5 of the BIGD. The load rating is only required for the bridge component which is in CS4; for example if a beam is in CS4, a deck rating may not be required only a superstructure rating. If the element placed in CS4 can be repaired, rehabilitated or replaced through a work request submitted via HMMS or to the bridge owner for non-SCDOT owned bridges and if the BITL believes the work on the element may improve the element's CS, a load rating is not necessarily required.

SCDOT requires that if an element is placed in CS4, a photograph of the element shall be placed in the inspection report.

When an element has defects in CS4, the inspector shall add more about the defect than just the square footage or quantity. This additional information includes:

a. Inspection reports shall include photographs to convey the extent and location of defects which are in CS4.

b. If a defect cannot be completely described with a photo, such as a banging joint or a bearing which moves under load, additional description shall be included in the BEGTD on the inspection report. Short descriptive locations of CS4 defects in the BEGTD field may be helpful, such as "*Bearing Loss at Pier 1*" or "*Spalling in Beam 3, See Photo*".

7.2.5 SCDOT Element Guidance

7.2.5.1 Bridge Rail Elements

There are a total of five (5) bridge railing elements for use:

1. Element #330 – Metal Bridge Railing. The railings must be constructed, at least in part, of metal (steel, aluminum, metal beam, rolled shapes, etc.) However, the other components may be constructed of different materials. Included in this element are the posts of metal, timber, concrete, masonry, blocking and curb. This includes thrie-beam retrofit.
2. Element #331 – Reinforced Concrete Bridge Railing. All components of the railing (not including incidentals such as handrails or pedestrian fencing) must be constructed entirely of concrete.
3. Element #332 – Timber Bridge Railing. The railing must be constructed of timber. However, the other components may be constructed of different materials. Included in this element are the posts of metal, timber, concrete, masonry, blocking and curb.
4. Element #333 – Other Bridge Railing. The railing must be constructed of materials not otherwise defined as metal (steel, aluminum, metal beam, rolled shapes, etc.), concrete, timber, or masonry. All types and shapes of bridge railing that cannot be classified using any other defined railing element.
5. Element #334 – Masonry Bridge Railing. The railing must be constructed entirely of masonry blocking or stones.

Per AASHTO, every railing which is considered a **redirective railing** shall receive its own element quantity and applicable defects. For example, if a metal railing is placed on top of a concrete bridge railing, then there are two redirective railings. Therefore it shall be coded using both Element #330 – Metal Bridge Railing and Element #331 – Reinforced Concrete Bridge Railing; see Figure 7.2.5.1.

If a W-beam or Thrie beam metal railing is attached to the front of a concrete bridge railing, then the only redirective railing is metal. The reinforced concrete railing is not redirective. Therefore it shall be coded as Element #330 – Metal Bridge Railing. The element quantity includes only the metal rail on the bridge; see Figure 7.2.5.1. Element #331 shall not be used.

If a W-beam or Thrie beam metal railing is attached to posts and anchored into the deck along with a concrete parapet at the outer edges of the bridge, only the redirective railing impacting the vehicular traffic shall be coded. In this example, the element quantity includes only the metal rail on the bridge for Element #330. In this example, the reinforced concrete railing is considered a pedestrian railing and not coded; see Figure 7.2.5.1

Railings must be able to come into contact with a vehicle to be considered redirective. Curbs (non-mountable or mountable) are not considered railings and are not coded.

Only if a railing is not a combination of materials covered in the list above, it shall be coded as Element #333.

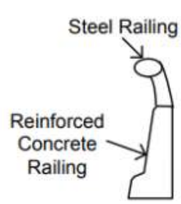
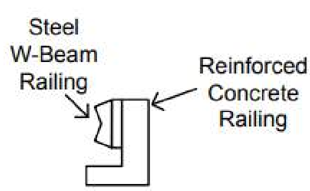
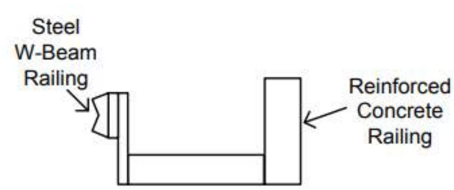
		
Element #330 – Metal Bridge Railing and Element #331 – Reinforced Concrete Bridge Railing	Element #330 – Metal Bridge Railing Only	Element #330 – Metal Bridge Railing Only

Figure 7.2.5.1 Bridge Rail Elements

7.2.5.2 Bridge Rail on Culverts

The *MBEI* considers all bridge rail elements (Elements #330 to #334) part of the deck. Since culverts do not have a deck (NBI Item 58 = N), element evaluation for railings present are not required. However, the coding NBI Item 36 (Traffic Safety Features) is still required and shall be done in accordance with Section 7.1.1.3 of this document.

7.2.5.3 Use of Elements for Steel and Concrete Piles and/or Columns

The *MBEI* provides guidance on which element to use for a substructure element whether it is continuously submerged in water or not.

7.2.5.3.1 Steel Piles and/or Columns

- Element #202 (Steel Pile or Column, Not Submerged) - This element defines only those steel columns or pile extensions. Piles exposed from erosion or included as part of the underwater inspection **are not** included in this element.
- Element #225 (Steel Submerged Pile or Column) - This element defines only those steel piles which are **continuously submerged** in water and are visible for inspection. Piles exposed from erosion or are part of the underwater inspection **are** included in this element.

7.2.5.3.2 Concrete Piles and/or Columns

- Element #205 (Reinforced Concrete Pile or Column, Not Submerged) - This element defines only those reinforced columns or pile extensions. Piles exposed from erosion or included as part of the underwater inspection **are not** included in this element.
- Element #227 (Reinforced Concrete Submerged Pile or Column) - This element defines only those reinforced concrete piles which are **typically submerged** in water and are visible for inspection. Piles exposed from erosion or are part of the underwater inspection **are** included in this element.

7.2.5.4 Environmental Factors for Condition States

Elements exposed to different environmental conditions deteriorate differently. These factors include:

- Operational activities from traffic and truck movements
- Exposure to water, salt and other corrosive materials
- Condition of protective and waterproofing systems
- Temperature extremes either from nature or man

When inventorying and assessing the condition of the elements, an inspector shall consider the environment in which the element is operating. The environment designation of an element can change over time, as it would if operating policies were changed to reduce the use of road salt. By definition, the environment designation cannot change as the result of maintenance work or deterioration.

Factors which could increase the severity of the environment rating for various elements include those shown in Table 7.2.5.4-1. The predominant environment shall be determined. Table 7.2.5.4-2 provides environmental factors to be applied for element condition states.

Table 7.2.5.4-1 Elements and Example Environmental Factors

Element	Example Environmental Factors
Timber Elements	High Moisture Content Pest Infestation Ice flow impacts
Steel Elements	Distance from salt air Water wet/dry cycles Exposure to corrosive soils and liquids
Concrete Elements	Freeze thaw cycles Tire Chain wear Deck salting
Petroleum Based Elements	High Temperatures
Joints and Bearings	Extreme Temperature Ranges
Operating Practices	High Traffic and/or Truck Volume

Table 7.2.5.4-2 Element Environmental Factors for Condition States

Environmental Factor	Description
1 - Benign	Neither environmental factors nor operating practices are likely to significantly change the condition of the element over time, or their effects have been mitigated by the presence of highly effective protective systems.
2 - Low	Environmental factors and/or operating practices either do not adversely influence the condition of the element, or their effects are substantially lessened by the application of effective protective systems.
3 - Moderate	Any change in the condition of the element is likely to be quite normal as measured against those environmental factors and/or operating practices which are considered typical by SCDOT.
4 - Severe	Environmental factors and/or operating practices contribute to the rapid decline in the condition of the element. Protective systems are not in place or are ineffective.

7.2.5.5 Pile Repairs and Applicable Condition States

Piles are a common element inspected on bridges in South Carolina. The condition state may change for piles which have been repaired since the last inspection based on the type of repair.

Typically, piles in CS3 should be protected or repaired, or in some cases, replaced. Typically, piles in CS4 should be repaired or replaced. Any pile requiring a structural review to determine strength or serviceability shall be rated as CS4 in accordance with the *MBEI*.

If a pile has been replaced or if a pile has received a repair equal to the original pile, then it shall be coded as CS1.

If a pile has received a structural repair and if the inspector determines the pile repair is not considered equal to the original member and can be coded as fair, then it shall be coded as CS2. The repairs may include structural pile jackets. While the capacity may have been improved, its lifespan likely remains shortened.

If a pile has been slightly repaired to improve the element, but the repaired state is not considered equal to the original, the pile shall be coded as CS3. These repairs may include pile splices or stud-up repairs.

If the repair has not improved the element, it should be coded as either CS3 or CS4 depending on the degree of deterioration.

Section 5.5.1 contains unique requirements for the recommended load rating procedures for timber substructures.

7.2.5.6 Saddle Repairs and Applicable Condition States

Saddle repairs on beam ends at bent caps are a common element inspected on bridges in South Carolina. While the saddle slightly improves the beam end, its lifespan likely remains shortened. The condition state may change for beam ends which have been repaired since the last inspection based on the type of repair. Only the element with the defect shall be coded in accordance with this section. Both the beam end and pile cap shall not be coded unless they both exhibit defects. In addition, only the length of the element with the defect shall be coded according to this section and not the entire length of the member. The applicable length may be as short at 1 linear foot.

Typically, beam ends in CS3 should be protected or repaired, or in some cases, replaced. Typically, beam ends in CS4 should be repaired or replaced. Any beam requiring a structural review to determine strength or serviceability shall be rated as CS4 in accordance with the *MBEI*.

If a beam has been replaced or if the beam end has received a repair equal to the as-built condition, then it shall be coded as CS1.

If a beam end has a saddle installed and the saddle exhibits no deficiencies, the beam end shall be coded as CS2 with an appropriate defect.

If a beam end has a saddle installed and the saddle does exhibits deficiencies, the beam end shall be coded as CS3 with an appropriate defect. Defective saddles include saddles with extensive corrosion or section loss, movement, loose or missing hardware, etc.

If the saddle repair has not improved the element, the beam end should be coded as either CS3 or CS4 depending on the degree of deterioration.

7.3 SUPPLEMENTAL CODING GUIDE FOR NBI SI&A DATA AND NBI ITEMS

A supplemental coding guide for SI&A data is available as Appendix J. Specific guidelines for coding NBI Items 06 and 07 are available in Appendix M. Unless otherwise stated, the units used for NBI Items shall be in English units.

7.3.1 Inventory Route Minimum Vertical Clearance (NBI Item 10)

Record the minimum vertical clearance measured over the inventoried route identified in NBI Item 5, rounded down to the nearest tenth of a foot. NBI Item 10 shall be coded regardless of whether the route is on the structure or under the structure. Inventory routes are sometimes underneath the inventoried structure. Some examples are railroad, mass-transit, pedestrian and bikeway bridges over highways owned by SCDOT or “RRO” bridges; see Appendix M.

For routes on the bridge, measure the vertical clearance plumb from the deck or roadway surface (including paved or stabilized shoulders) to the lowest superstructure restriction (truss portal, etc.), appurtenance (signs, utilities, etc.) attached to the bridge, or other structure (multi-level interchange, etc.)

For routes under the bridge, measure the vertical clearance plumb from the inventoried roadway surface (including paved or stabilized shoulders) to the lowest superstructure restriction or appurtenance (signs, utilities, etc.) attached to the bridge.

Stabilized shoulders shall not be used for vertical clearance measurements in South Carolina unless the stabilized shoulder is regularly used by traffic.

For structures having multiple openings, clearance for each opening shall be recorded, but only the smallest of the clearances shall be coded regardless of the direction of travel. This would be the practical clearance; see Figure 7.3.1 where 13.5 feet would be recorded for NBI Item 10.

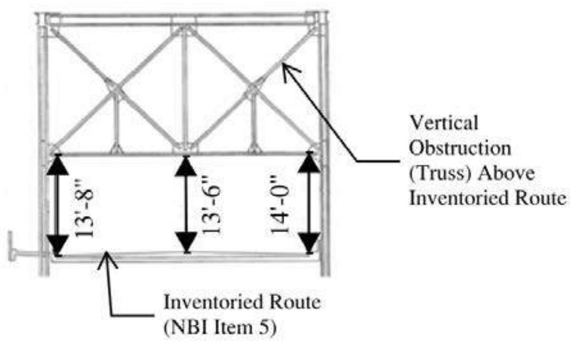


Figure 7.3.1 Inventory Route Minimum Vertical Clearance

When no restriction exists or when the restriction is 100 feet or greater, code 99.9. If the clearance is over 30.0 feet, the length can be estimated and coded.

7.3.2 Kilometerpoint (NBI Item 11)

According to the *Coding Guide*, the kilometerpoint is used to establish the location of the bridge on the base highway network. NBI Item 11 is reported to FHWA as a seven digit code. As stated in Section 7.3, all units shall be entered in as US units (in this case for NBI Item 11, miles). SCDOT has a post-processing function which automatically converts as needed in the background, so the inspector does not need to perform any conversions when coding NBI Item 11.

7.3.3 Design Vehicle (NBI Item 31)

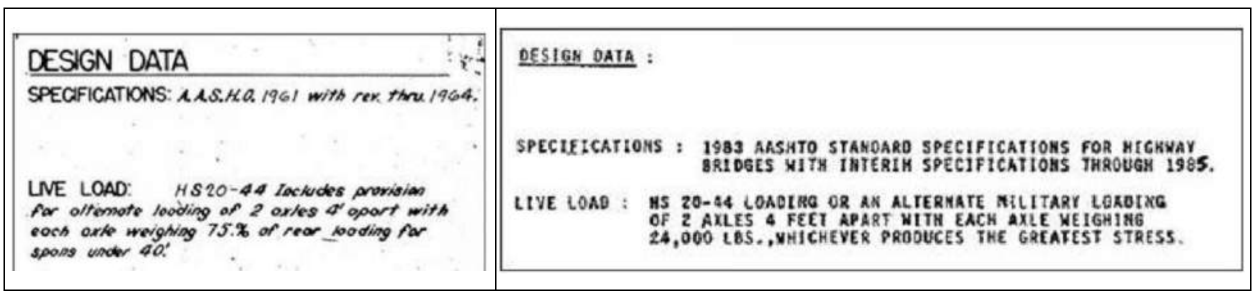
The *Coding Guide* is amended by a FHWA memorandum dated February 2, 2011 to provide guidance on coding NBI Item 31 for the record of live load for which the bridge was designed. For design vehicles, one of the following codes shall be used:

(0) Unknown

(1) H-10
(2) H-15
(3) HS-15
(4) H-20
(5) HS-20
(6) HS-20+Mod
(7) Pedestrian
(8) Railroad
(9) HS-25 or Greater
(A) HL-93
(B) Greater than HL-93
(C) Other

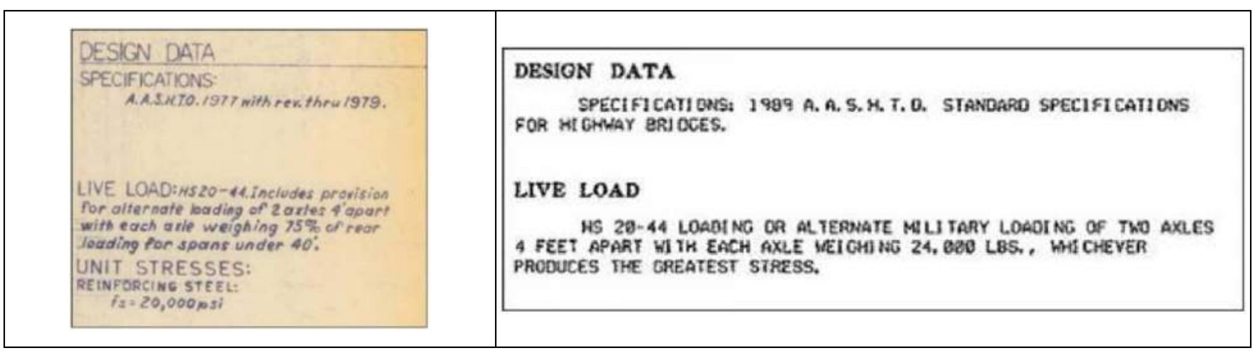
If a bridge was widened or rehabilitated, record the lowest design load governing any portion of the bridge. For example, a bridge designed for an HS-20 load is later widened and the widening is designed for the HL-93 load; then record as designed for "*HS-20*".

If a bridge was designed with an HS-20 loading and alternate military loading (as shown in Figure 7.3.3-1) or if a bridge was designed with a similar, alternate military loading (as shown in Figure 7.3.3-2); then record as designed for "*HS-20+Mod*".


DESIGN DATA
SPECIFICATIONS: A.A.S.H.O. 1961 with rev. thru 1964.
LIVE LOAD: HS20-44 Includes provision for alternate loading of 2 axles 4' apart with each axle weighing 75% of rear loading for spans under 40'.

DESIGN DATA :
SPECIFICATIONS : 1983 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES WITH INTERIM SPECIFICATIONS THROUGH 1985.
LIVE LOAD : HS 20-44 LOADING OR AN ALTERNATE MILITARY LOADING OF 2 AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 LBS.,WHICHEVER PRODUCES THE GREATEST STRESS.

Figure 7.3.3-1 Examples of HS-20 Loading (Modified) – Code (6) "*HS-20+Mod*"


DESIGN DATA
SPECIFICATIONS:
A.A.S.H.T.O. 1977 with rev. thru 1979.
LIVE LOAD: HS20-44. Includes provision for alternate loading of 2 axles 4' apart with each axle weighing 75% of rear loading for spans under 40'.
UNIT STRESSES:
REINFORCING STEEL:
fs = 20,000 psi

DESIGN DATA
SPECIFICATIONS: 1989 A. A. S. H. T. O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
LIVE LOAD
HS 20-44 LOADING OR ALTERNATE MILITARY LOADING OF TWO AXLES 4 FEET APART WITH EACH AXLE WEIGHING 24,000 LBS., WHICHEVER PRODUCES THE GREATEST STRESS.

Figure 7.3.3-2 Examples of HS-20 Loading (Modified) – Code (6) "*HS-20+Mod*"

If, per a bridge design requirement, a bridge is designed using LRFD, in which the truck load portion of the HL-93 load is increased by an amount; then record as designed for "*Greater than HL-93*".

Record as designed for "*Other*" when an owner-specified special design vehicle or evaluation permit vehicle governs over the AASHTO design load or when the design is not based on AASHTO design load configurations. For example, per a bridge design requirement, a bridge is designed for the HL-93 design load, with further consideration of a SCDOT defined permit vehicle, and the permit vehicle controls the design of the superstructure; then record as designed for "*Other*".

Code "*Unknown*" for NBI Item 31 when the design plans are not available and the likely design load cannot be inferred from design characteristics of the bridge or agency policy at the time the bridge was built. A code other than "*Unknown*" can be recorded when design plans are not available, but the design load can be inferred from design characteristics of the bridge or agency policy at the time the bridge was built.

7.3.4 Approach Roadway Width (NBI Item 32)

According to the *Coding Guide*, the approach roadway width within 100 feet of the bridge shall be measured perpendicularly to the centerline of the roadway between curbs or rails. Usable roadway is defined as the width of the traffic lanes, along with the widths of the shoulders. To be included in the measurement, shoulders must be constructed and normally maintained flush with the adjacent traffic lane and must be structurally adequate for all weather and traffic conditions consistent with the facility carried. Unstabilized grass or dirt which is flush with and beside the traffic lane, with no base course, is not to be considered a shoulder for measurement; see Figure 7.3.4-1 for a graphical interpretation of this requirement. In South Carolina, if an inspector is not sure of the structural adequacy of a shoulder, the shoulder shall NOT be included. When it is not readily known if stabilized construction details were used, the presence of rutting, heaving, water retention, or other distress may be used as indicators that the shoulder is not stabilized. The approach roadway width measurement shall exclude usable distance measurements: medians, sidewalk and other protected areas with non-mountable curbs or barriers greater than six inches high.

Usable roadway widths shall be measured beyond the flared roadway transitions approaching the structure. For structures carrying two-way traffic, record measurements using the most restrictive (considering guardrail) of the usable route widths at either end of the structure. For structures carrying one-way traffic, record measurements using the usable road widths leading to the structure, not departing.

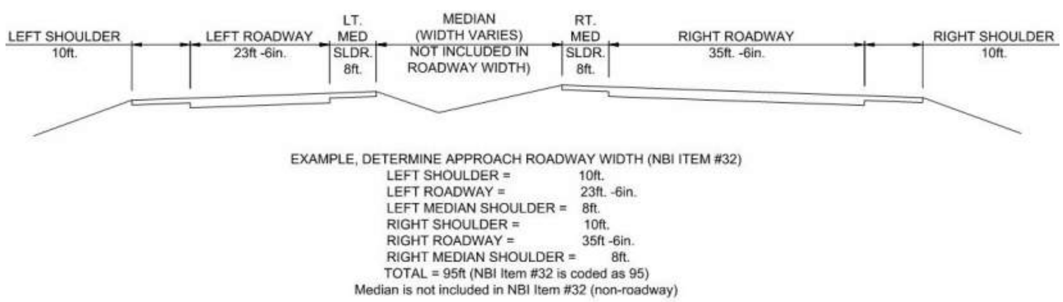
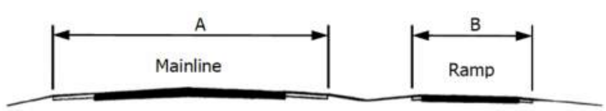


Figure 7.3.4-1 Approach Roadway Width (Graphic Interpretation)

If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width if both roadways are carried on one bridge. If the mainline roadway and ramp are on two different bridges, record the approach roadway widths separately for each bridge; see Figure 7.3.4-2.



Approach Roadway Width for Mainline and Ramp on Same Bridge = A + B

Mainline and Ramp on Different Bridges = Record A and B Separately for Each Bridge

Figure 7.3.4-2 Approach Roadway Width (Mainline and Ramp)

NBI Items 32 and 51 (Bridge Width, curb-to-curb) are measured and coded separately; see Figure 7.3.4-3 for examples of where the items may be dissimilar.

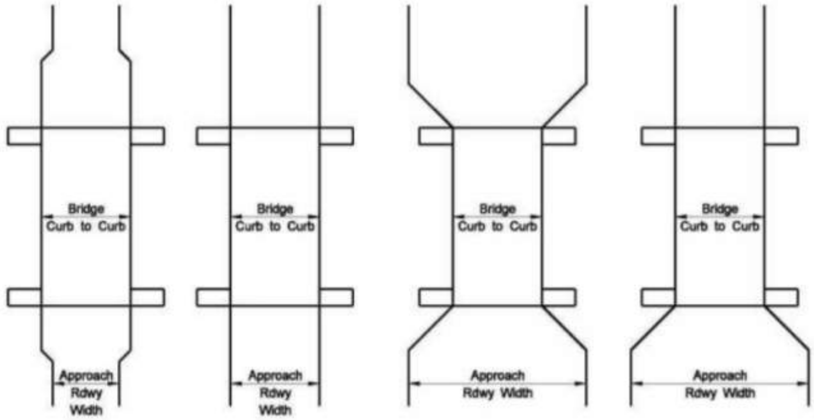


Figure 7.3.4-3 Approach Roadway Width and Bridge Width

7.3.5 Bridge Medians at Culverts (NBI Item 33)

According to the *Coding Guide*, the type of median shall be coded as open, closed with no barrier, closed with a mountable barrier or without a median all together. The type of bridge medians on culverts also must be coded. For bridge medians at culverts, one of the following codes shall be used:

(0) No median for structures running beneath one-way traffic or two-way traffic with no median (separated by a double yellow line or center turn lane).

(1) Open median for structures located side by side sharing the same Asset ID where two-way traffic is physically separated by barriers (e.g. guardrail).

(2) Closed median (no barrier) for structures running beneath two-way traffic and separated (typically by vegetation or concrete medians) without permanent, non-mountable barriers. Engineering judgment should be used to determine if the median is capable of supporting traffic, and if not, then a repair recommendation should be made to the structure owner to add a barrier (e.g. guardrail).

(3) Closed median with non-mountable barriers for structures running beneath two-way traffic and separated by one or more non-mountable barriers.

Applicable notes include the follow regarding the coding of NBI Item 33. Permanent barriers shall be considered non-mountable if they are greater than 6” in height (and mountable if 6” or less). There may be other cases where engineering judgment by the load rater or the BITL is necessary, for instance where overlays are in place or may be placed in the future. Median vegetation (i.e. trees, shrubs, etc.) should not be considered a permanent, non-mountable barrier. Barriers (e.g. guardrails) shall be continuous on both sides to be considered coded as “3”.

7.3.6 Structure Open, Posted or Closed to Traffic (NBI Item 41), Date of Temporary Structure (SBI Item 422) and Date of Posting (SBI Item 423)

According to the *Coding Guide*, this item provides information about the actual operational status of a structure. One of the following codes shall be used:

(A) Open, no restriction

(B) Open, posting recommended but not legally implemented

(D) Open, would be posted or closed except for temporary shoring, etc. to allow for unrestricted traffic

(G) New structure not yet open to traffic

(E) Open, temporary structure in place to carry loads while original structure is closed and awaiting replacement or rehabilitation

(K) Bridge closed to all traffic

(P) Posted for load

(R) Posted for other special, load-capacity restriction

When the user selects a value for NBI Item 41 = "*E*" or when NBI Item 103 = "*T*", a new data item will then be visible in RIMS, SBI Item 422. SBI Item 422 is termed "*Date of Temporary Structure*" and is formatted as MM/YYYY. SBI Item 422 is not editable in BIO. If an inspector changes NBI Item 41 to "*E*" or NBI Item 103 to "*T*" for a temporary bridge, the inspector shall email the BMO and request SBI Item 422 is updated with the same date the change was made to Item 41 or Item 103. See Section 2.3.8 for the requirements of the inspection of temporary bridges. Per FHWA, if a temporary bridge is posted, NBI Item 41 shall be coded as "*P*" and not "*E*".

In addition to NBI Item 41 coded as "*E*", temporary bridges (if they are in place for less than 24 months) shall have NBI Item 103 coded as "*T*". Temporary bridges which will be or have been in place for over 24 months shall not have NBI Item 103 coded. If the permanent bridge which the temporary bridge has replaced is closed to traffic, NBI Item 41 for the permanent bridge shall be coded as "*K*".

When the user selects a value for NBI Item 41 = "*P*", a new data item will then be visible in RIMS, SBI Item 423. SBI Item 423 is termed "*Date of Posting*" and is formatted as MM/YYYY. This field shall be required to be coded for any bridge record that has a NBI Item 41 field equal to "*P*". The BMO shall update NBI Item 41 and SBI Item 423 when a posting is approved.

7.3.7 Bridge Length for Culverts (NBI Item 52)

For culverts, NBI Item 52 (bridge length out-to-out) shall be coded as the greater of the following:

- Length from Culvert Headwall to Culvert Headwall
- Length from Barrel End to Barrel End as shown below in Figure 7.3.7

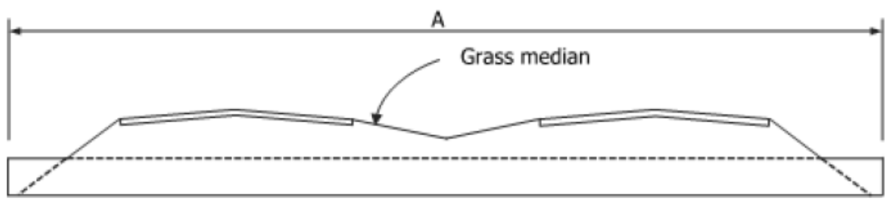


Figure 7.3.7 Bridge Width (Barrel End to Barrel End)

7.3.8 Clearance Measurements (NBI Item 54, NBI Item 55 and NBI Item 56)

Section 5.3.8.1 contains the requirements to determine travel direction prior to reporting clearance measurements. Section 5.3.8.2 contains the procedure requirements for vertical clearance measurements to be taken and recorded during inspections. Section 5.3.8.3 contains the procedure requirements for lateral clearance measurements to be taken and recorded during inspections.

BIO contains fields for NBI Item 54A, NBI Item 54B, NBI Item 54C, NBI Item 55A, NBI Item 55B and Item 56. Until modifications are made, the inspector shall code the minimum or controlling measurement in the BIRF. Other measurements with no place in the BIRF shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

If NBI Item 54A is coded as N, NBI Item 54B and NBI Item 54C shall be coded as 0 feet, 0 inches.

Section 7.3.8 is divided into subsections for the various type of crossings. Each section includes a step-by-step approach to measure and document clearances. Sections also include examples.

- Section 7.3.8.1 – Non-Divided Highway (Two-Way Traffic)
- Section 7.3.8.2 – Divided Highway with Bent (Two-Way Traffic)
- Section 7.3.8.3 – Divided Highway with Median (No Bent) (Two-Way Traffic)
- Section 7.3.8.4 – One-Way Traffic on Highway/Road/Ramp

The subsections generally discuss roadways under roadways but occasionally a railroad will be under a roadway. In these instances, similar clearance measurements shall be taken. Vertical clearance measurements under a bridge shall be taken to the top of the rails. Lateral clearance measurements shall be taken from the centerline of the tracks.

If a SCDOT maintained roadway goes under a non-roadway bridge, such as a railroad bridge or pedestrian bridge, clearance measurements are still taken. Per Sections 5.3.8.2 and 5.3.8.3, vertical and lateral clearances shall be taken at these structures and coded in the BMS.

SCDOT RDS maintains a database map of some bridges over divided highways. The Bridges Over Divided Routes Map database is listed in Section 1.6.2.

7.3.8.1 Non-Divided Highway (Two-Way Traffic)

Example Bridge: Asset ID 4270 carries Interstate I-26 over S-10-1187 in North Charleston (District 6)

- Route Over: Interstate I-26 (EB / WB)
- Route Under: S-10-1187 (NB / SB)
- Non-Divided Highway with Two-Way Traffic
- Lanes Separated - Double Yellow Line

Figure 7.3.8.1-1 Asset ID 4270

1. Travel Direction

   Travel direction is critical to determine prior to performing clearance measurements.

   Example Bridge: *As stated above, the route over (I-26) is an east to west route. The route under (S-10-1187) is a south to north route.*

2. Feature Under Bridge

   NBI Item 54A and NBI Item 55A shall be to describe the feature under the bridge, either a roadway (H), railroad (R) or another type of feature (N) such as a waterway, sidewalk without a highway or land.

   Example Bridge: *The feature under this bridge is a roadway, therefore NBI Item 54A and 55A shall be coded as H.*

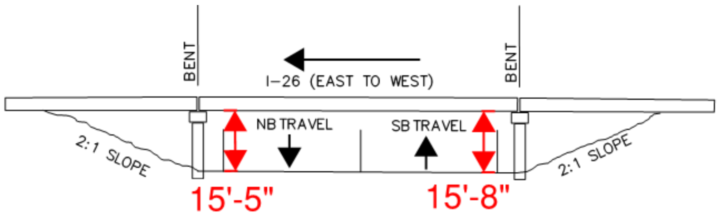
3. Vertical Clearance Measurements

   To determine the minimum vertical clearance, determine the high spot on the roadway and the low spot on the superstructure. If unsure, take several measurements from the travel way (travel lanes only, excluding the shoulder) beneath the structure to the lowest superstructure restriction or appurtenance (signs, utilities, etc.) attached to the inventoried bridge.

   NBI Item 54B shall be recorded for the **minimum** vertical clearance. Record 99.9 when the clearances are 100 feet or greater or no restriction exists above the roadway.

   NBI Item 54C shall be recorded as 0 because the route under is non-divided.

   Example Bridge: *The distance from the roadway at the northwest corner of the bridge controls at 15'-5". Code NBI Item 54B as 15'-5". Since the route is non-divided, there is no vertical clearance for NBI Item 54C recorded. (NBI Item 54C is coded as 0).*



Vertical Clearance Schematic	NBI Coding in BIO		
		FT	IN
	(54A) Vert Clear Ref	H	
	(54B) Vert Clear	15	5
	(54C) *Not Recorded*		
Required Text in BEGTD			
None			

Figure 7.3.8.1-2 Vertical Clearance Schematic, Coding and Text Requirement for Non-Divided Highway with Two-Way Traffic

4. Lateral Clearance Measurements

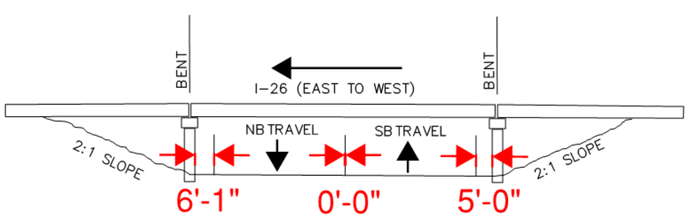
Lateral clearance measurements shall be taken from the left and right edge lines of the roadway (excluding shoulders, turn lanes, acceleration or deceleration lanes) in the travel direction to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers.

For two-way traffic, four clearance measurements shall be taken and recorded, two for each travel direction; one to the left and one to the right.

NBI Item 55B (lateral clearance at right) shall be recorded as the minimum of the two lateral clearance at right measurements performed in both travel directions. Both lateral clearance at right measurements shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

NBI Item 56 (lateral clearance at left) shall be recorded as 0 because the route under is non-divided and there is 0 feet between the left edge lines and the other travel direction.

Example Bridge: *For S-10-1187, there are 6'-1" from the edge of the northbound edge line and the concrete column of the bent, and there are 5'-0" from the edge of the southbound edge line and the concrete column of the bent. Both measurements are placed in the BEGTD's* ***Miscellaneous*** *heading. NBI Item 55B is coded as 5'-0" and NBI Item 56 is coded as 0.*



Lateral Clearance Schematic	NBI Coding in BIO		
		FT	IN
	(55A) Lat Clear Ref	H	
	(55B) Lat Clear Right	5	0
	(56) Lat Clear Left	0	0
Required Text in BEGTD			
Miscellaneous Notes: NON-DIVIDED HIGHWAY LATERAL CLEARANCE MEASUREMENTS PER BIGD 7.3.8 LAT CL AT RIGHT (55B) -NB LANE EDGE TO BENT = 6'-1" -SB LANE EDGE TO BENT = 5'-0"			

Figure 7.3.8.1-3 Lateral Clearance Schematic, Coding and Text Requirement for Non-Divided Highway with Two-Way Traffic

7.3.8.2 Divided Highway with Bent (Two-Way Traffic)

Example Bridge: Asset ID 3024 carries Interstate I-26 over SC 302 in West Columbia (District 1)

- Route Over: Interstate I-26 (EB / WB)
- Route Under: SC 302 (EB / WB)
- Divided Highway with Two-Way Traffic
- Bent Between Travel Directions

Figure 7.3.8.2-1 Asset ID 3024

1. Travel Direction

   Travel direction is critical to determine prior to performing clearance measurements.

   Example Bridge: *As stated above, the route over (I-26) is an east to west route. The route under (SC 302) is an east to west route.*

2. Feature Under Bridge

   NBI Item 54A and NBI Item 55A shall be to describe the feature under the bridge, either a roadway (H), railroad (R) or another type of feature (N) such as a waterway, sidewalk without a highway or land.

   Example Bridge: *The feature under this bridge is a roadway, therefore NBI Item 54A and 55A shall be coded as H.*

3. Vertical Clearance Measurements

   To determine the minimum vertical clearance, determine the high spot on the roadway and the low spot on the superstructure. If unsure, take several measurements from the travel way (travel lanes only, excluding the shoulder) beneath the structure to the lowest superstructure restriction or appurtenance (signs, utilities, etc.) attached to the inventoried bridge.

   For divided, two-way traffic, up to four clearance measurements may be taken and recorded, two for each travel direction; one to the left and one to the right.

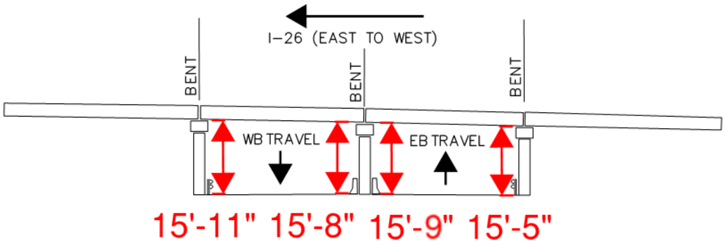
   NBI Item 54B (vertical clearance for northbound or eastbound) shall be recorded as the minimum of the two vertical clearances at the left and right sides of the NORTHBOUND or EASTBOUND travel lanes. Both vertical clearance measurements (left and right) shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

   NBI Item 54C (vertical clearance for southbound or westbound) shall be recorded as the minimum of the two vertical clearances at the left and right sides of the SOUTHBOUND or WESTBOUND travel lanes. Both vertical clearance measurements (left and right) shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

   Record 99.9 when the clearances are 100 feet or greater or no restriction exists above the roadway.

   Example Bridge: *The four vertical clearance measurements are taken, two for each travel direction along the left and right edges of the travel lanes. Both controlling distances are coded in BIO. Code NBI Item 54B as 15'-5" and NBI 54C as 15'-8". All four measurements are placed in the BEGTD's* ***Miscellaneous*** *heading.*

Vertical Clearance Schematic



NBI Coding in BIO

	FT	IN
(54A) Vert Clear Ref	H	
(54B) Vert Clear NB/EB	15	5
(54C) Vert Clear SB/WB	15	8

Required Text in BEGTD

See Figure 7.3.8.2-4

Figure 7.3.8.2-2 Vertical Clearance Schematic, Coding and Text Requirement for Divided Highway with Bent with Two-Way Traffic

4. Lateral Clearance Measurements

Lateral clearance measurements shall be taken from the left and right edge lines of the roadway (excluding shoulders, turn lanes, acceleration or deceleration lanes) in the travel direction to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers.

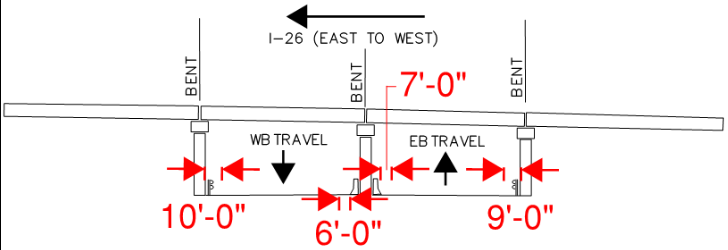
For divided, two-way traffic, four clearance measurements shall be taken and recorded, two for each travel direction, one to the left and one to the right.

NBI Item 55B (lateral clearance at right) shall be recorded as the minimum of the two lateral clearance at right measurements performed <u>in both travel directions</u>. Both lateral clearance at right measurements shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

NBI Item 56 (lateral clearance at left) shall be recorded as the minimum of the two lateral clearance at left measurements performed <u>in both travel directions</u>. Both lateral clearance at left measurements shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

Example Bridge: *For SC 302, there are 9'-0" from the edge of the eastbound edge line to the right to the concrete column of the bent and 10'-0" from the edge of the westbound edge line to the right to the concrete column of the bent. The flexible guardrail is not considered. There are 7'-0" from the edge of the eastbound edge line to the left to the concrete barrier and 6'-0" from the edge of the westbound edge line to the left to the concrete barrier. All four measurements are placed in the BEGTD's* ***Miscellaneous*** *heading. NBI Item 55B is coded as 9'-0" and NBI Item 56 is coded as 6'-0".*

Lateral Clearance Schematic



NBI Coding in BIO

	FT	IN
(55A) Lat Clear Ref	H	
(55B) Lat Clear Right	9	0
(56) Lat Clear Left	6	0

Required Text in BEGTD

See Figure 7.3.8.2-4

Figure 7.3.8.2-3 Lateral Clearance Schematic, Coding and Text Requirement for Divided Highway with Bent with Two-Way Traffic

Miscellaneous Notes:

DIVIDED HIGHWAY
VERTICAL CLEARANCE MEASUREMENTS PER BIGD 7.3.8

VERT CL NB/EB (54B):
-AT LEFT: 15'-9"
-AT RIGHT: 15'-5"
VERT CL SB/WB (54C):
-AT LEFT: 15'-8"
-AT RIGHT: 15-11"

DIVIDED HIGHWAY
LATERAL CLEARANCE MEASUREMENTS PER BIGD 7.3.8

LAT CL AT RIGHT (55B):
-EB LANE TO BENT: 9'-0"
-WB LANE TO BENT: 10'-0"
LAT CL AT LEFT (56):
-EB LANE TO BARRIER: 7'-0"
-WB LANE TO BARRIER: 6'-0"

Figure 7.3.8.2-4 Required Text in BIO for Divided Highway with Bent with Two-Way Traffic

7.3.8.3 Divided Highway with Median (No Bent) (Two-Way Traffic)

Example Bridge: Asset ID 8421 carries Interstate I-526 EB over US 17 in Mount Pleasant (District 6)

- Route Over: Interstate I-526 EB
- Route Under: US 17 (NB / SB)
- Divided Highway with Two-Way Traffic
- Median Between Travel Directions

Figure 7.3.8.3-1 Asset ID 8421

1. Travel Direction

   Travel direction is critical to determine prior to performing clearance measurements.

   Example Bridge: *As stated above, the route over (I-526) is an east route. The route under (US 17) is a south to north route.*

2. Feature Under Bridge

   NBI Item 54A and NBI Item 55A shall be to describe the feature under the bridge, either a roadway (H), railroad (R) or another type of feature (N) such as a waterway, sidewalk without a highway or land.

   Example Bridge: *The feature under this bridge is a roadway, therefore NBI Item 54A and 55A shall be coded as H.*

3. Vertical Clearance Measurements

   To determine the minimum vertical clearance, determine the high spot on the roadway and the low spot on the superstructure. If unsure, take several measurements from the travel way (travel lanes only, excluding the shoulder) (or railroad track) beneath the structure to the lowest superstructure restriction or appurtenance (signs, utilities, etc.) attached to the inventoried bridge.

   For divided, two-way traffic, up to four clearance measurements may be taken and recorded, two for each travel direction; one to the left and one to the right.

   NBI Item 54B (vertical clearance for northbound or eastbound) shall be recorded as the minimum of the two vertical clearances at the left and right sides of the NORTHBOUND or EASTBOUND travel lanes. Both vertical clearance measurements (left and right) shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

   NBI Item 54C (vertical clearance for southbound or westbound) shall be recorded as the minimum of the two vertical clearances at the left and right sides of the SOUTHBOUND or WESTBOUND travel lanes. Both vertical clearance measurements (left and right) shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

Record 99.9 when the clearances are 100 feet or greater or no restriction exists above the roadway.

Example Bridge: *The four vertical clearance measurements are taken, two for each travel direction along the left and right edges of the travel lanes. Both controlling distances are coded in BIO. Code NBI Item 54B as 16'-9" and NBI 54C as 17'-3". All four measurements are placed in the BEGTD's* ***Miscellaneous*** *heading.*

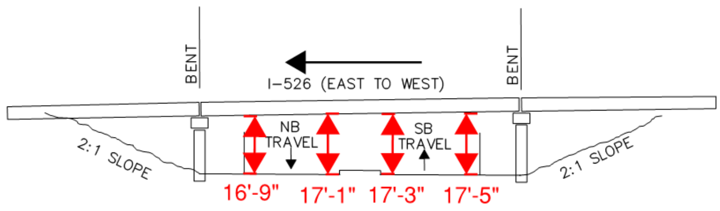
<table>
<tr><td rowspan="5">Vertical Clearance Schematic

</td><td colspan="3">NBI Coding in BIO</td></tr>
<tr><td></td><td>FT</td><td>IN</td></tr>
<tr><td>(54A) Vert Clear Ref</td><td colspan="2">H</td></tr>
<tr><td>(54B) Vert Clear NB/EB</td><td>16</td><td>9</td></tr>
<tr><td>(54C) Vert Clear SB/WB</td><td>17</td><td>3</td></tr>
<tr><td colspan="4">Required Text in BEGTD
See Figure 7.3.8.3-4</td></tr>
</table>

Figure 7.3.8.3-2 Vertical Clearance Schematic, Coding and Text Requirement for Divided Highway with No Bent with Two-Way Traffic

4. Lateral Clearance Measurements

Lateral clearance measurements shall be taken from the left and right edge lines of the roadway (excluding shoulders, turn lanes, acceleration or deceleration lanes) in the travel direction to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers.

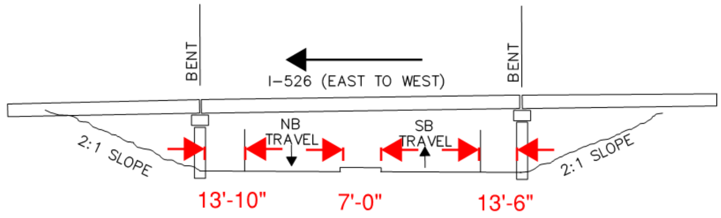
For divided, two-way traffic with a median (no bent), three clearance measurements shall be taken and recorded, two measurements to the right (one for each travel direction) and one to the left over the median. Over the median, the distance from either left edge of roadway to the other left edge of roadway should be the same.

NBI Item 55B (lateral clearance at right) shall be recorded as the minimum of the two lateral clearance at right measurements performed regardless of travel direction. Both lateral clearance at right measurements shall be entered in the BEGTD on the inspection report under the **Miscellaneous** heading.

NBI Item 56 (lateral clearance at left) shall be recorded as the distance from the left edge line of the roadway over the median to the other left edge line.

Example Bridge: *For US17, there are 13'-10" from the edge of the northbound edge line to the right to the concrete column of the bent and 13'-6" from the edge of the southbound edge line to the right to the concrete column of the bent. There are 7'-0" from the edge of the eastbound edge line to the left to the edge of the westbound edge line. The two right lateral clearance measurements are placed in the BEGTD's* ***Miscellaneous*** *heading. NBI Item 55B is coded as 13'-6" and NBI Item 56 is coded as 7'-0".*

Lateral Clearance Schematic



NBI Coding in BIO

	FT	IN
(55A) Lat Clear Ref	H	
(55B) Lat Clear Right	13	6
(56) Lat Clear Left	7	0

Required Text in BEGTD

See Figure 7.3.8.3-4

Figure 7.3.8.3-3 Lateral Clearance Schematic, Coding and Text Requirement for Divided Highway with No Bent with Two-Way Traffic

Miscellaneous Notes:

DIVIDED HIGHWAY
VERTICAL CLEARANCE MEASUREMENTS PER BIGD 7.3.8

VERT CL NB/EB (54B):
-AT LEFT: 17'-1"
-AT RIGHT: 16'-9"
VERT CL SB/WB (54C):
-AT LEFT: 17'-3"
-AT RIGHT: 17-5"

DIVIDED HIGHWAY
LATERAL CLEARANCE MEASUREMENTS PER BIGD 7.3.8

LAT CL AT RIGHT (55B):
-EB LANE TO BENT: 13'-10"
-WB LANE TO BENT: 13'-6"

Figure 7.3.8.3-4 Required Text in BIO for Divided Highway with No Bent with Two-Way Traffic

7.3.8.4 One-Way Traffic on Highway, Road, Ramp or Railroad

Example Bridge: Asset ID 9634 carries US 276 over Ramp 7408 (Ramp on I-185) in Simpsonville (District 3)

- Route Over: US 276
- Route Under: Ramp 7408 (Ramp on I-185)
- One-Way Traffic
- Only One Travel Direction

Figure 7.3.8.4-1 Asset ID 9634

1. Travel Direction

   Travel direction is critical to determine prior to performing clearance measurements.

   Example Bridge: *As stated above, the route over (US 276) is an east route. The route under (Ramp 7408) is a south to north route per SCDOT GIS.*

2. Feature Under Bridge

   NBI Item 54A and NBI Item 55A shall be used to describe the feature under the bridge, either a roadway (H), railroad (R) or another type of feature (N) such as a waterway, sidewalk without a highway or land.

   Example Bridge: *The feature under this bridge is a roadway; therefore NBI Item 54A and 55A shall be coded as H.*

3. Vertical Clearance Measurements

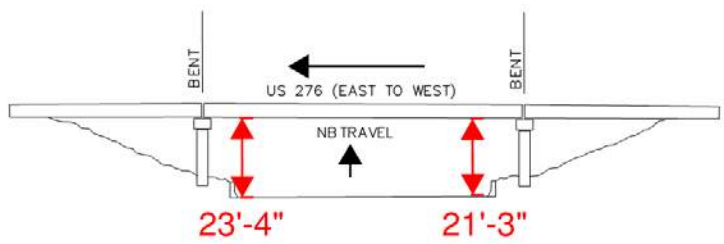
   To determine the minimum vertical clearance, determine the high spot on the roadway and the low spot on the superstructure. If unsure, take several measurements from the travel way (travel lanes only, excluding the shoulder) (or railroad track) beneath the structure to the lowest superstructure restriction or appurtenance (signs, utilities, etc.) attached to the inventoried bridge.

NBI Item 54B shall be recorded for the **minimum** vertical clearance. Record 99.9 when the clearances are 100 feet or greater or no restriction exists above the roadway.

NBI Item 54C shall be recorded as 0 because the route under is non-divided.

Example Bridge: *The distance from the roadway at the northwest corner of the bridge controls at 21'-3". Code NBI Item 54B as 21'-3". Since the route is one-way, there is no vertical clearance for NBI Item 54C recorded. (NBI Item 54C is coded as 0.)*

Vertical Clearance Schematic



NBI Coding in BIO

	FT	IN
(54A) Vert Clear Ref	H	
(54B) Vert Clear	21	3
(54C) *Not Recorded*		

Required Text in BEGTD

None

Figure 7.3.8.4-2 Vertical Clearance Schematic, Coding and Text Requirement for One-Way Traffic

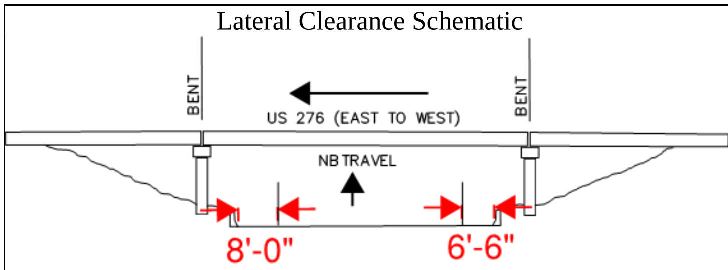
4. Lateral Clearance Measurements

Lateral clearance measurements shall be taken from the left and right edge lines of the roadway (excluding shoulders, turn lanes, acceleration or deceleration lanes) in the travel direction to the nearest substructure unit, rigid barrier, oncoming traffic lane or toe of slope that is steeper than 1 to 3 (vertical to horizontal). Reinforced concrete and masonry traffic safety features are considered rigid barriers; metal and timber railings are not considered rigid barriers.

For one-way traffic, two clearance measurements shall be taken and recorded; one to the right and one to the left. The lateral clearance measurements shall be recorded as NBI Item 55B (at right) and NBI Item 56 (at left).

Example Bridge: *For Ramp 7408, from the left edge line to the concrete barrier there is 8'-0" and from the right edge line to the concrete barrier there is 6'-6". NBI Item 55B is coded as 6'-6" and NBI Item 56 is coded as 8'-0".*

Lateral Clearance Schematic



NBI Coding in BIO

	FT	IN
(55A) Lat Clear Ref	H	
(55B) Lat Clear Right	6	6
(56) Lat Clear Left	8	0

Required Text in BEGTD

None

Figure 7.3.8.4-3 Lateral Clearance Schematic, Coding and Text Requirement for One-Way Traffic

7.3.9 Inventory and Operating Ratings, Methods to Determine Ratings and Conditions During Rating (NBI Item 63, NBI Item 64, NBI Item 65, NBI Item 66 and SBI Item 418)

NBI Items 63 to 66 are used to code the method to determine ratings (NBI Items 63 and 65) and to code the ratings (NBI Items 64 and 66). NBI Items 63 to 66 shall be coded using the HL-93 LRFR ratings. If LFR is used for posting avoidance, NBI Items 63 to 66 shall still be coded using the HL-93 LRFR factors. NBI Items 63 and 65 should generally be coded ‘8’.

NBI Items 64 and 66 shall be coded as a rating factor. NBI Items 64 and 66 should be coded with three integers and a decimal representing the rating (e.g. ‘1.58’).

SBI Item 418 shall be coded based on the applicable conditions under which the rating is performed. SBI Item 418 shall be coded using the most recent bridge inspection report and load rating site assessment. SBI Item 418 is the data obtained from NBI Item 58, NBI Item 59 and NBI Item 60 as a three digit code. For culverts, the first digit is the data obtained from NBI 62 and the last two digits are blank.

7.3.10 Responsible Maintenance County and Inspection District (SBI Item 311 and 312)

Rarely, a bridge may be located in one district or county but inspection and maintenance responsibility for the bridge are assigned to an adjacent district or county. This is typically done because a bridge has historically been the responsibility of one county or district with no regards to exact county or district borders.

SBI Item 311 (Responsible Maintenance County) identifies the county responsible for maintenance of a bridge.

SBI Item 312 (Inspection District) identifies the district responsible for inspection of a bridge.

NBI Items 02 (District) and 03 (County) shall be coded as the district and county where the bridge is physically located. If a bridge is between two districts or counties, the district and county responsible for the inspection and maintenance of the bridge shall be used to code NBI Items 02 and 03 as long as it is one of the counties or districts on either side of the bridge.

SBI Items 311 and 312 are not federally reported.

7.3.11 Paint Date (SBI Item 319)

SBI Item 319 identifies the date that the bridge last received a complete (or nearly complete) painting. It identifies the date in which the bridge painting was completed, not started. If the date is unknown, provide an estimated date. If the bridge has never been painted, then leave this field blank. Partial paintings including spot painting and limited painting (such as the painting of bearings) shall not be considered a complete (or nearly complete) painting.

7.3.12 Date Last Rated (SBI Item 411)

SBI Item 411 identifies the date that the bridge last received a load rating. The date last rated shall be the date the LRSF is signed by the engineer performing the load rating. If the load rating was selected for sampling QA and the inventory and operating ratings require no update following QA, Item 411 shall not be revised. If the inventory and operating ratings required revision following QA, the date last rated shall be the date the LRSF is signed by the engineer revising the load rating per QA comments.

CHAPTER 8 DEFICIENCY REPORTING

8.1 INDENTIFICATION OF CRITICAL FINDINGS

Reporting and tracking of Critical Findings is required under the NBIS. Critical structural and safety related deficiencies shall be brought to the attention of the bridge owner or responsible agency by a consultant or BITL. This process alerts the bridge owner to ensure:

1. Timely action is taken to ensure the safety of the traveling public;
2. Damage or deterioration can be repaired in a proper and timely manner; and
3. The damage and repairs are documented in the Bridge File.

A Critical Finding is defined in the NBIS as "*a structural or safety related deficiency that requires immediate follow-up inspection or action.*" Critical Findings shall be reported and subsequently tracked using Attachment 5.5, the Critical Findings Form. SCDOT further defines a Critical Finding as a deficiency of a bridge component, visually or by rating evaluation, of such severity that might critically threaten public safety and structural stability leading to partial restriction (load posting or lane closure) or full closure of the structure.

Depending on the severity of the Critical Findings discovered, the BITL shall not wait to complete the Critical Findings Form and will immediately take action to protect the public as described in this chapter. If a deficiency is found that requires immediate action, the BITL shall **immediately** notify district personnel including the DME and DBIS. In addition to a BITL, any member of SCDOT or a consultant working for SCDOT may report Critical Findings. See Section 8.2.2.1 regarding the requirements for immediate notification, which is not always required, and Section 8.2.2.2 for the notification requirements with the electronic submission of the Critical Findings Form which is **always** required.

Critical Findings are classified, based on levels of severity, as described below and summarized in Table 8.1.

Table 8.1 Summary of Severity Classification

Severity	Color Code	Immediate Action(s)
Urgent	Red	Bridge Closure
Restrictive	Orange	Bridge Restriction
Serious	Yellow	Immediate Safety Action

8.1.1 Urgent Critical Findings (Red)

Urgent Critical Findings (Color: Red) are structural deficiencies of primary structural bridge element which threaten the integrity of the structure as a whole. Urgent Critical Findings likely require the bridge to be closed and immediate action is required. Urgent Critical Findings likely require bridge replacement or major rehabilitation or repair. For most urgent Critical Findings, the person discovering the finding should use their inspection vehicle to close the bridge and they may need to immediately contact district personnel including the DME and DBIS.

8.1.2 Restrictive Critical Findings (Orange)

Restrictive Critical Findings (Color: Orange) are structural deficiencies that may affect load restrictions and/or establish restrictions. Restrictive Critical Findings likely require a lane and/or shoulder closure, a load restriction and/or the immediate request that a load rating be performed.

8.1.3 Serious Critical Findings (Yellow)

Serious Critical Findings (Color: Yellow) are deficiencies that do not have an effect on the traffic pattern on the bridge (i.e. no load posting, closures and/or restrictions) because of structural deficiencies. These deficiencies are typically safety items that are still critical in nature and must be addressed as soon as possible by maintenance.

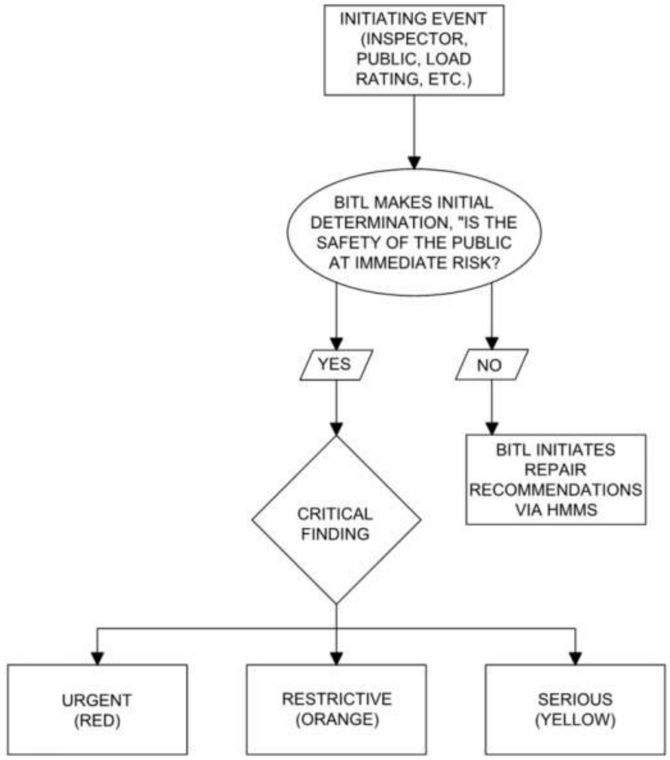


Figure 8.1 Critical Findings Identification Flow Chart

8.2 NOTIFICATION OF CRITICAL FINDINGS

8.2.1 Discovery of Critical Findings

As described below, at any time during the observation of the field conditions, completion of a load rating and/or completion of a scour assessment someone may discover the need to notify the bridge owner of a Critical Finding. See Section 8.2.2 regarding the notification requirements.

The lists below are not all-inclusive. Special consideration shall be made if the bridge involved carries or is over an Interstate or route on the NHS, has an ADT greater than 10,000 or has recommendations for immediate work needed to prevent a substantial load reduction for the safety of the traveling public.

8.2.1.1 Field Observation

A condition of the bridge may be field discovered which requires the notification of a Critical Finding. Detailed examples of what may be discovered in the field and what may warrant a Critical Finding are included in Appendix O. If a field condition changes one of the NBI ratings listed below, a notification shall be issued.

- Bridges which are given a structural Condition Evaluation Rating Code of 3 or less; this includes:
    - NBI Item 58 (Deck)
    - NBI Item 59 (Superstructure)
    - NBI Item 60 (Substructure)
    - NBI Item 62 (Culvert)
- Bridges which are given any waterway rating of 3 or less; this includes:
    - NBI Item 61 (Channel and Channel Protection)
    - NBI Item 71 (Waterway Adequacy)

8.2.1.2 *Completion of a Load Rating*

If a consultant under contract with SCDOT or if an engineer with SCDOT completes a load rating and the resulting inventory load rating is 6 tons or less, a notification shall be issued. Existing posting signs which may be displaying restrictions under 6 tons shall not to be used as a reason for submitting a notification.

8.2.1.3 *Completion of a Scour Assessment*

If a consultant under contract with SCDOT or if an engineer with SCDOT completes a scour assessment and the recommended Scour Critical Appraisal Rating (NBI Item 113) is 2 or less, a notification shall be issued.

8.2.2 Notification of Critical Findings

The use of the Critical Findings Form (Attachment 5.5) is required. The electronic submission of this form will be considered the notification of the Critical Finding. See Section 8.2.2.2 for additional requirements for this form. If immediate notification is needed, this shall be done **via phone** as stated in Section 8.2.2.1.

8.2.2.1 *Immediate Notification*

Depending on the severity of the Critical Finding, the BITL shall not wait to complete the Critical Findings Form and will immediately take action to protect the public as described in this chapter. If a deficiency is found that requires immediate action, the BITL shall immediately notify district personnel including the DME and DBIS.

SCDOT has created an emergency contract list for each district. The emergency contract list by district includes contacts who can coordinate and address immediate safety concerns, if needed. The contact list includes at least three contacts per district. At least annually, SCDOT internally updates this document and provides it to inspectors.

Any immediate notification shall be logged on the Critical Findings Form.

8.2.2.2 *Notification of Critical Findings*

The Critical Findings Form (Attachment 5.5) shall be completed and submitted within **1 calendar day** of the discovery. The electronic submission of this form will be considered the notification of the Critical Finding.

The form requires the use of photographs. A photograph must be taken of all Critical Findings and every completed action or repair. Multiple photographs, including an overall view, are helpful. The text in the description shall be concise and detailed, including exact measurements and location (when needed).

The primary method of contact will be phone/email notification and a required follow-up email to properly document correspondences. Sections 8.10 to 8.12 include flowcharts depicting the notification process.

The Critical Findings Form will document the notification process by including description of incident and action plan (any immediate, short-term and long-term plans). If it occurred, initial communication with district emergency contacts shall be documented on the Critical Findings Form. When any inspection report is submitted for a bridge with a Critical Finding, the Critical Findings Form shall also be attached in its current state. The inspection report could be written around the time of notification or the time of the Critical Findings resolution, and the form still needs to be included.

8.3 PROCEDURES TO "*FOLLOW-UP ON CRITICAL FINDINGS*"

The NBIS (§ 650.313(h)) requires SCDOT to assure FHWA that the Critical Findings are addressed in a timely manner. SCDOT is required to periodically notify the FHWA of the actions taken to resolve or monitor Critical Findings.

A responsible party shall be appointed for each Critical Finding. For all Critical Findings requiring maintenance on SCDOT owned bridges, the DME or designee is the responsible party. The SBME may be involved as needed to assist the DME for maintenance or repair needs.

For load ratings and load postings related to Critical Findings, the SBME or designee inside the BMO shall be the responsible party.

If the immediate safety concern is remediated to the satisfaction of the responsible party, the Critical Finding may be considered addressed but not resolved if outstanding action is still required. Addressed Critical Findings are those where the bridge owner has taken action to address public safety, such as closure, lane or load restriction, shoring, repair or replacement of the bridge, or a process for monitoring. Increased inspection frequency alone may not fully address a critical finding if the safety issue is not rectified. Resolved Critical Findings are permanent solutions which are implemented to completely mitigate the deficiencies and protect public safety. These could involve permanent repair, closure, or replacement.

8.3.1 Immediate Actions

Immediate action may be to close the bridge or close lane(s) on the bridge until maintenance, a special inspection or a load rating can be performed. Special inspections can include underwater inspections for scour or waterway concerns, NDT for unique testing recommendations or other inspections listed in Section 4.7. Bridge closure requirements are included in Section 8.4. If a load rating is recommended, the completion of the Load Rating Request Form (which is available in Attachment 3.1) shall be submitted. Minimal steel section remaining or several hollow timber piles in a single bent may warrant a load rating; see Section 5.5.

In the event a load rating is recommended, the load rating process shall be performed concurrently with the Critical Findings reporting process and maintenance process outlined below. At times, maintenance may be deferred until a load rating is performed. However, district maintenance personnel (including the DME, RME and DBIS) are required to take any actions to protect the public as needed while a load rating is performed such as temporary load posting signs, lane closures or bridge closure.

In the event that the results from another inspection or results from a load rating warrant a change in Critical Finding classification or status, the SBME or designee inside the BMO shall work directly with the BITL to update the status of Critical Findings. Records of changing the status of Critical Findings shall be kept via email and included in the Bridge File. Results from a subsequent inspection or a load rating may be sufficient to close Critical Findings.

8.3.2 Critical Findings Repair Work

While the form satisfies FHWA requirements for Critical Findings, all maintenance requests shall still be logged into HMMS. A SCDOT BITL shall input the work request in HMMS within 1 day of discovery or within 1 day of receiving the notification of a Critical Finding from a consultant. While HMMS is required, it shall not be used by the responsible party to update Critical Finding Status. As the responsible party, the DME or designee is responsible for monitoring the timely completion of the maintenance work once a BITL submits the Critical Findings Form. The district shall have **30 days** to complete any needed repairs unless other actions are taken such as a bridge closure, lane closure, shoulder closure, weight restriction, subsequent inspection or a load rating. All maintenance actions including planning, mobilization, execution and completion of the work shall be listed on the Critical Findings Form by the responsible party. The BIPM, SBME, or designee shall have the authority to assign a different timeframe than the one defined in this Section based on the criticality of the Critical Finding so long as the change in timeframe is documented on the Critical Findings Form.

8.3.3 Review of Critical Findings on Municipality/County Owned Bridges

The municipalities or counties which own bridges also have 30 days to complete actions on Critical Findings related to maintenance as bridge owners. If a load rating or load posting is required, the SBME and the BMO shall be contacted. Following the release of the Critical Findings Memorandum (Attachment 2.4), the BITL shall follow-up after 15 calendar days with the municipality/county to confirm whether the actions have been completed. If the municipality or county fails to perform needed actions, SCDOT may be required to close the bridge to protect the traveling public. The Critical Findings reminder and the notification of the failure to act shall be performed by the BITL via memorandum. Sample correspondences are:

- Attachment 2.5 – Municipality-County Bridge Critical Finding Reminder Memorandum
- Attachment 2.6 – Municipality-County Bridge Critical Finding Action Taken by SCDOT

Municipality and county bridge owners are required to complete all fields related to the action plan on the Critical Findings Form. Action plans should not be completed by SCDOT for municipality/county owned bridges unless action is taken by SCDOT and Attachment 2.5 is used.

8.3.4 Follow-up Maintenance Inspection

The DBIS shall monitor all Critical Findings in his/her district on a **weekly basis**. The DBIS shall stay in contact with the DME or designee regarding submitted Critical Findings. The DME or designee shall contact the DBIS when repairs are complete. A representative from municipalities or counties shall contact the DBIS when repairs are completed.

When the repairs are completed, a follow-up maintenance inspection by a BITL from the district in which the bridge is located shall be performed to verify the work has been completed. The Critical Findings Form shall be used to document all repair work and actions taken. Any verification dates must be included along with photographs.

The Critical Findings Form shall be used to log actions from follow-up maintenance inspections. The remaining portions of the Critical Findings Form shall be completed. Outstanding maintenance items shall be logged in HMMS.

8.3.5 Critical Findings Submittal

Every three months the BMQE will provide the FHWA Division Bridge Engineer with a status report on all Critical Findings. All Critical Findings must remain on this report until **resolved**. This report shall contain:

- Bridge Owner
- Asset ID
- Date of Critical Finding
- Status of Critical Finding
  - Open
  - Addressed
  - Resolved
- Description and Photos (if possible)
- Description of Corrective Actions
  - Completed
  - Temporary
  - Planned
- Status of Corrective Actions
  - Active
  - Completed
- Estimated Date of Completion if Corrective Actions are Active
- Date of Completion if Corrective Actions are Completed

8.4 BRIDGE CLOSING PROCEDURE

For urgent Critical Findings in some extreme cases, when the structure is in imminent danger of collapse, the inspector shall close the bridge to traffic. The following is a review of the procedures expected of bridge maintenance personnel when a bridge closing is recommended by the BITL. The BITL, before taking any action, is free to discuss the bridge closing with other BITLs, DBISs or the BMO.

1. The BITL’s first action will be to close the bridge until a proper determination can be made. If this is done, the BITL could contact local or state law enforcement to implement this temporary closure. The bridge may be closed by using inspection vehicle(s) to block the roadway, traffic devices or other means necessary to protect the traveling public until proper bridge closure signs may be installed by maintenance.

2. The BITL’s second action will be to notify the DBIS in the district the bridge is located of the recommended closing.

3a. For maintenance related Critical Findings, the BITL or DBIS shall then contact the DME to inform the DME of the recommendation and to see if repairs can be made. The DME will then serve as the responsible party or appoint another member of maintenance to serve as the responsible party.

3b. For load rating or load posting related Critical Findings, the BITL or DBIS shall then contact the BMO to inform the SBME or designee of the need for a load rating and possible subsequent load posting. The SBME will then serve as the responsible party or appoint another member of maintenance to serve as the responsible party.

4. At this time, a visit to the site (by the responsible party) may be made to evaluate the Critical Finding. During this phase appropriate personnel may be brought to the site to aid in the evaluation of the Critical Finding.

5. The responsible party has the ultimate responsibility to determine the appropriate course of action when a bridge closure is contemplated. The responsible party shall determine if the bridge shall remain closed,

open with restrictions or open without restrictions.

6a. For maintenance related Critical Findings, the responsible party will see that immediate repairs are made, if possible, to reopen the bridge.

6b. For load rating or load posting related Critical Findings, the responsible party will execute the load rating, if possible, to reopen the bridge.

7. The BITL shall note the bridge traffic status (closed, open with restrictions, open, etc.) in BIO (NBI Item 41); see Section 7.3.6.
8. If needed, the district office shall coordinate the appropriate traffic restrictions for public safety. See below regarding the DEA's responsibility to release information regarding bridge closure.
9. The BITL shall complete the Critical Findings Form (Attachment 5.5) within 1 calendar day of the discovery.
10. FHWA is notified of the Critical Finding when the Critical Findings Form is submitted. Local FHWA representation may coordinate with the bridge owner or responsible party if needed.

Due to the urgency involved, telephone communication shall be used for the purposes of notification and communication. Follow-up correspondence in the form of email shall be used to document communication between all parties involved. Follow-up correspondence shall be performed within 1 calendar day of discovery of the Critical Finding, including the completion of the Critical Findings Form.

If the decision is made to close the bridge, the DEA is responsible for the coordination of information being released to the necessary public, private officials, and local stakeholders upon the bridge closure. At least once a year, the DEA or district designee shall review his or her list of stakeholders which need to be informed about the change in structure status and update as necessary. This list of officials and parties who need to be informed shall be kept in the district office.

8.4.1 Required Action for Closed Bridge to Reopen to Traffic

A BITL **may not** change the status of the bridge to open in BMS and district maintenance may not remove bridge closure signs until the Closed Bridge Reopening Form is completed. This form is included as Attachment 5.24. The process for a closed bridge to be re-opened to traffic shall be documented using the Closed Bridge Reopening Form which must be completed. The form requires, at a minimum, a BITL to perform a maintenance inspection on the bridge; see Section 4.8.1.

In addition to the maintenance inspection, a South Carolina Registered Professional Engineer shall approve any structural repairs (if deemed necessary by the SBME or designee) or a South Carolina Registered Professional Engineer shall perform the load rating per the LRGD (if bridge modifications were made requiring a load rating) in order to complete the Closed Bridge Reopening Form.

The district office is responsible for the coordination of information being released to local officials in the event of a closed bridge being re-opened. The DEA may be involved to coordinate information to local stakeholders.

8.5 STRUCTURE LOAD RATING PROCEDURES

Section 5.5 details procedures for how a bridge inspection can lead to a bridge load rating. If a load rating is requested by the BITL, the BITL shall complete the Load Rating Request Form (which is available in Attachment 3.1), and it shall be transmitted according to the form.

If the decision is made to post the bridge, BMO will request the installation of the posting signs and will notify the BITL of the decision. The posting signs shall be installed within thirty days upon the SBME, or designee, approval of the Posting Form; see LRGD. The DEA is responsible for the coordination of information being released to the necessary public, private officials, and local stakeholders prior to the placement of any bridge weight restrictions.

At least once a year, the DEA or district designee shall review his or her list of stakeholders which need to be informed about the change in structure status and update as necessary. This list of officials and parties who need to be informed shall be kept in the district office.

8.6 REPAIR RECOMMENDATION IDENTIFICATION

While the discovery, tracking and closure of Critical Findings are important to protect the traveling public, the occurrence rate of Critical Findings is generally very low. Much more common are repair recommendations on bridges to maintain them for years to come.

Repair recommendations are made based on the time frame in which the bridge owner must complete the recommended repair. Some repair recommendations are also Critical Findings which require reporting to FHWA. In these instances Critical Findings shall be reported as repair recommendations, the Critical Findings Form shall still be completed; see Section 8.3.2. HMMS entry logs may be attached to the Critical Findings Form if needed.

The DME and RME are responsible for monitoring the timely completion of the work once the BITL or DBIS logs the recommendation in HMMS. The table below notes required time frame for work to be completed depending on the type of repair. The RME shall request additional resources if work is backlogged. If the work is not being completed in a timely manner, appropriate action shall be taken by the DBIS which includes email notice of outstanding repair recommendations to be sent to the RME, DME and the BMO. The BIPM shall have the authority to assign different timeframes than the ones defined in this Section based on the criticality of the deficiencies so long as the change in timeframe is documented in an email which is placed in the Bridge File's maintenance section.

Repair notes must include measurable information about the condition of interest, allowing subsequent inspectors to more easily and accurately determine if the condition is changing. Photos, sketches, and/or measurements are among the ways to provide this information, which must also clearly include location and date.

Inspectors are required to review previous repair recommendations prior to a bridge inspection. If a BITL has previously recommended a repair, another recommendation **is not needed** unless the flag type has escalated into a higher priority.

Priority D Flags are not to be used by bridge inspection.

Table 8.6 Time Frame for Repair Recommendations

Flag Type	Timeline for Work Completion once logged in HMMS
Priority A	30 Calendar Days (1 Month)
Priority B	90 Calendar Days (3 Months)
Priority C	365 Calendar Days (12 Months)*

* Some repair recommendations which are considered "*Priority C*" Flags may be long-term repair recommendations. While the 365 day timeframe should be followed per HMMS, it is understood that some repair recommendations may not be possible until funding is obtained or a maintenance contract is executed. All maintenance related correspondences shall be placed in the Bridge File.

8.6.1 Priority A Flags

Maintenance is expected to address Priority A Flag deficiencies, via HMMS, within 30 calendar days of being reported by district bridge inspectors or consultants.

Examples of Priority A Flags are included in Appendix O.

8.6.2 Priority B Flags

Maintenance is expected to address Priority B Flag deficiencies, via HMMS, within 90 calendar days of being reported by district bridge inspectors or consultants.

Examples of Priority B Flags are included in Appendix O.

8.6.3 Priority C Flags

Maintenance is expected to address Priority C Flag deficiencies, via HMMS, within 12 months of being reported by

SCDOT district bridge inspectors or consultants.

BITLs shall use industry knowledge of bridge maintenance operations when documenting repair recommendations and only list deficiencies which are needed on the bridge in the next 12 months.

Examples of a Priority C Flags are included in Appendix O.

8.7 REPAIR RECOMMENDATION NOTIFICATION (STATE OWNED BRIDGES)

8.7.1.1 BITL and DBIS Responsibility

8.7.1.1.1 SCDOT BITLs

As the BITL completes the inspection reports, deficiencies shall be entered into HMMS. As deficiencies are entered into HMMS, the BITL shall print summaries of each priority category. A PDF of each summary, one for each priority category, shall be uploaded and attached to the inspection report.

8.7.1.1.2 Consultant BITLs

Consultants performing inspections do not have access to HMMS. The consultants shall complete the Repair Recommendations Form (Attachment 5.6). When the Repair Recommendations Form is electronically transmitted, the DBIS will receive a copy. The Repair Recommendations Form shall be submitted to the DBIS or designee within 7 calendar days of the discovery. The Repair Recommendations Form may be completed before the inspection report is written. The DBIS has 7 calendar days to return the completed Repair Recommendations Form to the consultant. The completed Repair Recommendations Form (with DBIS or designee signature) shall be attached to BIO and included in the bridge inspection report.

If the consultant recommends a pile stud-up repair, the BITL shall inquire via email to the DBIS if the Pile Stud-Up Planning Form (Attachment 5.27) is needed for the maintenance crew which will do the work on the bridge. If the DBIS confirms the Pile Stud-Up Planning Form is needed, it shall be submitted to the DBIS along with the Repair Recommendations Form.

8.7.1.1.3 SCDOT DBISs

The DBIS or designee from each district shall have the responsibility for logging repair recommendations from consultant inspections into HMMS. Repair recommendations from consultant inspections shall be entered into HMMS within 7 calendar days of receipt of the Repair Recommendations Form. When the DBIS completes the form, the DBIS shall return it to the consultant. The signed form shall be included in the inspection report. The DBIS has 7 calendar days to return the signed Repair Recommendations Form to the consultant.

8.7.1.2 SCDOT BMO Responsibility

While the majority of repair recommendations are reported by bridge inspection teams for repairs to be performed by district maintenance staff, the BMO has the overall responsibility of the program’s success and shall takes steps necessary to ensure adherence to these requirements.

8.8 REPAIR RECOMMENDATION NOTIFICATION (MUNICIPALITY/COUNTY OWNED BRIDGES)

The responsibility for issuing repair recommendations following inspections to municipalities or counties which own bridges in South Carolina is assigned to bridge inspectors. Repair recommendations shall be included in the inspection report. Unlike SCDOT owned inspections, the release of the inspection report shall be accompanied by correspondence to assist with the distribution.

All repair recommendations for municipality/county owned bridges shall be placed in HMMS by the DBIS or designee for consultant inspections or in HMMS by a SCDOT BITL for SCDOT inspections.

For consultant inspections on municipality/county owned bridges, the Repair Recommendations Form shall be used as described above. After the DBIS inputs the repair recommendations in HMMS, the HMMS Bridge Deficiency Report shall be returned to the consultant to include the HMMS Bridge Deficiency Report in the correspondence to be sent to the owner.

The HMMS Bridge Deficiency Report for municipality/county owned bridges shall indicate by markup or highlighting which repairs (such as installing regulatory or warning signs) may be performed by SCDOT, if required. **All other repairs are the responsibility of owner.**

Attachment 2.2 is available for use to release a bridge inspection report and repair recommendations to municipalities or counties. The marked up HMMS Bridge Deficiency Report shall be attached to the letter. Prior to releasing a hard copy, the DBIS may allow an email to be sent with the HMMS Bridge Deficiency Report, a summary and description of the defect and/or photographs of the repair needed to a municipality or county official.

The status of repair recommendations will be checked during the following inspection unless another inspection is recommended by the DBIS, the BMO or requested by the bridge owner.

8.9 HMMS BRIDGE DEFICIENCY MODULE

All bridge maintenance items shall be reported via the HMMS Bridge Deficiency Module. This module electronically records these deficiencies to the appropriate RME for response. The applicable deficiency code shall be used to initiate the deficiency activity. Bridge deficiencies shall be classified by priority per bridge; see Section 8.6. When the work is reported, the RME or designee shall distribute the work accordingly.

8.9.1 Step 1 – Immediate Notification for Critical Findings

Some Critical Findings cannot wait for notification in HMMS or in the inspection report. In these instances, the BITL shall not wait to complete the logging of deficiencies in HMMS and will immediately take action to protect the public as described in this chapter.

8.9.2 Step 2 – Logging Repair Recommendations in HMMS

Repair recommendations shall be documented in the HMMS Bridge Deficiency Report. The HMMS Bridge Deficiency Report requires the inspection date, work activity code and flag priority type for each deficiency. The deficiency text field should use directional notes to aid maintenance in determining correct elements to repair. HMMS work activity codes are included in Table 8.9.2.

Table 8.9.2 HMMS Work Activity Codes

HMMS Work Activity Code	Type of Deficiency (Suggested)	HMMS Work Activity Code	Type of Deficiency (Suggested)
102	Settlement Repair/Repair Asphalt	801	Any Curb/Sidewalk Repair on Bridge
202	Washout Under the Caps	802	Any Concrete Parapet Repair
203	Washout Around the Four Corners/Repair Flumes	803	Repair Any Beams and Truss Members / Reinforced Concrete Diaphragms
401	Mowing, Hand Trimming & Remove Vegetation from Bridge	805	Clean/Repair Expansion Joints
407	Remove Trash on or around Bridge	806	Clean, Paint or Repair Bearings / Repair Saddles
407	Remove Trash from Channel	807	Repair Headwalls
408	Tree Removal from Bridge or Channel	807	Fender Repair
408	Remove Vegetation from Channel	807	Install Temporary Bridge
409	**STORM USE ONLY**	807	Maintain Temporary Bridge
504	R.C. Medians, Curbs, Sidewalks Not on Bridge	807	Remove Temporary Bridge
603	Signs, Temporary	807	Clean/Clear Scuppers
603	Bridge End Markers/Load Restriction	807	Repair Guardrail/Bridge Rail/Post on Bridge only
603	Any Sign Repair or Replacement	807	Clean and Paint Steel Beams
610	Any Approach Rail Repair/Installation	807	Scour/Build-up at Culvert and Bridge Piles
613	Crash Attenuator Repair/Replacement	809	Repair Spalls in Piles/Caps/Paint Clean Steel H-Pile
801	Any Deck Repair and Clean/Paint Exposed Rebar		

The BITL logging deficiencies in HMMS shall log **one work item at a time**. If all deficiencies are combined, it is difficult to track deficiency closure. For example, if the clearing of deck drains and a deck spall repair are recommended, they shall not be entered under one maintenance item; they shall be entered into HMMS as two separate repair recommendations using work activity codes 807 (cleaning deck drains) and 801 (deck spall repair).

HMMS only allows one deficiency for each work activity code per flag priority type to be added per day. In the event more than one deficiency for a work activity code with the same flag priority type needs to be entered, the BITL shall input one deficiency per day until all deficiencies are input. If more than 5 deficiencies with the same work activity code and flag priority type need to be input for a consultant performed inspection, deficiencies can be combined. If input into HMMS takes longer than 15 days for a SCDOT performed inspection and delays the time needed to send the report to QC, deficiencies can be combined.

This report can be printed by using the "*Print Screen*" option listed in the HMMS menu. PDFs of the HMMS Bridge Deficiency Report shall be attached in BIO and included in the inspection report as required by Section 5.4.4 of the BIGD. The PDF of the HMMS Bridge Deficiency Report must be sent to the consultant by SCDOT for municipality/county owned bridges which are inspected by consultants for inclusion in inspection correspondence. The PDF of the HMMS Bridge Deficiency Report is not required to be included in consultant inspection reports for bridges owned by SCDOT.

When the deficiency is generated, it is routed to the RME for response. The status will be identified as "*Incomplete*" until notified of repairs or other actions.

8.9.3 Step 3 – Actions Taken (for A Flags and B Flags only)

When the deficiency is reported as being complete by the RME via the HMMS Bridge Deficiency Module, it is routed back to the district inspection team. The status will be identified as "*Inspection Needed*". This notification prompts the district inspection team to check the status as discussed in Section 8.9.4.

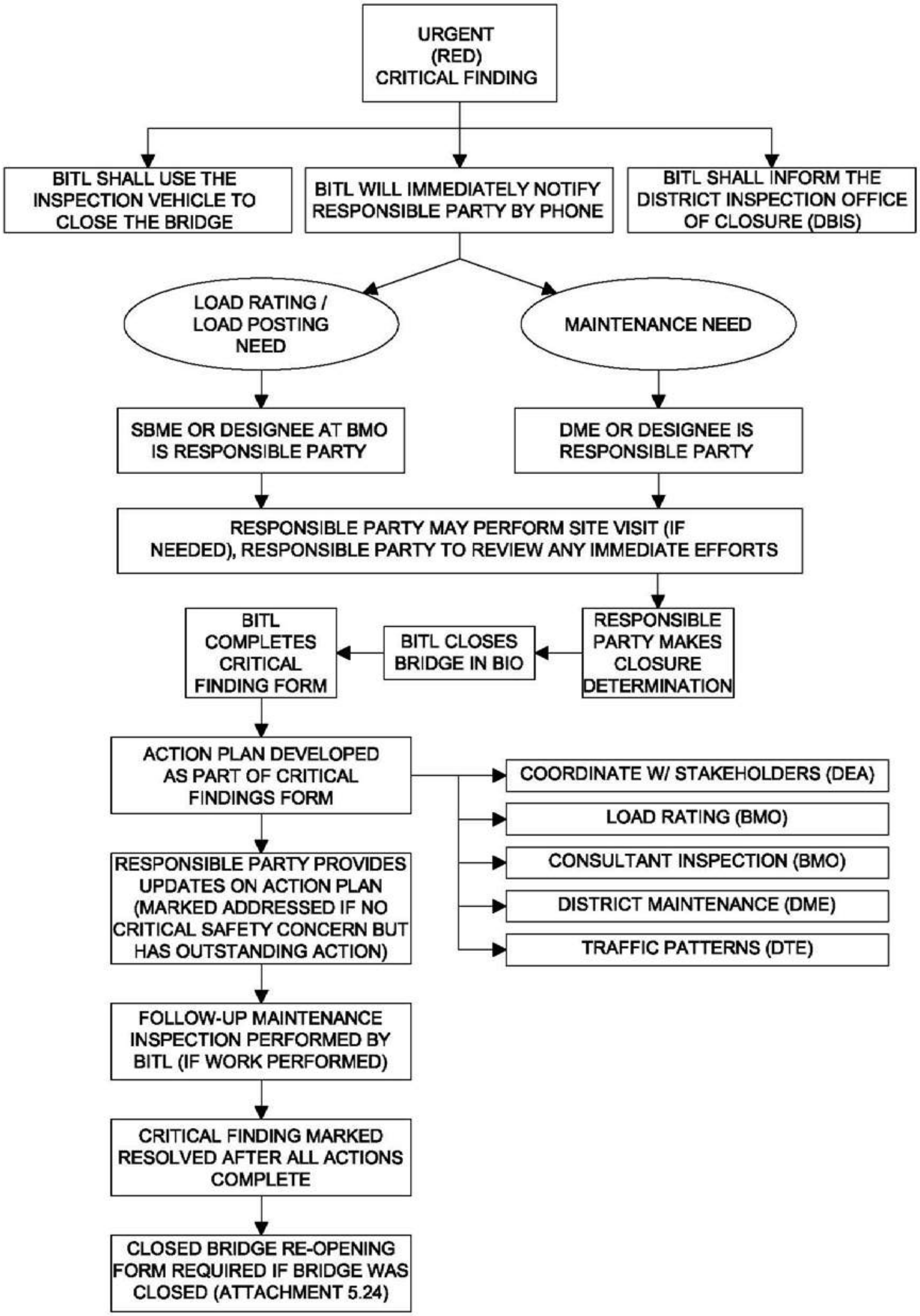
8.9.4 Step 4 – Flagged Bridge Status

Any bridge with existing Priority A Flags or Priority B Flags is considered by maintenance to be a "*Flagged Bridge*". This "*Flagged Bridge*" status shall be removed upon the completion of repairs or correction of the problematic condition via the HMMS Bridge Deficiency Module.

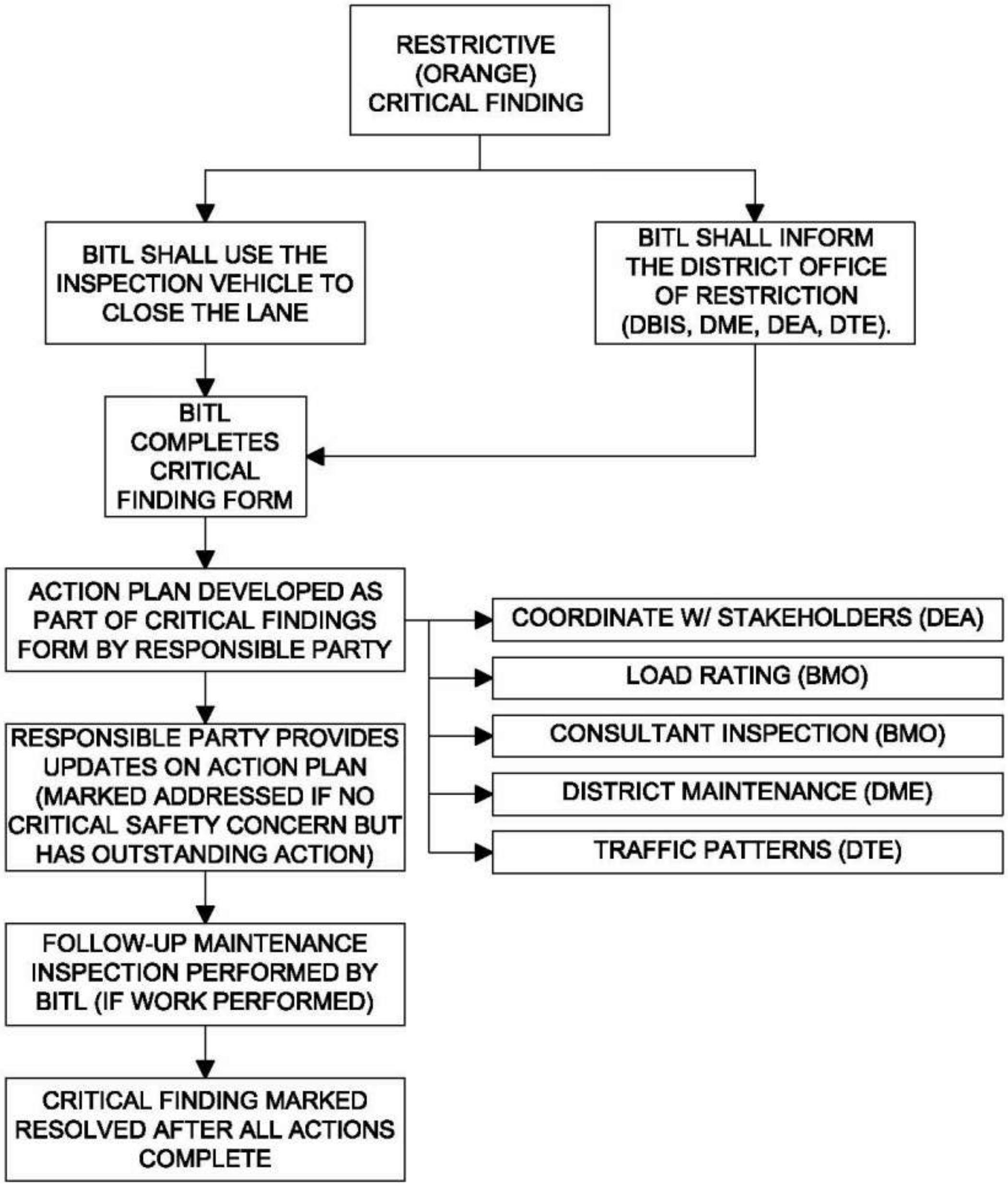
When re-visiting the bridge, the BITL shall perform a maintenance inspection (see Section 4.8.1) to check the status of the repair performed. The "*Flagged Bridge*" status shall only be removed by a BITL. Unless there was a Critical Finding or an urgent maintenance inspection was requested by the DME, **an immediate maintenance inspection is not required. The inspection may take place at the convenience of a BITL or at the next scheduled inspection.**

When the deficiency is corrected, inspected and approved by a BITL, the status shall be changed to "*Deficiency Removed*". If not approved, the status will be changed to "*Inspected, Not Cleared*". This status routes back to the RME. The BITL shall not clear a deficiency if he or she is not satisfied with the correction. If the deficiency is not corrected and continues to be unresolved, it shall be sent to the DME by the DBIS, BITL or RME. The DME will make the final resolution. The use of the HMMS Bridge Deficiency Module for this process provides electronic record of deficiency correction.

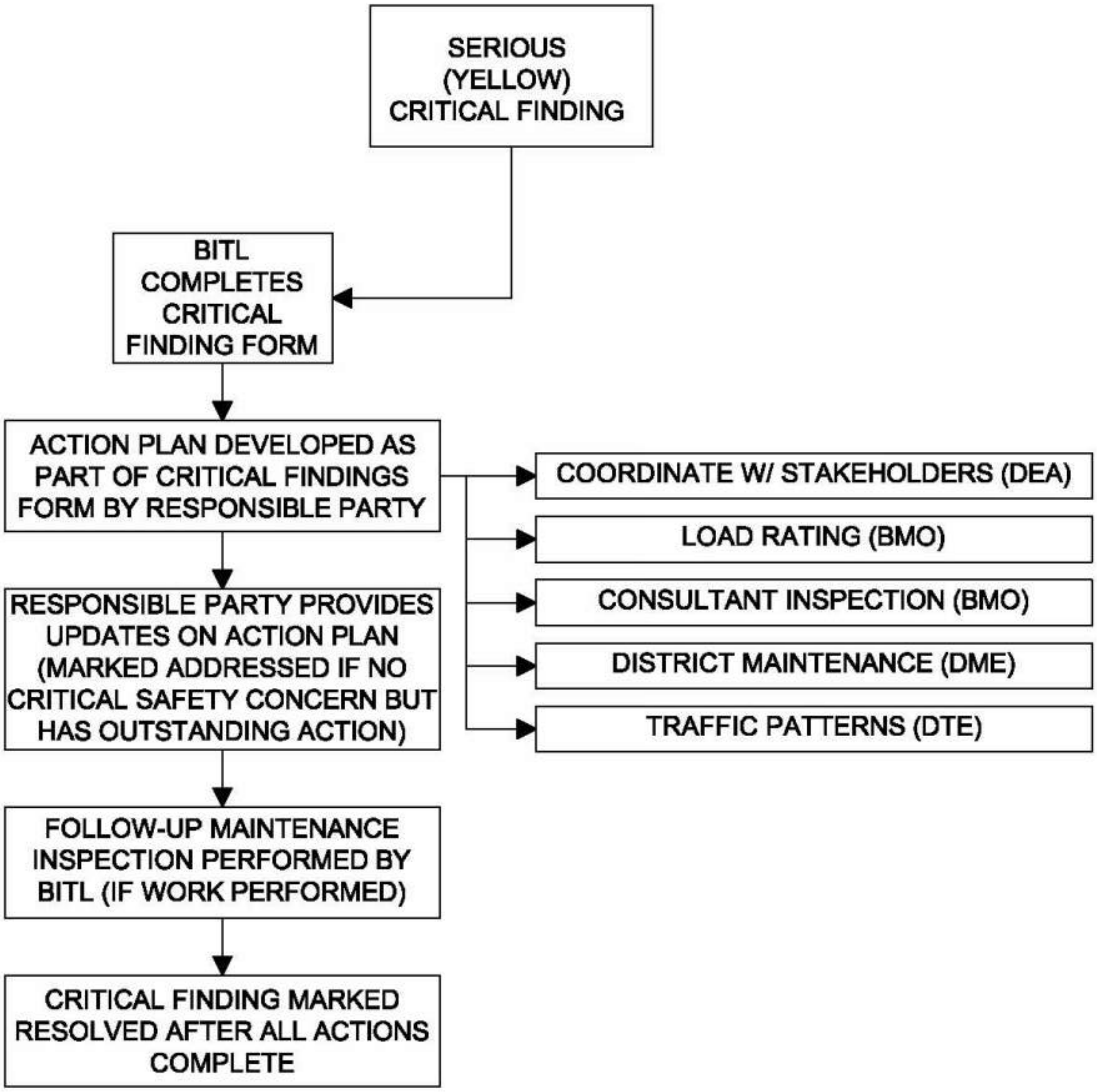
8.10 CRITICAL FINDINGS – URGENT (RED) – FLOWCHART



8.11 CRITICAL FINDINGS – RESTRICTIVE (ORANGE) – FLOWCHART



8.12 CRITICAL FINDINGS – SERIOUS (YELLOW) – FLOWCHART



CHAPTER 9 BRIDGE INSPECTION QUALITY CONTROL/QUALITY ASSURANCE

9.1 INTRODUCTION

FHWA has developed the NBIS which require SCDOT to develop and implement a Quality Control/Quality Assurance (QC/QA) program for all bridge inspection activities.

The focus of the QC/QA program is to provide independent inspections, reviews and evaluations of the bridge inspection procedures, practices and results in an effort to minimize the inconsistencies and variations in the data collected. The information gathered from this program will be used to improve the final quality of the data and reports available to manage the bridge inventory.

The QC/QA program seeks to establish and define quality in terms of measureable variations from established procedures, practices, and requirements. As per the CFR, included in the program will be "*periodic field reviews of inspection teams, periodic bridge inspection refresher training for the program manager and team leaders, and independent review of inspection reports*". The objectives of the QC/QA program are:

- Generate a greater consistency of the data collected,
- Standardize the interpretation and prioritization of inspection findings,
- Establish and monitor the qualifications of the personnel involved,
- Identify unclear or misleading information in the guides and manuals, and
- Increase communication between all consultants, SCDOT districts and SCDOT HQ.

This QC/QA program is meant to establish procedures and practices which are practical, pertinent to the statewide bridge management program, and a part of the effort to improve the quality of the SCDOT bridge inspection program. Because these objectives focus on improvement, this program will be updated and changed over time. To be effective, QC/QA procedures must be followed by all personnel and the procedures shall be evaluated and updated regularly.

9.1.1 Quality Efforts prior to QC/QA

Prior to the formalized QC/QA process, everyone involved in the bridge inspection program shall make efforts to perform quality work and produce quality reports. The efforts listed below should be performed by the DBIS, BITL or consultant PM prior to and during the field inspection. These efforts are best practices to improve overall quality of the program.

- Assure the inspection vehicle includes all required inspection tools and equipment, and applicable manuals and references,
- Observance of proper safety and traffic control procedures in accordance with the requirements of this guidance document and references,
- Proper recording of field conditions with clear, clean and complete field notes,
- Photographing deficient areas in accordance with this guidance document,
- Where photography is not adequate, develop sketches or marked-up drawings in sufficient detail to describe the conditions,
- Cleaning of rusted and/or corroded steel sections and measurement of remaining section to determine losses,
- Sounding of concrete structures to locate delamination,
- Proper reporting of Critical Findings and repair recommendations,
- Hands-on inspection of non-redundant members, FCMs, and fatigue-prone details,

- Documentation of access required for inspection,
- Updating inventory data based upon observed inspection conditions, and
- Documentation of diminished section remaining for load rating, if necessary.

Quality is the responsibility of **every person** involved in the daily activities of the bridge inspection program. Certain personnel shall be designated with specific responsibilities within the overall quality procedures.

Quality begins with proper preparation including scheduling, pre-visit reviews and equipment checks at the district level and with each consultant.

Inspections are performed as per all NBIS, FHWA and SCDOT policies and procedures. A qualified BITL must be present during each bridge inspection. OSHA regulations are adhered to as required. For safety reasons, a bridge inspector is not allowed to perform certain aspects of bridge inspection by himself or herself unless deemed an emergency.

All members associated with the inspection process shall have a commitment to quality work in both the office and the field. Ahead of some inspections, as an effort to improve quality, the BITL may review and discuss the upcoming work. This may include FCM inspections or the inspections of bridges which are scour critical or those which have complex components.

9.2 QUALITY CONTROL (QC)

QC is the enforcement of procedures which are intended to maintain the caliber of bridge inspection and documentation at or above the NBIS. Effective QC procedures will increase the statewide uniformity of inspection and recording methods, and will ensure quality reports. This is a daily operational function performed by any entity carrying out inspection operations. QC procedures help to ensure public safety is maintained at each bridge, inspections are performed in accordance with the NBIS, Bridge Files are complete and accurate, and the documentation of these daily activities is maintained.

9.2.1 Inspection Team Qualification Tracking Log

The Inspection Team Qualification Tracking Log is included as Attachment 9.1.

For SCDOT inspection staff, this log must be updated by the DBIS. The log must be submitted by the DBIS to the BMO (including the BIPM and BMQE) annually by December 1 each year.

For consultant inspection staff, this log must be updated as more inspections are performed with new personnel throughout the contract. The consultant PM shall submit the log to the BMO (including the BIPM and BMQE) upon receiving their Notice to Proceed and whenever additional staff are added to perform inspections.

The Inspection Team Qualification Tracking Log, at a minimum shall contain:

- List of inspectors from each district or each consultant
- Years and types of bridge inspection experience (Section 9.2.1.1)
- Record of any training completed (Section 9.2.1.2)
- Certifications and resignations for bridge inspectors (Section 9.2.1.3)

9.2.1.1 Years and Types of Experience

The DBIS or consultant PM is responsible for maintaining an updated log of the number of years in which the inspectors have experience in bridge inspection and the type of experience gained.

9.2.1.2 Training Completed

The DBIS or consultant PM is responsible for maintaining an updated log of the training completed by the inspectors.

9.2.1.3 Certifications and Registration

The DBIS or consultant PM is responsible for tracking certification and registration of the inspection staff. Copies of certification and registration are required to be collected by the DBIS or consultant PM, and these copies will be kept in the district or consultant office. As inspectors gain additional certifications and/or registrations, they shall also be tracked and collected by the DBIS or consultant PM.

At a minimum, the DBIS or consultant PM shall review certifications and registrations

The DBIS or consultant PM shall collect and review certifications and registrations from inspection staff. By December 1 of each year, the DBIS shall email these certificates and registrations to the BIPM and BMQE. The consultant PM shall email these certificates and registrations to the BIPM and BMQE after receiving a Notice to Proceed and whenever additional staff are added to his or her team to perform inspections.

9.2.1.3.1 BMO Review of Certifications

The BMQE shall review certifications of all SCDOT bridge inspection personnel annually. The BIPM shall review certifications of consultant inspection personnel as needed.

9.2.2 Quality Control (QC) Procedures for SCDOT Performed Inspections

9.2.2.1 QC Roles and Responsibilities

For SCDOT performed inspections, QC oversight has been assigned at the district level to the BITL and to the DBIS.

9.2.2.2 Field Review of SCDOT Inspection 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 more formal field review of each BITL at least twice per year. Each review will occur at a different bridge from the previous review. The DBIS shall select when the field review shall take place. While the DBIS may be present during many inspections, this more 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, another BITL shall perform a field review of the DBIS at least twice a year as well.

This evaluation shall document the arrival time, set-up time, preparations made for equipment, safety conformance, access methods and 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.

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.

9.2.2.3 Independent Inspection

For every SCDOT BITL actively performing inspections, his or her work shall be reviewed twice annually, at two different bridges, by the use of an independent inspection. For BITLs working under a DBIS, the DBIS shall select an inspection report which has been completed in the last three months for review. For the DBISs who are serving as BITLs, another DBIS from another district shall perform his/her independent inspection review. The independent review will require the reviewer to visit the bridge site to compare conditions. The DBIS shall select which two bridges each year are to be the subject of the independent inspection.

The previously complete inspection report, which is reviewed prior to the start of the independent inspection, is compared to the actual field conditions, and discrepancies (if any) are noted for discussion with the original BITL. Changes, revisions or updates to previously completed inspection reports shall be performed in accordance with the provisions in Chapter 5.

This procedure shall be used to form the basis of an inspection report evaluation. The report shall list the structure type, team and comparisons of the previous and current condition ratings for deck, superstructure and substructure of a particular bridge. This procedure shall be undertaken in the field. Also, the report shall address the documentation provided by the inspection team with a particular emphasis on sketches, photographs and detailed explanations. Conclusions shall be checked to verify they are logically stated and correct, and they were independently checked by the reviewer. Finally, an overall evaluation shall be given of the inspection report.

During and after the independent inspection, the reviewer shall complete the Independent Inspection Check Form which is available as Attachment 9.3. This quality form is meant to assist the reviewer in the independent inspection, but is not all-inclusive.

The completed Independent Inspection Check 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 independent inspection.

If an independent inspection results in an unsatisfactory review of the actual inspection report produced by the BITL, then the reviewer shall notify (via email) the BIPM, BMQE, DME and the BITL of the result of the field evaluation.

Any significant or pertinent items shall be discussed at the next Annual QA Meeting for the benefit of all SCDOT Bridge Maintenance Staff.

9.2.2.4 *Quality Control Procedure for Inspection Reports and Data*

Every initial, routine, fracture critical and special inspection report is to be forwarded by the BITL to the DBIS, or another BITL, for QC review. This procedure shall be followed to review inspection reports and validate data. The BITL who performs the QC review is considered the QCR. In the event the DBIS is not able to complete this review or if the DBIS was serving as the BITL, another BITL shall serve as the QCR so long as he/she can remain independent. The QCR shall have the same required qualifications as the BITL. For example, if a bridge inspection requires a BITL with fracture critical training, the QCR shall have the same required training.

If the QCR was present during the inspection, the BITL who is authoring the inspection report and the QCR shall not be overly collaborative in the field. For instance, if the two BITLs are working very close together in the field as they assess the condition of a particular element on the bridge, this would compromise their independence when one of them has to serve as the QCR. It is acceptable if the BITLs are collaborating on how to set up the inspection, manage the inspectors, etc.

In the event the two BITLs share the task of assigning a condition rating or making a formal recommendation the following steps shall be followed:

1. Inspection is performed, separate notes will be taken by each BITL,
2. Condition judgments shall be made independently by each BITL,
3. One BITL completes inspection report, sends to second QCR for review, and then
4. QCR performs QC on inspection report, notes may be compared from inspection and condition judgments during QC review.

In summary, having two BITLs at the inspection does not automatically create a QC conflict of interest. A conflict of interest would only happen if they start acting as one BITL via joint decisions. If there was a QC conflict of interest, another BITL not present at the inspection shall be the QCR. It is critical to the success program that the QCR remains independent at all times during inspection and evaluation. This provision is only applicable for SCDOT performed inspections. The QCR for consultant inspections shall not be active in the inspection.

The QCR shall complete the Bridge Inspection Quality Control Form which is available as Attachment 5.25.

The QCR shall review each inspection report for completeness and conformity to the NBIS requirements. Special attention shall be paid to the following points:

- Summary and/or repair recommendations given to assess the overall condition of the bridge,
- Consistency occurs between inspection data, photographs, sketches, notes,
- Review all information has been correctly entered in accordance with the *Coding Guide* and the BIGD criteria. This review will include, but not be limited to, a check of proper coding conventions, format, significant digits, and correct units have been used,
- Condition Rating coding:
    - Each item (NBI Items 58 through 62 especially) shall be compared to the previous report for consistency. It is unlikely the bridge has improved in condition since the last inspection unless repairs have been made.
    - Condition codes shall be consistent with element-level condition states and defects.
    - Special attention shall be given to items rated 5 or less - the referenced field notes shall be reviewed.
- For every routine inspection, an element-level inspection created with the routine inspection shall be reviewed for accuracy, including elements, quantities, and condition states. As stated above, consistency between condition ratings and element-level condition states and defects should be reviewed by the QCR.
- Load or height postings, dates, clearances, FPDs, FCMs, etc.,
- Photos, Additional Notes, Etc. - The reviewer shall check the photographs and additional notes are referenced.
- Correct and consistent interpretation of inspection items and inspection ratings in conformance with the NBIS,
- Consistency of information between the current inspection report and previous inspection reports, as well as the underwater inspection report, scour assessment documentation, and/or load rating documentation, if applicable,
- For initial inspections:
    - A check of the inventory data on the NBI (SI&A) data against the construction plans to ensure the data is consistent.
    - For every initial inspection, a set of inventory photos has been taken and included in the report.
- Completeness of FCMs documentation if applicable, and
- Follow up with priority repairs before being cleared in HMMS.

The QC review is not limited to the items which have changed from those items printed on the form. Special attention shall be given to those items which cause the bridge to be load rated. The coding of each item shall be consistent.

The QCR will discuss issues with the inspectors and return the reports when necessary for revision. All QC comments shall be logged on the Bridge Inspection Quality Control Form. Thorough review of the reports is important for the accuracy of the data. The district is directly responsible for the accuracy of all data in the inspection report.

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

9.2.2.5 Procedure for Data Errors, Omissions and/or Changes

The procedure regarding the identification and resolution of data errors, omissions and/or changes is outlined in Chapter 5.

9.2.2.6 District Quality Meetings

The DBIS shall conduct quarterly quality meetings (four per year) with the bridge inspection staff in their district. These meetings will be used to help ensure consistency in the bridge inspection program, provide training, and keep the staff updated on current inspection activities. These quarterly quality meetings will recap ongoing QC efforts including field reviews, field QC checks, QC checking of inspection reports and maintaining inspection equipment in their inventory.

Attachment 9.4 includes a meeting sign-in sheet, a list of required topics and the checklist of required equipment. This form shall be released by the DBIS to the BIPM and BMQE within 30 calendar days from the meeting.

9.2.2.7 Quality Control Documentation

The DBIS is responsible for maintaining QC records per the BFP. Districts may keep hard copies but all quality records must be available to the BMO and FHWA at all times. The Bridge Inspection Quality Control Forms shall be attached to each inspection report. Quality records, at a minimum, shall include:

- Inspection Team Qualification Tracking Log,
- Certification and Training Records of Inspection Staff,
- Field Review Quality Forms,
- Field QC Check Forms,
- Bridge Inspection QC Forms, and
- District Quality Meeting Forms.

Quality records shall be maintained according to the BFP.

9.2.3 Quality Procedures for Consultant Performed Inspections

These inspections include any inspection (including underwater inspections) performed by a consultant on behalf of SCDOT.

9.2.3.1 Roles and Responsibilities

QC for inspection reports has been assigned to the consultant performing the inspection. However, the BIPM, the BMQE or other members of SCDOT Bridge Maintenance may review work performed by the consultant.

9.2.3.1.1 SCDOT Roles and Responsibilities

The BIPM shall verify the consultant has a written QC Plan and the BIPM or designee may periodically visit the consultant's office to review the consultant's QC records. SCDOT may perform quality tasks as defined in Section 9.2.3.2, Section 9.2.3.3 and Section 9.2.3.4. Attachment 9.8 includes a checklist for use during the review of a consultant's QC Plan.

Consultants shall provide the required documentation to SCDOT for inclusion in the Bridge File as stated in Section 9.2.1.

9.2.3.1.2 Consultant Roles and Responsibilities

9.2.3.1.2.1 Consultant Staff

The consultant shall provide a sufficient number of qualified personnel to adequately control the work of the Project. Training, qualification, and/or certification shall include classroom training, written testing, documented demonstration of proper inspection, and an on-the-job training period. The consultant shall provide SCDOT with copies of each individual's training, qualifications, certifications and/or experience records as stated in Section 9.2.1.

9.2.3.1.2.2 Consultant Quality Control Plan

The consultant shall submit a QC Plan which outlines how the consultant shall assure the work is in compliance with applicable documents. The QC Plan shall also include how the consultant will follow the QC procedures which are SCDOT specific included in this chapter. The initial plan shall be submitted to SCDOT for review and approval at least 15 business days prior to the commencement of any inspection activity. The plan shall be updated as necessary prior to the start of any specific operation. The plan shall include a list of personnel responsible for management and QC of the project, and define the role of each individual, including the identified QCR. The plan shall also include how the consultant will monitor quality and deal with failing procedures and work.

In addition to the consultant's own forms or documentation, the QCR shall also complete the SCDOT-specific Bridge Inspection Quality Control Form which is available as Attachment 5.25 for each inspection.

All consultant QC Plans shall include the processes to maintain the required inspection equipment listed in Table 5.1.5.1. In the event the consultant is performing underwater inspections, they must include the processes to maintain the required underwater inspection equipment listed in Table 5.1.5.2.

If requested, the consultant shall provide access to the BIPM or designee to all files needed to review the consultant's QC practice.

Consultants performing inspections shall designate a QCR who has the same required qualifications as the BITL. For example, if a bridge inspection requires a BITL with ten years of complex bridge inspection experience, the QCR shall have the same required experience. The consultant's QCR shall not be involved in the field inspection and structure evaluation being performed. Consultants shall review their work, and the work of their subconsultants, as described in the consultant's QC Plan which is submitted to the BMO.

9.2.3.2 *Participation in Field Inspections*

During the inspection of bridges, specifically those with complex components or other critical structures, staff from SCDOT may be present on site during the bridge inspection to review the work of the bridge inspection team. This provides an opportunity to review inspection methods by the consultants, to provide technical assistance to the bridge inspection team, and to foster a learning experience for both the inspectors and SCDOT staff.

9.2.3.3 *Required Field Observation of Consultants*

While staff from SCDOT may visit consultant field inspections, a structure field observation for the consultant is required. Every consultant firm shall be evaluated in the field at least once a calendar year by the BMQE or designee. The format of the field observation of the consultant can be determined by the BMQE; however, at a minimum, it shall include the completion of Attachment 9.2, the Field Review Quality Form.

9.2.3.4 *Review of Consultant Inspection Reports*

The inspection reports submitted by consultants may be reviewed for completeness, conformance to SCDOT standards and presence of proper endorsements by the BMQE or designee.

The BMQE or designee may review reports for repeated problems and meet with appropriate staff to remedy the problems. In the event of consistent issues with consultant reports, the BIPM or the BMQE may request a meeting with the consultant to discuss. This meeting must be attended by the consultant's PM for the inspection work.

9.2.4 Quality Procedures Prior to Quality Assurance

On the first day of each month, each DBIS and consultant PM shall complete the QC Tracking Spreadsheet to list all initial (including initial underwater), routine, fracture critical and underwater inspections completed in queried month as depicted in Figures 9.2.4.1 and 9.2.4.2. Other inspection types do not have to be placed in the QC Tracking Spreadsheet as they do not receive QC reviews.

The QC Tracking Spreadsheet is included as Attachment 9.5. This spreadsheet is due to the BMQE by the first of the month and will include inspections completed in the second most recent month. Based on the Asset ID Number, the remainder of selected SI&A data will populate the QC Tracking Spreadsheet. When completing the QC Tracking Spreadsheet, consider the following requirements:

- Underwater inspections shall leave the columns for "*Bridges with FCMs*" and "*Bridges with Complex Components*" blank on the QC Tracking Spreadsheet.
- Fracture critical inspections shall leave the columns for "*Scour Critical Bridges*" blank on the QC Tracking Spreadsheet.
- Special inspections shall leave the columns blank which were not applicable to the subject of the special inspections on the QC Tracking Spreadsheet.

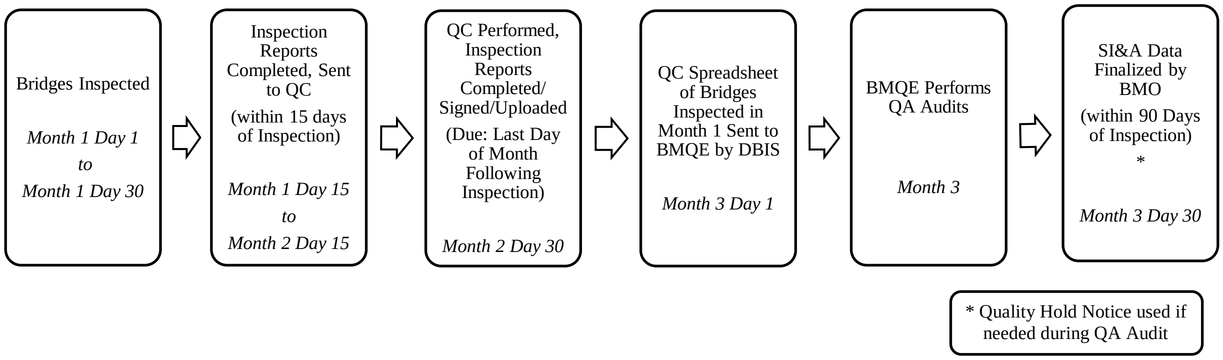


Figure 9.2.4.1 Timeline for Inspection Report Submittal and Quality Reviews (SCDOT Inspections)

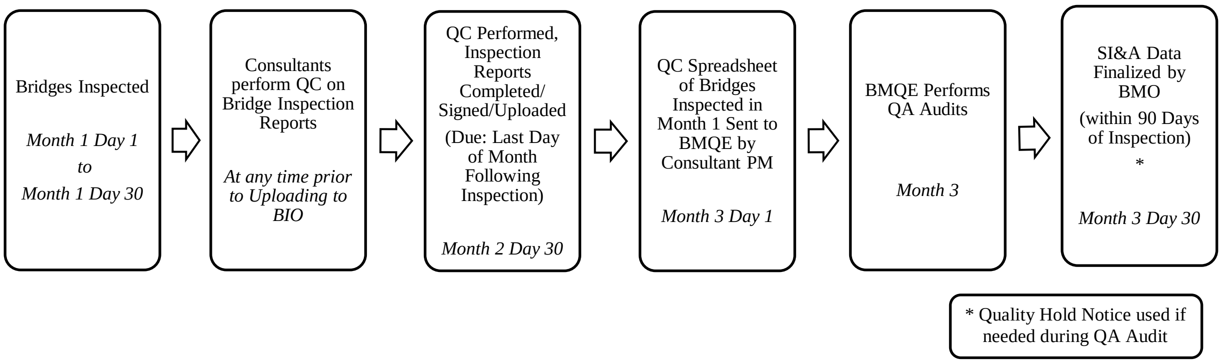


Figure 9.2.4.2 Timeline for Inspection Report Submittal and Quality Reviews (Consultant Inspections)

9.3 QUALITY ASSURANCE (QA)

The objective of QA activities is not to identify and correct deficiencies within a specific inspection report or bridge folder, but rather to monitor and modify as necessary the statewide bridge inspection program requirements to ensure the overall quality levels are maintained. To be a constructive process, it is important for Quality Assurance procedures to be independent, well documented and clearly understood by all personnel involved.

QA is a measurement of the level and consistency of the overall program. QA will be performed by BMO.

The BMQE or designee may release Technical Notes to SCDOT inspection teams and consultant inspections teams to provide clarity on items to assure quality work is being performed. These Technical Notes shall be sent electronically and placed on the SCDOT Bridge Maintenance Office website. When applicable, subjects of these Technical Notes shall be included in the Annual Quality Assurance Report (Section 9.3.3.1) and shall be discussed in the Annual Quality Assurance Meeting (Section 9.3.3.2).

9.3.1 QA Roles and Responsibilities

The BIPM has primary responsibility for QA and shall oversee the QA initiative. QA shall be an independent function which is primarily executed by the BMQE. This BMQE or designee will serve as the QA Reviewer (QAR).

The BMQE's quality assurance function is to monitor the inspection program by independently inspecting a representative sample of bridges previously inspected by SCDOT teams or consultant teams and preparing a report comparing findings for consistency and accuracy. In addition, the BMQE shall perform a field observation of each consultant performing bridge inspections for SCDOT as described in Section 9.2.3.3.

9.3.2 Quality Assurance for Inspection Reports

Effective QA procedures are based on objective, quantitative data. Qualitative information is anything not represented numerically and can include general observations, personal comments and subjectivity or bias. Quantitative data is represented numerically; it can be summarized and used for independent analysis and comparison. Examples of quantitative data are the specific number of errors per bridge inspection or the difference in a condition state rating between the most recent routine inspection and an independent QA review of the bridge inspection.

Characteristics of comprehensive QA programs also include provisions for corrective actions and mechanisms for continual improvement. Corrective actions directed at the source of the variability, inconsistency, or misunderstanding will raise the level of quality throughout the bridge inspection program. Corrective actions may be very specific, such as changing the description or definition of an inspection term to provide clarity, or more general such as changes in personnel descriptions and qualifications. Corrective actions may be systemic such as making adjustments to the numbers of bridges included in the review process. Annual review and discussion of the QC/QA program to determine if corrective actions recommended in the statewide activities have actually been implemented is an essential part of the program, and an example of a mechanism for continual improvement.

Characteristics of the yearly QA may change from year to year depending on general inspection results, observed problems or inconsistencies in reporting, or the desire to monitor new or critical evaluation items.

For larger inspection reports, the BMQE shall include thorough documentation of materials reviewed. The BMQE may be required to supplement the Bridge Inspection Quality Assurance Form with an additional written record of all materials reviewed during his or her QA review. The BMQE shall make every effort to do a substantive review of the report, instead of a simple visual check of the contents.

9.3.3 Quality Assurance Review Procedure

QA reviews shall be performed on a monthly basis for all bridge inspections submitted by all inspectors the previous month.

Each month, the BMQE will combine the QC Tracking Spreadsheet received from each SCDOT district and from each consultant into a master QA Tracking Spreadsheet to determine which bridges will be assigned for QA. The information will be filtered by various priority categories. The categories, in order of priority, include:

1. Bridges with FCMs
2. Scour Critical Bridges
3. Bridges with NBI Condition Ratings of 4 or less for any of the four NBIS Structure Condition Rating items (NBI Item 58, NBI Item 59, NBI Item 60 or NBI Item 62)
4. Bridges with Complex Components
5. Bridges on the NHS
6. Bridges with Critical Findings
7. All Remaining Bridges

Some inspection types may require columns to be left blank on the QC Tracking Spreadsheet; see Section 9.2.4.

For each category, QA review shall be performed on 10% of the inspection reports submitted the previous month and the actual bridges selected shall be determined by a random number generator. If a bridge falls into more than one category and is randomly selected more than once, it will be replaced in the lowest-priority category. Not less than one bridge shall be reviewed for each category if the sample lot for the category is less than 10 inspections (unless there are no bridges for the category during the month). The standardized Quality Assurance Tracking Spreadsheet output is included as Attachment 9.6.

Random selection ensures reports for smaller culverts are reviewed as well as reports for larger structures, structures of different superstructure types, and structures of differing materials.

The QAR shall review the QC Review documentation (QC Review Checklist) to confirm a QC review was completed for the selected inspection reports and to verify consistency in bridge inspection procedures among all SCDOT Districts involved in the bridge inspection process. The QAR reviewer shall complete the Bridge Inspection Quality Assurance Form, which is available as Attachment 9.7, for each selected bridge and saved according to the BFP.

Section 5.4.5.4 includes provisions for quality hold notices if needed to hold

If further review is necessary during the quality assurance review, Section 5.4.5.4 includes provisions for quality hold notices prior to final approval. Quality hold notices shall only be needed if there will be a delay in the submittal of bridge data into the BMS or if there is a significant issue in a report that should be investigated by the BMQE. Quality hold notices should be discussed in the Annual QA Meeting.

9.3.3.1 Annual Quality Assurance Report

An Annual QA Report will be authored by the BMQE. In this annual report, the BMQE may make recommendations to improve the overall inspection program. This may include special training on specific items, issuance of clarifying memorandums or directives, or meetings with staff and/or consultant inspection teams.

The report shall be presented to the Director of Maintenance (DOM), SBME, BIPM and DMEs for overall evaluation of the program. The DOM, SBME, BIPM and DMEs are encouraged to meet to discuss the findings.

9.3.3.2 Annual Quality Assurance Meeting

Each year, the BMO shall schedule a QA meeting for all SCDOT bridge inspectors to attend. The meeting must be attended by the BIPM, the BMQE, the DBISs from each SCDOT District, consultant PMs and all BITLs performing inspections in South Carolina.

The agenda for the Annual QA Meeting shall be set by the BIPM. The purpose of the meeting shall be to discuss issues and items from past inspections so all parties can be aware of them for future inspections. This meeting is meant to be used as an effective collaboration opportunity to confirm uniformity across districts. This meeting shall review any Technical Notes released in the year and any quality hold notices from the past year.

At least one inspection report, from an inspection which has taken place within the last 12 months, shall be presented and reviewed by the BMQE during the Annual QA Meeting.

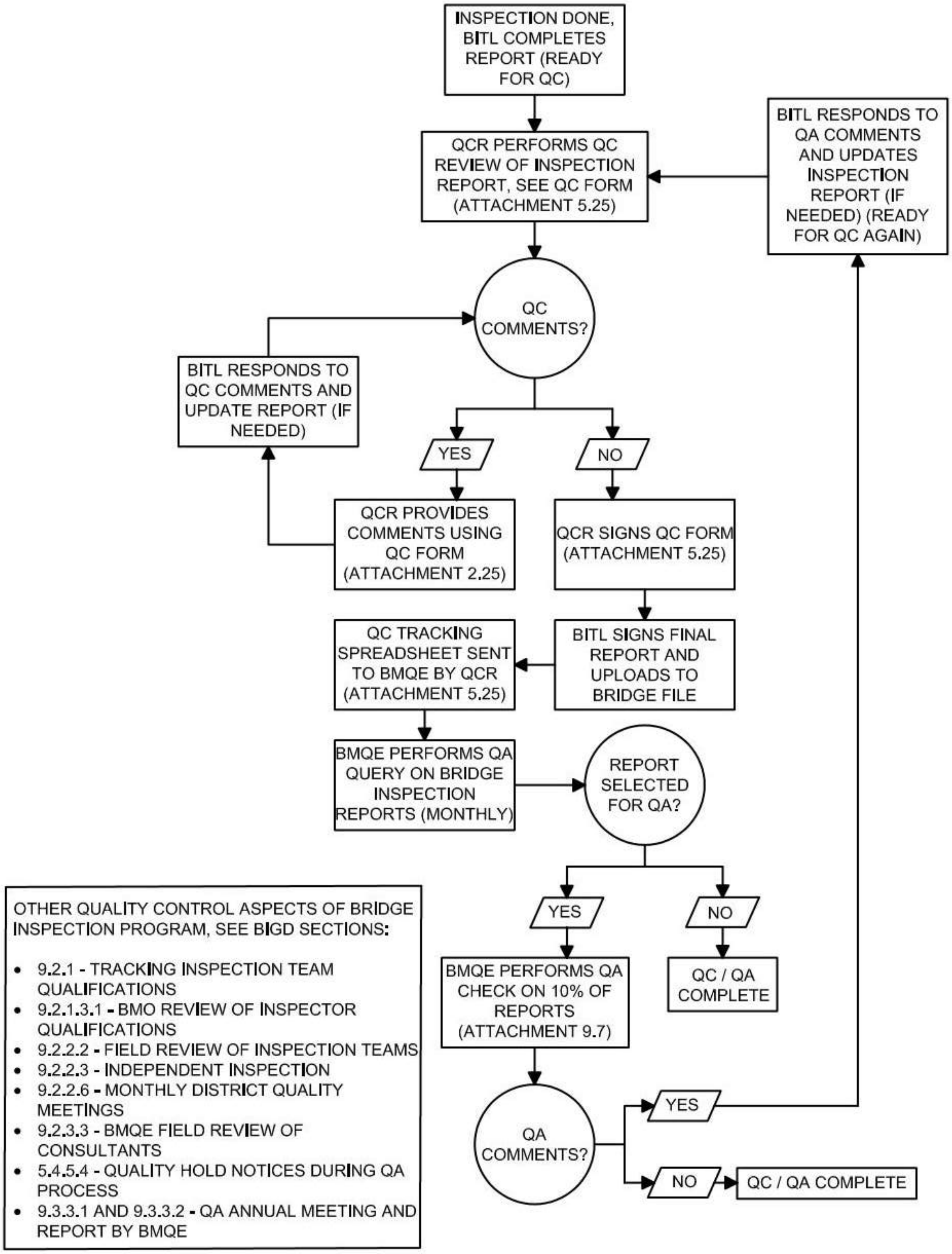
The BIPM, or designee, will prepare a presentation for this Annual QA Meeting. The presentation, along with any additional meeting notes, shall be released to attendees within 30 calendar days from the meeting date.

The Annual QA Meeting must occur within 12 months of the previous Annual QA Meeting.

9.4 PARTICIPATION IN FHWA AUDITS AND REVIEWS

All members of the bridge inspection program in South Carolina are reminded at any time, the FHWA may perform audits of the state’s bridge inspection program. At least once annually, FHWA conducts a review of the state’s bridge inspection program. All members must be cooperative with these audits and reviews.

9.5 QC/QA FLOWCHART



APPENDIX A

Appendix/Attachment Title

CFR, 23 CFR 650, Subpart C

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The NBIS are published in the CFR, 23 CFR 650, Subpart C. The NBIS set the national standard for the proper safety inspection and evaluation of bridges and apply to all structures defined as part of the NBI.

Appendix/Attachment Description

23 CFR 650, Subpart C is attached and included herein for reference during bridge inspection.

§ 650.209 Construction.

(a) Permanent erosion and sediment control measures and practices shall be established and implemented at the earliest practicable time consistent with good construction and management practices.

(b) Implementation of temporary erosion and sediment control measures and practices shall be coordinated with permanent measures to assure economical, effective, and continuous control throughout construction.

(c) Erosion and sediment control measures and practices shall be monitored and maintained or revised to insure that they are fulfilling their intended function during the construction of the project.

(d) Federal-aid funds shall not be used in erosion and sediment control actions made necessary because of contractor oversight, carelessness, or failure to implement sufficient control measures.

(e) Pollutants used during highway construction or operation and material from sediment traps shall not be stockpiled or disposed of in a manner which makes them susceptible to being washed into any watercourse by runoff or high water. No pollutants shall be deposited or disposed of in watercourses.

§ 650.211 Guidelines.

(a) The FHWA adopts the AASHTO Highway Drainage Guidelines, Volume III, "Erosion and Sediment Control in Highway Construction," 1992,[1] as guidelines to be followed on all construction projects funded under title 23, United States Code. These guidelines are not intended to preempt any requirements made by or under State law if such requirements are more stringent.

(b) Each State highway agency should apply the guidelines referenced in paragraph (a) of this section or apply its own guidelines, if these guidelines are more stringent, to develop standards and practices for the control of erosion and sediment on Federal-aid construction projects. These specific standards and practices may reference available resources, such as the procedures presented in the AASHTO "Model Drainage Manual," 1991.[2]

(c) Consistent with the requirements of section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990 (Pub. L. 101–508, 104 Stat. 1388–299), highway construction projects funded under title 23, United States Code, and located in the coastal zone management areas of States with coastal zone management programs approved by the United States Department of Commerce, National Oceanic and Atmospheric Administration, should utilize "Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters," 84–B–92–002, U.S. EPA, January 1993.[3] State highway agencies should refer to this Environmental Protection Agency guidance document for the design of projects within coastal zone management areas.

Subpart C—National Bridge Inspection Standards

SOURCE: 69 FR 74436, Dec. 14, 2004, unless otherwise noted.

§ 650.301 Purpose.

This subpart sets the national standards for the proper safety inspection and evaluation of all highway bridges in accordance with 23 U.S.C. 151.

§ 650.303 Applicability.

The National Bridge Inspection Standards (NBIS) in this subpart apply to all structures defined as highway bridges located on all public roads.

[1] This document is available for inspection from the FHWA headquarters and field offices as prescribed by 49 CFR part 7, appendix D. It may be purchased from the American Association of State Highway and Transportation Officials offices at Suite 225, 444 North Capitol Street, NW., Washington, DC 20001.

[2] This document is available for inspection from the FHWA headquarters and field offices as prescribed by 49 CFR part 7, appendix D. It may be purchased from the American Association of State Highway and Transportation Officials offices at Suite 225, 444 North Capitol Street, NW., Washington, DC 20001.

[3] This document is available for inspection and copying as prescribed by 49 CFR part 7, appendix D.

§650.305 Definitions.

Terms used in this subpart are defined as follows:

American Association of State Highway and Transportation Officials (AASHTO) Manual. "The Manual for Bridge Evaluation," First Edition, 2008, published by the American Association of State Highway and Transportation Officials (incorporated by reference, *see* §650.317).

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

Bridge inspection experience. Active participation in bridge inspections in accordance with the NBIS, in either a field inspection, supervisory, or management role. A combination of bridge design, bridge maintenance, bridge construction and bridge inspection experience, with the predominant amount in bridge inspection, is acceptable.

Bridge inspection refresher training. The National Highway Institute "Bridge Inspection Refresher Training Course"[1] or other State, local, or federally developed instruction aimed to improve quality of inspections, introduce new techniques, and maintain the consistency of the inspection program.

Bridge Inspector's Reference Manual (BIRM). A comprehensive FHWA manual on programs, procedures and techniques for inspecting and evaluating a variety of in-service highway bridges. This manual may be purchased from the U.S. Government Printing Office, Washington, DC 20402 and from National Technical Information Service, Springfield, Virginia 22161, and is available at the following URL: *http://www.fhwa.dot.gov/bridge/bripub.htm.*

Complex bridge. Movable, suspension, cable stayed, and other bridges with unusual characteristics.

Comprehensive bridge inspection training. Training that covers all aspects of bridge inspection and enables inspectors to relate conditions observed on a bridge to established criteria (see the Bridge Inspector's Reference Manual for the recommended material to be covered in a comprehensive training course).

Critical finding. A structural or safety related deficiency that requires immediate follow-up inspection or action.

Damage inspection. This is an unscheduled inspection to assess structural damage resulting from environmental factors or human actions.

Fracture critical member (FCM). A steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse.

Fracture critical member inspection. A hands-on inspection of a fracture critical member or member components that may include visual and other nondestructive evaluation.

Hands-on. Inspection within arms length of the component. Inspection uses visual techniques that may be supplemented by nondestructive testing.

Highway. The term "highway" is defined in 23 U.S.C. 101(a)(11).

In-depth inspection. A close-up, inspection of one or more members above or below the water level to identify any deficiencies not readily detectable using routine inspection procedures; hands-on inspection may be necessary at some locations.

Initial inspection. The first inspection of a bridge as it becomes a part of the bridge file to provide all Structure Inventory and Appraisal (SI&A) data and other relevant data and to determine baseline structural conditions.

Legal load. The maximum legal load for each vehicle configuration permitted by law for the State in which the bridge is located.

Load rating. The determination of the live load carrying capacity of a bridge using bridge plans and supplemented

[1] The National Highway Institute training may be found at the following URL: *http://www.nhi.fhwa.dot.gov./*

by information gathered from a field inspection.

National Institute for Certification in Engineering Technologies (NICET). The NICET provides nationally applicable voluntary certification programs covering several broad engineering technology fields and a number of specialized subfields. For information on the NICET program certification contact: National Institute for Certification in Engineering Technologies, 1420 King Street, Alexandria, VA 22314–2794.

Operating rating. The maximum permissible live load to which the structure may be subjected for the load configuration used in the rating.

Professional engineer (PE). An individual, who has fulfilled education and experience requirements and passed rigorous exams that, under State licensure laws, permits them to offer engineering services directly to the public. Engineering licensure laws vary from State to State, but, in general, to become a PE an individual must be a graduate of an engineering program accredited by the Accreditation Board for Engineering and Technology, pass the Fundamentals of Engineering exam, gain four years of experience working under a PE, and pass the Principles of Practice of Engineering exam.

Program manager. The individual in charge of the program, that has been assigned or delegated the duties and responsibilities for bridge inspection, reporting, and inventory. The program manager provides overall leadership and is available to inspection team leaders to provide guidance.

Public road. The term "public road" is defined in 23 U.S.C. 101(a)(27).

Quality assurance (QA). The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program.

Quality control (QC). Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level.

Routine inspection. Regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, to identify any changes from initial or previously recorded conditions, and to ensure that the structure continues to satisfy present service requirements.

Routine permit load. A live load, which has a gross weight, axle weight or distance between axles not conforming with State statutes for legally configured vehicles, authorized for unlimited trips over an extended period of time to move alongside other heavy vehicles on a regular basis.

Scour. Erosion of streambed or bank material due to flowing water; often considered as being localized around piers and abutments of bridges.

Scour critical bridge. A bridge with a foundation element that has been determined to be unstable for the observed or evaluated scour condition.

Special inspection. An inspection scheduled at the discretion of the bridge owner, used to monitor a particular known or suspected deficiency.

State transportation department. The term "State transportation department" is defined in 23 U.S.C. 101(a)(34).

Team leader. Individual in charge of an inspection team responsible for planning, preparing, and performing field inspection of the bridge.

Underwater diver bridge inspection training. Training that covers all aspects of underwater bridge inspection and enables inspectors to relate the conditions of underwater bridge elements to established criteria (see the Bridge Inspector's Reference Manual section on underwater inspection for the recommended material to be covered in an underwater diver bridge inspection training course).

Underwater inspection. Inspection of the underwater portion of a bridge substructure and the surrounding channel, which cannot be inspected visually at low water by wading or probing, generally requiring diving or other appropriate techniques.

[69 FR 74436, Dec. 14, 2004, as amended at 74 FR 68379, Dec. 24, 2009]

§ 650.307 Bridge inspection organization.

(a) Each State transportation department must inspect, or cause to be inspected, all highway bridges located on public roads that are fully or partially located within the State's boundaries, except for bridges that are owned by Federal agencies.

(b) Federal agencies must inspect, or cause to be inspected, all highway bridges located on public roads that are fully or partially located within the respective agency responsibility or jurisdiction.

(c) Each State transportation department or Federal agency must include a bridge inspection organization that is responsible for the following:

(1) Statewide or Federal agencywide bridge inspection policies and procedures, quality assurance and quality control, and preparation and maintenance of a bridge inventory.

(2) Bridge inspections, reports, load ratings and other requirements of these standards.

(d) Functions identified in paragraphs (c)(1) and (2) of this section may be delegated, but such delegation does not relieve the State transportation department or Federal agency of any of its responsibilities under this subpart.

(e) The State transportation department or Federal agency bridge inspection organization must have a program manager with the qualifications defined in §650.309(a), who has been delegated responsibility for paragraphs (c)(1) and (2) of this section.

§650.309 Qualifications of personnel.

(a) A program manager must, at a minimum:

(1) Be a registered professional engineer, or have ten years bridge inspection experience; and

(2) Successfully complete a Federal Highway Administration (FHWA) approved comprehensive bridge inspection training course.

(b) There are five ways to qualify as a team leader. A team leader must, at a minimum:

(1) Have the qualifications specified in paragraph (a) of this section; or

(2) Have five years bridge inspection experience and have successfully completed an FHWA approved comprehensive bridge inspection training course; or

(3) Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Certification in Engineering Technologies (NICET) and have successfully completed an FHWA approved comprehensive bridge inspection training course, or

(4) Have all of the following:

(i) A bachelor's degree in engineering from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;

(ii) Successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals of Engineering examination;

(iii) Two years of bridge inspection experience; and

(iv) Successfully completed an FHWA approved comprehensive bridge inspection training course, or

(5) Have all of the following:

(i) An associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology;

(ii) Four years of bridge inspection experience; and

(iii) Successfully completed an FHWA approved comprehensive bridge inspection training course.

(c) The individual charged with the overall responsibility for load rating bridges must be a registered professional engineer.

(d) An underwater bridge inspection diver must complete an FHWA approved comprehensive bridge inspection training course or other FHWA approved underwater diver bridge inspection training course.

§650.311 Inspection frequency.

(a) *Routine inspections.* (1) Inspect each bridge at regular intervals not to exceed twenty-four months.

(2) Certain bridges require inspection at less than twenty-four-month intervals. Establish criteria to determine the level and frequency to which these bridges are inspected considering such factors as age, traffic characteristics, and known deficiencies.

(3) Certain bridges may be inspected at greater than twenty-four month intervals, not to exceed forty-eight-months, with written FHWA approval.

This may be appropriate when past inspection findings and analysis justifies the increased inspection interval.

(b) *Underwater inspections.* (1) Inspect underwater structural elements at regular intervals not to exceed sixty months.

(2) Certain underwater structural elements require inspection at less than sixty-month intervals. Establish criteria to determine the level and frequency to which these members are inspected considering such factors as construction material, environment, age, scour characteristics, condition rating from past inspections and known deficiencies.

(3) Certain underwater structural elements may be inspected at greater than sixty-month intervals, not to exceed seventy-two months, with written FHWA approval. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval.

(c) *Fracture critical member (FCM) inspections.* (1) Inspect FCMs at intervals not to exceed twenty-four months.

(2) Certain FCMs require inspection at less than twenty-four-month intervals. Establish criteria to determine the level and frequency to which these members are inspected considering such factors as age, traffic characteristics, and known deficiencies.

(d) Damage, in-depth, and special inspections. Establish criteria to determine the level and frequency of these inspections.

§ 650.313 Inspection procedures.

(a) Inspect each bridge in accordance with the inspection procedures in the AASHTO Manual (incorporated by reference, *see* § 650.317).

(b) Provide at least one team leader, who meets the minimum qualifications stated in § 650.309, at the bridge at all times during each initial, routine, in-depth, fracture critical member and underwater inspection.

(c) Rate each bridge as to its safe load-carrying capacity in accordance with the AASHTO Manual (incorporated by reference, *see* § 650.317). Post or restrict the bridge in accordance with the AASHTO Manual or in accordance with State law, when the maximum unrestricted legal loads or State routine permit loads exceed that allowed under the operating rating or equivalent rating factor.

(d) Prepare bridge files as described in the AASHTO Manual (incorporated by reference, *see* § 650.317). Maintain reports on the results of bridge inspections together with notations of any action taken to address the findings of such inspections. Maintain relevant maintenance and inspection data to allow assessment of current bridge condition. Record the findings and results of bridge inspections on standard State or Federal agency forms.

(e) Identify bridges with FCMs, bridges requiring underwater inspection, and bridges that are scour critical.

(1) Bridges with fracture critical members. In the inspection records, identify the location of FCMs and describe the FCM inspection frequency and procedures. Inspect FCMs according to these procedures.

(2) Bridges requiring underwater inspections. Identify the location of underwater elements and include a description of the underwater elements, the inspection frequency and the procedures in the inspection records for each bridge requiring underwater inspection. Inspect those elements requiring underwater inspections according to these procedures.

(3) Bridges that are scour critical. Prepare a plan of action to monitor known and potential deficiencies and to address critical findings. Monitor bridges that are scour critical in accordance with the plan.

(f) *Complex bridges.* Identify specialized inspection procedures, and additional inspector training and experience required to inspect complex bridges. Inspect complex bridges according to those procedures.

(g) *Quality control and quality assurance.* Assure systematic quality control (QC) and quality assurance (QA) procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, periodic bridge inspection refresher training for program managers and team leaders, and independent review of inspection reports and computations.

(h) *Follow-up on critical findings.* Establish a statewide or Federal agency wide procedure to assure that critical findings are addressed in a timely manner. Periodically notify the FHWA of the actions taken to resolve or monitor critical findings.

§ 650.315 Inventory.

(a) Each State or Federal agency must prepare and maintain an inventory of all bridges subject to the NBIS. Certain Structure Inventory and Appraisal (SI&A) data must be collected and retained by the State or Federal agency for collection by the FHWA as requested. A tabulation of this data is contained in the SI&A sheet distributed by the FHWA as part of the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges," (December 1995) together with subsequent interim changes or the most recent version. Report the data using FHWA established procedures as outlined in the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges."

(b) For routine, in-depth, fracture critical member, underwater, damage and special inspections enter the SI&A data into the State or Federal agency inventory within 90 days of the date of inspection for State or Federal agency bridges and within 180 days of the date of inspection for all other bridges.

(c) For existing bridge modifications that alter previously recorded data and for new bridges, enter the SI&A data into the State or Federal agency inventory within 90 days after the completion of the work for State or Federal agency bridges and within 180 days after the completion of the work for all other bridges.

(d) For changes in load restriction or closure status, enter the SI&A data into the State or Federal agency inventory within 90 days after the change in status of the structure for State or Federal agency bridges and within 180 days after the change in status of the structure for all other bridges.

§ 650.317 Reference manuals.

(a) The materials listed in this subpart are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of the approval, and notice of any change in these documents will be published in the FEDERAL REGISTER. The materials are available for purchase at the address listed below, and are available for inspection at the National Archives and Records Administration (NARA). These materials may also be reviewed at the Department of Transportation Library, 1200 New Jersey Avenue, SE., Washington, DC 20590, (202) 366–0761. For information on the availability of these materials at NARA call (202) 741–6030, or go to the following URL: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.htm.* In the event there is a conflict between the standards in this subpart and any of these materials, the standards in this subpart will apply.

(b) The following materials are available for purchase from the American Association of State Highway and Transportation Officials, Suite 249, 444 N. Capitol Street, NW., Washington, DC 20001, (202) 624–5800. The materials may also be ordered via the AASHTO bookstore located at the following URL: *http://www.transportation.org.*

(1) The Manual for Bridge Evaluation, First Edition, 2008, AASHTO, incorporation by reference approved for §§ 650.305 and 650.313.

(2) [Reserved]

[74 FR 68379, Dec. 24, 2009]

Subpart D—Highway Bridge Replacement and Rehabilitation Program

SOURCE: 44 FR 15665, Mar. 15, 1979, unless otherwise noted.

§ 650.401 Purpose.

The purpose of this regulation is to prescribe policies and outline procedures for administering the Highway Bridge Replacement and Rehabilitation Program in accordance with 23 U.S.C. 144.

APPENDIX B

Appendix/Attachment Title

SCDOT District Map

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

South Carolina's counties are separated into seven districts as shown in the attached map. County numbers are shown in parenthesis, bolded and underlined.

District 1

Kershaw (**28**)

Lee (**31**)

Lexington (**32**)

Richland (**40**) – District HQ in Columbia (Richland County)

Sumter (**43**)

District 2

Abbeville (**1**)

Anderson (**4**)

Edgefield (**19**)

Greenwood (**24**) – District HQ in Greenwood (Greenwood County)

Laurens (**30**)

McCormick (**35**)

Newberry (**36**)

Saluda (**41**)

District 3

Greenville (**23**) – District HQ in Greenville (Greenville County)

Oconee (**37**)

Pickens (**39**)

Spartanburg (**42**)

District 4

Cherokee (**11**)

Chester (**12**) – District HQ in Chester (Chester County)

Chesterfield (**13**)

Fairfield (**20**)

Lancaster (**29**)

Union (**44**)

York (**46**)

District 5

Darlington (**16**)

Dillon (**17**)

Florence (**21**) – District HQ in Florence (Florence County)

Georgetown (**22**)

Horry (**26**)

Marion (**33**)

Marlboro (**34**)

Williamsburg (**45**)

District 6

Beaufort (**7**)

Berkeley (**8**)

Charleston (**10**) – District HQ in North Charleston (Charleston County)

Colleton (**15**)

Dorchester (**18**)

Jasper (**27**)

District 7

Aiken (**2**)

Allendale (**3**)

Bamberg (**5**)

Barnwell (**6**)

Calhoun (**9**)

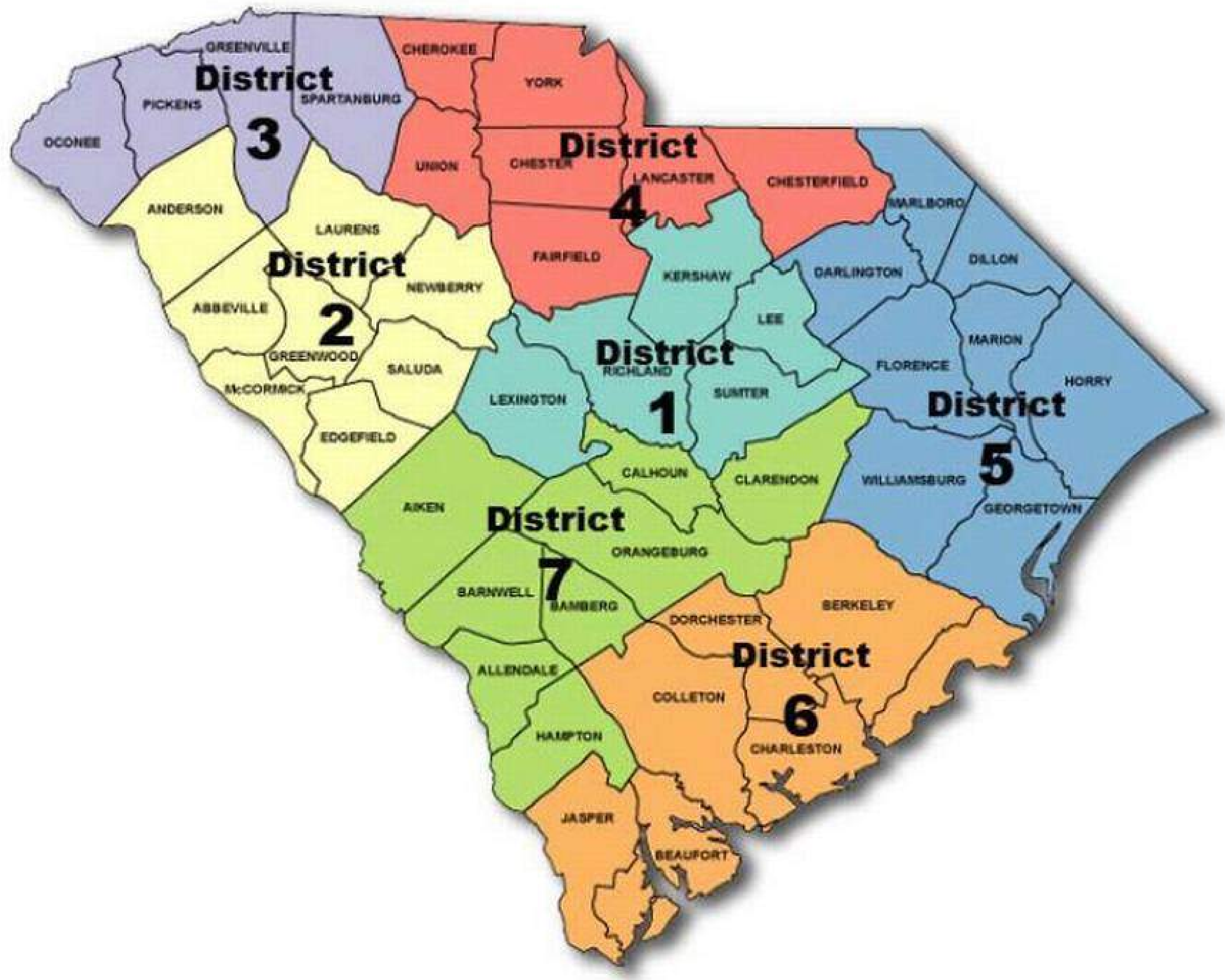
Clarendon (**14**)

Hampton (**25**)

Orangeburg (**38**) – District HQ in Orangeburg (Orangeburg County)

Appendix/Attachment Description

SCDOT Districts are shown in the attached map.


District 3
OCONEE
PICKENS
GREENVILLE
SPARTANBURG
District 2
ANDERSON
LAURENS
ABBEVILLE
NEWBERRY
GREENWOOD
SALUDA
McCORMICK
EDGEFIELD
District 4
CHEROKEE
YORK
UNION
CHESTER
LANCASTER
CHESTERFIELD
FAIRFIELD
District 1
KERSHAW
LEE
RICHLAND
LEXINGTON
SUMTER
District 5
MARLBORO
DARLINGTON
DILLON
MARION
FLORENCE
HORRY
WILLIAMSBURG
GEORGETOWN
District 7
AIKEN
CALHOUN
CLARENDON
ORANGEBURG
BARNWELL
BAMBERG
ALLENDALE
HAMPTON
District 6
DORCHESTER
BERKELEY
COLLETON
CHARLESTON
JASPER
BEAUFORT

APPENDIX C

Appendix/Attachment Title

Bridges with Complex Components

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The NBIS (*23 CFR 650.313 (f)*) requires South Carolina to identify specific inspection procedures and additional inspector training and experience required to inspect complex bridges. District inspection teams and consultant inspection teams shall inspect complex bridges according to those procedures. The BIPM shall be responsible for coordinating the inspection of a bridge with complex components and may request a consultant to perform the inspections.

Note that while the bridges included in this Appendix are unique, there are other bridges in South Carolina that require some form of specific inspection procedure already identified in the NBIS and/or the BIGD. These bridges may not be included in this Appendix:

- Bridges where Underwater Inspections are required or
- Bridges which have Fracture Critical Members (FCM).

Information in Appendix C is current at the time of this document's publication. Contact BMO for updated information.

Appendix/Attachment Description

The bridges shown in this appendix are Bridges with Complex Components. Refer to both the Bridge File and the BIGD for inspection procedures. Bridges with Complex Components are defined in Section 4.5 of the BIGD.

FHWA Complex Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	FHWA Complex Bridge Type (NBI 43B)	Long Span Steel Bridge > 200ft	Long Span Concrete Bridge > 150 ft	Number of Main Spans > 25	Number of Approach Spans > 25	Has FCMs?	District (NBI 02)	County (NBI 03)
228	US 17 SB	ASHLEY RIVER	16					Yes	6	CHARLESTON
686	S-26-20	INTRACOASTAL WATERWAY	17	216				Yes	5	HORRY
687	S-26-616	INTRACOASTAL WATERWAY	17	217				Yes	5	HORRY
925	US 21	HARBOR RIVER	17				67	Yes	6	BEAUFORT
1303	SC 703	INTRACOASTAL WATERWAY	17	250				Yes	6	CHARLESTON
2303	SC 171	WAPPOO CREEK	16					Yes	6	CHARLESTON
3186	US 21 BUS	BEAUFORT RIVER	17	245			36	Yes	6	BEAUFORT
3607	US 17 NB	ASHLEY RIVER	16					Yes	6	CHARLESTON
8235	I-526 EB	WANDO RIVER	21		400		40		6	CHARLESTON
8238	I-526 WB	WANDO RIVER	21		400		40		6	CHARLESTON
9824	US 17	COOPER RIVER, TOWN CREEK	14				25	Yes	6	CHARLESTON
9973	L-834	INTRACOASTAL WATERWAY	17					Yes	5	HORRY

Long Span Steel (LSS) Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	FHWA Complex Bridge Type (NBI 43B)	Long Span Steel Bridge > 200ft	Long Span Concrete Bridge > 150 ft	Number of Main Spans > 25	Number of Approach Spans > 25	Has FCMs?	District (NBI 02)	County (NBI 03)
229	US 78	S.C.L. RR & S-39		220					6	CHARLESTON
838	US 29	BIG THICKETTY CREEK		200					4	CHEROKEE
1757	C-39-512	NS RR		217					3	PICKENS
1793	SC 700	STONO RIVER		230			115		6	CHARLESTON
1931	SC 7	ASHLEY RIVER		602		25			6	CHARLESTON
2668	S-10-20	STONO RIVER		300					6	CHARLESTON
4792	US 17	WACCAMAW RIVER		782					5	GEORGETOWN
7220	S-12-46	I-77		252					4	CHESTER
7221	S-12-52	I-77		219					4	CHESTER
7223	S-12-497	I-77		200					4	CHESTER
7889	US 17 SBL	SAMPIT RIVER_& S-103		650					5	GEORGETOWN
8021	RAMP OFF I-77 NB	I-26 & I-77		200					1	LEXINGTON
8104	US 76 EB	WATEREE RIVER		210			60		1	SUMTER
8154	S-19-53	STEVENS CREEK		222					2	EDGEFIELD
8222	SC 28 EBL	SAVANNAH RIVER		210					7	AIKEN
8516	I-526	COOPER RIVER		800			135	Yes	6	BERKELEY
8519	I-526 EB	(URBAN AREA) US 52		202			229		6	CHARLESTON
8525	I-526 WB	(URBAN AREA) US 52		202			229		6	CHARLESTON
8579	US 76 WB	GREAT PEE DEE RIVER		200			137		5	MARION
8590	SC 39	SALUDA RIV		235					2	SALUDA
8719	SC 174	DAWHOO RIVER		200			94		6	CHARLESTON
8902	SC 34	GREAT PEE DEE RIVER		240			38		5	MARLBORO
9350	SC 34	SALUDA RIVER		213					2	NEWBERRY
9473	SC 56	ENOREE RIVER		200					4	UNION
9602	I- 185 RMP	I- 385		239					3	GREENVILLE
9768	SC 183	NS & CSXT RR		236					3	GREENVILLE
9825	US 17 NB	MEETING STREET		200					6	CHARLESTON
9826	RAMP OFF I-26 EB	I-26&RAMPSON US 17&US 52		213				Yes	6	CHARLESTON
9828	RAMP ON I-26 WB	ACCESS RD		220					6	CHARLESTON
9830	RAMP ON US 17 SB	US 17 NB		210					6	CHARLESTON
9832	US 17 SB	MEETING ST, I-26		210				Yes	6	CHARLESTON
9879	US 501 NB	FOREST BROOK RD		292					5	HORRY
9880	US 501 SB	FORESTBROOK RD		294					5	HORRY
9889	US 278	BROAD CREEK TOLL BRIDGE		200			39		6	BEAUFORT
9931	US 78 EB	S-43/N.A.D RD		214					6	CHARLESTON
9932	US 78 EB	US 52		230					6	CHARLESTON
9953	US 176 RAMP	I-585 WB EXIT		231					3	SPARTANBURG
10032	US 521	US 521 BUS		215					5	GEORGETOWN
10088	I-95 NBL	SAVANNAH RIVER		220			25		6	JASPER
10089	I-95 SBL	SAVANNAH RIVER		220			25		6	JASPER
10090	SC 72	SAVANNAH RIVER		238				Yes	2	ABBEVILLE
10118	RAMP 5366 & 5367	US 17		250					6	CHARLESTON

Long Span Concrete (LSC) Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	FHWA Complex Bridge Type (NBI 43B)	Long Span Steel Bridge > 61m (200ft)	Long Span Concrete Bridge >46m (150 ft)	Number of Main Spans > 25	Number of Approach Spans > 25	Has FCMs?	District (NBI 02)	County (NBI 03)
220	US 29	PACOLET RIVER			175				3	SPARTANBURG
431	SC 9 SB	CATAWBA RIVER			170				4	LANCASTER
1253	SC 903	BIG LYNCHES RIVER			150				1	KERSHAW
1629	SC 49	ENOREE RIVER			194				2	LAURENS
2429	S-44-22	ENOREE RIVER			150				4	UNION
2662	SC 170	BROAD RIVER			180		58		6	BEAUFORT
8617	SC 30	ASHLEY AND WAPPOO.			157	74	78		6	CHARLESTON
8750	SC 544	SC 707 & S-611 & ICWW			180	37			5	HORRY
9402	I-526 EB	US 17 & SC 7			152				6	CHARLESTON
9778	SC 31 SBL	HORRY CO. RR			150				5	HORRY
9779	SC 31 NBL	HORRY CO. RR			150				5	HORRY
9865	I-520 EBL	SC 126			155				7	AIKEN
9866	I-520 WBL	SC 126			155				7	AIKEN
9957	US 21 NB	BEAUFORT RIVER			170		35		6	BEAUFORT
10006	SC 31 BRIDGE RAMP	US 501			259				5	HORRY
10007	SC 31 BRIDGE RAMP	US 501			334				5	HORRY
10016	S-1315	ICWW			150				5	HORRY
10101	US 17 NBL	SC 707/L-2907			300				5	HORRY
10102	US 17 SBL	SC 707/L-2907			300				5	HORRY
10107	S-26-1244	ICWW & L-3658			330				5	HORRY
10262	SC 31	INTRACOASTAL WATERWAY			310		25		5	HORRY
10270	I-26 RAMP	I-26 RAMP 7902			251				6	BERKELEY
10271	I-26 RAMP	I-26			262				6	BERKELEY

Multi-Span Main (MSM) Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	FHWA Complex Bridge Type (NBI 43B)	Long Span Steel Bridge > 61m (200ft)	Long Span Concrete Bridge >46m (150 ft)	Number of Main Spans > 25	Number of Approach Spans > 25	Has FCMs?	District (NBI 02)	County (NBI 03)
150	US 52	SANTEE RIVER SWAMP				25			6	BERKELEY
151	US 52/N US HWY 52	SANTEE RIVER SWAMP				46			6	BERKELEY
492	US 1	THOMPSON CREEK				26			4	CHESTERFIELD
1026	US 17 ALT	COMBAHEE RIVER				27			6	COLLETON
2166	US 401	LYNCHES RIVER				36			5	DARLINGTON
2216	US 378	GREAT PEE DEE RIVER				32			5	MARION
2757	SC 119	BLACK SWAMP (NO. 1)				34			6	JASPER
3632	I-26 EB	FOUR HOLE SWAMP				25			6	BERKELEY
3633	I-26 WB	FOUR HOLE SWAMP				25			6	BERKELEY
3651	US 301	LYNCHES RIVER				27			5	FLORENCE
3997	S-45-30	BLACK RIVER				29			5	WILLIAMSBURG
4945	I-26	S-2472				27			6	CHARLESTON
5036	S-18-56	FOUR HOLE SWAMP				25			6	DORCHESTER
5040	I-95 NB	LYNCHES RIVER				27			5	FLORENCE
5046	I-95 SB	LYNCHES RIVER				27			5	FLORENCE
5231	I-26 EB	THE HERIOT ST VIADUCT				96			6	CHARLESTON
5690	I-95 NB	COMBAHEE RIVER				27			6	COLLETON
5692	I-95 SB	COMBAHEE RIVER				27			6	COLLETON
5780	I-20 EB	WATEREE SWP OVERFLOW (1)				25			1	KERSHAW
5781	I-20 EB	WATEREE SWP OVERFLOW (2)				25			1	KERSHAW
5785	I-20 WB	WATEREE SWP OVERFLOW (1)				25			1	KERSHAW
5786	I-20 WB	WATEREE SWP OVERFLOW (2)				25			1	KERSHAW
7812	I-77 NB	CONGAREE RIVER OVF #3				26			1	LEXINGTON
7813	I-77 SB	CONGAREE RIVER OFV #3				26			1	LEXINGTON
7826	I-77 NB	CONGAREE SWAMP				44			1	RICHLAND
7831	I-77 SB	CONGAREE SWAMP				44			1	RICHLAND
8061	I-526 EB	TIDAL CREEK				25			6	BERKELEY
8062	I-526 WB	TIDAL CREEK				25			6	BERKELEY
8414	US 278 EB	OKATIE RIVER				27			6	BEAUFORT
8416	US 278 WB	OKATIE RIVER				27			6	BEAUFORT
8443	SC 403	LYNCHES RIVER				27			5	FLORENCE
8522	RAMP OFF I-526 EB	VEGETATIVE RIGHT OF WA				45			6	CHARLESTON
8527	RAMP ON I-526 WB	FILBIN CREEK				48			6	CHARLESTON
8622	SC 30 EB	MARSH				28			6	CHARLESTON
8623	SC 30	MARSH				30			6	CHARLESTON
8975	SC 61	MARSH				63	30		6	CHARLESTON
9541	US 52	SANTEE RIVER SWAMP (MD-6				27			5	WILLIAMSBURG
9678	SC 22 EB	MAPLE SWAMP				43			5	HORRY
9679	SC 22 WB	MAPLE SWAMP				43			5	HORRY
9687	SC 22 EB	KINGSTON LAKE				99			5	HORRY
9688	SC 22 WB	KINGSTON LAKE				99			5	HORRY
9700	SC 22 WBL	JONES BIG SWAMP #2				28			5	HORRY
9701	SC 22 EBL	JONES BIG SWAMP #2				28			5	HORRY
9702	SC 22 EB	JONES BIG SWAMP #3				92			5	HORRY
9703	SC 22 WB	JONES BIG SWAMP #3				92			5	HORRY
9708	SC 22 EB	JONES BIG SWAMP #5				25			5	HORRY
9709	SC 22 WB	JONES BIG SWAMP #5				25			5	HORRY
9944	S-10-2535	MARSH				33			6	CHARLESTON
9970	US 301	JEFFERIES CREEK				27			5	FLORENCE
10087	SR 404P-US 17	BACK RIVER				47			6	JASPER

Multi-Span Approach (MSA) Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	FHWA Complex Bridge Type (NBI 43B)	Long Span Steel Bridge > 61m (200ft)	Long Span Concrete Bridge >46m (150 ft)	Number of Main Spans > 25	Number of Approach Spans > 25	Has FCMs?	District (NBI 02)	County (NBI 03)
356	SC 28	SAVANNAH RIVER					51		2	MCCORMICK
889	US 1 SB	GREAT PEE DEE RIVER					32		5	MARLBORO
1061	SC 170	LITTLE BACK RIV-GA. LINE					76		6	JASPER
1712	US 17 SB	SOUTH SANTEE RIVER					25	Yes	5	GEORGETOWN
1823	US 17 SB	NORTH SANTEE RIVER					40	Yes	5	GEORGETOWN
1862	US 52	SANTEE RIVER					36		6	BERKELEY
2297	US 278 EB	MACKAY CREEK					54		6	BEAUFORT
3923	US 76 EB	GREAT PEE DEE RIVER					136	Yes	5	MARION
3928	US 1 NB	GREAT PEE DEE RIVER					32		5	MARLBORO
4443	US 301	SAVANNAH RIVER					27		7	ALLENDALE
4465	SC 802	LUCY POINT CREEK					28		6	BEAUFORT
5045	I-95 NB	GREAT PEE DEE RIVER					56		5	FLORENCE
5051	I-95 SB	GREAT PEE DEE RIVER					56		5	FLORENCE
5105	US 1 NB	WATEREE RIVER					36		1	KERSHAW
5249	I-95 NB	LAKE MARION					80		7	CLARENDON
5258	I-95 SB	LAKE MARION					80		7	CLARENDON
6087	US 17 ALT	EDISTO RIVER					25		6	DORCHESTER
6492	S-21-49	LYNCHES RIVER					25		5	FLORENCE
7114	US 17 NB	SOUTH SANTEE RIVER					29		5	GEORGETOWN
7115	US 17 NB	NORTH SANTEE RIVER					45		5	GEORGETOWN
7329	I-526 EB	ASHLEY RIVER&BULL CREEK					81		6	CHARLESTON
7330	I-526 WB	ASHLEY RIVER&BULL CREEK					81		6	CHARLESTON
7425	US 21 SB	BEAUFORT RIVER					52		6	BEAUFORT
7537	US 278 EB	SKULL CREEK					25		6	BEAUFORT
7650	US 278 WB	MACKAY CREEK					54		6	BEAUFORT
7890	US 701	BLACK RIVER					30		5	GEORGETOWN
7911	I-77 NB	L-66					48		1	LEXINGTON
7912	I-77 NB	CONGAREE CREEK					45		1	LEXINGTON
7915	I-77 SB	L-66 & OVERFLOW #2					48		1	LEXINGTON
7916	I-77 SB	CONGAREE CREEK					45		1	LEXINGTON
8134	I-526 EB	BERESFORD CREEK					40		6	BERKELEY
8135	I-526 WB	BERESFORD CREEK					40		6	BERKELEY
8323	I-526 EB	I-26 & S-1600 & RR					29		6	CHARLESTON
8324	I-526 RAMP	RAMP TO I-26WB FR I526EB					31		6	CHARLESTON
8327	I-562 WB	I-26					30		6	CHARLESTON
8413	US 21 NB	WHALE BRANCH					30		6	BEAUFORT
8524	RAMP OFF I-526 EB	RR CSXT					67		6	CHARLESTON
8529	RAMP ON I-526 WB	VEGETATIVE RIGHT OF WAY					65		6	CHARLESTON
8713	US 21	BATTERY CREEK					34		6	BEAUFORT
8720	SC 517	INTRACOASTAL WATERWAY					98		6	CHARLESTON
9339	US 1 SB	WATEREE RIVER					36		1	KERSHAW
9396	US 17 ALT	SANTEE RIVER					47		6	BERKELEY
9716	SC 22 EB	ICWW OVERFLOW					34		5	HORRY
9717	SC 22 WB	ICWW OVERFLOW					34		5	HORRY
9758	SC 35	SCX RR					93		1	LEXINGTON
10008	SC 31 BRIDGE RAMP	US 501					143		5	HORRY
10094	US 25 BUS	SAVANNAH RIVER					25		7	AIKEN

APPENDIX D

Appendix/Attachment Title

Border Bridges

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Identification of border bridges and the identification of the responsible party for these border bridges is important to properly maintain and inspect the bridge inventory.

Border bridges are structures crossing borders of states. South Carolina has two borders with other states, Georgia and North Carolina. Border bridges on highways connecting South Carolina with neighboring states shall be inspected according to written agreements between the States' Departments of Transportation.

FHWA uses NBI Item 98 to identify border bridges. NBI Item 98A is coded 134 for bridges connecting South Carolina and Georgia. NBI Item 98A is coded 374 for bridges connecting South Carolina and North Carolina.

According to written agreements, responsibility for bridge inspection and maintenance is assigned to each state. See below for the responsibility codes for NBI Item 98B:

- 0 = South Carolina is responsible for bridge inspection and maintenance
- 99 = Other state is responsible for bridge inspection and maintenance

FHWA uses NBI Item 99 to identify the border state's structure number for the border bridge.

The BIPM is responsible for maintaining the list of South Carolina's border bridges.

Border bridge agreements shall be included in the appropriate bridge's file.

Information in Appendix D is current at the time of this document's publication. Contact BMO for updated information.

Appendix/Attachment Description

The bridges shown in this Appendix are border bridges. SCDOT is responsible for the inspection and maintenance of the bridges as shown as "Yes" in the "SCDOT Responsible?" column.

Border Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	Border State Code (98A)	Bordering State	Responsilbility Code (99 = Not Responsible) (NBI 99B)	Border State's Bridge Structure Number (NBI 99)	SCDOT Responsible?	District (NBI 02)	County (NBI 03)
356	SC 28	SAVANNAH RIVER	134	Georgia	0	073-9002-0	Yes	2	MCCORMICK
1061	SC 170	LITTLE BACK RIV-GA. LINE	134	Georgia	0	051-9001-0	Yes	6	JASPER
1642	US 76	CHATTOOGA RIV-GA. LINE	134	Georgia	0	241-9001-0	Yes	3	OCONEE
2288	US 29	SAVANNAH RIV/CO RD IN GA	134	Georgia	0	147-9001-0	Yes	2	ANDERSON
2996	SC 119	SAVANNAH RIVER	134	Georgia	0	103-9001-0	Yes	6	JASPER
3710	I-85 NB	HARTWELL RESERVOIR	134	Georgia	0	147-9002-0	Yes	3	OCONEE
3712	I-85 SB	HARTWELL RESERVOIR	134	Georgia	0	147-9003-0	Yes	3	OCONEE
3941	US 123	TUGALOO RIVER	134	Georgia	0	257-9001-0	Yes	3	OCONEE
4443	US 301	SAVANNAH RIVER	134	Georgia	0	251-9001-0	Yes	7	ALLENDALE
5132	S-37-160	TUGALOO RIVER	134	Georgia	0	257-9001-0	Yes	3	OCONEE
5196	SC 28 WBL	SAVANNAH RIVER	134	Georgia	0	245-9001-0	Yes	7	AIKEN
7646	SC 184	SAVANNAH RIVER	134	Georgia	0	105-9001-0	Yes	2	ANDERSON
8222	SC 28 EBL	SAVANNAH RIVER	134	Georgia	0	245-9002-0	Yes	7	AIKEN
9854	I-520	SAVANNAH RIVER	134	Georgia	0	073-9001-0	Yes	7	AIKEN
10087	SR 404P-US 17	BACK RIVER	134	Georgia	99	051-5096-0	No	6	JASPER
10088	I-95 NBL	SAVANNAH RIVER	134	Georgia	99	103-0025-0	No	6	JASPER
10089	I-95 SBL	SAVANNAH RIVER	134	Georgia	99	103-0026-0	No	6	JASPER
10090	SC 72	SAVANNAH RIVER	134	Georgia	99	105-0006-0	No	2	ABBEVILLE
10091	SC 181	SAVANNAH RIVER	134	Georgia	99	147-0017-0	No	2	ANDERSON
10092	US 378	SAVANNAH RIVER	134	Georgia	99	181-5019-0	No	2	MCCORMICK
10093	SC 28	CHATTOOGA RIVER	134	Georgia	99	241-0017-0	No	3	OCONEE
10094	US 25 BUS	SAVANNAH RIVER	134	Georgia	99	245-0009-0	No	7	AIKEN
10095	US 1	SAVANNAH RIVER	134	Georgia	99	245-0021-0	No	7	AIKEN
10096	I-20 EBL	SAVANNAH RIVER	134	Georgia	99	245-0053-0	No	7	AIKEN
10097	I-20 WBL	SAVANNAH RIVER	134	Georgia	99	245-0054-0	No	7	AIKEN
10098	US 1 CONN	SAVANNAH RIVER	134	Georgia	99	245-0094-0	No	7	AIKEN
10099	SC 49	CATAWBA RIVER	374	North Carolina	99	590023	No	4	YORK
10100	SC 198	BUFFALO CREEK	374	North Carolina	99	220013	No	4	CHEROKEE

APPENDIX E

Appendix/Attachment Title

Bridges with Underwater Inspections

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

All underwater inspections in South Carolina are performed by consultants. The BIPM is responsible for assigning underwater inspections in the state. In the event that an underwater inspection is recommended for a bridge not on this list, Attachment 4.1, the Consultant Inspection Request Form, shall be completed.

Information in Appendix E is current at the time of this document's publication. Contact BMO for updated information.

Appendix/Attachment Description

The bridges shown in this Appendix are bridges which are scheduled for underwater inspections as of the date of publication of BIGD. This Appendix shall be maintained by the BIPM or BMO designee. This Appendix shall be updated at least annually.

As stated in the BIGD, underwater inspections require specific underwater inspection procedure for the bridge. See Chapter 5 of the BIGD for applicable underwater inspection procedures.

Bridges with Underwater Inspections

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)
8579	US 76 WB	GREAT PEE DEE RIVER	5	MARION
3923	US 76 EB	GREAT PEE DEE RIVER	5	MARION
8516	I-526	COOPER RIVER	6	BERKELEY
1793	SC 700	STONO RIVER	6	CHARLESTON
8720	SC 517	INTRACOASTAL WATERWAY	6	CHARLESTON
8719	SC 174	DAWHOO RIVER	6	CHARLESTON
7329	I-526 EB	ASHLEY RIVER&BULL CREEK	6	CHARLESTON
7330	I-526 WB	ASHLEY RIVER&BULL CREEK	6	CHARLESTON
5249	I-95 NB	LAKE MARION	7	CLARENDON
5258	I-95 SB	LAKE MARION	7	CLARENDON
8617	SC 30	ASHLEY AND WAPPOO.	6	CHARLESTON
925	US 21	HARBOR RIVER	6	BEAUFORT
8104	US 76 EB	WATEREE RIVER	1	SUMTER
2662	SC 170	BROAD RIVER	6	BEAUFORT
5051	I-95 SB	GREAT PEE DEE RIVER	5	FLORENCE
5045	I-95 NB	GREAT PEE DEE RIVER	5	FLORENCE
7650	US 278 WB	MACKAY CREEK	6	BEAUFORT
2297	US 278 EB	MACKAY CREEK	6	BEAUFORT
7425	US 21 SB	BEAUFORT RIVER	6	BEAUFORT
356	SC 28	SAVANNAH RIVER	2	MCCORMICK
9396	US 17 ALT	SANTEE RIVER	6	BERKELEY
7115	US 17 NB	NORTH SANTEE RIVER	5	GEORGETOWN
1823	US 17 SB	NORTH SANTEE RIVER	5	GEORGETOWN
8235	I-526 EB	WANDO RIVER	6	CHARLESTON
8238	I-526 WB	WANDO RIVER	6	CHARLESTON
8902	SC 34	GREAT PEE DEE RIVER	5	MARLBORO
9339	US 1 SB	WATEREE RIVER	1	KERSHAW
5105	US 1 NB	WATEREE RIVER	1	KERSHAW
1862	US 52	SANTEE RIVER	6	BERKELEY
3186	US 21 BUS	BEAUFORT RIVER	6	BEAUFORT
9957	US 21 NB	BEAUFORT RIVER	6	BEAUFORT
8713	US 21	BATTERY CREEK	6	BEAUFORT
889	US 1 SB	GREAT PEE DEE RIVER	5	MARLBORO
3928	US 1 NB	GREAT PEE DEE RIVER	5	MARLBORO
8413	US 21 NB	WHALE BRANCH	6	BEAUFORT
7114	US 17 NB	SOUTH SANTEE RIVER	5	GEORGETOWN
4465	SC 802	LUCY POINT CREEK	6	BEAUFORT
4443	US 301	SAVANNAH RIVER	7	ALLENDALE
7537	US 278 EB	SKULL CREEK	6	BEAUFORT
1712	US 17 SB	SOUTH SANTEE RIVER	5	GEORGETOWN
10094	US 25 BUS	SAVANNAH RIVER	7	AIKEN
9824	US 17	COOPER RIVER, TOWN CREEK	6	CHARLESTON
10088	I-95 NBL	SAVANNAH RIVER	6	JASPER
10089	I-95 SBL	SAVANNAH RIVER	6	JASPER
228	US 17 SB	ASHLEY RIVER	6	CHARLESTON
7538	US 278 WB	SKULL CREEK	6	BEAUFORT
7889	US 17 SBL	SAMPIT RIVER_& S-103	5	GEORGETOWN
3607	US 17 NB	ASHLEY RIVER	6	CHARLESTON
5196	SC 28 WBL	SAVANNAH RIVER	7	AIKEN
5960	US 17	LITTLE RV.S-236 & 1110	5	HORRY
7157	I-126 EB	BROAD RIVER	1	RICHLAND
2996	SC 119	SAVANNAH RIVER	6	JASPER
793	US 501	WACCAMAW RIV SCLRR L-123	5	HORRY
8222	SC 28 EBL	SAVANNAH RIVER	7	AIKEN
2753	US 501 BYP	WACCAMAW RIVER	5	HORRY
5779	I-20 EB	WATEREE RIVER	1	KERSHAW
5784	I-20 WB	WATEREE RIVER	1	KERSHAW
2668	S-10-20	STONO RIVER	6	CHARLESTON
8577	US 15	LYNCHES RIVER	1	LEE
5061	US 17	PEE DEE RIVER	5	GEORGETOWN
568	SC 121	SALUDA RIVER	2	NEWBERRY
10097	I-20 WBL	SAVANNAH RIVER	7	AIKEN
10096	I-20 EBL	SAVANNAH RIVER	7	AIKEN
8159	US 17 NBL	SAMPIT RIVER_& S-103	5	GEORGETOWN
1941	US 17	EDISTO RIVER	6	COLLETON
174	US 17	COMBAHEE RIVER	6	BEAUFORT
1303	SC 703	INTRACOASTAL WATERWAY	6	CHARLESTON
5360	SC 130	STAMP CREEK	3	OCONEE
5219	US 21 SB	WHALE BRANCH	6	BEAUFORT
2813	US 76	SENECA RIVER	3	PICKENS
2303	SC 171	WAPPOO CREEK	6	CHARLESTON
6898	SC 12	CONGAREE RIVER	1	LEXINGTON
6717	SC 9 NB	CATAWBA RIVER	4	LANCASTER
6579	SC 395	SALUDA RIVER	2	SALUDA
8639	S-20-101	DUTCHMANS CREEK	4	FAIRFIELD

Bridges with Underwater Inspections

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)
431	SC 9 SB	CATAWBA RIVER	4	LANCASTER
5384	S-42-42	PACOLET RIVER	3	SPARTANBURG
4792	US 17	WACCAMAW RIVER	5	GEORGETOWN
4018	I-85 NBL	SENECA RIVER	2	ANDERSON
7146	S-36-45	ENOREE RIVER	2	NEWBERRY
9350	SC 34	SALUDA RIVER	2	NEWBERRY
3738	S-39-291	KEOWEE RIVER	3	PICKENS
8640	S-20-101	TAYLOR CREEK	4	FAIRFIELD
6773	S-41-59	CLOUDS CREEK	2	SALUDA
4021	I-85 SBL	SENECA RIVER	2	ANDERSON
8638	S-20-101	COLONEL CREEK	4	FAIRFIELD
1275	SC 41	BLACK MINGO CREEK	5	WILLIAMSBURG
7355	SC 34	BROAD RIV & SOU.RWY.	4	FAIRFIELD
6865	S-22-179	BLACK RIVER	5	GEORGETOWN
6338	S-32-231	CAMPING CREEK	1	LEXINGTON
7003	S-32-46	HOLLOW CREEK	1	LEXINGTON
4147	US 501	INTERCOASTAL WATERWAY	5	HORRY
1289	US 17/SAVANNAH HWY	RANTOWLES CREEK	6	CHARLESTON
1465	SC 41	LYNCHES RIVER	5	FLORENCE
9755	S-46-1132	LAKE WYLIE	4	YORK
2087	S-42-30	PACOLET RIVER	3	SPARTANBURG
687	S-26-616	INTRACOASTAL WATERWAY	5	HORRY
686	S-26-20	INTRACOASTAL WATERWAY	5	HORRY
10087	SR 404P-US 17	BACK RIVER	6	JASPER
2216	US 378	GREAT PEE DEE RIVER	5	MARION
1026	US 17 ALT	COMBAHEE RIVER	6	COLLETON
3651	US 301	LYNCHES RIVER	5	FLORENCE
1931	SC 7	ASHLEY RIVER	6	CHARLESTON
3079	I-126 WB	BROAD RIVER	1	RICHLAND
1707	US 52 WBL	LYNCHES RIVER	5	FLORENCE
6490	US 52 EBL	LYNCHES RIVER	5	FLORENCE
9546	US 52	BLACK RIVER OVERFLOW	5	WILLIAMSBURG
6144	I-20 EB	LYNCHES RIVER	1	LEE
6147	I-20 WB	LYNCHES RIVER	1	LEE
4638	I-20	BROAD RIVER	1	RICHLAND
7934	I-126 RAMP	I-126 I-26 SALUDA RIV RR	1	RICHLAND
3163	SC 24	THREE & TWENTY CREEK	2	ANDERSON
3162	SC 24	SENECA RIV-HARTWELL RES.	2	ANDERSON
926	SC 41	WANDO RIVER	6	BERKELEY
8571	S-30-29	REEDY RIVER	2	LAURENS
395	US 1	BLACK CREEK	4	CHESTERFIELD
45	US 76	LITTLE PEE DEE RIVER	5	MARION
9722	SC 22 RAMP	ICWW & S-1407	5	HORRY
2300	SC 171	FOLLY RIVER	6	CHARLESTON
10098	US 1 CONN	SAVANNAH RIVER	7	AIKEN
2298	SC 170	CHECHESSEE RIVER	6	BEAUFORT
9696	SC 22 EB	WACCAMAW RIVER	5	HORRY
9697	SC 22 WB	WACCAMAW RIVER	5	HORRY
5281	I-95 SB	LITTLE PEE DEE RIVER	5	DILLON
5280	I-95 NB	LITTLE PEE DEE RIVER	5	DILLON
10095	US 1	SAVANNAH RIVER	7	AIKEN
1965	US 21	CONGAREE RIVER	1	LEXINGTON
1391	US 15	GREAT PEE DEE RIVER	5	MARLBORO
1156	SC 41	BLACK RIVER	5	WILLIAMSBURG
3645	SC 213	BROAD RV & SOUTHERN RWY	4	FAIRFIELD
924	US 21	JOHNSON CREEK	6	BEAUFORT
10092	US 378	SAVANNAH RIVER	2	MCCORMICK
258	US 1	CONGAREE RIVER	1	RICHLAND
2301	SC 171	SOL LEGARE CREEK	6	CHARLESTON
7652	SC 45	REDIVERSION CANAL	6	BERKELEY
9500	S-20-55	WATEREE CREEK	4	FAIRFIELD
1371	US 378	LYNCHES RIVER	5	FLORENCE
454	US 176	BROAD RIVER	1	RICHLAND
3716	SC 93 EB	SENECA RIVER	3	OCONEE
3022	I-26	SALUDA RIVER	1	LEXINGTON
7651	US 52	REDIVERSION CANAL	6	BERKELEY
9765	S-4 WB	SENICA RIVER	3	OCONEE
1288	US 17 NB	WALLACE RIVER	6	CHARLESTON
8014	SC 97	BEAVER CREEK	1	KERSHAW
3164	SC 24	SIX & TWENTY CREEK	2	ANDERSON
3101	SC 9	LAKE BOWEN	3	SPARTANBURG
3110	S-42-37	LAKE BOWEN	3	SPARTANBURG
2305	SC 703	BREACH INLET	6	CHARLESTON
948	US 378	LITTLE RIVER	2	MCCORMICK
4604	I-20	SALUDA RIVER	1	LEXINGTON

Bridges with Underwater Inspections

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)
3719	S-37-184	CONEROSS CREEK	3	OCONEE
7653	S-8-35	REDIVERSION CANAL	6	BERKELEY
3941	US 123	TUGALOO RIVER	3	OCONEE
10090	SC 72	SAVANNAH RIVER	2	ABBEVILLE
3787	I-85 SB	THREE & TWENTY CREEK	2	ANDERSON
3784	I-85 NBL	THREE & TWENTY CREEK	2	ANDERSON
3712	I-85 SB	HARTWELL RESERVOIR	3	OCONEE
3710	I-85 NB	HARTWELL RESERVOIR	3	OCONEE
5250	I-95 NB	LAKE MARION RELIEF	7	CLARENDON
5259	I-95 SB	LAKE MARION RELIEF	7	CLARENDON
5902	US 17 SB	WALLACE RIVER	6	CHARLESTON
10091	SC 181	SAVANNAH RIVER	2	ANDERSON
3700	SC 213	BROAD RIVER	2	NEWBERRY
7014	S-36-28	HELLERS CREEK	2	NEWBERRY
1569	US 378 WB	BLACK RIVER	1	SUMTER
8970	S-8-9	DURHAM CREEK	6	BERKELEY
7013	S-36-28	CANNONS CREEK	2	NEWBERRY
1492	US 321	COOSAWHATCHIE RIVER	7	HAMPTON
1837	US 76	ROCKY BLUFF SWAMP (1)	1	SUMTER
1878	C-24-61	CUFFYTOWN CREEK	2	GREENWOOD
5589	SC 11	KEOWEE RIVER	3	OCONEE
3711	I-85 NB	FAIRPLAY CREEK	3	OCONEE
3713	I-85 SB	FAIRPLAY CREEK	3	OCONEE
1159	SC 184	ROCKY RIVER	2	ABBEVILLE
2928	S-13-346	LAKE ROBINSON	4	CHESTERFIELD
3797	S-4-71	LAKE HARTWELL	2	ANDERSON
559	SC 28	LONG CANE CREEK	2	MCCORMICK
3943	S-37-37	SENECA RIVER	3	OCONEE
3798	S-4-71	LAKE HARTWELL	2	ANDERSON
3488	I-26 WB	BOWEN LAKE (S.PAC. RV)	3	SPARTANBURG
3480	I-26 EB	BOWEN LAKE (S PAC RV)	3	SPARTANBURG
7723	S-39-15	HARTWELL LAKE	3	PICKENS
3841	US 17	ASHEPOO RIVER	6	COLLETON
9244	S-33-39	LITTLE RIVER	2	MCCORMICK
1599	SC 402	WADBOO SWAMP	6	BERKELEY
2302	SC 171	JAMES ISLAND CREEK	6	CHARLESTON
1287	US 17 ALT	SANTEE TAIL RACE CANAL	6	BERKELEY
8372	SC 391	SALUDA RIVER	2	NEWBERRY
5591	SC 183	LAKE KEOWEE	3	OCONEE
3946	S-37-67	BIG CHOESTOEA CREEK	3	OCONEE
6192	US 378 EB	BLACK RIVER	1	SUMTER
5158	S-42-59	PACOLET RIVER	3	SPARTANBURG
9444	S-30-307	RABON CREEK	2	LAURENS
7646	SC 184	SAVANNAH RIVER	2	ANDERSON
5592	SC 188	LAKE KEOWEE (CANE CK)	3	OCONEE
5359	SC 130	N.CANAL-LAKE KEOWEE	3	OCONEE
5358	SC 130	LAKE KEOWEE (S. CANAL)	3	OCONEE
1851	C-4-2126	LAKE HARTWELL	2	ANDERSON
887	SC 81	LITTLE RIVER	2	MCCORMICK
4644	I-20	BIG JACKSON CREEK	1	RICHLAND
2734	S-23-154	LITTLE CREEK	3	GREENVILLE
10156	SC 9	BROAD RIVER	4	CHESTER
1598	SC 45	DIVERSION CANAL	6	BERKELEY
607	US 25 BUS	SALUDA RIVER	2	LAURENS
1184	US 301	LITTLE PEE DEE RIVER	5	DILLON
8999	SC 61	EDISTO RIVER	6	DORCHESTER
3573	US 76 EBL	SIX & TWENTY CREEK	2	ANDERSON
3575	US 76 WBL	SIX & TWENTY	2	ANDERSON
7278	S-36-20	CAMPING CREEK	2	NEWBERRY
9404	SC 171	OAK ISLAND CREEK	6	CHARLESTON
5593	SC 188	LAKE KEOWEE (CROOKED CK)	3	OCONEE
1199	US 378	HOLLOW CK (LAKE MURRAY)	1	LEXINGTON
1200	US 378	HORSE CK (LAKE MURRAY)	1	LEXINGTON
3720	S-37-210	SENECA CREEK	3	OCONEE
477	SC 247	SALUDA RIVER	2	ANDERSON
2409	SC 133	TWELVE MILE CREEK	3	PICKENS
9547	US 52	BLACK RIVER	5	WILLIAMSBURG
3792	US 178	SIX & TWENTY CREEK	2	ANDERSON
2434	S-45-116	HOME SWAMP	5	WILLIAMSBURG
5707	S-16-332	INDIAN CREEK	5	DARLINGTON
558	SC 6	SPILLWAY DREHER SHOALS	1	LEXINGTON
7166	S-41-44	LITTLE SALUDA RIVER	2	SALUDA
6818	SC 274	BIG ALLISON CREEK	4	YORK
2160	US 21	BUCKHEAD CREEK (2)	6	COLLETON
3947	S-37-68	TRIB TO TUGALOO RIVER	3	OCONEE

Bridges with Underwater Inspections

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)
9718	SC 22 EB	ICWW	5	HORRY
9719	SC 22 WB	ICWW	5	HORRY
3615	S-12-141	ROCKY CREEK	4	CHESTER
5845	S-41-88	LAKE MURRAY	2	SALUDA
8961	S-2-1725	TRIB TO S EDISTO RIVER	7	AIKEN
9468	US 76	SCAPE ORE CREEK (NO. 3)	1	SUMTER
9467	US 76	SCAPE ORE CREEK (NO. 2)	1	SUMTER
9466	US 76	SCAPE ORE CREEK (NO. 1)	1	SUMTER
6688	C-24-95	MULBERRY CREEK	2	GREENWOOD
6799	S-45-585	KINGSTREE SWAMP	5	WILLIAMSBURG
5165	I-95	DOUGLAS SWAMP	1	SUMTER
1859	US 278	BUCK CREEK	7	BARNWELL
6140	I-20	UNNAMED STREAM	1	LEE
1576	SC 527	CHURCH BRANCH	1	SUMTER
1852	C-4-2126	LAKE HARTWELL BACKWATER	2	ANDERSON
853	US 17 ALT	GREAT SWAMP	6	COLLETON
2161	US 21	BUCKHEAD CREEK (1)	6	COLLETON
9212	S-26-309	JOINER SWAMP	5	HORRY
4696	S-3-342	CALL BRANCH	7	ALLENDALE
4814	S-26-430	CEDAR CREEK	5	HORRY
5094	S-26-144	BRANCH OF CAMP SWAMP	5	HORRY
6690	C-24-485	LITTLE COWHEAD CK	2	GREENWOOD
5095	S-26-569	SMITH SWAMP	5	HORRY
5091	S-25-20	UNNAMED -DITCH-	7	HAMPTON
9502	S-22-255	TRIB. TO WACCAMAW R/ICWW	5	GEORGETOWN
6122	I-20	SWIFT CREEK	1	KERSHAW
3781	I-85 NB	STEEL CREEK	2	ANDERSON
1726	S-28-18	SWIFT CREEK	1	KERSHAW
6121	I-20	TOWN CREEK	1	KERSHAW
126	US 278	DUCK CREEK	7	ALLENDALE
6141	I-20	BLACK RIVER	1	LEE
832	C-4-763	BEAVERDAM CR	2	ANDERSON
1266	SC 48	BACK SWAMP	1	RICHLAND
1235	S-2-105	BRIDGE CREEK	7	AIKEN

APPENDIX F

Appendix/Attachment Title

Bridges with Fracture Critical Members

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The NBIS require bridge-specific procedures be on file for bridges with FCMs. SCDOT is required to have procedures for the inspection of a bridge with FCMs in the Bridge File with FCMs on plans and FPDs.

Due to their nature, FCM inspections require more extensive planning and preparation. See Chapter 5 of the BIGD for applicable inspection procedures.

Information in Appendix F is current at the time of this document's publication. Contact BMO for updated information.

Appendix/Attachment Description

The bridges shown in this Appendix are bridges which have FCMs. This Appendix shall be maintained by the BIPM or BMO designee.

Bridges with Fracture Critical Members

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Superstructure Type (NBI 042)	Superstructure Type (Name) (NBI 042)
85	C-42-787	S.C.L. RAILROAD	3	SPARTANBURG	10	TRUSS - THRU
181	S-19-68	TURKEY CREEK	2	EDGEFIELD	10	TRUSS - THRU
228	US 17 SB	ASHLEY RIVER	6	CHARLESTON	16	MOVABLE - BASCULE
440	S-33-42	CUFFEYTOWN CREEK	2	MCCORMICK	10	TRUSS - THRU
611	S-33-117	LONG CANE CREEK	2	MCCORMICK	10	TRUSS - THRU
633	S-33-117	BOLD BRANCH	2	MCCORMICK	10	TRUSS - THRU
686	S-26-20	INTRACOASTAL WATERWAY	5	HORRY	17	MOVABLE - SWING
687	S-26-616	INTRACOASTAL WATERWAY	5	HORRY	17	MOVABLE - SWING
707	C-4-1285	BEAVER CR	2	ANDERSON	10	TRUSS - THRU
793	US 501	WACCAMAW RIV SCLRR L-123	5	HORRY	3	GIRDER AND FLOORBEAM SYSTEM
810	SC 23	STEVENS CREEK	2	MCCORMICK	10	TRUSS - THRU
832	C-4-763	BEAVERDAM CR	2	ANDERSON	10	TRUSS - THRU
868	S-23-14	REEDY RIVER	3	GREENVILLE	3	GIRDER AND FLOORBEAM SYSTEM
925	US 21	HARBOR RIVER	6	BEAUFORT	17	MOVABLE - SWING
969	US 76	C.N.& L. RAILROAD	1	RICHLAND	2	STRINGER/MULTI-BEAM OR GIRDER
1109	C-37-634	CHAUGA RIVER	3	OCONEE	10	TRUSS - THRU
1143	C-42-395	CLINCHFIELD RR	3	SPARTANBURG	10	TRUSS - THRU
1144	C-42-10	CEDAR SHOALS CR	3	SPARTANBURG	10	TRUSS - THRU
1146	C-42-1887	CLINCHFIELD RR	3	SPARTANBURG	10	TRUSS - THRU
1163	C-4-656	TRIB TO CHARLES CR	2	ANDERSON	10	TRUSS - THRU
1236	C-4-652	TRIB TO CHARLES CR	2	ANDERSON	10	TRUSS - THRU
1301	C-4-3328	PRICHARD BRANCH	2	ANDERSON	10	TRUSS - THRU
1302	C-4-9046	TRIB. LAKE HARTWELL	2	ANDERSON	10	TRUSS - THRU
1303	SC 703	INTRACOASTAL WATERWAY	6	CHARLESTON	17	MOVABLE - SWING
1541	S-37-32	W FORK LITTLE RIVER	3	OCONEE	10	TRUSS - THRU
1645	SC 93	SOUTHERN RAILROAD	3	PICKENS	2	STRINGER/MULTI-BEAM OR GIRDER
1674	C-4-2168	BIG BRUSHY CREEK	2	ANDERSON	10	TRUSS - THRU
1712	US 17 SB	SOUTH SANTEE RIVER	5	GEORGETOWN	3	GIRDER AND FLOORBEAM SYSTEM
1823	US 17 SB	NORTH SANTEE RIVER	5	GEORGETOWN	3	GIRDER AND FLOORBEAM SYSTEM
1915	C-4-989	BROAD MOUTH CRK	2	ANDERSON	10	TRUSS - THRU
1965	US 21	CONGAREE RIVER	1	LEXINGTON	3	GIRDER AND FLOORBEAM SYSTEM
2108	S-1-159	LONG CANE CREEK	2	ABBEVILLE	10	TRUSS - THRU
2127	C-4-2097	WILSON CR	2	ANDERSON	10	TRUSS - THRU
2295	C-4-866	WILSON CR	2	ANDERSON	10	TRUSS - THRU
2303	SC 171	WAPPOO CREEK	6	CHARLESTON	16	MOVABLE - BASCULE
2469	C-4-1104	ROCKY RIVER	2	ANDERSON	10	TRUSS - THRU
2656	C-4-855	WILSONS CR	2	ANDERSON	10	TRUSS - THRU
3178	C-4-7356	WILSON CR	2	ANDERSON	10	TRUSS - THRU
3186	US 21 BUS	BEAUFORT RIVER	6	BEAUFORT	17	MOVABLE - SWING
3607	US 17 NB	ASHLEY RIVER	6	CHARLESTON	16	MOVABLE - BASCULE
3618	S-13-104	LYNCHES RIVER	4	CHESTERFIELD	1	SLAB
3923	US 76 EB	GREAT PEE DEE RIVER	5	MARION	3	GIRDER AND FLOORBEAM SYSTEM
3996	S-44-16	TYGER RIVER	4	UNION	10	TRUSS - THRU
4260	C-4-2096	WILSONS CR	2	ANDERSON	10	TRUSS - THRU
4403	S-39-277	TWELVE MILE CREEK	3	PICKENS	10	TRUSS - THRU
7320	C-4-839	TRIB TO CROOKED CRK	2	ANDERSON	10	TRUSS - THRU
8516	I-526	COOPER RIVER	6	BERKELEY	10	TRUSS - THRU
9824	US 17	COOPER RIVER, TOWN CREEK	6	CHARLESTON	14	STAYED GIRDER
9826	RAMP OFF I-26 EB	I-26&RAMPSON US 17&US 52	6	CHARLESTON	2	STRINGER/MULTI-BEAM OR GIRDER
9832	US 17 SB	MEETING ST, I-26	6	CHARLESTON	2	STRINGER/MULTI-BEAM OR GIRDER
9973	L-834	INTRACOASTAL WATERWAY	5	HORRY	17	MOVABLE - SWING
10071	C-32-356	RAWLS CREEK	1	LEXINGTON	10	TRUSS - THRU
10090	SC 72	SAVANNAH RIVER	2	ABBEVILLE	3	GIRDER AND FLOORBEAM SYSTEM
10098	US 1 CONN	SAVANNAH RIVER	7	AIKEN	2	STRINGER/MULTI-BEAM OR GIRDER

APPENDIX G

Appendix/Attachment Title

Scour Critical Bridges

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The NBIS (*23 CFR 650.313 (e)*) requires South Carolina to identify bridges that are scour critical. Bridges that are scour critical must have a scour plan of action (POA) prepared to monitor known and potential deficiencies and to address scour critical findings. Bridges that are scour critical must be monitored in accordance with the POA located in bridge files.

FHWA uses NBI Item 113 to identify scour critical bridges:

- If NBI Item 113 has a numerical coding of 3 or less, the bridge is considered scour critical.
- If NBI Item 113 has a coding of "U", the foundation is unknown and the bridge is therefore considered scour critical.

A scour critical bridge is one with abutment or pier foundations which are rated as unstable due to

- Observed scour at the bridge site or
- A scour potential as determined from a scour evaluation study.

For bridges which have been determined to be scour critical, it will be necessary to take stream bed profiles at both the upstream and downstream fascia to comply with the FHWA mandated Scour POA.

The BIPM is responsible for maintaining the inventory of scour critical bridges. Only the BIPM or designee will update NBI Item 113.

The BITL must be aware, able to recognize and document changes which are occurring in the channel in the vicinity of the structures. These changes, documented by inspections, are to be used to assist in determining if the request for a re-evaluation of NBI Item 113 - Scour Critical Bridges is necessary.

FHWA Metric #18 requires:

- All bridges over water have a scour evaluation as indicated by NBI scour coding.
- All bridges have a documented scour evaluation assessing scour vulnerability.
- All bridges that are scour critical or with unknown foundations have a scour POA.
- All bridges subject to a triggering event are monitored in accordance with the POA.

Information in Appendix G is current at the time of this document's publication. Contact BMO for updated information.

Appendix/Attachment Description

The bridges shown in this Appendix are scour critical bridges. FHWA uses NBI Item 113 to identify scour critical bridges according to the *Coding Guide*.

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
2754	US 701	MAPLE SWAMP	5	HORRY	2	FOUNDATIONS UNSTABLE;IMMEDIATE ACTION REQUIRED
5045	I-95 NB	GREAT PEE DEE RIVER	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5105	US 1 NB	WATEREE RIVER	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10088	I-95 NBL	SAVANNAH RIVER	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10089	I-95 SBL	SAVANNAH RIVER	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6087	US 17 ALT	EDISTO RIVER	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
568	SC 121	SALUDA RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2439	SC 211	BROAD RIVER	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
343	SC 34	LITTLE RIVER	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6717	SC 9 NB	CATAWBA RIVER	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7761	S-2-110	N EDISTO RIVER	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7110	SC 213	LITTLE RIVER	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1246	US 21	BIG WATEREE CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4212	S-42-31	PETERS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
580	SC 49	FAIRFOREST CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
856	SC 34	BLACK CREEK	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7251	I-77 SBL	BIG WATEREE CK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7249	I-77 NBL	BIG WATEREE CK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9494	SC 145	BIG BLACK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7949	S-42-118	ENOREE RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5621	S-42-55	PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
270	US 15	EDISTO RIVER	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5456	SC 81	SALUDA RIVER & S-4-143	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1895	US 378	LITTLE SALUDA RIVER	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6409	SC 322	TURKEY CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6527	S-29-42	CLEMS BRANCH	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5129	S-37-34	CHAUGA CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7450	I-77 NB	LITTLE WATEREE CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7451	I-77 SB	LITTLE WATEREE CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3138	SC 211	BULLOCKS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7041	S-44-4	BIG BROWNS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7305	S-46-195	BIG DUTCHMAN CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4383	C-36-22	MUDLICK CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1276	US 21	STEEL CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7639	SC 184	HOGSKIN CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8069	SC 200	REEDY CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9336	SC 702	HALFWAY SWAMP CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4579	US 521	BEAR CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8143	S-11-68	BELLS BRANCH	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5869	S-44-324	GAULT CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7338	S-11-584	GOUCHER CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6586	S-44-359	BROCKS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6844	S-11-42	THICKETTY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6198	S-44-279	FAIR FOREST CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6778	SC 417	BENS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7165	SC 194	BIG CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2011	S-12-36	LITTLE ROCK CR	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4283	S-12-503	BEAVER DAM CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7436	S-11-128	MARTIN CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7634	S-46-72	BEAVERDAM CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7269	S-28-58	TRIB TO FLAT ROCK CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6448	S-13-46	BEAVER DAM CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3680	S-29-26	LITTLE LYNCHES CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7148	S-37-181	CANE CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7028	S-42-77	MIDDLE TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4925	S-4-41	HEN COOP CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2841	SC 146	ENOREE RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2870	S-46-64	ALLISON CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4160	S-29-770	HANGING ROCK CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1142	S-42-317	N. TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6103	S-23-156	ENOREE RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2588	US 176	GOODBYS SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7180	S-44-602	PINCKNEY CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2631	S-44-86	BIG BROWN CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4314	S-20-12	ROCKY CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2103	SC 5	TOOLS FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4315	S-20-101	MARTIN BRANCH	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2280	S-46-251	BR TO CATAWBA RIVER	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1205	US 76	CATFISH BRANCH	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2636	S-46-81	TOOLS FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8954	SC 901	TAYLORS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7316	S-4-53	HURRICANE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8216	S-44-522	TINKERS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8692	S-42-195	TRIB-BENS CK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8293	S-39-33	TRIB TO MIDDLE FORK CR	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
8409	S-4-118	CUPBOARD CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8065	C-13-62	WESTFIELD CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8381	S-39-179	TRIB TO 23 MI.CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7119	S-23-97	OIL CAMP CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9381	S-46-54	BR OF BIG ALLISON CR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5394	S-44-328	FANNING CREEK BR	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7845	C-42-367	TRIB TO BUCK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7401	S-39-158	GOLDEN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7623	C-42-989	TRIB NORTH PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6863	S-20-247	BR OF LITTLE RIVER	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7268	S-28-58	LITTLE FLAT ROCK CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7939	S-40-244	HOPES CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3524	C-42-682	TRIB TO NORTH TIGER RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7815	S-32-59	TRIB TO HOLLOW CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7747	C-42-922	TRIB NORTH PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7627	C-42-1916	TRIB TO ISLAND CK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7715	S-36-730	SECOND CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7632	S-46-22	JACKSON BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6937	S-42-195	BENS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6597	S-46-22	STEEL CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8392	S-42-107	TRIB TO PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7607	S-39-140	SHOAL CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7626	C-42-1912	ISLAND CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4399	S-39-159	TRIB TO PRATERS CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7857	C-42-946	OBED CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6022	S-46-11	CLARKS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7618	C-42-651	REEDY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8508	S-4-76	TRIB. TO ROCKY RIVER	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8513	S-4-258	RICHLAND CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8391	S-42-47	FOUR MILE CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8693	S-42-222	TRIB TO N. TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8333	S-11-52	BUFFALO CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7162	S-40-311	UNNAMED STREAM	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5533	S-23-633	TRIB REEDY RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2166	US 401	LYNCHES RIVER	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5690	I-95 NB	COMBAHEE RIVER	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3651	US 301	LYNCHES RIVER	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5040	I-95 NB	LYNCHES RIVER	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5692	I-95 SB	COMBAHEE RIVER	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5046	I-95 SB	LYNCHES RIVER	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
492	US 1	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3632	I-26 EB	FOUR HOLE SWAMP	6	BERKELEY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3633	I-26 WB	FOUR HOLE SWAMP	6	BERKELEY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2547	S-24-102	NINETY SIX CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1364	SC 41	LITTLE PEE DEE RIVER	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6757	SC 453	FOUR HOLE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6712	S-27-87	COOSAWHATCHIE RIVER	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9019	US 601	COOSAWHATCHIE RIVER	7	HAMPTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6547	US 501 NBL	LITTLE PEE DEE SWP-4	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
564	US 501 SBL	LITTLE PEE DEE SWP-4	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3693	US 1 NB	PEE DEE OVERFLOW (NO. 1)	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3694	US 1 NB	PEE DEE OVERFLOW (NO. 2)	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
811	US 1 SB	PEE DEE OVERFLOW (NO. 1)	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
812	US 1 SB	PEE DEE OVERFLOW (NO. 2)	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1099	US 176	INDIAN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
45	US 76	LITTLE PEE DEE RIVER	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1067	SC 341	LITTLE LYNCHES RV (2)	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7991	SC 9	LITTLE PEE DEE RIVER	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9428	US 301	SPARROW SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1518	US 1	LITTLE LYNCHES RIVER	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5281	I-95 SB	LITTLE PEE DEE RIVER	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5280	I-95 NB	LITTLE PEE DEE RIVER	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5832	US 301 NB	FOUR HOLE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1920	US 321	S. EDISTO RIVER	7	BAMBERG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6546	US 501 NBL	LITTLE PEE DEE SWP-3	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4785	US 378 BUS	LYNCHES LAKE	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6544	US 501 NBL	LITTLE PEE DEE SWP-1	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3316	S-24-27	NINETY SIX CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5410	SC 322	FISHING CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
540	SC 34	WILSON CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
562	US 501 SBL	LITTLE PEE DEE SWP-2	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
561	US 501 SBL	LITTLE PEE DEE SWP-1	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4954	S-11-61	LINDER CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7959	S-46-163	FISHING CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1985	S-1-40	CALHOUN CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
352	US 221	WARRIOR CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
283	US 52	LYNCHES LAKE	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
682	US 76	SPARROW SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1753	US 301 SB	FOUR HOLE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1371	US 378	LYNCHES RIVER	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6067	I-95 SB	GREAT SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6062	I-95 NB	GREAT SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6817	SC 97	BULLOCKS BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5748	S-24-42	NINETY-SIX CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6747	S-36-22	LITTLE RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2202	S-29-166	CAMP CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6439	S-11-164	THICKETTY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8123	S-2-212	SOUTH EDISTO RIVER	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6907	S-36-82	CANNON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2120	S-4-244	ROCKY RIVER	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
515	SC 64/BELLS HWY	BUCKHEAD CREEK TRIP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5010	US 15	BLACK CREEK	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
529	US 15	CROOKED CREEK	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2229	SC 3	NORTH EDISTO RIVER	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
494	US 52	JUNIPER CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1493	SC 363	COOSAWHATCHIE RIVER	7	HAMPTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7375	S-24-124	WILSON CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6440	S-11-165	THICKETTY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3896	S-24-397	BIG ROCK CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5875	S-46-101	LOVE CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2568	S-28-97	BEAVER DAM CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1889	US 176	DUNCAN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2997	SC 119	SAVANNAH RIVER SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6758	SC 453	FOUR HOLE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4185	S-36-244	BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2265	US 401	ROCK BLUFF CK (1)	1	SUMTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5713	S-2-1020	SHAWS CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5513	S-20-54	JACKSON CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3346	S-28-53	25-MILE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7735	S-40-841	LITTLE JACKSON CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5870	S-44-600	MILL CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7353	S-19-34	SHAVER CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8434	S-14-103	DEEP CREEK	7	CLARENDON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1878	C-24-61	CUFFYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3948	S-37-68	LONGNOSE CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8218	S-46-103	TOOLS FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5160	S-42-590	TRIB N TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3956	S-38-1148	CAW CAW SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2106	S-46-82	S. FORK FISHING CK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
738	SC 41	REEDY CREEK	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
526	US 15	EDISTO RIVER RELIEF	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
530	US 15	BRANCH TO EDISTO RIVER	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
537	US 25	CUFFEYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4773	I-95 NB	GR. PEE DEE SWP & F-RD	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4783	I-95 SB	GR. PEE DEE SWP & F-RD	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4784	I-95 SB	GR. PEE DEE SWP & F-RD	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4218	S-42-591	MIDDLE TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8583	S-38-50	FOUR HOLE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9436	S-25-13	WHIPPY SWAMP	7	HAMPTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6519	SC 3/HERITAGE RD	CYPRESS CREEK	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8505	S-2-49	SOUTH EDISTO RIVER	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6558	SC 11	CONEROSS CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7522	S-46-59	LITTLE TURKEY CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4596	S-30-102	LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4511	SC 41	BEAR SWAMP	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8186	S-32-104	LICK FORK BRANCH	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6716	S-28-775	TWENTY FIVE MILE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6602	SC 394	DEAN CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2688	S-11-133	IRENE RESERVOIR	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6167	S-36-56	BIG BEAVER DAM	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3140	S-46-166	STONY FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7054	S-46-1274	MUD CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6819	S-46-64	BEAVERDAM CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6446	S-12-353	BEAVER DAM CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5363	S-38-189	BULL SWAMP CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2345	S-19-75	SHAWS CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3723	I-26 WB	COW CASTLE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3880	SC 418	HUFF CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2528	SC 341	LYNCHES LAKE (NO. 1)	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3595	I-26 WB	CYPRESS SWAMP	6	BERKELEY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
1365	SC 41 ALT	BUCK SWAMP	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4416	SC 11	S PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3594	I-26 EB	CYPRESS SWAMP	6	BERKELEY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
854	US 17 ALT	IRELAND CREEK	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5928	US 17 ALT	SLANDS BRG-ASHLEY RIV	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
348	SC 9 BUS	BEAR CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1836	US 321	CRANE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3722	I-26 EB	COW CASTLE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6379	US 29 NB	NORTH TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7994	SC 51	MIDDLE SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6679	S-23-134	MIDDLE TYGER RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6339	US 76 EB	TOBYS CREEK	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6655	SC 453	FOUR HOLE SWAMP	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7303	S-43-37	RAFTING CREEK	1	SUMTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6170	S-36-58	BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7163	S-40-698	WATEREE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6795	S-44-438	COX CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2589	US 176	HORSE RANGE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7579	SC 97	WHITE OAK CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4955	S-11-61	CLARY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4172	S-33-38	BOLD BRANCH	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7940	S-40-804	CABIN CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5240	S-11-401	BR OF BOWEN RIVER	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3058	S-36-272	SECOND CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3414	S-37-324	CANE CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5238	S-11-87	STREAM	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5392	S-42-781	BR OF PETERS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4890	S-44-220	MITCHELL CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6445	S-12-198	BEAVER DAM CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4431	S-46-815	LITTLE ALLISON CK.	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4425	S-42-268	TRIB-PACOLET RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3987	S-42-538	LAWSON FORK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2517	S-19-140	SLEEPY CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5491	S-13-410	BIG BLACK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3913	S-30-399	BEAVER DAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3002	S-28-131	BIG PINE TREE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6822	S-46-72	LOVE BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6209	S-46-1461	WRIGHTS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5462	S-4-115	BIG GARVIN CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2548	S-24-166	HENLEYS CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4806	S-24-412	ROCKY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3936	S-36-587	BR TO LAKE MURRAY	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7521	S-46-59	BRYSON CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5237	S-11-76	HORSE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3892	S-24-44	BEAVERDAM CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5517	S-20-419	MORRIS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4353	S-30-52	BUCKHEAD CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5334	S-30-258	NW BR OF BOYD MILL POND	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5877	S-46-560	STONY FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6587	S-44-408	ROCKY CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5718	S-20-650	BR OF SAWNEYS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6131	S-28-696	WHITE OAK CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5793	S-29-12	BEAR CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4666	S-42-679	BR OF SHOALLY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2095	SC 114	SANDY RUN CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2367	S-24-164	HARD LABOR CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2170	S-20-54	MILLS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2210	S-30-344	BANKS CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
74	C-40-2391	GILLS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2255	S-42-184	PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8277	C-30-874	SOUTH DURBIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2585	C-36-99	CANNON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5992	C-36-503	CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5650	I-20 EB	N. EDISTO RIVER	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4777	I-95 SB	JEFFERIES CREEK	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
577	US 176	HOLSTON CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5653	I-20 WB	N. EDISTO RIVER	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4327	SC 288	MIDDLE SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4768	I-95 NB	JEFFERIES CREEK	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2729	SC 14	SOUTH TYGER RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
803	SC 200	BEAR CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4249	I-85 NBL	BRUSHY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2287	I-85 SBL	BRUSHY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4824	I-95 SB	GREAT SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1041	US 21	DUTCHMANS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
4823	I-95 NB	GREAT SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2566	SC 157	LITTLE LYNCHES RIVER	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2635	SC 557	CROWDERS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
858	US 52	JEFFERIES CREEK	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5506	SC 230	CHEVES CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
19	SC 64	JONES SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3512	S-42-494	LAWSONS FORK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1085	SC 72	DUNCAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1261	US 601	CONGAREE SWAMP (NO 3)	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1184	US 301	LITTLE PEE DEE RIVER	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1372	US 378	BIG SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4112	S-19-275	WIMBLEY BRANCH	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4585	US 601	LYNCHES RIVER	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2181	S-24-101	WILSON CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
518	SC 641	WILLOW SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6557	SC 11	COLONELS FORK CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6974	SC 51	JEFFRIES CREEK	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6085	I-95 NB	INDIAN FIELD SWAMP	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7185	SC 55	CLARKS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7347	SC 34	REEDY CREEK	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7479	SC 9 SBL	MITCHELL SWAMP	5	HORRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6086	I-95 SB	INDIAN FIELD SWAMP	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6262	I-20 EB	JEFFERIES CREEK	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8047	S-44-52	SUGAR CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6265	I-20 WB	JEFFERIES CREEK	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8173	S-24-398	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7559	SC 403	DEEP HOLE SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4843	S-30-202	LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4634	S-39-222	TWELVE MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2488	S-11-86	KINGS CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6846	S-13-770	FORK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7374	S-24-39	ROCKY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4187	S-36-342	BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7063	S-4-212	BIG CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6935	S-42-86	FERGERSON CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2721	S-19-146	DURKES POND BR	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4197	S-39-2	WOLF CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3306	S-23-42	TRIB TO N SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3168	S-4-57	SIX & TWENTY MILE CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2689	S-11-265	MANNING CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7982	S-11-60	BR OF SUCK CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5910	S-13-81	JUNIPER CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7089	S-13-109	FORK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5514	S-20-302	MC-CLURES CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5717	S-20-303	EAST FORK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3931	S-36-350	HELLERS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4622	S-36-359	BRANCH OF BIG CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3705	S-36-363	TRIB TO LITTLE RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3364	S-30-307	LONG LICK BRANCH	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4848	S-30-531	BR OF ENOREE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3741	S-40-56	LITTLE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6380	S-42-30	TRIB TO PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4683	S-46-820	BULLOCKS CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6947	S-46-1273	CONRAD CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5641	S-46-996	SILVER CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5630	S-44-69	MENG CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5715	S-20-90	BR OF WEST FORK CR	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2584	S-36-164	CRIMS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7721	S-38-135	CATTLE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6026	S-46-1102	BR TO BUCKHORN CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4927	S-4-853	BIG CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4926	S-4-207	BROAD MOUTH CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5688	S-13-49	BROCKS MILL STREAM	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4489	S-13-43	FORK SWAMP CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4145	S-24-180	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3922	S-33-52	ROCKY CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5794	S-29-766	HANGING ROCK CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4844	S-30-314	TYLERVILLE CK.	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6575	S-40-86	CABIN CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3452	S-39-222	GOLDEN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5412	S-46-766	BR TO CONRAD CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5390	S-42-755	FAWN CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9753	S-42-974	MEADOW CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6957	S-4-244	HEN COOP CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6443	S-12-70	SMALL CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
5084	S-24-387	BR TO MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5285	S-20-304	MORRIS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7147	S-36-684	SCOTTS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3929	S-36-17	BIG CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5150	S-40-1436	NORTH BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3756	S-42-183	PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2820	S-39-160	TRIB TO KEOWEE RIVER	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5631	S-44-389	BIG BROWN CR	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4432	S-46-815	BR TO LITTLE ALLISON	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3513	S-42-496	LITTLE CHINQUEPIN CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2899	S-4-435	TRIB TO ROCKY RIVER	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2690	S-12-190	TRIB TO ROCKY CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3322	S-24-230	TOWNSEND CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3059	S-36-272	TRIB. TO SECOND CR	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6311	S-28-349	25-MILE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2828	S-40-57	HARMON CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7720	S-38-39	BETTY BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6365	S-39-325	MAD DOG CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3433	S-38-160	BIG BEAVER CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5177	S-44-324	SANDY RUN CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6208	S-46-1106	MITCHELL CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5626	S-42-769	JIMMIES CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7530	S-2-79	CEDAR CREEK #1	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2650	S-4-294	WILSONS CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3169	S-4-458	CHEROKEE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5515	S-20-302	CHICKEN CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6089	S-20-30	LITTLE CEDAR CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5531	S-23-149	BRUSHY CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3932	S-36-353	BR OF CANNON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3368	S-30-314	BR OF WARRIOR CK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3743	S-40-228	SMITH BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4884	S-40-1388	HORSE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4433	S-46-819	TRIB TO GRIST BR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3580	S-4-469	NESBIT CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5680	S-11-285	BLUE BRANCH	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7439	S-13-30	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6444	S-12-70	HICKLIN BRANCH	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5716	S-20-303	BR OF EAST FORK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7256	S-20-85	MCCULLY CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7452	S-20-63	CROOKED RUN CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3918	S-32-59	LITTLE CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3912	S-30-398	DIRTY CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5331	S-29-100	GILLS CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3359	S-30-38	SIMMONS CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5151	S-40-1694	BEASLEY CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6768	S-40-2385	UNNAMED STREAM	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5876	S-46-101	S. FORK FISHING CK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8045	S-44-24	BRUSHY CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7424	S-4-231	CUFFIE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7531	S-2-206	SHAW'S CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4075	S-12-462	TRIB TO SANDY RIVER	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5487	S-11-388	LIMESTONE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5740	S-23-440	GILDER CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4146	S-24-398	TRIB. OF SALUDA RIVER	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3054	S-36-97	MUD CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4356	S-30-93	BR OF MOUNTAIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4664	S-42-224	TRIB TO S. TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7053	S-46-963	MANCHESTER CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5627	S-42-775	TWO MILE CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2256	S-42-184	JAMISON CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2431	S-44-86	HUGHES CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2291	S-4-291	BIG BEAVERDAM CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2182	S-24-123	BEAVERDAM CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2169	S-20-54	MORRIS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2357	C-23-27	GROVE CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2258	S-42-209	SPIVEY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2075	S-39-159	PRATERS CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2365	S-24-50	HARD LABOR CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2049	S-30-86	BEAVER DAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2221	S-36-38	CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2252	S-41-98	HALFWAY SWAMP CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2430	S-44-86	LITTLE BROWN CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2231	S-38-80	SANDY RUN CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5582	C-36-249	TIMOTHY CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9235	C-30-523	NORTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
9236	C-30-614	DURBIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1220	SC 210	PROVIDENCE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
24	US 78	CATTLE CREEK	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4775	I-95 SB	LAKE SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1982	S-42-44	LAWSONS FORK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3725	US 176	PROVIDENCE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1592	SC 88	THREE & TWENTY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
723	US 52	WESTFIELD CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4766	I-95 NB	LAKE SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1128	US 378	RED BANK CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1987	US 1	SHAWS CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5021	I-95 SB	POCCOSIN SWAMP	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6246	SC 150	GOUCHER CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2530	SC 341	LYNCHES LAKE (NO. 3)	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3356	I-26 EB	DUNCAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1515	US 321	BLACK SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3342	US 521	SWIFT CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1413	SC 185	LONG CANE CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5018	I-95 NB	POCCOSIN SWAMP	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4540	SC 101	SOUTH TYGER RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3358	I-26 WB	DUNCAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5837	SC 11	OOLENOY RIVER	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4328	SC 417	HORSE PEN CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5411	SC 322	WILDCAT CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1338	SC 184	TURKEY CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3343	SC 261	SWIFT CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
916	SC 557	BEAVER DAM CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1056	US 25	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2529	SC 341	LYNCHES LAKE (NO. 2)	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3460	SC 48 WB	GILLS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
915	SC 322	TOOLS FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2098	SC 261	PAISLEY SWAMP	5	WILLIAMSBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
882	US 401	BLACK RIVER	1	LEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
912	SC 274	MILL CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1659	SC 72	FISHING CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8165	S-23-455	REEDY RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2617	S-41-122	BIG CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3047	S-36-32	INDIAN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7012	SC 9	CROOKED CREEK	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8510	S-4-107	HEN COOP CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8164	S-23-451	PAYNE BRANCH	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8598	SC 527	CLAPP SWAMP	5	WILLIAMSBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7886	S-19-53	DEEP STEP BRANCH	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6333	I-20 EB	NEWMAN SWAMP	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8270	S-30-42	BURNT MILL CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
991	SC 28	CALHOUN CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6459	SC 212/WILLIAMS RD	BUCKHEAD CREEK (2)	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6334	I-20 WB	NEWMAN SWAMP	5	DARLINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6499	S-23-506	REEDY RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4182	S-36-65	MUDLICK CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6180	S-39-49	LITTLE ESTATOE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6943	S-44-446	MILL CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7412	S-44-481	ISAACS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3894	S-24-285	ROCKY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4189	S-36-481	GILDERS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3970	S-39-222	RICES CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5205	S-4-247	HEN COOP CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2878	S-1-37	HOGSKIN CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7766	S-11-63	GOFORTH CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4173	S-33-86	ROCKY CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3704	S-36-351	SECOND CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3668	S-24-271	CORONACA CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2540	S-23-40	SOUTH SALUDA RIV	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4854	S-36-500	HELLERS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6010	S-41-189	WEST CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6110	S-24-459	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4201	S-39-250	MACHINE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7265	S-24-39	CORONACA CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5567	S-29-185	CAMP CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4842	S-30-97	BEAVERDAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5844	S-41-21	HALFWAY SWAMP CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1621	US 78	POLK SWAMP	6	DORCHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5636	SC 322	STONY FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5833	US 301 NB	GOODBYS CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6037	S-4-67	TRIB TO LITTLE RIVER	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
5908	S-11-431	MORGAN CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4554	S-24-382	LITTLE MOUNTAIN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6878	S-24-490	BIG ROCK CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5313	S-24-186	CUNNING FORD CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6994	S-28-53	TWENTY FIVE MILE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8092	C-39-1042	TOWN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3955	S-38-1148	CAW CAW SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6357	S-38-60	LIMESTONE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4430	S-46-759	BR TO BIG ALLISON CK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4891	S-44-267	MILL CR BRANCH	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1902	S-42-1858	TRIB TO PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6605	S-2-264	ROCKY SPRINGS CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6437	S-11-51	PEOPLES CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3667	S-24-268	ROCKY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4533	S-20-294	MANNS BRANCH	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4337	S-24-44	BR. TO CUFFEYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7571	S-26-19	LAKE SWAMP	5	HORRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5989	S-36-66	BR OF BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7279	S-36-49	BEAVER DAM CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4382	S-36-405	BRANCH OF CAMPING CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4361	S-30-425	BR OF RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2574	S-30-19	CANE CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5414	S-46-766	BR - CONRAD CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3559	S-46-818	GRIST CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2861	S-44-12	MCCLURE CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2904	C-4-4156	RICHLAND CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5907	S-11-63	GOFORTH CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3317	S-24-54	BR OF LONG CANE CR.	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3666	S-24-134	REEDY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7376	S-24-148	HARD LABOR CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4805	S-24-386	BR OF WILSON CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5085	S-24-418	BR OF NINETY-SIX CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5086	S-24-418	BR OF NINETY-SIX CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3706	S-36-366	WELCH CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3934	S-36-376	REEDER BRANCH	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3921	S-33-40	LEE CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2782	S-30-91	LAKE GREENWOOD BAY	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5329	S-28-588	LITTLE BUFFALO CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3509	S-42-196	TIMS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6183	S-40-960	TRIB TO MILL CR NO. 1	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7062	S-4-164	BR OF THREE & TWENTY CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7878	S-13-46	LITTLE BEAVERDAM BR	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7882	S-13-271	BR-ROCK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5750	S-24-456	BR OF HARD LABOR CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3893	S-24-103	THOMPSON CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7111	S-20-30	BRANCH OF CEDAR CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4363	S-30-481	BR OF CANE CK.	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3063	S-36-572	SECOND CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3361	S-30-95	SOUTH DURBIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6373	S-40-1889	CRANE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6926	S-40-1912	TRIB TO BROAD RIVER	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3468	S-41-192	TRIB TO LTL SALUDA RV	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7499	S-38-195	MIDDLE PEN CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7183	SC 512	PAISLEY SWAMP (NO. 2)	5	WILLIAMSBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1901	S-42-1858	BUCK BRIDGE	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4254	S-4-466	DOUBLE BRANCH	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5681	S-11-296	PEOPLES CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7883	C-13-143	N. PRONG CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2572	S-29-195	CAMP CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3053	S-36-96	GARRISON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2766	S-28-305	BUFFALO CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5790	S-28-631	UNNAMED STREAM	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4358	S-30-416	BEAVER DAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6780	S-42-62	TRIB TO S TYGER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6827	S-46-1255	BR MANCHESTER CR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7497	C-37-523	N. FORK LITTLE RIVER	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2871	S-46-74	MITCHELL BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6411	S-46-1474	MORRIS BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2898	S-4-370	LITTLE BEAVERDAM CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2720	S-19-72	TIGER CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5299	S-23-958	ROCKY CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5518	S-20-419	BR OF MORRIS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4856	S-36-900	BR TO HELLERS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4571	S-28-47	SPEARS CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7408	S-40-2439	UNNAMED CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
6004	S-38-190	LONG BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5413	S-46-766	CONRAD CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3432	S-38-160	LITTLE BEAVER CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5389	S-42-651	BEAVERDAM CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5207	S-4-300	LITTLE GARVIN CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3160	S-2-733	UNNAMED STREAM	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7341	S-13-843	BR THOMPSON CR	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6438	S-11-117	BR OF GILKEY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7435	S-11-128	GOUCHER CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6441	S-11-499	PHILLIPS CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3319	S-24-225	BR TO HENLEY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5519	S-20-420	UNNAMED STREAM	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5525	US 17 ALT	SUMMONS SWAMP	5	GEORGETOWN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8255	S-20-94	UNNAMED STREAM	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4847	S-30-522	BUCKHEAD CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4184	S-36-244	BRANCH OF BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3362	S-30-95	REEDY CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5791	S-28-651	HORSE HEAD BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4359	S-30-417	BEAVER DAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4344	S-28-87	MILLS CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6182	S-40-960	TRIB TO MILL CR NO. 2	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6914	S-38-1255	PROVIDENCE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4238	S-46-50	MANCHESTER CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6035	S-4-67	CORNER CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6038	S-4-208	CUPBOARD CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7077	S-11-38	BR TO LITTLE THICKETTY	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2697	S-13-157	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7337	S-11-293	BR OF THICKETTY CK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6877	S-24-456	BEAVERDAM CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3321	S-24-229	BR OF LONG CANE CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5083	S-24-374	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4186	S-36-271	TRIB TO LAKE MURRAY	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3935	S-36-407	BIG CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4188	S-36-408	TRIB TO LAKE MURRAY	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4168	S-32-232	TRIB TO WATEREE CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4855	S-36-510	SANDY RUN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4357	S-30-415	BEAVER DAM CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4360	S-30-419	LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2615	S-41-31	PERSIMMON CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7580	S-28-13	BEAVER CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2762	S-28-40	GRANNYS QUARTER CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3003	S-28-562	SWIFT CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5137	S-38-184	BOLAN MILL	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5640	S-46-995	STONY FORK CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2632	S-44-113	HOBSON CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2121	S-4-246	CUPBOARD CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2343	S-19-41	BR OF S EDISTO RIVER	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2041	S-24-48	REEDY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2397	S-36-505	CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2595	S-38-92	INDIAN CAMP BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2096	S-44-87	PADGETTS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2289	S-4-218	DOUBLE BRANCH	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2522	S-20-214	LITTLE CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2215	S-32-76	LIGHTWOOD KNOT CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3076	S-39-80	WOLF CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2546	S-24-95	CAMP CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2206	S-30-46	SIMMONS CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2541	S-23-40	SALUDA OVERFLOW	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2058	S-36-98	BR OF CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1842	S-46-181	LITTLE ALLISON CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2432	S-44-196	JOHNS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2089	S-42-115	HACKER CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2245	S-40-405	WATEREE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2307	S-11-113	TRIB TO PACOLET RIVER	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2382	S-28-129	BELL BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1974	S-38-200	BUSHY BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2599	S-38-202	KETTLE BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2279	S-46-170	MCCLURES BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2386	S-30-107	REEDY CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2064	S-37-181	BEATY CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5972	C-30-532	SOUTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8472	C-36-787	TRIB TO CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8905	C-36-514	TRIB TO CANNONS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6689	C-24-289	CUFFYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
736	SC 336/TILLMAN RD	GREAT SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
50	US 1	WHITES CREEK	5	MARLBORO	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
426	US 521	GRANNEYS QUARTER CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1385	SC 101	NORTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1260	US 178	CAW CAW SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
742	SC 183	CANE CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
148	US 176	PADGETTS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2808	SC 183	CONEROSS CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4744	I-95 NB	BIG REEDY CREEK	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
885	US 21	CONGAREE CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2826	SC 215	CRANE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2590	US 301 SB	GOODBYS CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5931	S-19-34	HORN CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4748	I-95 SB	BIG REEDY CREEK	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
350	SC 75	DELANEY CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1765	SC 56	FAIRFOREST CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1366	SC 41 ALT	BUCK SWAMP	5	DILLON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3264	SC 230	ANDERSON BRANCH	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1748	US 176	KINGS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3724	US 176	PROVIDENCE SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3132	SC 49	BIG BROWNS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3133	SC 49	LITTLE BROWNS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3131	SC 49	MENG CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3561	SC 71	CALHOUN CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1876	US 301	DOUGLAS SWAMP	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
904	SC 49	CEDAR SHOALS_CR.	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
279	SC 200	WATEREE CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8359	S-28-36	TWNEY FIVE MILE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2722	S-19-311	BEECH CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2901	S-4-439	WILSONS CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2060	S-36-170	CRIMS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7638	SC 184	JOHNSON CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
993	SC 28	PARK CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3895	S-24-288	NINETY SIX CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2582	S-36-58	GARRISON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2079	S-41-43	BIG CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2284	S-46-816	WOLF CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8553	S-23-159	GROVE CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2268	SC 72	CANE CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1595	SC 252	HEN COOP CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8406	S-2-29	SHAWS CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6458	SC 212/WILLIAMS RD	BUCKHEAD CREEK (1)	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8272	S-30-64	WALNUT CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8083	S-30-54	LONG LICK BRANCH	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8100	S-42-186	BUCK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8254	S-20-48	MORRIS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8346	S-20-115	CEDAR CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8181	S-30-40	WARRIOR CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8273	S-30-82	BURRIS CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7881	S-13-48	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8512	S-4-208	BROADWAY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7557	S-19-75	BEECH CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7299	S-42-108	TRIB TO PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7533	S-4-61	HEMBREE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8251	S-19-34	BURKHALTER CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4350	SC 66	INDIAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8212	S-44-25	SUGAR CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6936	S-42-88	KELSEY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7746	C-42-975	MEADOW CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5353	S-36-81	BR OF ENOREE RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4849	S-30-563	WALNUT CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5333	S-30-53	DUNCAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5146	S-39-291	SIX MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5609	S-39-158	RICES CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4388	S-37-172	W FORK LITTLE RIVER	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6288	S-19-18	LITTLE TURKEY CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3641	S-19-61	ROCKY CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7453	S-20-362	LITTLE CEDAR CR	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2771	S-29-765	HANGING ROCK CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2605	S-39-23	TOWN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4449	S-4-56	18 MI.CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2464	S-4-201	BEAR CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2523	S-20-214	BIG CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3663	S-23-90	SOUTH SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3682	S-30-34	MILLERS FORK CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7755	C-44-175	TINKER CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
7743	C-42-482	DUTCHMAN CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7984	S-11-286	KINGS CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6861	S-20-233	BIG CEDAR CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2521	S-20-151	SAWNEYS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6168	S-36-56	BR OF BIG BEAVERDAM	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5814	SC 219	BRANCH OF CANNON CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3753	S-41-449	MOORES CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7153	S-39-64	EIGHTEEN MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6823	S-46-195	MANCHESTER CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7043	S-44-440	BR LITTLE BROWN CK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2516	S-19-51	BEAVERDAM CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7570	S-24-44	CUFFEYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6871	S-23-920	MOUNTAIN CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7112	S-20-408	MANNS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3933	S-36-376	SANDY RUN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5126	S-36-506	BR TO LAKE GREENWOOD	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6998	S-29-614	HANNAH CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6719	S-29-34	CAMP CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7292	S-40-592	BR OF WATEREE CK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6794	S-44-434	BUSHY CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6792	S-44-19	SPEARS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7793	S-23-30	BRUSHY CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3703	S-36-315	TIMOTHY CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2614	S-40-643	HOPES CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7520	S-44-383	MENG CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7042	S-44-440	LITTLE BROWN CK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3795	SC 252	BLUE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2887	S-2-732	GOODLAND CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2649	S-4-294	EAST BEARDS CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8144	S-12-34	WHITESIDES BRANCH	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6640	S-13-768	MILL CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6687	S-24-489	BR TO CORONACA CR	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7494	S-36-343	TRIB TO BUSH RIVER #2	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4597	S-30-482	BR OF SHELL CK.	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5354	S-36-546	BR TO BIG CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2785	S-30-267	GRANNY CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3752	S-41-107	TRIB TO LTL SALUDA RV	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5825	S-37-548	PERKINS CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3461	S-40-205	SMITH BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3759	S-42-188	SHOALLY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7021	S-39-113	WEAVER CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3453	S-39-222	TRIB TO GOLDEN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5391	S-42-755	BR OF FAWN CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7880	S-13-48	BR OF THOMPSON CR	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7550	S-13-40	PHYLISS BRANCH	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6688	C-24-95	MULBERRY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4532	S-20-294	GIBSON BRANCH	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2550	S-24-166	TOLBERTS BRANCH	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2581	S-33-114	BYRD CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5107	S-28-47	HAIGS CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4838	S-28-755	TRIB TO LITTLE SWIFT CRK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3466	S-40-2375	SMITH BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7397	S-38-71	TAMPA CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3454	S-39-222	TRIB TO GOLDEN CK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5161	S-42-906	KELSEY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6830	S-46-1321	BR TO BEAVERDAM CR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4665	S-42-678	TRIB N. TYGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3579	S-4-169	SIX & TWENTY CCREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7078	S-11-141	BRANCH OF KINGS CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7441	S-13-916	UNNAMED STREAM	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3232	S-13-639	WILSON BRANCH	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7394	S-36-692	TRIB TO CAMPING CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4846	S-30-516	DURBIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4171	S-33-34	ROCKY CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8460	S-28-45	BIG PINE TREE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3467	S-41-68	PERSIMMON CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3471	S-41-255	BR OF PERSIMMON CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5374	C-39-1635	TRIB TO TWELVE MILE CRK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5610	S-39-166	TRIB OF 23 MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6787	C-42-8532	TRIB PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6828	S-46-1230	TURKEY CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6948	S-46-1287	BR MANCHESTER CR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4215	S-42-349	WOLFE CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2645	S-4-47	BIG GENEROSTEE CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6416	S-2-79	CEDAR CREEK #2	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
4920	S-2-1139	UNNAMED STREAM	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4247	S-2-1166	CRUM BRANCH	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7088	S-13-20	BEAVER CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9752	S-11-612	STREAM	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5076	S-23-978	TRIB-MIDDLE TYGER RV	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3889	S-23-333	GILDER CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2743	S-24-104	BR TO MOUNTAIN CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5119	S-32-945	UNNAMED STREAM	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7493	S-36-343	TRIB TO BUSH RIVER #1	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3363	S-30-101	BR OF LICK CK.	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6370	S-40-66	CABIN BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7291	S-40-232	BEAR CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6769	S-40-2387	SPEARS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4874	S-38-1608	SALEM CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8379	S-38-1609	TRIB TO GOODBYS SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4879	S-39-283	TRIB TO BRUSHY CK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2609	S-39-135	HAMILTON CR	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8292	S-38-80	CATTLE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6829	S-46-1257	TURKEY CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2461	S-4-156	WEST BR OF WILSON CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4442	S-2-1760	TRIB TO LTL HORSE CRK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7340	S-13-40	BR LITTLE FORK CR	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2552	S-24-178	BR BIG CURL TAIL CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6876	S-24-108	LITTLE JOHN CR.	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6661	S-20-41	HORSE BRANCH	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5516	S-20-317	BR OF DUTCHMAN CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5571	S-32-1140	BEAR CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5792	S-28-652	BR GRANNIES QUARTER CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4850	S-30-565	LAKE GREENWOOD	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8882	S-28-15	BIG PINE TREE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3979	S-41-78	PERSIMMON CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2618	S-41-123	PERSIMMON CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2830	S-41-150	WARREN BRANCH	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5382	S-41-281	TRIB TO LAKE MURRAY	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6762	S-38-1263	COOPER SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7602	S-39-26	CARPENTER CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6821	S-46-72	TRIB TO LOVE BR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3737	S-39-230	BRUSHY CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4439	S-2-108	ETHERIDGE MILL POND	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6420	S-4-209	CUPBOARD CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7551	S-13-52	INDIAN CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7767	S-13-54	CAT TAIL BRANCH	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5489	S-13-41	LITTLE FORK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4807	S-24-431	BR OF NINETY SIX CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5749	S-24-456	BR TO HARD LABOR CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6691	C-24-500	HARD LABOR CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6488	S-20-378	CROOKED RUN CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6555	S-36-638	CRIMS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3060	S-36-273	SCOTT CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3061	S-36-277	BR OF BIG BEAVERDAM	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2197	S-28-313	PINE TREE CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6714	S-28-90	SWIFT CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5375	S-40-985	UNNAMED STREAM	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7293	S-40-2480	BR OF WATEREE CK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2896	S-4-246	PEA CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4253	S-4-83	W. BR OF WILSON CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2518	S-19-423	BRIDGE TO CYPER CR	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7664	S-13-54	BR OF BIG BLACK CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6254	S-13-54	WILSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4129	S-23-94	TRIB TO ENOREE RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3018	S-30-300	BR OF SHELL CK.	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3911	S-30-303	BR OF ENOREE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2763	S-28-101	BEAR CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2767	S-28-568	TRIB TO TOWN CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4424	S-42-219	GRAYS CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6599	S-46-72	BR OF LOVE BR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3730	S-38-166	SADDLER SWAMP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6796	S-44-439	UNNAMED STREAM	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6212	S-2-151	GULLY CREEK	7	AIKEN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4725	S-12-16	MOBLEY CREEK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3231	S-13-585	WILSON BRANCH	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7087	S-12-752	BR OF CONRAD CK	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2744	S-24-104	BR TO MOUNTAIN CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5087	S-24-422	BR OF BIG ROCK CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7585	S-32-29	STEVENS CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
6169	S-36-58	SCOTTS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4380	S-36-187	BRANCH OF BUFFALO CREEKK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4614	S-33-65	ROCKY CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4345	S-28-449	BR PINE TREE CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4573	S-28-87	TRIB LITTLE LYNCHES RIV	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4575	S-28-87	TRIB LITTLE LYNCHES RIV	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4355	S-30-80	WALNUT CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7734	S-40-220	TWENTY-FIVE MILE CK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2616	S-41-82	TRIB TO BIG CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6377	S-41-154	MOUNTAIN CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7612	S-40-2514	UNNAMED CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3469	S-41-252	BR OF MINE CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4873	S-38-1607	GIN BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5834	S-38-117	TRIB TO BETTY BR	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4872	S-38-161	TURKEY BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7301	S-42-554	TRIB TO ENOREE RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4222	S-44-19	BUFFALO CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2515	S-19-40	LOG CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2370	S-24-180	TURKEY CKEEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2388	S-30-340	MOUNTAIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2071	S-38-475	TRIB MIDDLE PEN BR.	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2406	S-38-77	LITTLE LIMESTONE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2633	S-44-233	MITCHELL CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2346	S-19-84	ACADEMY BRANCH	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2042	S-24-93	BR TURKEY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2201	S-29-163	RUM CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2259	S-42-214	RAINBOW LAKE	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2081	S-41-59	TRIB TO RICHLAND CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2249	S-41-65	SALEM BRANCH	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2598	S-38-199	BIG POPLAR CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2116	SC 412	TRIB BIG GENEROSTEE CR.	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2347	S-19-149	SHAWS CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2242	S-39-168	TRIB TO GEORGES CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2419	S-42-930	PAGE CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2269	S-44-18	PADGETTS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5957	S-24-428	DUNNS CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2176	S-23-117	BURBAN FORK CRK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2052	S-32-102	BULL SWAMP CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2414	S-41-37	ROCKY CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8360	S-28-549	TRIB BIG PINE TREE CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2097	S-44-241	JUMPING RUN CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2342	S-19-41	S. BR BEECH CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2250	S-41-65	BIG CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1833	S-38-39	S. EDISTO RIVER SWP	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7154	S-39-113	WEAVER CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2209	S-30-113	BR TO LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2381	S-28-128	HORSE HEAD BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2080	S-41-59	TRIB TO RICHLAND CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2238	S-39-25	TRIB TO OOLENOY RIVER	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1993	S-4-238	DEVIL FORK CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2123	S-4-280	SIX & TWENTY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2368	S-24-166	TRIB OF HENLEYS CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2061	S-36-276	LITTLE BEAVERDAM CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2396	S-36-342	BIG BEAVER DAM CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2059	S-36-98	BR OF CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2078	S-41-31	INDIAN CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2208	S-30-84	BURNT MILL CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8763	C-30-1381	BR TO N. RABON CK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8365	C-30-513	BR TO WARRIOR CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6860	C-19-117	BR TO CEDAR CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9446	C-30-457	BR TO REEDY RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9347	C-30-564	NORTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4190	C-36-483	INDIAN CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9237	C-30-620	LITTLE DURBIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8343	S-19-35	TURKEY CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3407	C-36-491	SECOND CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6330	C-30-767	MOUNTAIN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9445	C-30-433	LONG LICK BRANCH	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7261	S-23-124	SOUTH SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7283	S-39-51	TWELVE MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3406	C-36-430	TRIB TO GARRISONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8276	C-30-548	NORTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6983	C-24-177	REEDY BRANCH	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8792	C-42-90	PAULINE CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2100	SC 261	INDIANTOWN SWAMP	5	WILLIAMSBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
855	US 17 ALT	GREAT SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
692	US 501_BUS	SMITH SWAMP	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2203	US 76	LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2099	SC 261	BOGGY SWAMP	5	WILLIAMSBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3142	SC 71	PENNY CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
853	US 17 ALT	GREAT SWAMP	6	COLLETON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5984	SC 576 EB	SMITH SWAMP	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1212	US 76	RAMSEY CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5584	SC 11	LITTLE CANE CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6248	SC 150	LIMESTONE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2039	S-23-107	LAUREL CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5985	SC 576 WB	SMITH SWAMP	5	MARION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5409	SC 5	FISHING CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
955	US 176	CRIMS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4530	C-19-280	BR TO LITTLE STEVENS CR	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8442	C-19-414	BR TO LOG CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4165	S-30-380	GINGER CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4113	S-20-101	MARTIN BRIDGE	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2119	S-4-116	TONEY CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7290	S-40-69	TRIB COLONEL'S CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10318	S-40-1335	PERSIMMON FORK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3746	S-40-734	DRY BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1978	S-40-1352	NORTH BRANCH	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4886	S-40-1571	MYERS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4111	S-19-275	FLAT ROCK CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9343	C-28-1307	GRANNIES QUARTER CRK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9348	C-30-681	BEARDS CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4205	S-40-1307	TOMS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
617	C-42-1024	PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8319	S-4-158	MOUNTAIN CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8217	C-44-229	SPEER CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7953	C-42-2765	TRIB TO ENOREE RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7310	C-1-526	JOHNSON CK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8180	S-30-31	DUNCAN CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8299	S-41-145	TRIB TO SALUDA RIVER	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8085	S-30-88	LOCAL STREAM	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8011	S-27-14	GREAT SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8592	S-42-116	TRIB TO JIMMIES CK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3669	S-24-284	JOHN'S CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2251	S-41-98	TRIB TO HALFWAY SWP CK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4400	S-39-159	TRIB TO PRATERS CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7022	S-39-134	BRUSHY CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7855	C-42-853	TRIB BOWEN LAKE	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7036	C-42-793	NORTH TIGER RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6582	C-42-798	NORTH TIGER RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4183	S-36-244	TIMOTHY CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7662	S-12-574	TRIB TO BROAD RIVER	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3266	S-20-48	MILLS CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2253	S-41-192	DAILEY CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7741	C-42-134	JORDAN CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4385	C-36-458	KINGS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7659	S-11-611	BR-LTTL THICKETTY CK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3507	S-42-30	TRIB TO PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6583	C-42-827	LAWSON FORK CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5660	S-4-181	BR BROAD MOUTH CK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6735	C-32-4932	TRIB TO KINLEY CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7929	C-39-1401	GEORGES CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3972	S-39-237	TRIB-ROCKY BOTTOM CR	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3038	S-33-87	ROCKY CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5335	S-30-359	REEDY FORK CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7399	S-39-62	TRIB TO 18 MI.CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4667	C-42-977	MEADOW CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7336	S-11-38	LITTLE THICKETTY CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7136	S-32-29	BEAR CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7942	S-40-1862	UNNAMED CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6784	C-42-581	LAWSON FORK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7131	SC 315 OKATIE HWY	MONKEY JOHN SWAMP	6	JASPER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5543	S-24-495	BIG CURL TAIL CR	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7168	C-41-57	CLOUDS CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7799	C-23-1061	TRIB TO PAYNE BRANCH	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4265	S-9-226	TRIB TO LITTLE BEAVER CK	7	CALHOUN	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6678	S-23-114	TRIB MIDDLE TYGER RV	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4346	S-28-451	LONG BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5110	S-28-499	GRANNIES QUARTER CR	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4394	S-38-1206	PENN BRANCH	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
4871	S-38-58	BIG BEAVER CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2850	S-42-462	BR OF BUCK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5991	S-36-571	SWASH CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6541	C-32-5606	TRIB TO SALUDA RV	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5109	S-28-498	LITTLE FLAT ROCK CRK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7174	S-42-138	TRIB TO LAWSONS FORK CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6797	S-44-439	BR BUFFALO CR.	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2278	S-46-100	DRY BRANCH	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2849	S-42-460	TRIB TO LITTLE BUCK CK.	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7227	S-13-45	ROCKY CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6690	C-24-485	LITTLE COWHEAD CK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2755	US 701	BR OF HUGGINS SWAMP	5	HORRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4572	S-28-47	MCCASKILL CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4837	S-28-404	NANCY BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6312	S-28-496	UNNAMED STREAM	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3938	C-36-509	TRIB TO CANNONS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2784	S-30-255	NORTH LICK CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2875	S-46-538	BR WILDCAT CR	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8361	C-28-244	SANDERS BRANCH	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9763	C-38-1230	UNNAMED CANAL	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6793	S-44-56	BR. FANNING CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2647	S-4-91	TRIB TO DEVIL FORK CRK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2551	S-24-178	BIG CURTAIL CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9163	SC 541	CAMP BRANCH	5	FLORENCE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2583	S-36-106	TRIB TO SCOTTS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4853	S-36-500	BR. TO HELLERS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3757	S-42-184	CLEAR BRANCH	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9317	C-19-359	BR TO HORN CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4835	S-28-23	UNNAMED	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6184	S-40-1597	UNNAMED STREAM	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6449	S-13-54	O'CONNOR CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6450	S-13-54	CANNONS CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5075	S-23-869	TRIB ENOREE RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6724	C-30-617	BR TO ENOREE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4373	S-32-294	JACKSON BRANCH	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6542	C-32-5610	TRIB TO SALUDA RV	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6933	S-42-40	BR TO LAWSON FORK CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2057	S-36-29	ROCKY CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2180	S-24-48	CUNNING FORD CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2601	S-38-607	HORSE RANGE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2407	S-38-932	MIDDLE PEN CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2248	S-41-65	PENN CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1756	S-38-125	SUNNYSIDE CANAL	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2359	S-23-42	TRIB TO N SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2387	S-30-110	NORTH LICK CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1083	SC 72	ALLISONS BRANCH	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6329	C-30-573	TRIB TO N RABON CK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1731	C-28-250	LITTLE FLAT ROCK CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10078	C-39-477	TRIB ROCK BOTTOM CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3709	C-36-347	TRIB TO BUSH RIVER	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6748	C-36-174	TRIB TO CRIMS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6749	C-36-373	ROCKY CRK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4599	C-30-1400	BR OF LITTLE RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3064	C-36-2526	TRIB TO CANNONS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8575	C-30-148	BR TO REEDY RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6102	S-23-114	MIDDLE TYGER RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2003	S-11-31	IRENE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
187	S-29-19	CAMP CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
221	S-42-317	GREY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1074	US 76	SOUTH RABON CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2270	S-44-39	MILL POND CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1797	S-11-195	CHEROKEE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8026	C-36-3601	BIG BEAVERDAM CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1764	S-41-148	TRIB TO DRY CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5379	S-41-44	BR TO SALUDA RIVER	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7500	S-39-98	TRIB TO ROCKY BOTTOM CK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8602	C-1-40	SAWNEY CREEK	2	ABBEVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10193	S-137	CALABASH BRANCH	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2090	S-42-208	SPIVEY CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2007	S-11-793	PROVIDENCE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
633	S-33-117	BOLD BRANCH	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
282	C-20-601	BR OF LITTLE RIVER	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8267	S-24-62	CUFFEYTOWN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3815	C-4-839	E PRONG CRK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8534	S-11-66	JUMPING CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
5911	S-13-681	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2177	S-23-121	NORTH SALUDA RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3980	S-41-129	INDIAN CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2149	S-11-106	BR OF SUCK CK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2205	S-30-34	SHELL CREEK	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5380	S-41-79	SHILOH BRANCH	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5840	S-39-98	TRIB TO ROCKY BOTTOM CK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7726	C-39-765	GOLDEN CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7383	S-28-700	UNNAMED STREAM	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2819	S-39-148	BRUSHY CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2442	S-46-837	BUCK HORN CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7513	C-42-919	ALEXANDER CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5509	S-19-18	TURKEY CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8536	C-11-288	BR BROAD RIVER	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3034	S-32-175	RAWLS CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8225	C-4-753	BEAVERDAM CR	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5037	S-20-32	BR OF BIG WATEREE	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3747	S-40-1097	SPEARS CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5512	C-19-383	BIG CREEK	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1888	S-33-38	LEE CREEK	2	MCCORMICK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2390	S-32-49	RISTERS CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3369	S-30-315	BR OF REEDY RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
136	SC 4	GOODLAND CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
1117	SC 210	COW CASTLE CREEK	7	ORANGEBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7546	S-11-34	GOFORTH CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9079	C-41-545	DRY CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4578	S-28-505	SANDERS CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6525	S-28-26	SANDERS CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9872	S-28-549	UNNAMED STREAM	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7514	C-42-922	TRIB ALEXANDER CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5857	C-42-781	LAWSON FORK CREEK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4577	S-28-140	GRANNIES QUARTER CR #1	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6684	C-23-4922	ROCKY CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4552	C-23-512	ROCKY CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2822	C-39-563	RICES CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8322	C-4-1234	DEVILS FORK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3677	S-28-367	KELLY CREEK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4202	S-40-434	EIGHT MILE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7037	C-42-5058	TRIB NORTH PACOLET RIVER	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2091	S-42-253	TRIB-PACOLET RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4576	S-28-140	GRANNIES QUARTER CR #2	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7851	C-42-699	TRIB FAIRFOREST CK	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7824	C-39-1529	EIGHTEEN MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5841	C-39-636	SIX MILE CREEK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5370	C-39-3910	TRIB TO GEORGES CRK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6189	C-42-660	TRIB SOUTH TIGER RIV	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
9001	C-19-534	PACES BRANCH	2	EDGEFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7414	C-44-173	HAWKINS CREEK	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5537	C-23-1977	LITTLE MOUNTAIN CK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8174	C-24-177	REEDY BRANCH	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8192	C-36-783	SUBERS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2646	S-4-57	CUFFIE CREEK	2	ANDERSON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5078	C-23-588	TRIB TO REEDY RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8182	S-30-260	TRIB TO BUSH RIVER	2	LAURENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7798	C-23-707	TRIB TO HUFF CK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6304	C-23-6364	HUFF CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7686	C-23-360	BURBAN FORK CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8377	C-36-458	S FORK KINGS CK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7207	S-11-393	BR OF THICKETTY CK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6637	S-13-30	THOMPSON CREEK	4	CHESTERFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5763	SC 319	MILL BRANCH (NO. 4)	5	HORRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6984	C-24-904	REEDY CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5315	C-24-1699	BRIGHTMAN CREEK	2	GREENWOOD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5300	S-23-978	MIDDLE TYGER RIVER	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5125	S-36-383	SCOTTS CREEK	2	NEWBERRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
632	S-29-94	LITTLE CREEK	4	LANCASTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7052	S-46-228	BEAVER DAM CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5741	S-23-654	TRIB TO ROCKY CK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
8736	C-20-664	WEST FORK CREEK	4	FAIRFIELD	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6734	C-32-4932	KINLEY CREEK	1	LEXINGTON	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7132	S-28-15	LITTLE PINE TREE CK	1	KERSHAW	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7124	C-23-3312	TRIB TO BRUSHY CK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7155	S-39-142	TRIB TO 12 MILE CK	3	PICKENS	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6559	S-37-234	STAMP CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3721	C-37-626	CONEROSS CREEK	3	OCONEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE

Scour Critical Bridges

Asset ID (NBI 08)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	District (NBI 02)	County (NBI 03)	Scour Critical Bridge (NBI 113)	Scour Critical Status
8142	S-11-60	MOORE CREEK	4	CHEROKEE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
2153	S-12-574	TRIB TO BROAD RIVER	4	CHESTER	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7264	C-23-1209	TRIB TO BRUSHY CK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7508	S-41-57	MOORES CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3470	S-41-252	BR OF MINE CREEK	2	SALUDA	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
6831	S-46-338	BR WILDCAT CREEK	4	YORK	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5868	S-44-19	BR. BUFFALO CR.	4	UNION	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5760	SC 319	MILL BRANCH	5	HORRY	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
5306	C-23-648	HUFF CREEK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
7860	C-42-1945	CHEROKEE CR	3	SPARTANBURG	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4887	S-40-1600	UNNAMED	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4888	S-40-1601	UNNAMED	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4883	S-40-1021	UNNAMED	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
4543	S-23-310	TRIB TO RICHLAND CRK	3	GREENVILLE	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
3463	S-40-1509	EIGHT MILE CREEK	1	RICHLAND	3	BRIDGE IS SCOUR CRITICAL; FOUNDATIONS UNSTABLE
10094	US 25 BUS	SAVANNAH RIVER	7	AIKEN	U	UNKNOWN
10054	C-26-3697	UNNAMED STREAM	5	HORRY	U	UNKNOWN
10063	C-7-1526	TIDAL MARSH	6	BEAUFORT	U	UNKNOWN
10098	US 1 CONN	SAVANNAH RIVER	7	AIKEN	U	UNKNOWN
10062	C-7-1526	TIDAL MARSH	6	BEAUFORT	U	UNKNOWN
10095	US 1	SAVANNAH RIVER	7	AIKEN	U	UNKNOWN
10091	SC 181	SAVANNAH RIVER	2	ANDERSON	U	UNKNOWN
10072	L--2656	UNNAMED STREAM	1	RICHLAND	U	UNKNOWN
5901	US 17 SB	TEA FARM CREEK	6	CHARLESTON	U	UNKNOWN
10056	C-26-8949	UNNAMED STREAM	5	HORRY	U	UNKNOWN
10093	SC 28	CHATTOOGA RIVER	3	OCONEE	U	UNKNOWN
10129	S-8-1206	I-26	6	BERKELEY	U	UNKNOWN
10058	C-26-1895	UNNAMED CREEK	5	HORRY	U	UNKNOWN
10071	C-32-356	RAWLS CREEK	1	LEXINGTON	U	UNKNOWN
10166	S-18-123	UNNAMED STREAM	6	DORCHESTER	U	UNKNOWN
10081	S-29-862	SOUTH BRANCH OF WILDCAT	4	LANCASTER	U	UNKNOWN
10066	SC 6 CON	UNNAMED STEAM	7	ORANGEBURG	U	UNKNOWN
10070	C-10-1774	MELLICHAMP BRANCH	6	CHARLESTON	U	UNKNOWN
10055	C-26-3358	UNNAMED STREAM	5	HORRY	U	UNKNOWN
10057	C-26-1244	UNNAMED STREAM	5	HORRY	U	UNKNOWN
10167	S-18-13	HURRICANE BRANCH	6	DORCHESTER	U	UNKNOWN
10069	C-10-968	TRIB STEAMBOAT CREEK	6	CHARLESTON	U	UNKNOWN
10068	S-10-53	UNNAMED CREEK	6	CHARLESTON	U	UNKNOWN
10140	L-2656	JACKSON CREEK	1	RICHLAND	U	UNKNOWN
10126	S-8-424	TURKEY CREEK	6	BERKELEY	U	UNKNOWN
10141	S-35	UNNAMED STREAM	6	COLLETON	U	UNKNOWN
10146	S-15-74	UNNAMED STREAM	6	COLLETON	U	UNKNOWN
10145	S-15-48	UNNAMED STREAM	6	COLLETON	U	UNKNOWN
10188	S-10-636	UNNAMED STREAM	6	CHARLESTON	U	UNKNOWN
10128	S-8-127	UNNAMED STREAM	6	BERKELEY	U	UNKNOWN
10199	S-7-169	UNNAMED STREAM	6	BEAUFORT	U	UNKNOWN
10162	S-15-232	UNNAMED STREAM	6	COLLETON	U	UNKNOWN
10127	S-8-127	UNNAMED STREAM	6	BERKELEY	U	UNKNOWN
10170	S-18-50	UNNAMED STREAM	6	DORCHESTER	U	UNKNOWN

APPENDIX H

Appendix/Attachment Title

AASHTO Detail Categories for Fatigue

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Fatigue Categories - AASHTO LRFD Bridge Design Specifications, 8th Edition, Table 6.6.1.2.3-1 which includes Detail Categories for Load-Induced Fatigue

Appendix/Attachment Description

AASHTO fatigue specifications classify commonly used steel bridge details into fatigue Categories A, B, B', C, C', D, E and E' based on their fatigue characteristics. Details that fall into Categories D, E and E' shall be considered as fatigue-prone details (FPDs).

Section 5.4.4.2 of the BIGD requires photographs of all FCMs and FPDs to be maintained in the Bridge File and to be taken at every inspection.

Table 6.6.1.2.3-1—Detail Categories for Load-Induced Fatigue

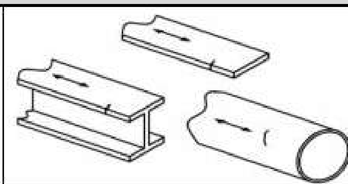
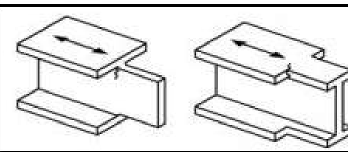
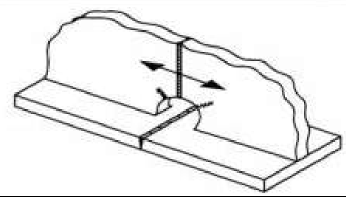
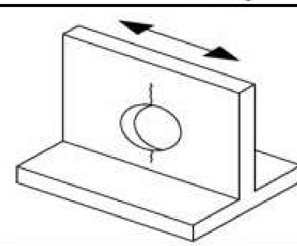
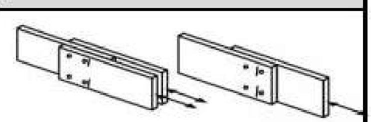
Description	Category	Constant A $(\text{ksi})^3$	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 1—Plain Material away from Any Welding					
1.1 Base metal, except noncoated weathering steel, with rolled or cleaned surfaces. Flame-cut edges with surface roughness value of 1,000 μ-in. or less, but without re-entrant corners.	A	250×10^8	24	Away from all welds or structural connections	
1.2 Noncoated weathering steel base metal with rolled or cleaned surfaces designed and detailed in accordance with FHWA (1989). Flame-cut edges with surface roughness value of 1,000 μ-in. or less, but without re-entrant corners.	B	120×10^8	16	Away from all welds or structural connections	
1.3 Member with re-entrant corners at copes, cuts, block-outs or other geometrical discontinuities made to the requirements of AASHTO/AWS D1.5, except weld access holes.	C	44×10^8	10	At any external edge	
1.4 Rolled cross sections with weld access holes made to the requirements of AASHTO/AWS D1.5, Article 3.2.4.	C	44×10^8	10	In the base metal at the re-entrant corner of the weld access hole	
1.5 Open holes in members (Brown et al., 2007).	D	22×10^8	7	In the net section originating at the side of the hole	
Section 2—Connected Material in Mechanically Fastened Joints					
2.1 Base metal at the gross section of high-strength bolted joints designed as slip-critical connections with pretensioned high-strength bolts installed in holes drilled full size or subpunched and reamed to size—e.g., bolted flange and web splices and bolted stiffeners. (Note: see Condition 2.3 for bolt holes punched full size; see Condition 2.5 for bolted angle or tee section member connections to gusset or connection plates.)	B	120×10^8	16	Through the gross section near the hole	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

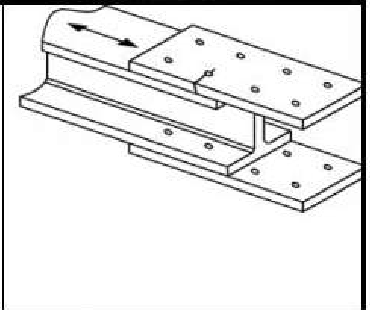
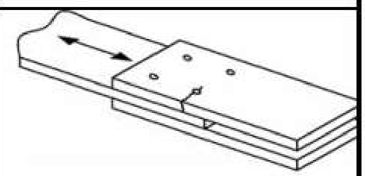
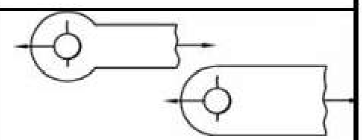
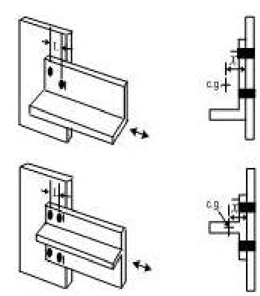
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
2.2 Base metal at the net section of high-strength bolted joints designed as bearing-type connections but fabricated and installed to all requirements for slip-critical connections with pretensioned high-strength bolts installed in holes drilled full size or subpunched and reamed to size. (Note: see Condition 2.3 for bolt holes punched full size; see Condition 2.5 for bolted angle or tee section member connections to gusset or connection plates.)	B	120×10^8	16	In the net section originating at the side of the hole	
2.3 Base metal at the net or gross section of high-strength bolted joints with pretensioned bolts installed in holes punched full size (Brown et al., 2007); and base metal at the net section of other mechanically fastened joints, except for eyebars and pin plates, e.g., joints using ASTM A307 bolts or non-pretensioned high-strength bolts. (Note: see Condition 2.5 for bolted angle or tee section member connections to gusset or connection plates).	D	22×10^8	7	In the net section originating at the side of the hole or through the gross section near the hole, as applicable	
2.4 Base metal at the net section of eyebar heads or pin plates (Note: for base metal in the shank of eyebars or through the gross section of pin plates, see Condition 1.1 or 1.2, as applicable.)	E	11×10^8	4.5	In the net section originating at the side of the hole	
2.5 Base metal in angle or tee section members connected to a gusset or connection plate with high-strength bolted slip-critical connections. The fatigue stress range shall be calculated on the effective net area of the member, $A_e = UA_g$, in which $U=(1-\bar{x}/L)$ and where A_g is the gross area of the member. $\bar{x}$ is the distance from the centroid of the member to the surface of the gusset or connection plate and L is the out-to-out distance between the bolts in the connection parallel to the line of force. The effect of the moment due to the eccentricities in the connection shall be ignored in computing the stress range (McDonald and Frank, 2009). The fatigue category shall be taken as that specified for Condition 2.1. For all other types of bolted connections, replace A_g with the net area of the member, A_n, in computing the effective net area according to the preceding equation and use the appropriate fatigue category for that connection type specified for Condition 2.2 or 2.3, as applicable.	See applicable Category above	See applicable Constant above	See applicable Threshold above	Through the gross section near the hole, or in the net section originating at the side of the hole, as applicable	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

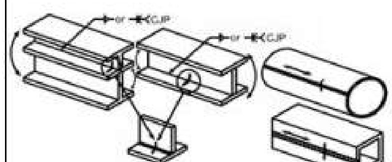
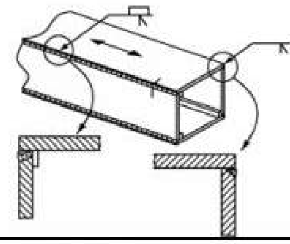
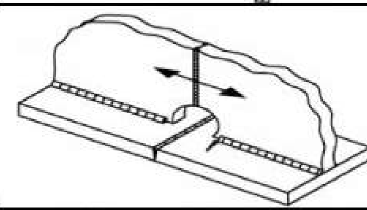
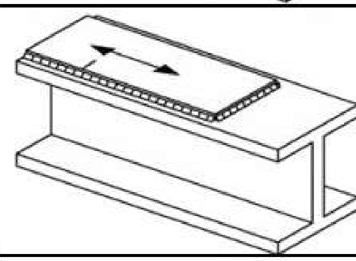
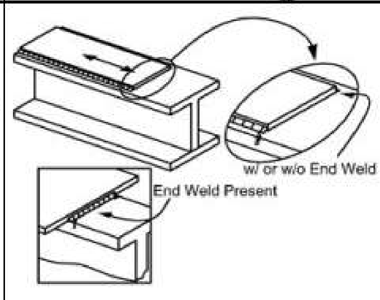
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 3—Welded Joints Joining Components of Built-up Members					
3.1 Base metal and weld metal in members without attachments built up of plates or shapes connected by continuous longitudinal complete joint penetration groove welds back-gouged and welded from the second side, or by continuous fillet welds parallel to the direction of applied stress.	B	120×10^8	16	From surface or internal discontinuities in the weld away from the end of the weld	
3.2 Base metal and weld metal in members without attachments built up of plates or shapes connected by continuous longitudinal complete joint penetration groove welds with backing bars not removed, or by continuous partial joint penetration groove welds parallel to the direction of applied stress.	B′	61×10^8	12	From surface or internal discontinuities in the weld, including weld attaching backing bars	
3.3 Base metal and weld metal at the termination of longitudinal welds at weld access holes made to the requirements of AASHTO/AWS D1.5, Article 3.2.4 in built-up members. (Note: does not include the flange butt splice).	D	22×10^8	7	From the weld termination into the web or flange	
3.4 Base metal and weld metal in partial length welded cover plates connected by continuous fillet welds parallel to the direction of applied stress.	B	120×10^8	16	From surface or internal discontinuities in the weld away from the end of the weld	
3.5 Base metal at the termination of partial length welded cover plates having square or tapered ends that are narrower than the flange, with or without welds across the ends, or cover plates that are wider than the flange with welds across the ends:				In the flange at the toe of the end weld or in the flange at the termination of the longitudinal weld or in the edge of the flange with wide cover plates	
Flange thickness ≤ 0.8 in.	E	11×10^8	4.5		
Flange thickness > 0.8 in.	E′	3.9×10^8	2.6		

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

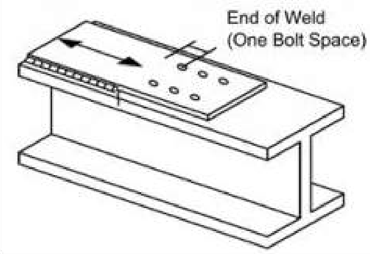
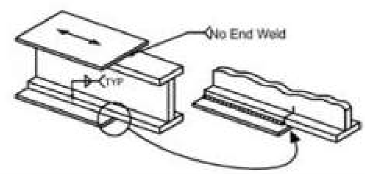
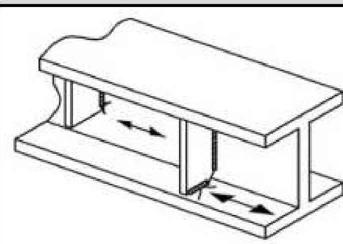
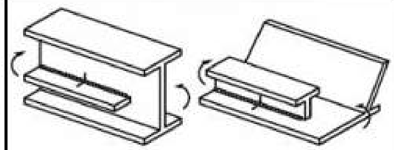
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 3—Welded Joints Joining Components of Built-Up Members (continued)					
3.6 Base metal at the termination of partial length welded cover plates with slip-critical bolted end connections satisfying the requirements of Article 6.10.12.2.3.	B	120×10^8	16	In the flange at the termination of the longitudinal weld	
3.7 Base metal at the termination of partial length welded cover plates that are wider than the flange and without welds across the ends.	E′	3.9×10^8	2.6	In the edge of the flange at the end of the cover plate weld	
Section 4—Welded Stiffener Connections					
4.1 Base metal at the toe of transverse stiffener-to-flange fillet welds and transverse stiffener-to-web fillet welds. (Note: includes similar welds on bearing stiffeners and connection plates). Base metal adjacent to bearing stiffener-to-flange fillet welds or groove welds.	C′	44×10^8	12	Initiating from the geometrical discontinuity at the toe of the fillet weld extending into the base metal	
4.2 Base metal and weld metal in longitudinal web or longitudinal box-flange stiffeners connected by continuous fillet welds parallel to the direction of applied stress.	B	120×10^8	16	From the surface or internal discontinuities in the weld away from the end of the weld	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

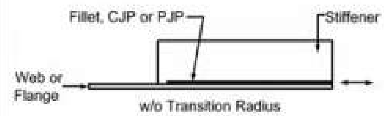
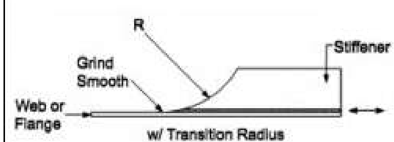
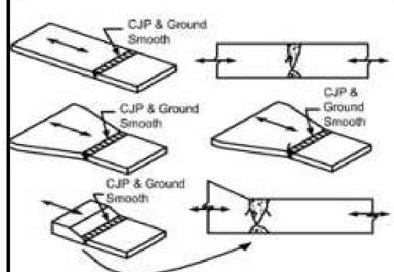
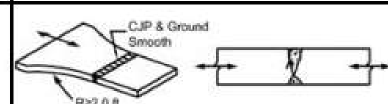
Description	Category	Constant A $(\text{ksi})^3$	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 4—Welded Stiffener Connections (continued)					
4.3 Base metal at the termination of longitudinal stiffener-to-web or longitudinal stiffener-to-box flange welds:					
With the stiffener attached by welds and with no transition radius provided at the termination:				In the primary member at the end of the weld at the weld toe	
Stiffener thickness < 1.0 in.	E	11×10^8	4.5		
Stiffener thickness ≥ 1.0 in.	E′	3.9×10^8	2.6		
With the stiffener attached by welds and with a transition radius R provided at the termination with the weld termination ground smooth:				In the primary member near the point of tangency of the radius	
$R \geq 24$ in.	B	120×10^8	16		
24 in. > $R \geq 6$ in.	C	44×10^8	10		
6 in. > $R \geq 2$ in.	D	22×10^8	7		
2 in. > R	E	11×10^8	4.5		
Section 5—Welded Joints Transverse to the Direction of Primary Stress					
5.1 Base metal and weld metal in or adjacent to complete joint penetration groove welded butt splices, with weld soundness established by NDT and with welds ground smooth and flush parallel to the direction of stress. Transitions in thickness or width shall be made on a slope no greater than 1:2.5 (see also Figure 6.13.6.2-1).				From internal discontinuities in the filler metal or along the fusion boundary or at the start of the transition	
$F_y < 100$ ksi	B	120×10^8	16		
$F_y \geq 100$ ksi	B′	61×10^8	12		
5.2 Base metal and weld metal in or adjacent to complete joint penetration groove welded butt splices, with weld soundness established by NDT and with welds ground parallel to the direction of stress at transitions in width made on a radius of not less than 2 ft with the point of tangency at the end of the groove weld (see also Figure 6.13.6.2-1).	B	120×10^8	16	From internal discontinuities in the filler metal or discontinuities along the fusion boundary	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

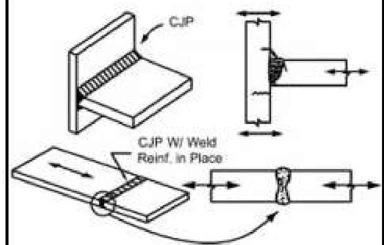
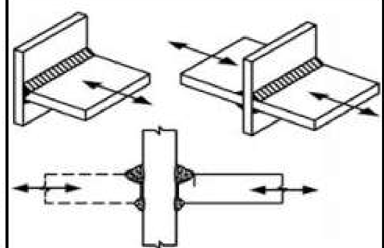
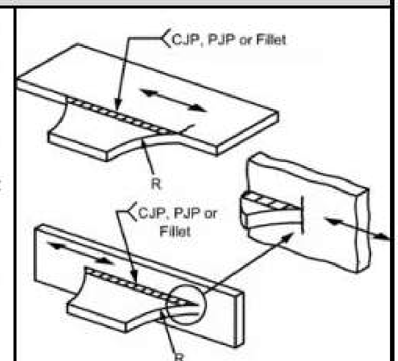
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
5.3 Base metal and weld metal in or adjacent to the toe of complete joint penetration groove welded T or corner joints, or in complete joint penetration groove welded butt splices, with or without transitions in thickness having slopes no greater than 1:2.5 when weld reinforcement is not removed. (Note: cracking in the flange of the "T" may occur due to out-of-plane bending stresses induced by the stem).	C	44×10^8	10	From the surface discontinuity at the toe of the weld extending into the base metal or along the fusion boundary	
5.4 Base metal and weld metal at details where loaded discontinuous plate elements are connected with a pair of fillet welds or partial joint penetration groove welds on opposite sides of the plate normal to the direction of primary stress.	C as adjusted in Eq. 6.6.1.2.5-4	44×10^8	10	Initiating from the geometrical discontinuity at the toe of the weld extending into the base metal or initiating at the weld root subject to tension extending up and then out through the weld	
Section 6—Transversely Loaded Welded Attachments					
6.1 Base metal in a longitudinally loaded component at a transversely loaded detail (e.g. a lateral connection plate) attached by a weld parallel to the direction of primary stress and incorporating a transition radius R: With the weld termination ground smooth:				Near point of tangency of the radius at the edge of the longitudinally loaded component or at the toe of the weld at the weld termination if not ground smooth	
$R \geq 24$ in.	B	120×10^8	16		
24 in. $> R \geq 6$ in.	C	44×10^8	10		
6 in. $> R \geq 2$ in.	D	22×10^8	7		
2 in. $> R$	E	11×10^8	4.5		
For any transition radius with the weld termination not ground smooth. (Note: Condition 6.2, 6.3 or 6.4, as applicable, shall also be checked.)	E	11×10^8	4.5		

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

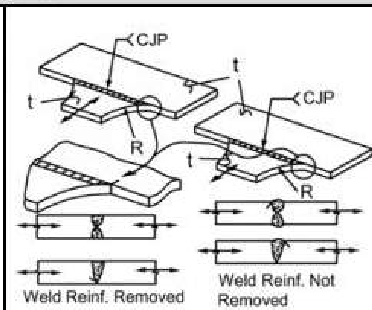
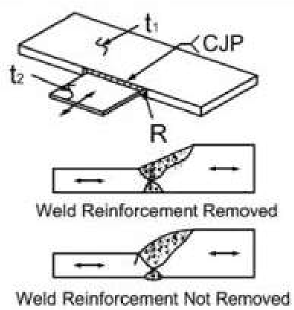
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 6—Transversely Loaded Welded Attachments (continued)					
6.2 Base metal in a transversely loaded detail (e.g. a lateral connection plate) attached to a longitudinally loaded component of equal thickness by a complete joint penetration groove weld parallel to the direction of primary stress and incorporating a transition radius R, with weld soundness established by NDT and with the weld termination ground smooth: With the weld reinforcement removed:					
$R \geq 24$ in.	B	120×10^8	16	Near points of tangency of the radius or in the weld or at the fusion boundary of the longitudinally loaded component or the transversely loaded attachment	
24 in. $> R \geq 6$ in.	C	44×10^8	10		
6 in. $> R \geq 2$ in.	D	22×10^8	7		
2 in. $> R$	E	11×10^8	4.5		
With the weld reinforcement not removed:				At the toe of the weld either along the edge of the longitudinally loaded component or the transversely loaded attachment	
$R \geq 24$ in.	C	44×10^8	10		
24 in. $> R \geq 6$ in.	C	44×10^8	10		
6 in. $> R \geq 2$ in.	D	22×10^8	7		
2 in. $> R$	E	11×10^8	4.5		
(Note: Condition 6.1 shall also be checked.)					
6.3 Base metal in a transversely loaded detail (e.g. a lateral connection plate) attached to a longitudinally loaded component of unequal thickness by a complete joint penetration groove weld parallel to the direction of primary stress and incorporating a weld transition radius R, with weld soundness established by NDT and with the weld termination ground smooth:				At the toe of the weld along the edge of the thinner plate In the weld termination of small radius weld transitions At the toe of the weld along the edge of the thinner plate	
With the weld reinforcement removed:					
$R \geq 2$ in.	D	22×10^8	7		
$R < 2$ in.	E	11×10^8	4.5		
For any weld transition radius with the weld reinforcement not removed.	E	11×10^8	4.5		
(Note: Condition 6.1 shall also be checked.)					

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

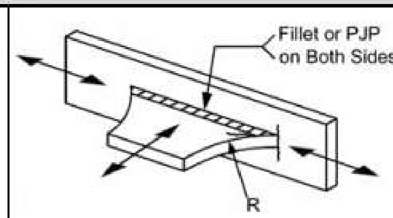
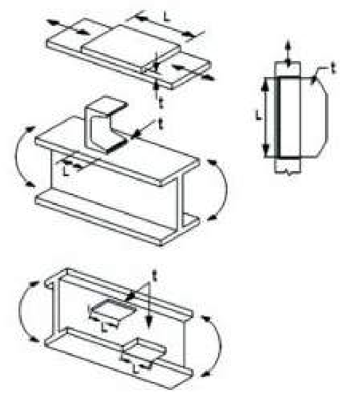
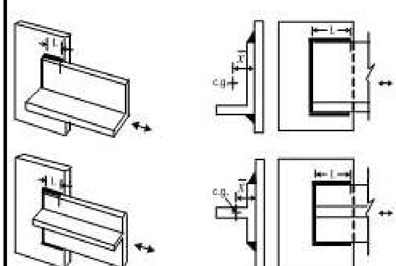
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 6—Transversely Loaded Welded Attachments (continued)					
6.4 Base metal in a transversely loaded detail (e.g. a lateral connection plate) attached to a longitudinally loaded component by a fillet weld or a partial joint penetration groove weld, with the weld parallel to the direction of primary stress (Note: Condition 6.1 shall also be checked.)	See Condition 5.4				
Section 7—Longitudinally Loaded Welded Attachments					
7.1 Base metal in a longitudinally loaded component at a detail with a length L in the direction of the primary stress and a thickness t attached by groove or fillet welds parallel or transverse to the direction of primary stress where the detail incorporates no transition radius:				In the primary member at the end of the weld at the weld toe	
$L < 2$ in.	C	44×10^8	10		
2 in. $\leq L \leq 12t$ or 4 in	D	22×10^8	7		
$L > 12t$ or 4 in.					
$t < 1.0$ in.	E	11×10^8	4.5		
$t \geq 1.0$ in.	E′	3.9×10^8	2.6		
(Note: see Condition 7.2 for welded angle or tee section member connections to gusset or connection plates.)					
7.2 Base metal in angle or tee section members connected to a gusset or connection plate by longitudinal fillet welds along both sides of the connected element of the member cross-section, and with or without backside welds. The fatigue stress range shall be calculated on the effective net area of the member, $A_e = UA_g$, in which $U = (1- \bar{x}/L)$ and where A_g is the gross area of the member. $\bar{x}$ is the distance from the centroid of the member to the surface of the gusset or connection plate and L is the maximum length of the longitudinal welds. The effect of the moment due to the eccentricities in the connection shall be ignored in computing the stress range (McDonald and Frank, 2009).	E′	3.9×10^8	2.6	Toe of fillet welds in connected element	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

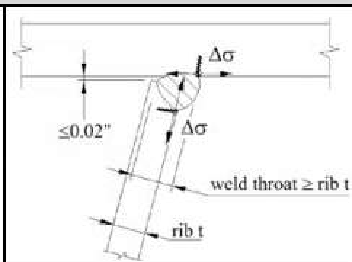
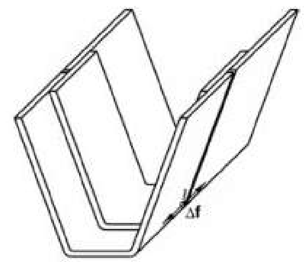
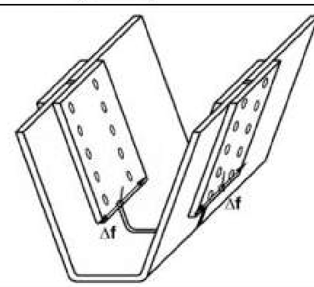
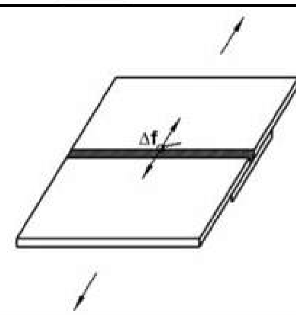
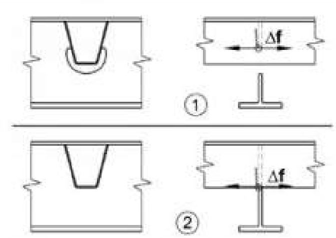
Description	Category	Constant A (ksi)^3	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 8—Orthotropic Deck Details					
8.1 Rib to Deck Weld—One-sided (60% min) penetration weld with root gap ≤ 0.02 in. prior to welding. Weld throat ≥ rib wall thickness. Allowable Design Level 1, 2, or 3	C	44×10^8	10	See Figure	
8.2 Rib Splice (Welded)—Single groove butt weld with permanent backing bar left in place. Weld gap > rib wall thickness Allowable Design Level 1, 2, or 3	D	22×10^8	7	See Figure	
8.3 Rib Splice (Bolted)—Base metal at gross section of high strength slip critical connection Allowable Design Level 1, 2, or 3	B	120×10^8	16	See Figure	
8.4 Deck Plate Splice (in Plane)—Transverse or Longitudinal single groove butt splice with permanent backing bar left in place Allowable Design Level 1, 2, or 3	D	22×10^8	7	See Figure	
8.5 Rib to FB Weld (Rib)—Rib wall at rib to FB weld (fillet or CJP) Allowable Design Level 1, 2, or 3	C	44×10^8	10	See Figure	

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Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

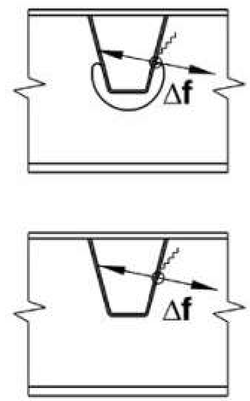
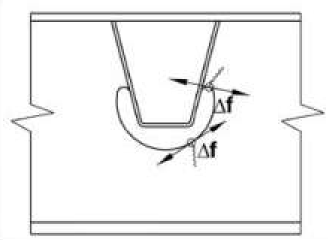
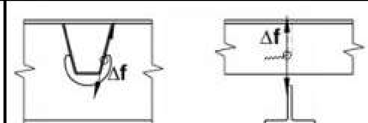
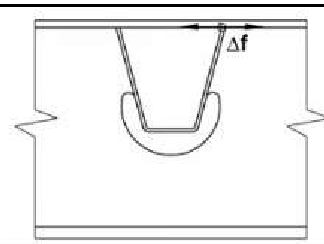
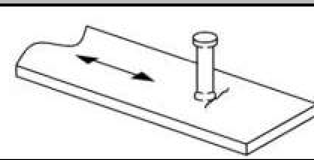
Description	Category	Constant A $(\text{ksi})^3$	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
8.6 Rib to FB Weld (FB Web)—FB web at rib to FB weld (fillet, PJP, or CJP) Allowable Design Level 1 or 3	C (see Note 1)	44×10^8	10	See Figure	
8.7 FB Cutout—Base metal at edge with "smooth" flame cut finish as per AWS D1.5 Allowable Design Level 1 or 3	A	250×10^8	24	See Figure	
8.8 Rib Wall at Cutout—Rib wall at rib to FB weld (fillet, PJP, or CJP) Allowable Design Level 1 or 3	C	44×10^8	10	See Figure	
8.9 Rib to Deck Plate at FB Allowable Design Level 1 or 3	C	44×10^8	10	See Figure	
Note 1: Where stresses are dominated by in-plane component at fillet or PJP welds, Eq. 6.6.1.2.5-4 shall be considered. In this case, Δf should be calculated at the mid-thickness and the extrapolation procedure as per Article 9.8.3.4.3 need not be applied.					
Section 9—Miscellaneous					
9.1 Base metal at stud-type shear connectors attached by fillet or automatic stud welding	C	44×10^8	10	At the toe of the weld in the base metal	

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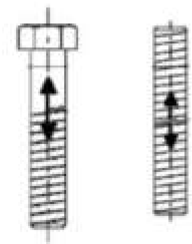
Table 6.6.1.2.3-1 (continued)—Detail Categories for Load-Induced Fatigue

Description	Category	Constant A (ksi^3)	Threshold $(\Delta F)_{TH}$ ksi	Potential Crack Initiation Point	Illustrative Examples
Section 9—Miscellaneous (continued)					
9.2 Nonpretensioned high-strength bolts, common bolts, threaded anchor rods, and hanger rods with cut, ground, or rolled threads. Use the stress range acting on the tensile stress area due to live load plus prying action when applicable.				At the root of the threads extending into the tensile stress area	
(Fatigue II) Finite Life	E′	3.9×10^8	N/A		
(Fatigue I) Infinite Life	D	N/A	7		

APPENDIX I

Appendix/Attachment Title

South Carolina Railroad Map and List

Appendix/Attachment Revision and Year:

Version 1.0, 2020

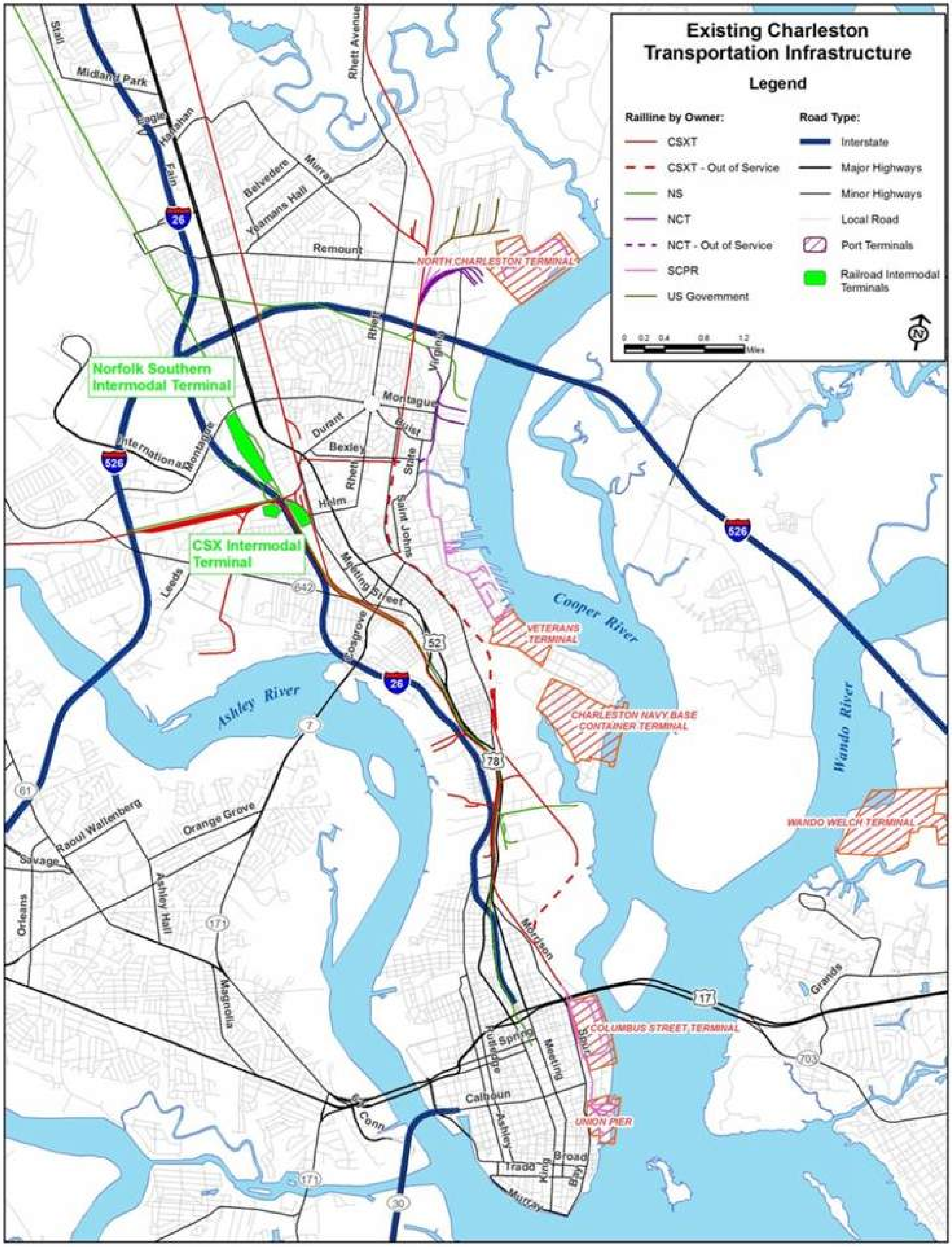
Appendix/Attachment Introduction and Discussion

The South Carolina rail system is operated by at least 13 rail carriers. The carriers range in size from fairly small intrastate railroads to large rail systems serving the entire eastern U.S. Of the line haul railroads, two are Class I carriers and the remainder are local carriers or switching and terminal companies. The state itself is a freight railroad operator. Palmetto Railways, a branch of the South Carolina Department of Commerce, operates four railroad subdivisions. All rail lines within the state are single-tracked with the exception of the NS main track in the Upstate and the CSXT "A Line" that lies in the I-95 corridor. Neither line is completely double-tracked, but both have double-track segments of various lengths at several locations.

Appendix/Attachment Description

Coordination may be required by the BITL when inspecting SCDOT roadway and highway bridges over active railroads.


Charlotte
North Carolina
Columbia
Georgia
Savannah
Atlantic Ocean
CSX
NS
PICK
GRLW
CPDR
PKHP
LC
PDRR
SCRF
AIKR
ECBR
Legend
Railroad:
CSX
NS
Short-Line
Cities
County Boundary
N
Miles
0
12.5
25
50



Sources: 2011 Class I Railroad Annual Reports to Surface Transportation Board, SC Association of Railroads, Association of American Railroads, SC Multimodal Transportation Plan, SC Statewide Rail Plan (CDM Smith and SCDOT)

- Aiken Railway Company, LLC (AIKR)
- Carolina Coastal Railway (CLNA)
- Carolina Piedmont Railroad (CPDR)
- CSX Transportation (CSXT)
- Greenville & Western Railway Company (GRLW)
- Lancaster & Chester Railway Company (LC)
- Norfolk Southern Railway (NS)
- Palmetto Railways (PR), previously South Carolina Public Railways
- Pee Dee River Railway Corporation (PDRR)
- Pickens Railway Company (PICK)
- R.J. Corman Railroad (RJCS)
- South Carolina Museum (SCMZ)
- South Carolina Central Railroad Company (SCRF)

Aiken Railway Company, LLC (AIKR)

The Aiken Railway Company began service in December, 2012, and is a wholly-owned subsidiary of Western Carolina Railway Service Corporation, the same company that owns and operates the Greenville and Western. It leases and operates two NS branch lines in Aiken County – the 12.45-mile line between Warrenville and Oakwood, and the 6.45-mile line running between Aiken and North Aiken – totaling 18.9 miles in length.

Carolina Coastal Railway (CLNA)

Carolina Coastal Railway operates approximately 198 miles of track primarily in North Carolina with the exception of a 7-mile line from Blacksburg to Kings Creek, South Carolina.

Carolina Piedmont Railroad (CPDR)

In 1990, RailTex, Inc. purchased a 39-mile branch line from CSXT and began operating the line between Laurens and East Greenville as RailTex, Inc.'s Carolina Piedmont Division (CPDR). The railroad is now owned by Genesee & Wyoming and is operated as the Carolina Piedmont Railroad. Traffic is interchanged with CSXT at Laurens. The railroad currently operates 35 mainline miles in Laurens County and Greenville County. Major commodities transported include plastic resin gas turbines and wind turbines. Major customers include General Electric and Cryovac.

CSX Transportation (CSXT)

This railroad is South Carolina's largest railroad with 1,269 route miles. CSXT's needs and improvements to address them are generally steered toward grade crossings, line capacity additions, and bottleneck issues, as well as industrial development potentials. For purposes of identifying needs and planning rail line improvements, CSXT classifies each of their lines into one of three categories (core, strategic, and non-strategic). In the absence of a freight rail funding program in South Carolina, CSXT improvement projects have in the past been primarily privately funded, with applications for Federal grants being submitted when the improvement projects comply with the necessary federal requirements.

Greenville & Western Railway Company (GRLW)

This railroad commenced operations in late 2006 after acquiring a 13-mile-long CSXT line segment from Pelzer to Belton in Anderson County. The railroad interchanges traffic with CSXT at Pelzer and with the Pickens Railroad Company at Belton, which also provides access to NS. The railway receives unit trains for Kinder Morgan with Belton Industries and Belton Metals, other on-line rail users.

Principal on-line commodities are ethanol, biodiesel, plastics, scrap metal, limestone, paper, and fertilizer.

Lancaster & Chester Railway Company (LC)

Prior to 2001, the railroad ran 29 miles between Chester and Lancaster. This original line segment dates back to an 1873 charter for a three-foot narrow gauge railroad that reached Lancaster from Chester in 1894. In 2001 a NS branch line running from Catawba to Lancaster and continuing east to Kershaw was acquired extending the railroad's total length to almost 60 miles and its presence to four counties - Chester, Kershaw, Lancaster, and York.

The railroad serves a variety of shippers/receivers, including PPG, Guardian Glass, Thyssen-Krupp Steel, Mississippi Lime, ADM, Gerdau Ameristeel, GAF Materials, Circle S Mills, and Boral/Owens Corning among others. Major commodities are chemicals, sand, steel, corn, soybeans, soybean oil and meal, recycled base oil, and building materials. The railroad interchanges traffic with both CSXT and NS at Chester. It became a part of Gulf and Ohio Railways, Inc. in December, 2010.

Norfolk Southern Railway (NS)

This Class I railroad operates a total of approximately 21,500 route miles and serves 22 states, the District of Columbia, and one Canadian province. In South Carolina, NS operates 679 route miles and has trackage rights over CSXT from Newberry to Spartanburg. The Norfolk Southern Railway Company is owned by the Norfolk Southern Corporation. The railroad has a division office in Greenville. Major commodities transported over the NS system in South Carolina are coal; lumber and wood products; chemicals; pulp, paper, and allied products; and transportation equipment.

Palmetto Railways (PR), previously South Carolina Public Railways (SCPR)

Palmetto Railways, previously known as South Carolina Public Railways (SCPR), provides technical assistance and consulting services in railroad matters to state, local, and municipal governments. As a division of the South Carolina Department of Commerce, Palmetto Railways operates four railroad subdivisions.

The Charleston Subdivision (Port Utilities Commission of Charleston – PUCC) and North Charleston Subdivision (Port Terminal Railroad – PTR) provide switching services to the terminals of the South Carolina State Ports Authority and other various industries in Charleston County, interchanging with CSXT and NS. As terminal switching railroads, PUCC and PTR have no mainline miles of track, but have an estimated track mileage of 4 miles and 1 mile, respectively.

The Charity Church Subdivision (East Cooper and Berkeley Railroad – ECBR) located in southern Berkeley County serves BP Chemical, Nucor Steel and Santee Cooper Cross Generating Station, interchanging with CSXT at State Junction. In addition, several industrial sites are available for development adjacent to the railroad. This 17-mile line, which began operations on November 15, 1978, extends from State Junction (Cordesville) to Charity Church in Berkeley County.

The Salkehatchie Subdivision, formerly Hampton and Branchville Subdivision, is 40 miles of commercial railroad stretching from Hampton to Canadys. The former line was closed due to an economic downturn in the coal industry. The reopening of this line provides opportunity for economic development to Hampton and Colleton Counties.

Pee Dee River Railway Corporation (PDRR)

In 1987 Marlboro County purchased the CSXT branch line extending from McColl to Marlboro via Tatum and Bennettsville along with a spur from Bennettsville to Breeden and contracted with the Pee Dee Railway Corporation (PDRR) to provide rail service. The PDRR began operations the same year.

A 3.8-mile spur was soon constructed to a new Willamette Industries (now Domtar) pulp, paper, and board (Flakeboard) complex. The PDRR is a subsidiary of the Aberdeen and Rockfish Railroad Company, which has headquarters in Aberdeen, NC

Pulp, paper, chemicals, aggregates, fertilizer, and plastic pellets are the predominate products handled over its current 25-mile length. Its major customers are Domtar, Mohawk, Flakeboard, Hanson Aggregates, and Southern States Cooperative. Traffic is interchanged with CSXT at McColl.

Pickens Railway Company (PICK)

The Pickens Railway Company consists of two separate operations located in the Upstate. One is the original Pickens Railroad (PICK), which runs 8.5 miles from a connection with the NS main track at Easley to Pickens in Pickens County that began operation in 1898. The other, the railroad's Honea Path Division (PKHP), is a combination of NS and CSXT branch lines located in Anderson County running from Anderson to Honea Path, via Belton for 28.5 miles. Service began over the first of these line segments in 1990.

The railroad's principal shippers include, among others: Owens Corning, Electrolux, Scots, Michelin, Southern States Cooperative, Crop Production Services, Carolina Recycling, PCA, and Tri-County Fertilizer. These customers account for the majority of the railroad's carloadings comprised of limestone, plastics, rubber, carbon black, fertilizer, scrap metal, paper, grain, and borate ore. Traffic is interchanged with NS at Easley and Anderson, as well as with GRLW at Belton and hence to a CSXT connection in Pelzer.

The railroad has filed an abandonment application for the 8.5-mile-long original Pickens Railroad.

R.J. Corman Railroad (RJCS)

R.J. Corman took possession of the former Carolina Southern Railroad on August 17, 2015. The line stretches from Mullins to Myrtle Beach and connects to lines in North Carolina. A rural freight project, including considerable repairs to the existing line, is scheduled to conclude in the spring of 2022.

South Carolina Museum (SCMZ)

The South Carolina Railroad Museum, Inc. was established in 1973 by a group of dedicated railroad enthusiasts from the Columbia and Charleston areas. In October of 1983, the Museum received, by the way of donation, the former Rockton and Rion Railway located in Fairfield County, South Carolina. The museum offers visitors train rides on 5 miles of the existing 11.5-mile line. The eastern terminal of the line is at the junction with Norfolk Southern Railway at the Rockton Station, extending generally westward through the Rion community to the Anderson Quarry.

South Carolina Central Railroad Company (SCRF)

In 1987, RailTex, Inc. purchased two disconnected segments of railroad from CSXT located in Florence, Darlington, Chesterfield, and Lee Counties. The South Carolina Central Railroad Company, Inc. (SCRF) began operations over the two line segments in December of that year. RailAmerica, Inc. acquired RailTex in 2000, but was itself purchased in 2012 by Genesee & Wyoming Inc., who now owns the railroad and operates 42 miles of mainline. The one operational segment connects and interchanges traffic with CSXT at Florence and extends to Bishopville via Darlington, Floyd, and Hartsville. It has a broad base of customers, with the largest being Nucor Steel, Sonoco Products, and Republic Services. Commodities handled by the railroad are dominated by chemicals, plastics, steel, and waste. The other segment connected and interchanged traffic with CSXT at Cheraw and extended southward to Society Hill. Service is no longer provided on this segment and abandonment has been approved but not yet implemented.

APPENDIX J

Appendix/Attachment Title

Supplemental Guide for Structure Inventory and Appraisal (SI&A) Data

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

For use by the BITL when completing the inspection report. This supplemental coding guide shall be used as a shortcut for the *Recording and Coding Guide for the SI&A of the Nation's Bridges*.

Appendix/Attachment Description

Items marked with magenta shaded boxes indicate the data is controlled by the SCDOT Office of Road Data Services and a change to this data must be formally requested per Section 5.4.7 of the BIGD. NBI Items 06 and 07 shall be coded in accordance with Appendix M of the BIGD.

Items marked with yellow shaded boxes indicate the data which is updated by the BITL.

Items marked with purple shaded boxes indicate the scour assessment data which shall be reviewed by the BITL **prior** to the inspection or **during** the inspection. Scour consultants or SCDOT HQ will update this field. BITLs shall verify accuracy of NBI Item 113 as required in Section 5.3.4.3. Per Section 5.3.4.3, if the purple shaded boxes require revision, the Bridge Scour - Item 113 Re-evaluation Form shall be filled out and submitted to the BIPM; see Attachment 4.2.

Items marked with green shaded boxes indicate the load rating data which shall be reviewed by the BITL **prior** to the inspection or **during** the inspection. For example, a Load Rating Summary Form may indicate an assumption regarding functioning post-tensioning that can only be verified as accurate during the inspection. These green shaded boxes shall be reviewed meaning the BITL may need to coordinate for further action (whether with BMO to request a load rating (see Section 5.5) or with maintenance to replace a posting sign (see Chapter 8).

The cyan shaded boxes show values updated automatically given the criteria set forth in the *Coding Guide*.

The blue shaded boxes show which information is completed after the quality control review.

SCDOT BRIDGE INSPECTION FORM

(420) BRIDGE ID:	Use SCDOT Road Data Services to Update	*(007) ROUTE:*	Use SCDOT Road Data Services to Update, See Also Appendix O
(008) ASSET NO	Use SCDOT Road Data Services to Update	*(006) CROSSING:*	Use SCDOT Road Data Services to Update, See Also Appendix O
(419) RAMP NO:	Use SCDOT Road Data Services to Update	*(009) LOCATION:*	Use SCDOT Road Data Services to Update
(026) FUNCTIONAL CLASS:	Use SCDOT Road Data Services to Update	*(016) LAT:* Use SCDOT Road Data Services to Update	*(017) LON:* Use SCDOT Road Data Services to Update

GENERAL BRIDGE DATA

	EXISTING / REVISED		EXISTING / REVISED
(027) Year Built	XXXX Year Built (4 Digits)	(042) Type Serv; On(A) Und(B)	42A&42B-Services on and under bridge (2 Digits)
(106) Year Recon	XXXX Year Reconstructed (4 Digits)	(028) Lanes; On(A) Und(B)	28A&28B-Lanes on and under structure (2 Digits)
(031) Design Load	1=H10,2=H15,3=HS15,4=H20,5=HS20,6=HS20Mod,9=HS25	(107) Deck Struc	XXXX Deck system (1 Digits)
(36A) Railings	0=Not to Standard or None, 1=Meets Standard, N=N/A	(108) Wear Surf/Membrane/Prot	XXXX W.S., Membrane, Deck Protection (3 Digits)
(36B) Transitions	0=Not to Standard or None, 1=Meets Standard, N=N/A		MAT-SUP-SUB / MAT-SUP-SUB
(36C) Appr Guard	0=Not to Standard or None, 1=Meets Standard, N=N/A	(43) Main Original (A)	43A&44A-1=Conc,2=Conc. Con.,3=Steel,4=Steel Con.,5=P/S Conc,
(36D) Appr Guard End	0=Not to Standard or None, 1=Meets Standard, N=N/A	Main Reconst (B)	6=P/S Conc. Con,7=Timber,8=Mason.,9=Alum./Iron,0=Other
(037) History	1=Historic,2=Eligbile,4=Unknown,5=Not Eligible	(44) Appr Orginal (A)	43B&44B-1=Slab,2=Stringer,3=Gir/FB,4=T-Bm, 5=Multi.Box, 6=Single Box
(319) Last Paint Date	Month (XX)/Year (XXXX)	(45) Appr Reconst (B)	7=Frame,10=Truss,11=Arch,14-17=Complex,19=Culvert,21=SBG,22-Ch.Bm

GEOMETRIC DATA

	EXISTING / REVISED		EXISTING (FT / IN) / REVISED (FT / IN)
(032) Appr Rdway	XXXX Normal Width (4 Digits meters)	(053) Vert Clr Above Deck	XXXX Min Vertical Clearance over bridge (4 Digits)
(033) Bridge Median	0=No Median,1=Open.M.,2=Clo.M,3=C.M.with non-mountable barriers	(54A) Vert Clear Ref	XXXX Min Vertical under clearance (4 Digits)
(034) Skew	XX Skew Angle (2 Digits)	(54B) Vert Clear Right	H=highway beneath Struc., R=railroad, N=Feature not a highway
(035) Flare	0=No Flare, 1=Yes, Flared	(54C) Vert Clear Left	Using Bent 1 as Reference, Measure Vert. Under Clr
(045) # Main Spans	XXXX Number of Spans (3 Digits)	(10A) Great Min Clr Over/Und	XXXX Min. Vertical Clearance (4 Digits)
(046) # Appr Spans	XXXX Number of Spans (4 Digits)	(10B) Great Min Right	Using Bent 1 as Reference, Measure Gr. Vert. Under Clr
(048) Max Span Lgt	XXXXX C. to C. Bearing Points (5 Digits)	(10C) Great Min Left	Using Bent 1 as Reference, Measure Gr. Vert. Under Clr
(308) Appr Span Lgth	XXXXXX C. to C. Structure Length (6 Digits)	(55A) Lat Clear Ref	H=highway,R=railroad,N=feature none, X reference feature (1 digit)
(049) Struct Length	XXXXXX C. to C. Structure Length (6 Digits)	(55B) Lat Clear Right	H=highway,R=railroad,N=feature none, XXX min. lateral unercl. (3 digits)
(47A) Horz Clear Right	XXXX Clearance A>B (3 Digits)	(056) Lat Clear Left	Measure from road edge/center of rail to nearest obstruction
(47B) Horz Clear Left	XXXX Clearance B>A (3 Digits)	(038) Navigation Cont	N=no water,0=no navigation,1=navigation control, XXXX bridge permit (1 digit)
(47UA) Horz Clear Right	XXXX U. Clearance A>B (3 Digits)	(039) Nav Vert Clear	XXXX Navigation vertical clearance (4 Digits) @ H. tide.
(47UB) Horz Clear Left	XXXX U. Clearance A>B (3 Digits)	(040) Nav Horz Clear	XXXXX Navigation horizontal clearance (5 Digits) @ H. tide.
(50B) Sidewalk Right	XXX Right Curb (3 Digits meters)	(111) Nav Pier Port	1=Nav. Protection,2=Functioning,3=Deteriorated,4=Reevaluation,5=None but Reeval.
(50A) Sidewalk Left	XXX Left Curb (3 Digits meters)		
(051) Curb to Curb	XXXX Curb to Curb distance (4 Digits meters)		
(052) Deck Out-Out	XXXX Out to Out width (4 Digits meters)		

RATINGS DATA

	EXISTING / REVISED		EXISTING / REVISED
(58) Deck	X Rating for Deck Condition (1 Digit)	(041) Traffic Status	A=open,B=no posted sign,G=new no open,E=temp. bridge,K=closed,P=posted,R=special
(59) Super Str	X Condition of Structure Members (1 Digit)	(063) Rating Method	1=load factor,2=ASD,3=LRFR,4=load testing,5=no rating analysis
(60) Sub Str	X Piers/Piles/Footing/Abutments Condition (1 Digit)	(064) Operating Method	XXX Capacity Rating (Max Load) (3 Digits, tons)
(061) Channel	X Flow of Water/Riprap/Channel Condition (1 Digit)	(065) Rating Method	1=load factor,2=A. stress,3=LRFR,4=load testing,5=no rating analysis
(062) Culv Ret	X Culvert Rating Condition (1 Digit)	(066) Inventory Rating	XXX Inventory Rating (Load Lvl for Indef. Use) (3 Digits, tons)
(071) Water Adeq	X Passage of Flow through Bridge (1 Digit)	(411) Date Rated	Month (XX)/Year (XXXX) (when last rating completed)
(072) Appr Rdway	X Roadway Alignment (1 Digit)	(418) Conditions During Rating	NBI Item 58 NBI Item 59 NBI Item 60 (when rated)
(113) Scour Critical	BIPM to Update at SCDOT HQ BMO		Freq Mth/Year / Freq Mth/Year
(067) Structure	RIMS Automatically Calculates Value	(091, 090) Routine Insp	Designated inspection & inspection date (2&4 Digits)
(068) Deck Geom	RIMS Automatically Calculates Value	(92A, 93A) Non-Redundant Steel Tension Member	Designated FCM inspection & inspection date (2&4 Digits)
(069) Underclear	RIMS Automatically Calculates Value	(92B, 93B) Underwater Ins	Designated UW inspection & inspection date (2&4 Digits)
(070) Bridge Post	RIMS Automatically Calculates Value	(92C, 93C) Special Insp	Designated Special inspection & inspection date (2&4 Digits)
Inspection Leader:	BITL Name	Reviewed By:	**(QCR)** Complete Once QC Review Form is Complete and
Date:	Date of Inspection	Date:	all QC comments have been addressed.

APPENDIX K

Appendix/Attachment Title

Supplement Guide for NBI Condition Ratings

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Condition ratings are used to describe the existing, in-place bridge as compared to the (new) as-built condition. Evaluation is for the materials related, physical condition of the deck, superstructure, and substructure components of a bridge. This supplemental guide is to aid with NBI Items:

- NBI Item 58 – Deck
- NBI Item 59 – Superstructure
- NBI Item 60 – Substructure
- NBI Item 62 – Culvert

Appendix/Attachment Description

The guide included in this appendix may be used by inspectors when performing their evaluation of the structure components following an inspection. See Appendix L for the element-level guide.

GENERAL

Element-level condition states may be converted to NBI Condition Ratings and vice versa according to the recommendations below. See Appendix N for element-level guidance. The conversions below are not to be used as a direct correlation but as a tool in weighing element-level condition states to the general condition rating of the component.

- Condition State 1 = NBI Condition Rating of 9, 8 or 7
- Condition States 2 or 3 = NBI Condition Rating of 6 or 5
- Condition State 4 = NBI Condition Rating of 4 or below

NBI ITEM 58 – DECK

This item describes the overall condition rating of the deck. Rate and code the condition in accordance with the above general condition ratings. Code N culverts and other structures without decks e.g., filled arch bridges.

Concrete decks should be inspected for cracking, scaling, spalling, leaching, chloride contamination, potholing, delamination, and full or partial depth failures.

Steel grid decks should be inspected for broken welds, broken grids, section loss, and growth of filled grids from corrosion.

Timber decks should be inspected for splitting, crushing, fastener failure, and deterioration from rot.

The condition of the wearing surface / protective system, joints, expansion devices, curbs, sidewalks, parapets, fascias, bridge rail, and scuppers shall not be considered in the overall deck evaluation. However, their condition shall be noted on the inspection form. Timber running planks shall be included under the wearing surface assessment.

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

Concrete Deck

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the deck item. Usually new decks.
- **8 VERY GOOD CONDITION**
  Minor transverse cracks with no deterioration, i.e. delamination, spalling, scaling or water saturation.
- **7 GOOD CONDITION**
  Sealable deck cracks, light scaling (less than ¼” depth). No spalling or delamination of deck surface but visible tire wear. Substantial deterioration of curbs, sidewalks, parapets, railing or deck joints (need repair). Drains or scuppers need cleaning.
- **6 SATISFACTORY CONDITION**
  Medium scaling (¼” to ½” in depth). Excessive number of open cracks in deck (5ft intervals or less). Extensive deterioration of the curbs, sidewalks, parapets, railing or deck joints (requires replacing deteriorated elements).

- **5 FAIR CONDITION**
  Heavy scaling (½” to 1” in depth). Excessive cracking and up to 5% of the deck area is spalled; 20-40% is water saturated and/or deteriorated. Disintegrating of deck edges or around scuppers. Considerable leaching through deck. Some partial depth failures, i.e. rebar exposed (repairs needed).
- **4 POOR CONDITION**
  Advanced section loss, deterioration, and spalling.
- **3 SERIOUS CONDITION**
  Loss of section, deterioration of primary structural elements. Shear cracks may be present.
- **2 CRITICAL CONDITION**

  Advanced deterioration of primary structural elements. Shear cracks in concrete may be present. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
- **1 “IMMINENT” FAILURE CONDITION**
  Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
- **0 FAILED CONDITION**
  Bridge is closed. Deck replacement necessary.

Timber Deck

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the deck. Generally, Element Condition State for Item 31 should be 1 for NBI Condition 9 unless localized deviancies are present.
- **8 VERY GOOD CONDITION**
  No crushing, rotting or splitting. Tightly secured to floor system. Generally, Element Condition State for Item 31 should be 1 for NBI Condition 8 unless localized deviancies are present.
- **7 GOOD CONDITION**
  Minor checking or splitting with a few loose planks. Generally, Element Condition State for Item 31 should be 1 for NBI Condition 7 unless localized deviancies are present.
- **6 SATISFACTORY CONDITION**
  More than 30% of planks are checked or split but sound. Some loose planks. Fire damage limited to surface scorching with no measurable section loss. Some wet areas noted. A few planks (under 5%) are in need of replacement. Generally, Element Condition State for Item 31 should be 2 for NBI Condition 6 unless localized deviancies are present.
- **5 FAIR CONDITION**
  Numerous (30 - 40%) planks checked, split, rotted, or crushed. Majority of planks are loose. Fire damage limited to surface charring with minor, measurable section loss. Some planks (5 - 10%) are in need of replacement. Generally, Element Condition State for Item 31 should be 3 for NBI Condition 5 unless localized deviancies are present.
- **4 POOR CONDITION**
  Majority (over 40%) of the planks are rotted, crushed, or split. Fire damage with significant section loss which may reduce the load carrying capacity of the member. Over 10% of the planks are in need of replacement. Generally, Element Condition State for Item 31 should be 4 for NBI Condition 4.

- **3 SERIOUS CONDITION**
  Severe signs of structural distress are visible. Major decay or fire damage is present which has substantially reduced the load carrying capacity of the deck. Generally, Element Condition State for Item 31 should be 4 for NBI Condition 3.
- **2 CRITICAL CONDITION**
  Advanced deterioration with partial deck failure. May be necessary to close bridge until corrective action is taken. Generally, Element Condition State for Item 31 should be 4 for NBI Condition 2.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back into light service. Generally, Element Condition State for Item 31 should be 4 for NBI Condition 1.
- **0 FAILED CONDITION**
  Bridge is closed. Deck replacement necessary.

Steel Deck

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the steel deck. Generally, Element Condition State for Items 28, 29 or 30 should be 1 for NBI Condition 9 unless localized deviancies are present.
- **8 VERY GOOD CONDITION**
  Tightly secured to floor system with no rust. Generally, Element Condition State for Items 28, 29 or 30 should be 1 for NBI Condition 8 unless localized deviancies are present.
- **7 GOOD CONDITION**
  Loose at some connections with minor rusting. A few cracked welds and/or broken grids. Generally, Element Condition State for Items 28, 29 or 30 should be 1 for NBI Condition 7 unless localized deviancies are present.
- **6 SATISFACTORY CONDITION**
  Considerable rusting with indications of initial section loss. Loose at many locations. Some cracked welds and/or broken grids. Generally, Element Condition State for Items 28, 29 or 30 should be 2 for NBI Condition 6 unless localized deviancies are present.
- **5 FAIR CONDITION**
  Heavy rusting with areas of section loss. Loose at numerous locations. Numerous cracked welds and/or broken grids. Generally, Element Condition State for Items 28, 29 or 30 should be 3 for NBI Condition 5 unless localized deviancies are present.
- **4 POOR CONDITION**
  Heavy rusting resulting in considerable section loss and some holes through deck. Many welds cracked and/or grids broken. Generally, Element Condition State for Items 28, 29 or 30 should be 4 for NBI Condition 4.
- **3 SERIOUS CONDITION**
  Severe signs of structural distress are visible. Generally, Element Condition State for Items 28, 29 or 30 should be 4 for NBI Condition 3.
- **2 CRITICAL CONDITION**
  Many holes through deck. Generally, Element Condition State for Items 28, 29 or 30 should be 4 for NBI Condition 2.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back in light service. Generally, Element Condition State for Items 28, 29 or 30 should be 4 for NBI Condition 1.
- **0 FAILED CONDITION**
  Bridge is closed. Deck replacement necessary.

NBI ITEM 59 – SUPERSTRUCTURE

This item describes the physical condition of all structural members. Rate and code the condition in accordance with the previously described general condition rating.

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

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

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

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

A superstructure with at least one saddle may not be evaluated greater than satisfactory condition. Superstructures with saddles which have **deterioration but have no observed movement** may be considered in satisfactory condition (6). Saddles with **increased movement and/or deterioration** may be considered in fair condition (5) or worse.

Concrete Superstructure

- **9 EXCELLENT CONDITION**
  New Condition.
- **8 VERY GOOD CONDITION**
  No noteworthy deficiencies which affect the load capacity of structural members.
- **7 GOOD CONDITION**
  Some minor problems. Non-structural hairline cracks without spalling or delamination. Load capacity of structure members unaffected.
- **6 SATISFACTORY CONDITION**
  Structural members show some minor deterioration. Hairline structural cracks may be present.
- **5 FAIR CONDITION**
  All structural members are sound (load capacity unaffected) but may have substantial deterioration or disintegration. Hairline structural cracks or spalls present with minor section loss of reinforcing steel possible.
- **4 POOR CONDITION**
  Extensive disintegration. Measurable structural cracks or large spall areas. Generally, reinforcing steel exposed with measurable section loss. Load capacity of structural members is affected.
- **3 SERIOUS CONDITION**
  Severe disintegration of concrete. Large structural cracks may be present. Generally, reinforcing steel exposed with advanced stages of corrosion. Local failures or loss of bond possible.
- **2 CRITICAL CONDITION**
  Advanced deterioration of primary structural elements. Concrete disintegration around reinforcing steel with loss of bond. Some reinforcing steel may be ineffective due to corrosion or loss of bond. Numerous large structural cracks may be present. Localized failures of bearing areas may exist. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.

- **1 “IMMINENT” FAILURE CONDITION**
  Bridge is closed to traffic. Major deterioration or section loss present on primary structural elements, obvious vertical or horizontal movement is affecting the structure’s stability. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge is closed; Out of service. Beyond corrective action; replacement necessary.

Prestressed Concrete Superstructure

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the superstructure.
- **8 VERY GOOD CONDITION**
  Non-structural cracks less than 0.013”.
- **7 GOOD CONDITION**
  Non-structural cracks between 0.013” and 0.016”. No rust stains.
- **6 SATISFACTORY CONDITION**
  Minor concrete damage or deterioration. Non-structural cracks over 0.016”. Isolated and minor exposure of mild steel reinforcement may be present.
- **5 FAIR CONDITION**
  Isolated and minor exposure of prestressing strand(s) may be present. Hairline structural cracks with little or no rust staining.
- **4 POOR CONDITION**
  Moderate damage or deterioration to concrete portions of the member exposing reinforcing bars or prestressing strands. Possible bond loss. Structural cracks with medium to heavy rust staining may be present. Loss of camber.
- **3 SERIOUS CONDITION**
  Severe damage to concrete and reinforcing elements of the member. Severed prestressing strand(s) are visibly deformed. Major or total loss of concrete section in bottom flange. Major concrete section loss in the web, but not occurring at the same location as concrete section loss in the bottom flange. Horizontal misalignment to member or negative camber. Unless closely monitored it may be necessary to restrict or close the bridge until corrective action is taken.
- **2 CRITICAL CONDITION**
  Critical damage to concrete and reinforcing elements of member. This damage may consist of one or more of the following:
  - Structural Cracks extend across the bottom flange or in the web directly above the bottom flange damage.
  - An abrupt lateral offset as measured along the bottom flange or lateral distortion of exposed prestressing strands.
  - Excessive vertical misalignment.
  - Longitudinal cracks at the interface of the web and the top flange that are not closed below the surface damage.
- **1 “IMMINENT” FAILURE CONDITION**
  Critical damage requiring the replacement of a member. Bridge is closed to traffic. Corrective action may put back into light service.

- **0 FAILED CONDITION**
  Bridge is closed and out of service.

Timber Superstructure

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the superstructure.
- **8 VERY GOOD CONDITION**
  Minor cracking or splitting of beams or stringers at non-critical locations.
- **7 GOOD CONDITION**
  Insignificant decay, cracking, or splitting of beams or stringers.
- **6 SATISFACTORY CONDITION**
  Some decay, cracking or splitting of beams or stringers. Fire damage limited to surface scorching with no measurable section loss.
- **5 FAIR CONDITION**
  Moderate decay, cracking, splitting or minor crushing of beams or stringers. Fire damage limited to surface charring with minor, measurable section loss.
- **4 POOR CONDITION**
  Extensive decay, cracking, splitting, fire damage or crushing of beams or stringers. Load capacity of the member is affected.
- **3 SERIOUS CONDITION**
  Severe decay, cracking, splitting, crushing of beams or stringers, or major fire damage. Load carrying capacity of the member is substantially reduced.
- **2 CRITICAL CONDITION**
  Beam defects noted in condition state 2 have resulted in local failures. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge is closed. Replacement necessary.

Steel Superstructure

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the superstructure.
- **8 VERY GOOD CONDITION**
  No visible rust.
- **7 GOOD CONDITION**
  Some rust without any section loss.
- **6 SATISFACTORY CONDITION**
  Initial section loss (minor pitting, scaling, or flaking) in non-critical areas.
- **5 FAIR CONDITION**
  Initial section loss in critical areas. Fatigue or out-of-plane bending cracks may be present in non-critical areas. Hinges may be showing minor corrosion problems.

- **4 POOR CONDITION**
  Significant (measurable) section loss in critical areas. Fatigue or out-of-plane bending cracks may be present in critical areas. Hinges may be frozen from corrosion.
- **3 SERIOUS CONDITION**
  Severe section loss or cracking in critical areas. Minor failures may have occurred.
- **2 CRITICAL CONDITION**
  Severe section loss in many areas with holes rusted through at numerous locations in critical areas.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge is closed. Replacement necessary.

NBI ITEM 60 – SUBSTRUCTURE

This item describes the physical condition of piers, abutments, piles, fenders, footings, or other components. Rate and code the condition in accordance with the previously described general condition ratings.

All substructure elements should be inspected for visible signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion.

As per FHWA directive, if the scour code (NBI Item 113) = 2 or less, then the substructure rating (NBI 60) must also be rated as a "2" or less. If the rating factor for Item 113 is 4 or less, the rating factor for NBI Item 60 Substructure may require revision.

The substructure condition rating shall be made independent of the deck and superstructure. Integral-abutment wingwalls to the first construction or expansion joint shall be included in the evaluation. For non-integral superstructure and substructure units, the substructure shall be considered as the portion below the bearings. For structures where the substructure and superstructure are integral, the substructure shall be considered as the portion below the superstructure.

Concrete Substructure

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.
- **8 VERY GOOD CONDITION**
  Shrinkage cracks, light scaling, or insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.
- **7 GOOD CONDITION**
  Deterioration or initial disintegration, cracking with some leaching, or spalls on concrete or masonry units with no effect on bearing area. Leakage of expansion devices have initiated minor cracking. Some rusting of steel without measurable section loss.
- **6 SATISFACTORY CONDITION**
  Moderate deterioration or disintegration, spalls, cracking, and leaching on concrete or masonry units with little or no effect on bearing areas.
- **5 FAIR CONDITION**
  Many concrete or masonry units show some section loss with exposed reinforcing steel possible. Scour may be progressive and/or is becoming more prominent with a possibility of exposing top of footing, but no misalignment or settlement noted.
- **4 POOR CONDITION**
  Structural cracks in concrete and masonry units. Extensive scouring or undermining of footing affecting the stability of the unit and requiring corrective action.
- **3 SERIOUS CONDITION**
  Severe disintegration of concrete. Generally, reinforcing steel exposed with advanced stages of corrosion. Bearing areas seriously deteriorated with considerable loss of bearing. Severe scouring or undermining of footings affecting the stability of the unit. Settlement of the substructure may have occurred. Shoring may be necessary.

- **2 CRITICAL CONDITION**
  Concrete cap is soft and spalling with reinforcing steel exposed with no bond to the concrete. Top of concrete cap is split or concrete column has undergone shear failure. Scour is sufficient that substructure is near state of collapse. Pier has settled.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge is closed. Replacement necessary.

Steel Substructure

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.
- **8 VERY GOOD CONDITION**
  Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.
- **7 GOOD CONDITION**
  Some rusting of steel without measurable section loss. Minor scouring may have occurred.
- **6 SATISFACTORY CONDITION**
  Initial (measurable) loss of steel section. Shallow, local scouring may have occurred near foundation.
- **5 FAIR CONDITION**
  Measurable section loss in steel members. Scour may be progressive and /or is becoming more prominent with a possibility of exposing top of footing, but no misalignment settlement noted.
- **4 POOR CONDITION**
  Extensive section loss in steel members. Additional cross bracing or backfilling is required. Extensive scouring or undermining of footing affecting the stability of the unit and requiring corrective action.
- **3 SERIOUS CONDITION**
  Severe section loss in critical stress areas. Bearing areas seriously deteriorated with considerable loss of bearing. Settlement of the substructure may have occurred. Shoring considered necessary to maintain the safety and alignment of the structure.
- **2 CRITICAL CONDITION**
  Structural steel members have critical section loss with holes in the web and/or knife-edged flanges typical. Scour is sufficient that substructure is near state of collapse. Pier has settled.
- **1 "IMMINENT" FAILURE CONDITION**
  Bridge is closed. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge is closed. Replacement necessary.

Timber Substructure

A substructure with spliced piles or piles with stud-ups may not be evaluated greater than satisfactory condition (6). Timber substructures with a **minor quantity (less than 25%) of spliced piles or piles with stud-ups** may be considered in satisfactory condition (6). Timber substructures with **over 25% of timber piles spliced or piles with stud-ups** may be considered in fair condition (5) or worse. Timber substructures with **over 75% of timber piles spliced or piles with stud-ups** may be considered in poor condition (4) or worse.

- **9 EXCELLENT CONDITION**
  No noticeable or noteworthy deficiencies which affect the condition of the substructure. Insignificant scrape marks caused by drift or collision.
- **8 VERY GOOD CONDITION**
  No crushing, brooming rotting or splitting. Insignificant damage caused by drift or collision with no misalignment and not requiring corrective action.
- **7 GOOD CONDITION**
  Minor checking or splitting with a few loose timber connections. Insignificant decay, brooming, cracking, or splitting of timber. Minor scouring may have occurred.
- **6 SATISFACTORY CONDITION**
  More than 30% of piles are checked or split but sound. Some loose connections. Fire damage limited to surface scorching with no measurable section loss. Some wet areas noted. A few piles (under 5%) are in need of replacement. Some initial decay, brooming, cracking or splitting of timber. Shallow, local scouring may have occurred near foundation.
- **5 FAIR CONDITION**
  Numerous (30 - 40%) piles checked, split, rotted, or crushed. Majority of timber connections are loose. Fire damage limited to surface charring with minor, measurable section loss. Some piles (5 - 10%) are in need of replacement. Moderate decay, brooming, cracking, splitting or minor crushing of timber; a few secondary members may need replacement. Some exposure of timber piles as a result of erosion, reducing penetration.
- **4 POOR CONDITION**
  Majority (over 40%) of the piles are rotted, crushed, or split. Fire damage with significant section loss which may reduce the load carrying capacity of the member. Over 10% of the piles are in need of replacement. Substantial decay, brooming, cracking, splitting, or crushing of primary timber members, requiring some replacement. Extensive exposure of timber piles as a result of erosion, reducing the penetration and affecting the stability of the unit. Additional cross bracing or backfilling is required.
- **3 SERIOUS CONDITION**
  Severe signs of structural distress are visible. Major decay or fire damage is present which has substantially reduced the load carrying capacity of the timber piles bents. Bearing areas seriously deteriorated with considerable loss of bearing. Settlement of the substructure may have occurred. Shoring is considered necessary.
- **2 CRITICAL CONDITION**
  Advanced deterioration with partial timber pile bent failure. May be necessary to close bridge until corrective action is taken. Primary timber members crushed or split and ineffective. Scour has occurred at the substructure to the extent the substructure is near collapse. It may be needed to close the bridge until corrective action is taken.
- **1 “IMMINENT” FAILURE CONDITION**
  Bridge is closed. Corrective action may put back into light service.
- **0 FAILED CONDITION**
  Bridge is closed. Timber pile bent replacement necessary.

NBI ITEM 62 – CULVERT

This item evaluates the alignment, settlement, joints, structural condition, scour, and other items associated with culverts.

The rating code is intended to be an overall condition evaluation of the culvert. Integral wingwalls to the first construction or expansion joint shall be included in the evaluation. For a detailed discussion regarding the inspection and rating of culverts, consult Report No. FHWA-IP-86-2, Culvert Inspection Manual, July 1986.

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

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

General Culvert

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

Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.

- **1 “IMMINENT” FAILURE CONDITION**
  Bridge Closed. Corrective action may put back in light service.
- **0 FAILED CONDITION**
  Bridge Closed. Replacement necessary.

Corrugated Metal Culvert Pipe

- **9 EXCELLENT CONDITION**
  No deficiencies.
- **8 VERY GOOD CONDITION**
  Shape: good, smooth curvature in barrel. Horizontal: with 10% of design. Seams or Joints: tight, no openings. Metal: Aluminum - superficial corrosion, slight pitting. Steel - superficial rust, no pitting.
- **7 GOOD CONDITION**
  Shape: generally good, top half of pipe smooth but minor flattening of bottom. Horizontal Diameter: within 10% of design. Seams or Joints: minor cracking at a few bolt holes, minor joint or seam opening, potential for backfill infiltration. Metal: Aluminum - moderate, no attack of core alloy. Steel - moderate rust, slight pitting.
- **6 SATISFACTORY CONDITION**
  Shape: fair, top half has smooth curvature but bottom half has flattened significantly. Horizontal Diameter: within 10% of design. Seams or Joints: minor cracking at bolts is prevalent in one seam in lower half of pipe. Evidence of backfill infiltration through seams or joints. Metal: Aluminum - significant corrosion, minor attack of core alloy. Steel - fairly heavy rust, moderate pitting.
- **5 FAIR CONDITION**
  Shape: generally fair, significant distortion at isolated locations in top half and extreme flattening of invert. Horizontal Diameter: 10 to 15% greater than design. Seams or Joints: moderate cracking at bolt holes along one seam near bottom of pipe, deflection of pipe caused by backfill infiltration through seam or joint. Metal: Aluminum - significant corrosion, moderate attack of core alloy. Steel - scattered heavy rust, deep pitting.
- **4 POOR CONDITION**
  Shape: marginal significant distortion throughout length of pipe, lower third may be kinked. Horizontal Diameter: 10 to 15% greater than design. Seams or Joints: Moderate cracking at bolt holes on one seam near top of pipe, deflection caused by loss of backfill through open joints. Metal: Aluminum - extensive corrosion, significant attack of core alloy. Steel - extensive heavy rust, deep pitting.
- **3 SERIOUS CONDITION**
  Shape: poor with extreme deflection at isolated locations, flattening of crown, crown radius 20 to 30 feet. Horizontal Diameter: > 15% of design. Seams: 3” long cracks at bolt holes on one seam. Metal: Aluminum - extensive corrosion attack of core alloy, scattered perforations. Steel - extensive heavy rust, deep pitting, scattered perforations.
- **2 CRITICAL CONDITION**
  Shape: critical, extreme distortion and deflection throughout pipe, flattening of crown, crown radius over 30 feet. Horizontal Diameter: > 20% than design. Seams: plate cracked from bolt to bolt on one seam. Metal: Aluminum - extensive perforations due to corrosion. Steel - extensive perforations due to rust.

- **1 "IMMINENT" FAILURE CONDITION**
  Shape: partially collapsed with crown in reverse curve. Seams: failed. Road: closed to traffic.
- **0 FAILED CONDITION**
  Pipe: totally failed. Road: closed to traffic.

Concrete Culverts

- **9 EXCELLENT CONDITION**
  No deficiencies.
- **8 VERY GOOD CONDITION**
  Alignment: good, no settlement or misalignment. Joints: tight with no defects apparent. Concrete: no cracking, spalling or scaling present; surface in good condition. Footings: good with no invert scour.
- **7 GOOD CONDITION**
  Alignment: generally good; minor misalignment at joints; no settlement. Joints: joint material deteriorated at isolated locations. Concrete: minor hairline cracking at isolated locations; slight spalling or scaling present on invert or bottom of the top slab. Footings: good with only minor invert scour.
- **6 SATISFACTORY CONDITION**
  Alignment: fair, minor misalignment and settlement at isolated locations. Joints: joint material generally deteriorated, minor separation, possible infiltration or exfiltration; minor cracking or spalling at joints allowing exfiltration. Concrete: extensive hairline cracks, some with minor delamination; scaling less than 0.25" deep or small spalls present on the invert or bottom of top slab. Footings: minor scour near footings.
- **5 FAIR CONDITION**
  Alignment: generally fair; minor misalignment or settlement; possible piping. Joints: open and allowing backfill to infiltrate; significant cracking or spalling at joints. Concrete: crack opening > 0.12"; significant delamination and moderate spalling exposing reinforcing steel; large areas of surface scaling > 0.25" deep. Footings: moderate scour along footing; protective measures may be required.
- **4 POOR CONDITION**
  Alignment: marginal; significant settlement and misalignment, evidence of piping. Joints: differential movement and separation of joints, significant infiltration or exfiltration at joints. Concrete: extensive cracking with crack opening > 0.12" (1/8") with efflorescence; spalling has caused exposure of rebar with area heavily corroded; extensive surface scaling on invert greater than 0.5" deep.
- **3 SERIOUS CONDITION**
  Alignment: poor with significant ponding of water due to sagging or misalignment pipes; end section drop-off has occurred. Joints: significant openings and differential movement; infiltration or exfiltration causing misalignment of culvert and settlement or depressions in roadway. Concrete: extensive cracking with spalling, delamination, and slight differential movement; scaling has exposed reinforcing steel in bottom of top slab or invert. Footings: severe undermining with slight differential settlement causing minor cracking or spalling in footing and walls.
- **2 CRITICAL CONDITION**
  Alignment: critical; culvert not functioning due to severe misalignment. Concrete: severe cracks with significant differential movement; concrete completely deteriorated in isolated locations in top slab or invert. Footings: severe undermining with significant differential settlement causing severe cracks.

- **1 "IMMINENT" FAILURE CONDITION**
  Culvert: partially collapsed. Road: closed to traffic. Footings: severe undermining resulting in partial collapse.
- **0 FAILED CONDITION**
  Culvert: total failure of culvert and fill. Road: closed to traffic.

APPENDIX L

Appendix/Attachment Title

Supplement Guide for Element-Level Condition States

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

This appendix is to be used when collecting element level data. This appendix supplements the *AASHTO Manual for Bridge Element Inspection* and the *Guide Manual for Bridge Element Inspection* provides further classification of the AASHTO elements.

The most effective tool for proper bridge management is the consistent condition assessment of bridge elements. The element level inspection method breaks the bridge down into several elements, such as the railing, deck, girders, abutments, pier columns, etc. Each element is inspected and assigned a Condition State based on the amount of deterioration. The element level inspection is a quantity-based inspection, and each quantity is assigned a Condition State to reflect the differing categories of deterioration that often exist on any bridge element.

Appendix/Attachment Description

This appendix describes the individual bridge elements evaluated in bridge inspection and management processes. The guide included in this appendix may be used by inspectors when performing their evaluation of the structure elements following an inspection. See Appendix K for the guide for Condition Ratings.

The first portion (Sections 1 to 9) of this appendix contains a detailed description for each element and is broken down into the following subsections:

- Element Number and Name
- Description—Detailed identification and classification of the element.
- Quantity Calculation—General guidelines on how to collect the quantity of the element and units.
- Element Commentary—Additional considerations to be aware of during data collection.
- Condition State Table to Reference

The condition state tables are in the second portion of this appendix (Section 10). They contain the following information:

- Condition State Definitions—Defect descriptions and severity with guidelines for the inspector on defect severity categorization.
- Pictures – Example cases of condition states.

All elements described are included in the standard set of National Bridge Elements (NBE) or Bridge Management Element (BME). The elements are organized by major groupings such as Decks and Slabs, Superstructure, Bearings, Substructure, etc.

The third portion of this appendix contains defect hierarchy, Section 11.

The fourth portion of this appendix contains guidance on some of the more difficult situations to properly quantify, Section 12.

The fifth portion contains guidance on coding the scour defect for substructure elements, Section 13.

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GENERAL

Element-level condition states may be converted to NBI Condition Ratings and vice versa according to the recommendations below. See Appendix K for component-level guidance on Condition Ratings. The conversions below are not to be used as a direct correlation but as a tool in weighing element-level condition states to the general condition rating of the component.

- Condition State 1 = NBI Condition Rating of 9, 8 or 7
- Condition States 2 or 3 = NBI Condition Rating of 6 or 5
- Condition State 4 = NBI Condition Rating of 4 or below

Guidance of Environmental Factors for Condition States for elements is located in Section 7.2.5.4 of the BIGD.

1. DECKS AND SLABS

Decks and slabs describe the components that transfer loads from vehicles to the bridge.

Deck structures transmit loads to superstructure systems. Slab elements transmit loads to the substructure. Structures that include slab elements typically do not have superstructure elements. These elements transmit traffic loads directly to the substructure.

Included in the decks/slabs grouping are the secondary deck elements of girder top flange, deck fascia, joints and any false decking or maintenance sheeting.

DECK (SQ. FT.)

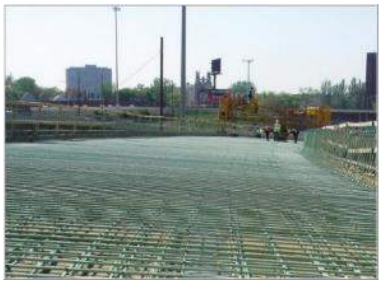
Description: This element defines all bridge decks regardless of the wearing surface or protection systems used. Decks carry traffic and transfer loads to the superstructure.

No.	Name	CS Table	Description
12	Reinforced Concrete	1	Reinforced concrete bridge decks
13	Prestressed Concrete	2	Prestressed concrete bridge decks.
28	Steel with Open Grid	3	All open grid steel decks with no fill.
29	Steel with Concrete Filled Grid	3	Steel bridge decks with concrete fill either in all of the openings or within the wheel tracks.
30	Steel - Corrugated/ Orthotropic/Etc.	3	Corrugated metal filled with portland cement, asphaltic concrete or other riding surfaces and Orthotropic steel. Materials added for riding surface are not part of the element condition.
31	Timber	4	Timber Bridge Decks. Timber running planks shall be included under the wearing surface assessment. (See pg. N-11)
60	Other	6	Composite materials or other materials that cannot be classified using any other defined deck element.

Quantity Calculation: Includes the area of the deck from edge to edge and reference line to reference line, including any median areas and accounting for any flares or ramps present. Deck area shall be calculated based on the out-to-out width of the deck and the total length of the bridge (back-to-back of backwalls or end-to-end of slab).

Element Commentary: The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all; and being captured using the defined condition states. Deck top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing or indicators in the materials covering the surfaces. Both the severity and density of spalls, delaminations, or patched areas, and severity and density of cracks and the existence of rust staining should be considered for the evaluation of the deck elements. A bridge may be composed of several deck elements i.e. Element 12 – Reinforced Concrete Deck and Element 28 - Steel Deck, Open Grid. For this example, both elements shall be coded.

DECK (SQ. FT.) (CONTINUED)



12 Reinforced Concrete

28 Steel Open Grid

31 Timber Deck

SLAB (SQ. FT.)

Description: This element defines all bridge slabs regardless of the wearing surface or protection systems used. Slabs carry traffic and transfer loads to the substructure. Deck Elements and Slab Elements are defined separately. Care should be taken to define these elements correctly. Slab Elements are stand-alone structures such as slab spans. Primary structural members, such as steel beams or prestressed beams, support Deck Elements.

No.	Name	CS Table	Description
38	Reinforced Concrete Slab	1	Reinforced concrete bridge slabs.
54	Timber Slab	4	Timber bridge slabs. Timber running planks shall be included under the wearing surface assessment. (See pg. N-11)
65	Other Slab	6	Composite materials or other materials that cannot be classified using any other defined slab element.

Quantity Calculation: Includes the area of the deck from edge to edge and reference line to reference line, including any median areas and accounting for any flares or ramps present.

Element Commentary: The slab evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all; and being captured using the defined condition states. Slab top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing or indicators in the materials covering the surfaces.

TOP FLANGE (SQ. FT.)

Description: This element defines all bridge girder top flanges where traffic rides directly on the structural element whether or not a wearing surface or protective system is present. These bridge types include bulb-tees, tee-beams, box girders and girders where traffic rides directly on the structural element.

No.	Name	CS Table	Description
15	Prestressed Concrete Top Flange	2	Prestressed concrete bridge girder top flanges.
16	Reinforced Concrete Top Flange	1	Reinforced concrete bridge girder top flanges.

Quantity Calculation: The quantity for this element includes the area of the top flange from edge to edge and reference line to reference line, including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.

Element Commentary: The flange evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, or both, and being captured using the defined condition states. Flange top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing or indicators in the materials covering the surfaces. An example of a prestressed concrete top flange is included at the end of this appendix.

JOINTS (FT.)

Description: These elements define bridge deck or slab joints and pavement relief joints.

No.	Name	CS Table	Description
300	Strip Seal Expansion Joint	8	Expansion joint devices that utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland.
301	Pourable Joint Seal	8	Joints filled with a pourable seal with or without a backer.
302	Compression Joint Seal	8	Joints filled with a preformed compression type seal. This joint does not have an anchor system to confine the seal.
303	Assembly Joint with Seal	8	Joints filled with an assembly mechanism that have a seal.
304	Open Expansion Joint	8	Joints that are open and not sealed.
305	Assembly Joint Without Seal	8	Joints that are open and not sealed. This element includes finger and sliding plate joints.
306	Other Joints	8	Joints that cannot be classified using any other defined joint element.

Quantity Calculation: Sum the lengths of all joints measured along the skew angle.

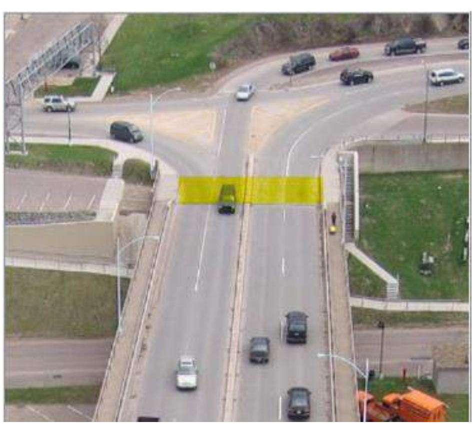
Element Commentary: Other Joints shall also include partial depth strip seal and block out style expansion joints.

2. APPROACH SLAB (SQ. FT.)

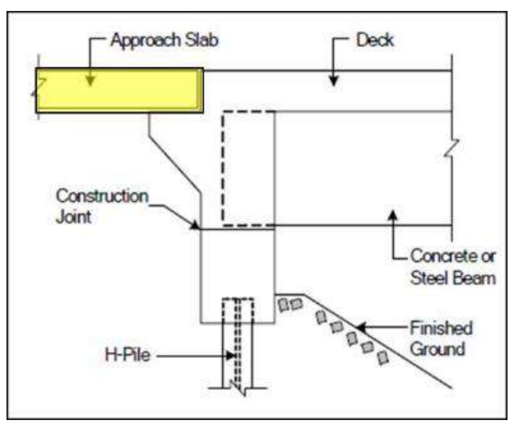
Description: These elements define structural sections, between the abutment and the approach pavement.

No.	Name	CS Table	Description
320	Prestressed Concrete Approach Slab	2	Prestressed (post-tensioned) reinforced concrete approach slabs.
321	Reinforced Concrete Approach Slab	1	Mild steel reinforced concrete approach slabs.

Quantity Calculation: The quantity for this element should include the area of the approach slab(s) from edge to edge including any median areas and accounting for any flares or ramps present. This includes the portion of link slabs and sleeper slabs that extend beyond the reference line.



321 Reinforced Concrete Approach Slab



3. BRIDGE RAILING (FT.)

Description: These elements are for bridge rail, which may be fabricated from steel, other metal, concrete, masonry, and other materials.

No.	Name	CS Table	Description
330	Metal Bridge Railing	3	All types and shapes of metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. will all be considered part of this element. Included in this element are the posts of metal, timber, concrete, masonry, blocking and curb. This includes thrie-beam retrofit.
331	Reinforced Concrete Bridge Railing	1	All types and shapes of reinforced concrete bridge railing. All elements of the railing (not including incidentals such as handrails or pedestrian fencing) must be concrete.
332	Timber Bridge Railing	4	All types and shapes of timber bridge railing. Included in this element are the posts of metal, timber, concrete, masonry, blocking and curb.
333	Other Bridge Railing	6	All types and shapes of bridge railing that cannot be classified using any other defined railing element.
334	Masonry Bridge Railing	5	All types and shapes of masonry, stone bridge railing. All elements of the railing must be masonry, stone.

Quantity Calculation: The quantity is the number of bridge barriers times the length of the bridge. The element quantity includes only the rail on the bridge from reference line to reference line.

Element Commentary: The number of rows of rail on a bridge is commonly two, one on each side of the bridge. In some cases, there may be more than two rows when you have a center median or protected pedestrian/bicycle lanes. See Section 7.2.5.1 of the BIGD. Regarding rail on culverts, see Section 7.2.5.2 of the BIGD.

4. SUPERSTRUCTURE

Superstructure elements described in this section transmit loads from decks to the substructure. These elements include girders, trusses, arches and floor systems. The floor systems include floor beams and stringers. Additional elements in this group include cables, gusset plates and pin and hanger assemblies. These elements do not include bracing components such as diaphragms, cross bracing or portal sway bracing.

Girder elements transmit the loads from the deck into the substructure. Elements listed include closed web (boxes) and open girders (I sections). The materials include steel, reinforced and prestressed concrete and timber.

Stringer elements are part of a floor system and transmit load from the deck into the floor system, such as floor beams. Floor beam elements are the intermediate transverse load carrying members and can be constructed from steel, concrete and timber.

Truss and Arch elements include materials of steel, concrete, timber and masonry; and are the main load carrying members for the span.

Miscellaneous superstructure elements include elements such as steel gusset plates and main and secondary cables.

GIRDERS (FT.)

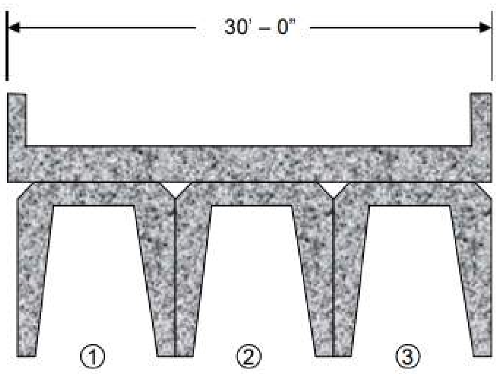
Description: These elements transmit loads from the deck to the substructure. Elements listed include closed web (boxes) and open girders (I-sections) regardless of protective systems.

No.	Name	CS Table	Description
102	Steel Closed Web/Box Girder	3	Steel box girders or closed web girders.
104	Prestressed Concrete Closed Web/Box Girder	2	Pretensioned or post-tensioned concrete closed web girders. When there is no deck and traffic rides directly on the girders the top flange is rated using NBE #15 (see pg. N-4).
105	Reinforced Concrete Closed Web/Box Girder	1	Reinforced concrete box girder or closed web girders. When there is no deck and traffic rides directly on the girders, the top flange is rated using NBE #16 (see pg. N-4).
106	Other Closed Web/Box Girder	6	Composite material or other material box girders or closed web girders that cannot be classified using any other defined closed web/box girder element.
107	Steel Open Girder/Beam	3	Steel open girders.
109	Prestressed Concrete Open Girder/Beam	2	Pretensioned or post-tensioned concrete open web girders. When traffic rides directly on the girders, the top flange is rated using NBE #15 (see pg. N-4).
110	Reinforced Concrete Open Girder/Beam	1	Mild steel reinforced open web girders. When there is no deck and traffic rides directly on the girders, the top flange is rated using NBE #16 (see pg. N-4).
111	Timber Open Girder	4	All timber open girders.
112	Other Open Girder/Beam	6	Composite material girders and open girder/beams that cannot be classified using any other defined element. Includes concrete encased steel girders.

Quantity Calculation: The quantity for these elements is the sum of all lengths of each girder or girder section. This convention applies to all girders, channels, and box girders. The quantity is NOT dependent on the number of visible pairs of girder faces but is determined by the length of the bridge multiplied by the number of girders, beams, channels or box girders.

Element Commentary: The girder evaluation is three dimensional in nature with the defects observed on all exterior and interior (if visible) surfaces.

GIRDERS (FT.) (CONTINUED)



Since there are three (3) channel beams, the quantity should be the length of the bridge multiplied by 3. For the above figure a bridge that is 25 feet in length and 30 feet wide, the total girder quantity should be 75 feet.

Reinforced Concrete Deck (Element 12)
Quantity = 30 FT x 25 FT = 750 SF

Reinforced Concrete – Open Girder/Beam (Element 110)
Quantity = 25 LF x 3 = 75 LF

104 Prestressed Closed Web/Box Girder
(Segmental)

109 Prestressed Concrete Open Girder
(Precast Double T)

FLOOR BEAMS (FT.)

Description: This element defines only elements that transversely support stringers or decks, regardless of protective systems.

No.	Name	CS Table	Description
152	Steel Floor Beam	3	The condition evaluation for this element includes web faces and the top and bottom flange.
154	Prestressed Concrete Floor Beam	2	Only prestressed elements.
155	Reinforced Concrete Floor Beam	1	Only mild steel reinforced concrete.
156	Timber Floor Beam	4	Timber floor beams.
157	Other Floor Beam	6	Composite materials, or other materials that cannot be classified using any other defined elements.

Quantity Calculation: The quantity for these elements is the sum of all lengths of each floor beam.

Element Commentary: The floor beam evaluation is three dimensional in nature with the defects observed on all exterior surfaces.

STRINGERS (FT.)

Description: These superstructure elements transmit loads from the deck to the floor system, such as floor beams, regardless of protective systems. These elements define members that support the deck in a stringer floor beam system.

No.	Name	CS Table	Description
113	Steel Stringer	3	Steel members that support the deck in a stringer floor beam system.
115	Prestressed Concrete Stringer	2	Pretensioned or post-tensioned concrete members that support the deck in a stringer floor beam system.
116	Reinforced Concrete Stringer	1	Mild steel reinforced concrete members that support the deck in a stringer floor beam system.
117	Timber Stringer	4	Timber members that support the deck in a stringer floor beam system.
118	Other Stringer	6	Composite materials or other materials that cannot be classified using any other defined elements.

Quantity Calculation: The quantity for these elements is the sum of all lengths of each section.

Element Commentary: The stringer evaluation is three dimensional in nature with the defects observed on all exterior surfaces.

TRUSSES (FT.)

Description: This element defines all truss components, including all tension and compression members for through and deck trusses, regardless of protective system.

No.	Name	CS Table	Description
120	Steel Truss	3	Steel truss elements. See element 162 (Gusset Plate) for additional details.
135	Timber Truss	4	Timber truss elements.
136	Other Truss	6	Composite materials or those that cannot be classified by any other defined truss element.

Quantity Calculation: The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinal along the traveled way. Observed distress in diagonal and vertical truss members shall be reported as the projected length along the length of the truss.

Element Commentary: Given their complexity, examples of trusses are included at the end of this appendix.

120 Steel Truss

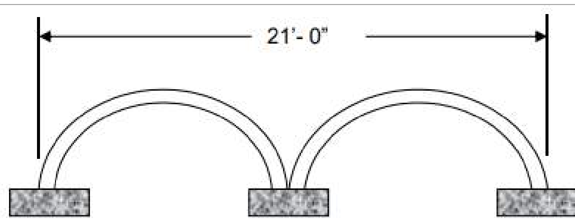
ARCHES (FT.)

Description: This element defines arches regardless of materials type or protective system.

No.	Name	CS Table	Description
141	Steel Arch	3	Steel arches.
142	Other Arch	6	Composite materials and arches, regardless of type, that cannot be classified using any other defined arch element.
143	Prestressed Concrete Arch	2	Pretensioned or post-tensioned concrete arches.
144	Reinforced Concrete Arch	1	Mild steel reinforced concrete arches.
145	Masonry Arch	5	Masonry or stacked stone arches.
146	Timber Arch	4	Timber arches.

Quantity Calculation: The quantity for this element is the sum of the length of each arch horizontally between spring lines and measured longitudinal to the travel way. It is not measured along the length of the barrel. See example below. For filled arches, the arch quantity shall be measured from spring line to spring line. The length below the spring line is considered substructure.

Element Commentary: Observed distress in arch diagonals and vertical members (including spandrel columns) shall be reported as the projected length along the arch length. For Steel Through, Tied or Deck Arches there are no separate elements for verticals and diagonals. They shall be included in the arch element (like a truss). Also include other associated steel superstructure elements such as: girders, floor beams, stringers, cables, etc. For 'Concrete Deck Arches – Covered With Fill' see 'Slab Spans - covered with fill' at the end of this appendix.



CABLES (SEE DESCRIPTION)

Description: This element defines cables regardless of material type, regardless of protective system.

No.	Name	CS Table	Description
147	Steel Main Cables	3	Steel main suspension or cable stay cables not embedded in concrete. This element is intended for use on main cables in suspension bridges or main cable stays in cable-stayed bridges. Suspender cables or other smaller cables shall be captured using the secondary cable element. The quantity for this element is the sum of all of the lengths of each main cable measured longitudinal to the travel way.
148	Secondary Steel Cables	3	Steel suspender cables not embedded in concrete. It is for all individual or cable groups. This element is intended for use on suspender cables, other smaller cables or groups of cables in one location acting as a system to carry loads from the superstructure to the main cable/arch. The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable/arch elements.
149	Other Secondary Cables	6	Other material cables not embedded in concrete. It is for all individual other material cables or cable groups regardless of protective systems. The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable/arch elements. The other material secondary cable is intended for cables of composite materials, or other materials that cannot be classified using any other defined cable elements.

Quantity Calculation: See descriptions above for quantity calculations specific to each.

MISCELLANEOUS SUPERSTRUCTURE ELEMENTS (EA.)

Description: This element defines miscellaneous superstructure elements that cannot be categorized according to any of the previously described categories regardless of material type and protective system.

No.	Name	CS Table	Description
161	Steel Pin and Pin & Hanger Assembly	3	Steel pin and hanger assemblies. Distress observed on either the pin, link plate, or web plate should be considered in the condition assessment. Ultrasonic testing results should be taken into consideration in the condition assessment if available. The quantity for this element is the sum of the number of pin and hanger assemblies.
162	Steel Gusset Plate	3	Only those steel gusset plate(s) connections that connect the main truss/arch panel(s). These connections can be constructed with one or more plates that may be bolted, riveted, or welded. The quantity for this element is the sum of the number of primary load path gusset plate assemblies. For multiple plate gusset connections at a single panel point, the quantity shall be one gusset plate assembly regardless of the number of individual plates at the single connection point.

Quantity Calculation: See description above for quantity calculations specific to each.

Element Commentary: The evaluation is three dimensional in nature with the defects observed on all exterior and interior (if visible) surfaces.

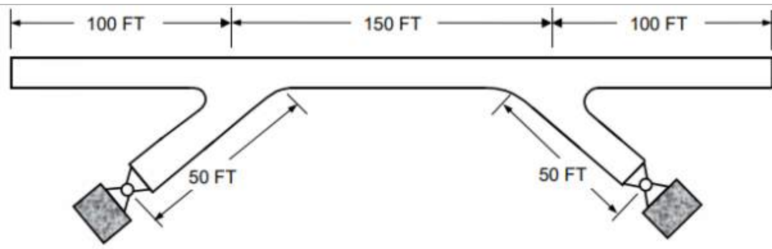
RIGID FRAMES AND THREE SIDED STRUCTURES (SEE DESCRIPTION)

Description: A steel frame shall be coded using Element 107 (Steel Open Girder/Beam).

No.	Name	CS Table	Description
107	Steel Open Girder/Beam	3	Steel open girders.

Quantity Calculation: The legs of the steel frame in this example are included in the overall length of the element 'Steel Open Girder/Beam'. Any elements located above the bearings are part of the superstructure.

Element Commentary: The girder evaluation is three dimensional in nature with the defects observed on all exterior and interior (if visible) surfaces.



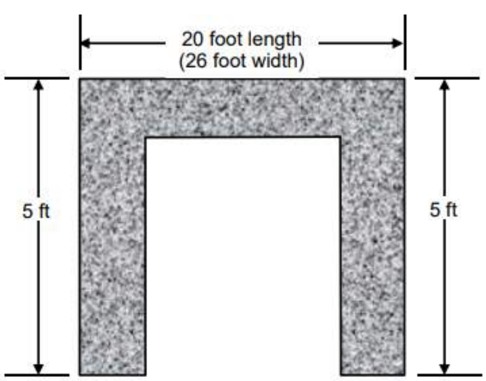
Steel Open Girder/Beam (Element 107)
Quantity = 450 LF (per girder line)

Description: A concrete frame shall be coded using Element 12 (Reinforced Concrete Deck) and Element 215 (Reinforced Concrete Abutment).

No.	Name	CS Table	Description
12	Reinforced Concrete	1	Reinforced concrete bridge decks
215	Reinforced Concrete Abutment	1	Mild steel reinforced concrete abutments including the sheet material retaining the embankment and wingwalls, abutment extensions, and any other monolithically placed concrete elements up to the first construction joint (cold joint, water stop, etc.).

Quantity Calculation: Concrete frames should be coded using the elements for reinforced concrete abutment and reinforced concrete deck. The abutment is calculated in linear feet and the deck is calculated in square feet.

Element Commentary: The quantity for abutment portion of the element is the sum of the width of the abutment with monolithic wingwalls and abutments extensions measured along the skew angle. The deck evaluation is three dimensional in nature with the defects observed on the top surface, bottom surface, edges or all; and being captured using the defined condition states. Deck top or bottom surfaces that are not visible for inspection shall be assessed based on the available visible surface. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and nondestructive testing or indicators in the materials covering the surfaces. Both the severity and density of spalls, delaminations, or patched areas, and severity and density of cracks and the existence of rust staining should be considered for the evaluation of the deck elements.



Reinforced Concrete Deck (Element 12)
Quantity = 20 FT x 26 FT = 520 SF

Reinforced Concrete Abutment (Element 215)
Quantity = 26 LF x 2 = 52 LF

5. WEARING SURFACES (SQ. FT.)

Description: This element defines the condition wearing surface, which is the protective coating for the deck element of a structure. Types of wearing surface include flexible (asphalt), semi-rigid (epoxy, polyester), rigid (concrete, latex, micro-silica or high performance cement) and timber planks. Inspectors will use element 510 to record the condition of the wearing surface. Note that NBI Item 108 is used only to record the type of wearing surface, not the condition.

No.	Name	CS Table	Description
510	Wearing Surface	7	This element is for the wearing surface, the protective coating for the deck element.

Quantity Calculation: The quantity for this element should include the entire area of wearing surface (or protective coating) for the element.

Element Commentary: The wearing surface evaluation should consider severity of the rutting, scaling, or wear in the wheel tracks. Also to be considered is the area of wearing surface debondment, such as pot holes or pan holes. For something to be called a wearing surface, it must be placed separately from the time the deck is placed. This is the first and most important test. Therefore, monolithically place concrete (the 1/4" that designers call a wearing surface) is not a wearing surface. The following are examples of wearing surfaces: asphaltic concrete overlays, cementitious overlays and epoxy overlays. There are others not mentioned here.

6. PROTECTIVE COATING (SQ. FT.)

Description: These elements define protective coatings including paint, oxide on weathering steel, cathodic protection, topcoat corrosion inhibitor and galvanization that influence the deterioration and condition of the underlying structural element.

No.	Name	CS Table	Description
515	Steel Protective Coating	10	This element is for steel elements that have a corrosion inhibiting protective coating.
521	Concrete Protective Coating	10	This element is for concrete elements that have a protective coating. These coatings include silane/siloxane water proofers, crack sealers such as High Molecular Weight Methacrylate (HMWM), or any topcoat barrier that protects concrete from deterioration and reinforcing steel from corrosion.

Quantity Calculation: The quantity for this element should include the entire area of protected surface for the element. The steel protective coating for superstructure elements for superstructure elements will be calculated by first determining the visible surface area of the primary structural elements (i.e. the top face of top flange is excluded) then adding 10% to account for secondary members such as diaphragms, web stiffeners, bearing stiffeners, etc.

515 Steel Protective Coating


521 Concrete Protective Coating

7. BEARINGS (EA.)

Description: These elements define bridge bearings.

No.	Name	CS Table	Description
310	Elastomeric Bearing	9	This element defines bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement.
311	Moveable Bearing	9	This element defines bridge bearings that provide for both rotation and longitudinal movement by means of roller, rocker, or sliding mechanisms.
312	Enclosed/Concealed Bearing	9	This element defines bridge bearings that are enclosed so that they are not open for detailed inspection. This element should be used for box girder hinges. In cases where the bearing material is not visible, the inspector shall assess the condition based on alignment, grade across the joint, persistence of debris, or other indirect indicators of the condition.
313	Fixed Bearing	9	This element defines bridge bearings that provide for rotation only (no longitudinal movement).
314	Pot Bearing	9	This element defines high load bearings with confined elastomer. The bearing may be fixed against horizontal movement, guided to allow sliding in one direction, or floating to allow sliding in any direction.
315	Disc Bearing	9	This element defines high load bearings with a hard plastic disk. This bearing may be fixed against horizontal movement, guided to allow movement in one direction, or floating to allow sliding in any direction.
316	Other Bearing	9	This element defines other material bridge bearings, regardless of translation or rotation constraints, that cannot be classified by any other defined bearing element.

Quantity Calculation: The quantity is the sum of each bearing type.

8. SUBSTRUCTURE

Substructure elements described in this section transmit loads from superstructure into the ground. These are the supporting elements of the structure and include columns, piles, pile extensions, pier walls, towers, trestles and abutments. These elements include elements of steel, concrete, timber, masonry, and other material.


215 Reinforced Concrete Abutment


210 Reinforced Concrete Pier Wall


207 Steel Tower

ABUTMENT (FT.)

Description: These elements define abutments, regardless of protective system.

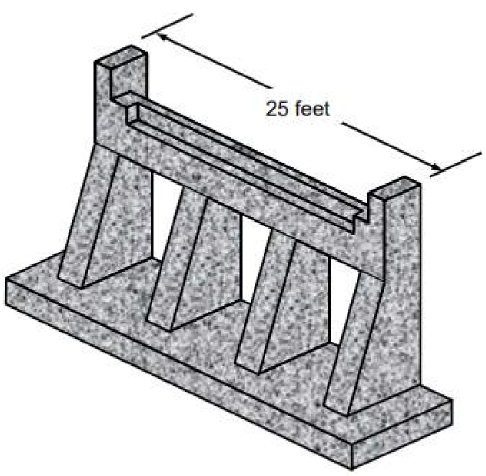
No.	Name	CS Table	Description
215	Reinforced Concrete Abutment	1	Mild steel reinforced concrete abutments including the sheet material retaining the embankment and wingwalls, abutment extensions, and any other monolithically placed concrete elements up to the first construction joint (cold joint, water stop, etc.).
216	Timber Abutment	4	Timber abutments including the sheet material retaining the embankment and wingwalls, abutment extensions, and any other monolithically placed concrete elements up to the first construction joint (plank butt joint, etc.).
217	Masonry Abutment	5	Abutments constructed of block or stone placed with or without mortar.
218	Other Abutment	6	Other material abutment systems that cannot be classified by any other defined abutment element, including the sheet material retaining the embankment and wingwalls, abutment extensions.
219	Steel Abutment	3	Steel abutments including the sheet material retaining the embankment and wingwalls, and abutment extensions

Quantity Calculation: The quantity for these elements are the sum of the width of the abutment with monolithic wingwalls and abutments extensions measured along the skew angle. Wingwalls that are not monolithic with the abutment shall not be included in the abutment or assessment of the abutment element.

Element Commentary: Spill-through abutments are common in South Carolina. See below.

SPILL-THROUGH ABUTMENT (SEE BELOW)

Quantity Calculation: If the columns are visible, the abutment should be coded as indicated below. If the columns are present but not directly visible, reasonable efforts should be made to observe the columns. If the columns are still not visible the Element should be coded and the condition state should be coded by other criteria. Destructive or non-destructive testing is not necessarily needed.



Reinforced Concrete Column (Element 205)
Quantity = 4 EA

Reinforced Concrete Pier Cap (Element 234)
Quantity = 25 LF

COLUMN (EA.)

Description: These elements define all columns, regardless of protective system.

No.	Name	CS Table	Description
202	Steel Column	3	Steel columns.
203	Other Column	6	Other material columns that cannot be classified using any other defined column element.
204	Prestressed Concrete Column	2	Prestressed concrete columns.
205	Reinforced Concrete Column	1	Reinforced concrete columns.
206	Timber Column	4	Timber columns.

Quantity Calculation: The quantity for these elements is the sum of the number of columns. Column elements are used for widths less than 10 feet. Columns shall bear on a footing, mudsill or other generally shallow foundation; unlike piles which bear on nothing and rely on friction. See Section 7.2.5.3 of the BIGD.

PIER WALL (FT.)

Description: This element defines pier walls, regardless of protective system.

No.	Name	CS Table	Description
210	Reinforced Concrete Pier Wall	1	Mild steel reinforced concrete pier walls.
211	Other Pier Wall	6	Other materials that cannot be classified by any other defined pier wall element.
212	Timber Pier Wall	4	Timber pier walls that include pile, timber sheet material, and filler.
213	Masonry Pier Wall	5	Block or stone placed with or without mortar.

Quantity Calculation: The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle. Pier Wall elements are used for widths greater than 10 feet.

PIER CAP (FT.)

Description: These elements define pier caps that support girders and transfer loads to piles or columns, regardless of protective systems.

No.	Name	CS Table	Description
231	Steel Pier Cap	3	Steel pier caps.
233	Prestressed Concrete Pier Cap	2	Prestressed concrete pier caps.
234	Reinforced Concrete Pier Cap	1	Reinforced concrete pier caps.
235	Timber Pier Cap	4	Timber pier caps.
236	Other Pier Cap	6	Other material pier caps that cannot be classified using any other defined pier cap element.

Quantity Calculation: The quantity for this element is the sum of the lengths of the pier caps measured along the skew angle.

Element Commentary: Pier caps shall include mudsills (if visible).

PILE (EA.)

Description: These elements define all piles, regardless of protective system.

No.	Name	CS Table	Description
225	Steel Pile	3	Steel piles.
226	Prestressed Concrete Pile	2	Prestressed concrete piles.
227	Reinforced Concrete Pile	1	Reinforced concrete piles.
228	Timber Pile	4	Timber piles.
229	Other Pile	6	Composite materials or piles that cannot be classified by any other defined pile element.

Quantity Calculation: The quantity for these elements is the sum of the number of piles visible for inspection.

Element Commentary: Piles exposed from erosion or scour or visible during an underwater inspection are included in this element. Piles shall bear on nothing and rely on friction; unlike columns which bear on a footing, mudsill or other generally shallow foundation. See Section 7.2.5.3 of the BIGD.

PILE CAP/FOOTING (FT.)

Description: This element defines prestressed concrete pier caps and culverts.

No.	Name	CS Table	Description
220	Reinforced Concrete Pile Cap/Footing	1	Reinforced concrete pile caps/footings that are visible for inspection.

Quantity Calculation: The quantity for these elements is the sum of the length of pile caps/footings.

Element Commentary: Pile Caps or Footings exposed from erosion, scour, or visible during an underwater inspection are included in this element.

TOWER (FT.)

Description: This element defines built up steel truss or framed tower supports, and is for all towers regardless of protective system.

No.	Name	CS Table	Description
207	Steel Tower	3	This element is steel built up or framed tower supports, is for all towers, and is intended to capture large supports and towers associated with suspension bridges, cable stayed bridges, moveable bridges or similar structural configurations.

Quantity Calculation: The quantity for this element is the sum of the heights of built up or framed tower supports.

TRESTLE (FT.)

Description: This element defines framed timber supports, regardless of protective system.

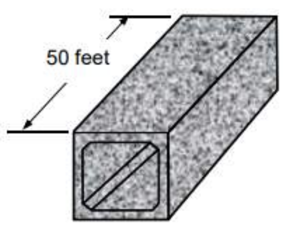
No.	Name	CS Table	Description
208	Timber Trestle	4	This element defines framed timber supports, and is intended to be used for truss-framed trestles or towers. This element is intended to capture large supports and towers associated with large deck truss bridges.

Quantity Calculation: The quantity for this element is the sum of the heights of built up or framed tower supports.

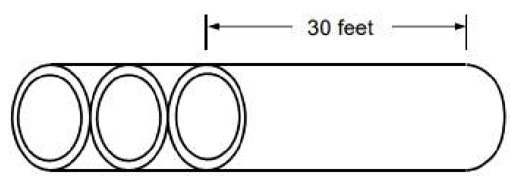
9. CULVERT

A culvert is a structure designed hydraulically to take advantage of submergence to increase water carrying capacity. Culverts, as distinguished from bridges, are usually covered with embankment and are composed of structural material around the entire perimeter. Some culverts are supported on spread footings with the streambed serving as the bottom of the culvert.

Description: These elements define all culverts, regardless of protective system, including box, arched, round, or elliptical shapes.			
No.	**Name**	**CS Table**	**Description**
240	Steel Culvert	3	Steel culverts, including arched, round or elliptical pipes.
241	Reinforced Concrete Culvert	1	Reinforced concrete culverts, includes 4-sided boxes.
242	Timber Culvert	4	Timber culverts.
243	Other Culvert	6	Other material culverts that cannot be classified using any other defined culvert element.
244	Masonry Culvert	5	Masonry block or stone culverts.
245	Prestressed Concrete Culvert	2	Prestressed concrete culverts.
Quantity Calculation: The quantity for these are collected in feet unless otherwise noted. The culvert element is measured along the flow line of the barrel times the number of barrels.			
Element Commentary: The distortion defect is contingent on a number of factors such as site, wall thickness, fill depth, etc.			

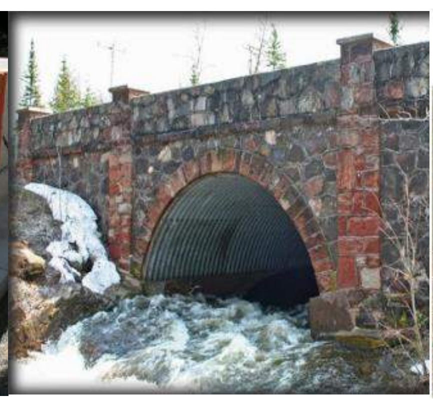


Reinforced Concrete Box Culvert (Element #241)
Quantity = 50 LF



Metal Pipe Culvert (Element #240)
Quantity = 30 LF x 3 barrels = 90 LF

3-Sided Concrete Box Culvert



Corrugated Metal Pipe Arch Culvert

Masonry Culvert

10. CONDITION STATE TABLES

The condition state descriptions for National Bridge Elements and Bridge Management Elements follows guidance provided by the *AASHTO Manual for Bridge Element Inspection* and the FHWA. This appendix attempts to cover the majority of all conditions observed in the field, but during the course of an inspection, the inspector may find conditions that are not described. In these cases, the inspector should use the general description of the condition states to determine the appropriate condition. Overarching descriptors for the four condition states are as follows:

Condition State 1 (Good) – that portion of the element that has either no deterioration or the deterioration is insignificant to the management of the element, meaning that portion of the element has no condition based preventive maintenance needs or repairs. Areas of an element that have received long lasting structural repairs that restore the full capacity of the element with an expected life expectancy equal to the original element can be coded as good condition.

Condition State 2 (Fair) – that portion of the element that has minor deficiencies that signifies a progression of the deterioration process. This portion of the element may need condition based preventive maintenance. Areas of the element that have received structural repairs that improve the element, but the repair is not considered equal to the original member can be coded as fair.

Condition State 3 (Poor) – that portion of the element that has advanced deterioration requiring repair. The summation of the quantity of the element in poor or worse condition determines the need for repairs, rehabilitation, or replacement activities.

Condition State 4 (Severe) – that portion of the element that warrants a review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge. Elements with a portion or all of the quantity in state 4 may often have load capacity implications warranting a structural review. Within this appendix, the term structural review is defined as a review by a person qualified to evaluate the field observed conditions and make a determination of the impacts of the conditions on the performance of the element. Structural reviews may include a review of the field inspection notes and photographs, review of as-built plans or analysis as deemed appropriate to evaluate the performance of the element.

CS TABLE 1 – REINFORCED CONCRETE

<table>
<tr><th rowspan="2">Defect</th><th>Condition State 1</th><th>Condition State 2</th><th>Condition State 3</th><th>Condition State 4</th></tr>
<tr><th>GOOD</th><th>FAIR</th><th>POOR</th><th>SEVERE</th></tr>
<tr><td>Spalls/ Delaminations/ Patch Areas (1080) (2) (3)</td><td>None.</td><td>Delaminated. Spall 1 in. or less deep or less than 6 in. diameter. Patched area is sound.</td><td>Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area is unsound or showing distress. Does not warrant structural review.</td><td rowspan="8">The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.</td></tr>
<tr><td>Exposed Rebar (1090) (2) (3)</td><td>None.</td><td>Present without section loss.</td><td>Present with section loss that does not warrant structural review.</td></tr>
<tr><td>Efflorescence/ Rust Staining (1120) (2) (3)</td><td>None.</td><td>Surface white without build-up or leaching without rust staining.</td><td>Heavy build-up with rust staining.</td></tr>
<tr><td>Cracking (1) Reinforced Concrete and Other (1130) (2) (3)</td><td>Insignificant cracks or moderate-width cracks that have been sealed.</td><td>Unsealed moderate-width cracks or unsealed moderate pattern (map) cracking.</td><td>Wide cracks or heavy pattern (map) cracking.</td></tr>
<tr><td>Abrasion /Wear (1190)</td><td>No Abrasion of wearing</td><td>Abrasion or wearing has exposed coarse aggregate</td><td>Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.</td></tr>
<tr><td>Distortion – Culvert (1900)</td><td>None.</td><td>Distortion not requiring mitigation or mitigated distortion.</td><td>Distortion that requires mitigation but does not require structural review.</td></tr>
<tr><td>Settlement – Substructure Elements (4000) (3)</td><td>None.</td><td>Exists within tolerable limits or arrested with effective actions taken to mitigate.</td><td>Exceeds tolerable limits but does not warrant structural review.</td></tr>
<tr><td>Scour – Substructure / Culvert Elements (6000) (3)</td><td>None.</td><td>Exists within tolerable limits or arrested with effective countermeasures. See Section 13.</td><td>Exceeds tolerable limits but is less than the limits determined by scour evaluation, and does not warrant structural review. See Section 13.</td></tr>
<tr><td>Damage (7000) (2) (3)</td><td>Not applicable.</td><td>The element has minor damage caused by vehicular or vessel impact.</td><td>The element has moderate damage caused by vehicular or vessel impact.</td><td>The element has severe damage caused by impact.</td></tr>
</table>

(1) The inspector should use judgment when utilizing the condition state defect conditions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation, and structure or nonstructural nature of the cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate, and cracks greater than 0.05 inches can be considered wide.

(2) If a saddle is present because of the indicated defect, the inspector shall consider the saddle's installation during the element-level assessment. See Section 7.2.5.6 of the BIGD.

(3) If a pile repair (such as a splice or stud-up) is present because of the indicated defect, the inspector shall consider the repair during the element-level assessment. See Section 7.2.5.5 of the BIGD.

Condition State 2

Condition State 3

Condition State 4

CS TABLE 1 – REINFORCED CONCRETE (Continued)


Condition State 2


Condition State 3


Condition State 4


Condition State 2


Condition State 3

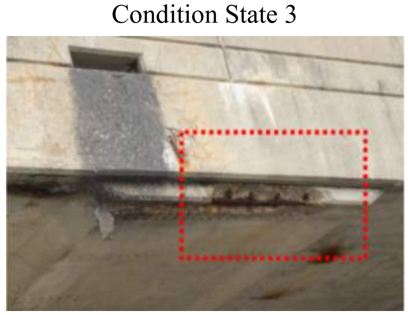

Condition State 4

CS TABLE 1 – REINFORCED CONCRETE – DEFECT SPECIFIC PHOTOGRAPHS


(1080 – Delamination/Spall/Patched Area)
Condition State 2


(1080 – Delamination/Spall/Patched Area)
Condition State 3


(1090 – Exposed Rebar)
Condition State 2

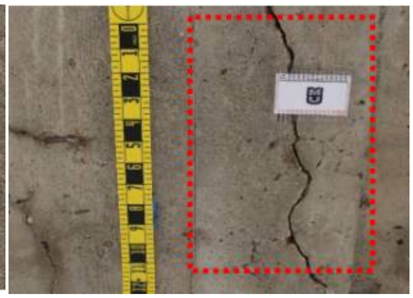

(1090 – Exposed Rebar)
Condition State 3

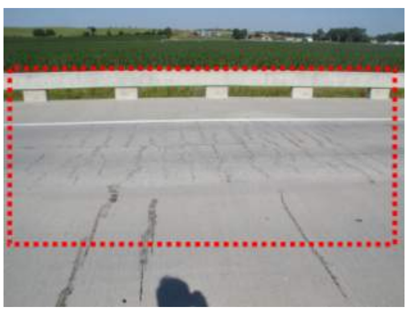
CS TABLE 1 – REINFORCED CONCRETE – DEFECT SPECIFIC PHOTOGRAPHS (Continued)


(1120 – Efflorescence/Rust Staining)
Condition State 2

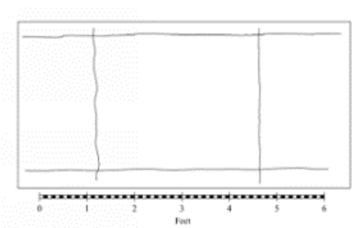

(1120 – Efflorescence/Rust Staining)
Condition State 3

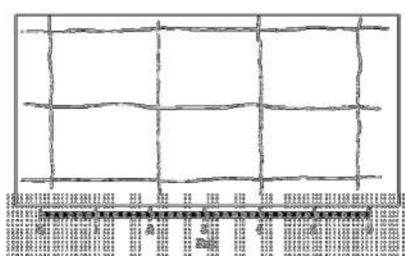

(1130 – Cracking/RC and Other)
Condition State 2

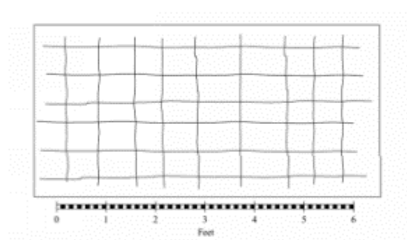

(1130 – Cracking/RC and Other)
Condition State 3


(1130 – Cracking/RC and Other)
Condition State 2


(1130 – Cracking/RC and Other)
Condition State 3


(Crack Pattern Guide)
Condition State 1


(Crack Pattern Guide)
Condition State 2


(Crack Pattern Guide)
Condition State 3

CS TABLE 1 – REINFORCED CONCRETE – DEFECT SPECIFIC PHOTOGRAPHS (Continued)

(1190 – Abrasion/Wear)
Condition State 2

(1190 – Abrasion/Wear)
Condition State 3

CS TABLE 2 – PRESTRESSED CONCRETE

Defects	Condition State 1	Condition State 2	Condition State 3	Condition State 4
	GOOD	FAIR	POOR	SEVERE
Spalls/ Delaminations/ Patch Areas (1080) (2) (3)	None.	Delaminated. Spall 1 in. or less deep or less than 6 in. diameter. Patched area is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar (1090) (2) (3)	None.	Present without section loss.	Present with section loss that does not warrant structural review.	
Exposed Prestressing (1100) (2) (3)	None.	Present without section loss.	Present with section loss that does not warrant structural review.	
Cracking (1) PSC (1110) (2) (3)	Insignificant cracks or moderate-width cracks that have been sealed.	Unsealed moderate-width cracks or unsealed moderate pattern (map) cracking.	Wide cracks or heavy pattern (map) cracking.	
Efflorescence / Rust Staining (1120) (2) (3)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Settlement - Substructure (4000) (3)	None.	Exists within tolerable limits or arrested with effective actions taken to mitigate.	Exceeds tolerable limits but does not warrant structural review.	
Scour – Substructure / Culvert Elements (6000) (3)	None.	Exists within tolerable limits or arrested with effective countermeasures. See Section 13.	Exceeds tolerable limits but is less than the limits determined by scour evaluation, and does not warrant structural review. See Section 13.	
Damage (7000) (2) (3)	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

(1) The inspector should use judgment when utilizing the condition state defect conditions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation, and structure or nonstructural nature of the cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.004 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.004 to 0.009 inches can be considered moderate, and cracks greater than 0.009 inches can be considered wide.

(2) If a saddle is present because of the indicated defect, the inspector shall consider the saddle's installation during the element-level assessment. See Section 7.2.5.6 of the BIGD.

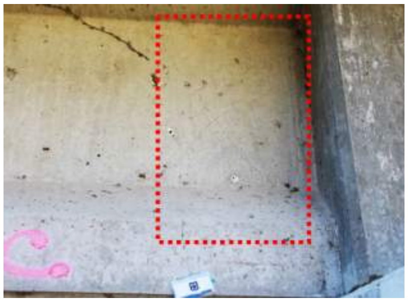
(3) If a pile repair (such as a splice or stud-up) is present because of the indicated defect, the inspector shall consider the repair during the element-level assessment. See Section 7.2.5.5 of the BIGD.


Condition State 2

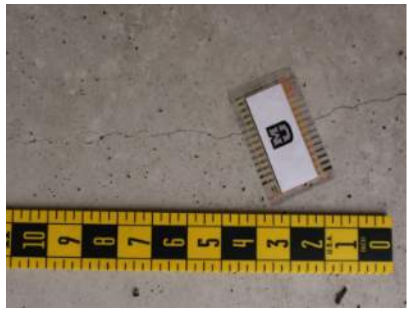

Condition State 3


Condition State 4

CS TABLE 2 – PRESTRESSED CONCRETE – DEFECT SPECIFIC PHOTOGRAPHS



(1110 – Cracking/PSC)
Condition State 2



(1110 – Cracking/PSC)
Condition State 3

CS TABLE 3 - STEEL

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Corrosion (1000) [1,2]	None.	Freckled Rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking/Fatigue (1010) [1,2]	None.	Cracks that have self-arrested or have been arrested with effective arrest holes, doubling plates or similar.	Identified cracks exist that are not arrested and do not require structural review.	
Connections (1020) [1,2]	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but do not warrant a structural review.	
Distortion (1900) [1,2]	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation but does not require structural review.	
Settlement – Substructure Elements (4000) [2]	None.	Exists within tolerable limits or arrested with effective actions taken to mitigate.	Exceeds tolerable limits but does not warrant structural review.	
Scour – Substructure / Culvert Elements (6000) [2]	None.	Exists within tolerable limits or arrested with effective countermeasures. See Section 13.	Exceeds tolerable limits but is less than the limits determined by scour evaluation, and does not warrant structural review. See Section 13.	
Damage (7000) [1,2]	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

(1) If a saddle is present because of the indicated defect, the inspector shall consider the saddle's installation during the element-level assessment. See Section 7.2.5.6 of the BIGD.

(2) If a pile repair (such as a splice or stud-up) is present because of the indicated defect, the inspector shall consider the repair during the element-level assessment. See Section 7.2.5.5 of the BIGD.

Condition State 2 (Damage)

Condition State 3 (Damage)

Condition State 4 (Damage)

CS TABLE 3 – STEEL (Continued)


(1000 – Corrosion)
Condition State 4


(1000 – Corrosion)
Condition State 3


(1000 – Corrosion)
Condition State 4


(1000 – Corrosion)
Condition State 2

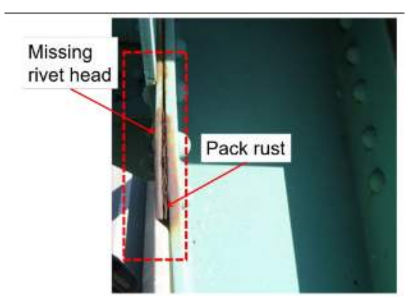

(1000 – Corrosion)
Condition State 3


(1020 – Connections)
Condition State 2


(1020 – Connections)
Condition State 3


(1020 – Connections)
Condition State 4

(1020 – Connections)
Condition State 2



(1020 – Connections)
Condition State 3

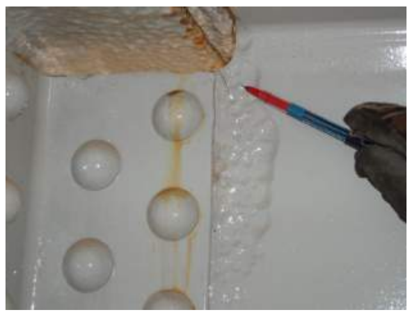
CS TABLE 3 – STEEL (Continued)

(1010 – Cracking)
Condition State 2

(1010 – Cracking)
Condition State 3

(1010 – Cracking)
Condition State 4

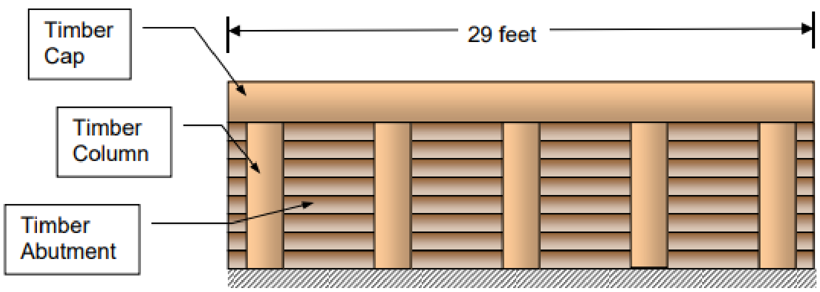
(1010 – Cracking)
Condition State 2



(1010 – Cracking)
Condition State 3

CS TABLE 4 – TIMBER

The condition of all diagonal/cross bracing on substructure units should be considered in rating the condition of the appropriate substructure unit (piles, etc.). In the event that the bracing is deteriorated, deteriorated section of bracing should be considered to be part of the nearest appropriate substructure unit (piles, etc.). Considering the Timber Bent shown below, if there was no decay of the piles, but there was decay of the cross bracing with no loss of strength or indication of deflection, then the Element 206 should be placed in CS2. Timber columns are used because this example assumes the timber columns are bearing on a shallow foundation. Typically coded as 3 different elements: a timber cap, timber columns, and a timber abutment. The timber abutment in these cases will consist only of the timber lagging of the abutment.



Timber Cap (Element 235)
Quantity = 29 LF

Timber Column (Element 206)
Quantity = 5 EA

Timber Abutment (Element 216)
Quantity = 29 LF

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Decay/ Section Loss (1140) [1,2]	None.	Affects less than 10% of the member section	Affects 10% or more of the member but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Checks/ Shakes (1150) [1,2]	Surface penetration less than 5% of the member thickness regardless of location.	Penetrates 5% - 50% of the thickness of the member and not in a tension zone.	Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural analysis.	
Cracks - Timber (1160) [1,2]	None.	Cracks that have been arrested through effective measures.	Identified cracks exist that are not arrested and do not require structural review.	
Splits/ Delamination - Timber (1170) [1,2]	None.	Length less than the member depth or arrested with effective actions taken to mitigate.	Length greater than the member depth and does not require structural review.	
Abrasion (1180) [1,2]	None or no measurable section loss.	Section loss less than 10% of the member thickness.	Section loss 10% or more of the member thickness but does not warrant structural review.	
Scour – Substructure Elements (6000) [2]	None.	Exists within tolerable limits or arrested with effective countermeasures. See Section 13.	Exceeds tolerable limits but is less than the limits determined by scour evaluation, and does not warrant structural review. See Section 13.	
Damage (7000) [1,2]	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by impact

(1) If a saddle is present because of the indicated defect, the inspector shall consider the saddle's installation during the element-level assessment. See Section 7.2.5.6 of the BIGD.
(2) If a pile repair (such as a splice or stud-up) is present because of the indicated defect, the inspector shall consider the repair during the element-level assessment. See Section 7.2.5.5 of the BIGD.

CS TABLE 4 – TIMBER – DEFECT SPECIFIC PHOTOGRAPHS

(1140 – Decay/Section Loss)
Condition State 3*

(1140 – Decay/Section Loss)
Condition State 4

* A stud-up repair is present. However, the water line is below the repair. The repair is generally ineffective; however, a structural review or repair is not needed. Therefore, place in CS 3 since greater than 10% of the pile is decayed and the repair is generally ineffective. See Note 2 on previous page and BIGD Section 7.2.2.5.

CS TABLE 5 – MASONRY

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Spalls/ Delaminations/ Patch Areas (1080)	None.	Delaminated. Spall 1 in. or less deep or less than 6 in. diameter. Patched area is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Mortar Breakdown - Masonry (1610)	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the joints.	
Splits or Spalls - Masonry (1620)	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Areas -Masonry (1630)	None.	Sound patches.	Unsound patches.	
Masonry Displacement (1640)	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Scour – Substructure Elements (6000)	None.	Exists within tolerable limits or arrested with effective countermeasures. See Section 13.	Exceeds tolerable limits but is less than the limits determined by scour evaluation, and does not warrant structural review. See Section 13.	
Damage (7000)	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

CS TABLE 6 – OTHER MATERIALS

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking/Fatigue (1010)	None.	Cracks that have self-arrested or that have been arrested with effective arrest holes, doubling plates, or similar.	Identified cracks exist that are not arrested and do not require structural review.	
Connections (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but do not warrant a structural review.	
Spalls/ Delaminations/ Patch Areas (1080)	None.	Delaminated. Spall 1 in. or less deep or less than 6 in. diameter. Patched area is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining (1120)	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking [(1)] Reinforced Concrete and Other (1130)	Insignificant cracks or moderate-width cracks that have been sealed	Unsealed moderate-width cracks or unsealed moderate pattern (map) cracking.	Wide cracks or heavy pattern (map) cracking.	
Deterioration (Other) (1220)	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown that does not warrant structural review.	
Damage (7000)	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

(1) The inspector should use judgment when utilizing the condition state defect conditions, especially for concrete cracking. The crack defect description definitions describe generalized distress, but the inspector should consider width, spacing, location, orientation, and structure or nonstructural nature of the cracking. The inspector should consider exposure and environment when evaluating crack width. In general, reinforced concrete cracks less than 0.012 inches can be considered insignificant and a defect is not warranted. Cracks ranging from 0.012 to 0.05 inches can be considered moderate, and cracks greater than 0.05 inches can be considered wide.

CS TABLE 7 – WEARING SURFACES

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Spalls/ Delaminations/ Patch Areas/ Potholes (3210)	None.	Delaminations. Spalls 1 in. or less deep or less than 6 in. in diameter. Patched areas are sound. Partial depth potholes.	Spalls greater than 1 in. deep or greater than 6 in. in diameter. Patched areas are unsound or showing distress. Full depth potholes.	The wearing surface is no longer effective.
Cracks (3220)	Widths less than 0.012 in. or spacing greater than 3.0 ft.	Widths 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Widths of more than 0.05 in. or spacing of less than 1.0 ft.	
Effectiveness (3230)	Fully effective. No evidence of leakage or further deterioration of the protected element.	Substantially effective. Deterioration of the protected element has slowed.	Limited effectiveness. Deterioration of the protected element has progressed.	
Damage (7000)	Not applicable	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

CS TABLE 8 – JOINTS

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Leakage (2310)	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion – Joints with Seals Only (2320)	Fully adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion.	Complete loss of adhesion.
Seal Damage – Joints with Seals Only (2330)	None.	Seal abrasion without punctures.	Punctured, ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Seal Cracking – Joints with Seals Only (2340)	None.	Surface cracks.	Cracks that partially penetrate the seal.	Cracks that fully penetrate the seal.
Debris Impaction (2350)	None.	Partially filled, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header (2360)	Sound. No spalls, delamination or unsound patches.	Edge delamination or spall less than 1 in. deep or less than 6 in. diameter. No exposed rebar. Patched area is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched area that makes the joint loose.	Spall, delamination, unsound patched area or loose joint anchor that impacts joint performance.
Metal Damage (2370)	None.	Freckled rust, metal has no cracks or impact damage. Connections may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.	Extensive metal cracking, section loss damage or connection failures impacting joint performance.
Damage (7000)	None.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.

CS TABLE 8 – JOINTS (Continued)


Condition State 2


Condition State 3


Condition State 4


Condition State 2


Condition State 3

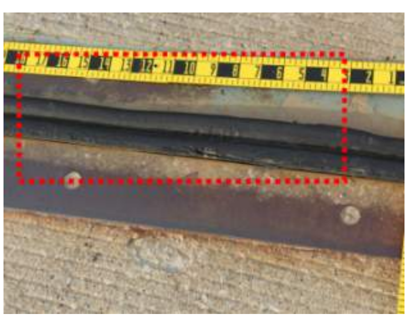

Condition State 4

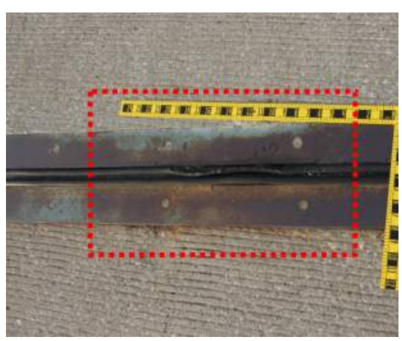

Condition State 2

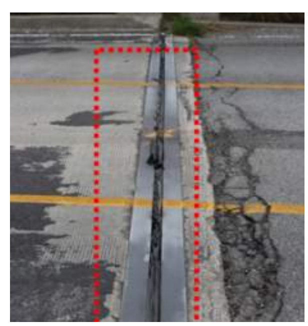

Condition State 3


Condition State 4

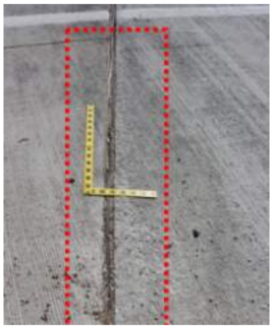
CS TABLE 8 – JOINTS – DEFECT SPECIFIC PHOTOGRAPHS


(2330 – Seal Damage)
Condition State 2


(2330 – Seal Damage)
Condition State 3


(2330 – Seal Damage)
Condition State 4

CS TABLE 8 – JOINTS – DEFECT SPECIFIC PHOTOGRAPHS (Continued)



(2350 – Debris Impaction)
Condition State 2

(2350 – Debris Impaction)
Condition State 3

(2350 – Debris Impaction)
Condition State 4

CS TABLE 9 – BEARINGS

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Corrosion (1000)	None.	Freckled rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge. The element has severe damage caused by vehicular or vessel impact.
Connection (1020)	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion but does not warrant structural review.	
Movement (2210)	Free to move.	Minor restriction.	Restricted but not warranting structural review.	
Alignment (2220)	Lateral and vertical alignment is as expected for the temperature conditions.	Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.	Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.	
Bulging, Splitting or Tearing (2230)	None	Bulging less than 15% of the thickness.	Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.	
Loss of Bearing Area (2240)	None.	Loss of less than 10%.	Loss of 10% or more but does not warrant a structural review.	
Damage (7000)	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	

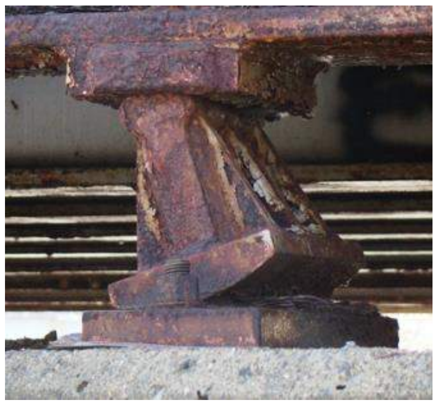
CS TABLE 9 – BEARINGS (Continued)

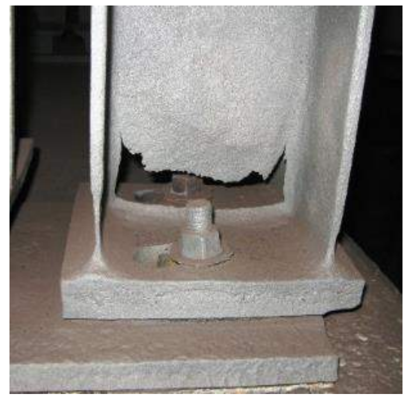

Condition State 2


Condition State 3


Condition State 4


Condition State 2

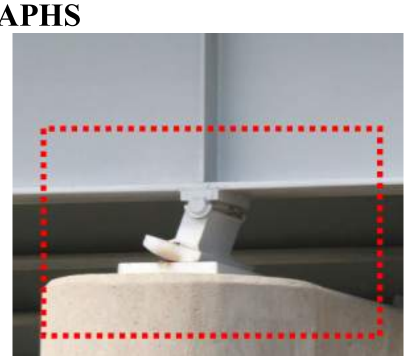

Condition State 3


Condition State 4

CS TABLE 9 – BEARINGS – DEFECT SPECIFIC PHOTOGRAPHS


(2220 – Alignment)
Condition State 1


(2220 – Alignment)
Condition State 2


(2220 – Alignment)
Condition State 3


(2240 – Loss of Bearing Area)
Condition State 2


(2240 – Loss of Bearing Area)
Condition State 3

CS TABLE 10 – PROTECTIVE SYSTEMS

	Condition State 1	Condition State 2	Condition State 3	Condition State 4
Defects	**GOOD**	**FAIR**	**POOR**	**SEVERE**
Chalking - Steel Protective Coatings (3410)	None.	Surface dulling.	Loss of pigment.	Not applicable.
Peeling/Bubbling/ Cracking - Steel Protective Coatings (3420)	None.	Finish coats only.	Finish and primer coats.	Exposure of bare metal.
Oxide Film Degradation Color/ Texture Adherence – Steel Protective Coatings (3430)	Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.	Granular texture.	Small flakes, less than 1/2 in. diameter.	Dark black color. Large flakes, 1/2 in. diameter or greater or laminar sheets or nodules.
Effectiveness - Steel Protective Coatings (3440)	Fully effective.	Substantially effective.	Limited effectiveness.	Failed. No protection of the underlying metal.
Wear - Concrete Protective Coatings (3510)	None.	Underlying concrete not exposed. Coating showing wear from UV exposure. Friction course missing.	Underlying concrete is not exposed and thickness of the coating is reduced.	Underlying concrete exposed. Protective coating no longer effective.
Effectiveness - Concrete Protective Coatings (3540)	Good condition. Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Effectiveness - Protective System [e.g. cathodic, scour monitoring] (3600)	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage (7000)	Not applicable.	The element has minor damage caused by vehicular or vessel impact.	The element has moderate damage caused by vehicular or vessel impact.	The element has severe damage caused by vehicular or vessel impact.


Condition State 2


Condition State 3

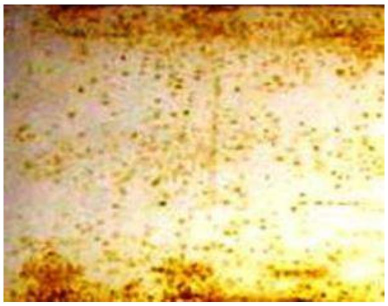

Condition State 4

CS TABLE 10 – PROTECTIVE SYSTEMS (Continued)


Condition State 2


Condition State 3


Condition State 4

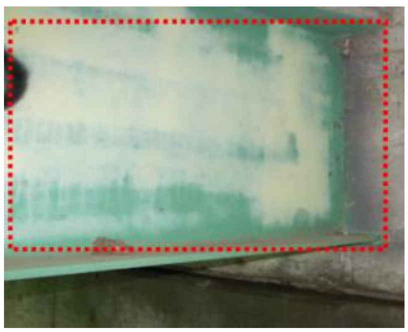

Condition State 2


Condition State 3


Condition State 4

CS TABLE 10 – PROTECTIVE SYSTEMS – DEFECT SPECIFIC PHOTOGRAPHS


(3410 – Chalking)
Condition State 2

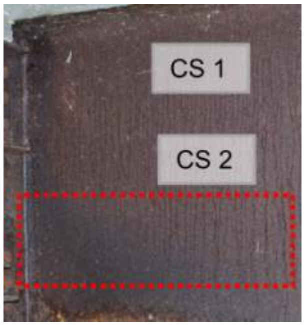

(3410 – Chalking)
Condition State 3


(3420 – Peeling/Bubbling/Cracking)
Condition State 2


(3420 – Peeling/Bubbling/Cracking)
Condition State 3


(3420 – Peeling/Bubbling/Cracking)
Condition State 4

CS TABLE 10 – PROTECTIVE SYSTEMS – DEFECT SPECIFIC PHOTOGRAPHS (Continued)



(3430 – Oxide Film Degradation)
Condition State 2


(3430 – Oxide Film Degradation)
Condition State 3


(3430 – Oxide Film Degradation)
Condition State 3


(3440 – Effectiveness)
Condition State 2


(3440 – Effectiveness)
Condition State 3


(3440 – Effectiveness)
Condition State 4

11. DEFECT HIERARCHY

Defects will often coincide, either overlapping or one next to another in the same area; a typical example of the former would be exposed rebar in a spall and the latter would be a one foot section of a girder with cracking and a spall, but the cracking does not run through the spall. In both cases this one foot area cannot be counted twice, since that would result in two feet of defects where there is only one foot of element.

In cases where defects coincide, only one defect can be reported. The following will assist the inspector in determining which defect should be assigned to the subject area. In such areas, where there are two or more overlapping defects, the worse condition takes precedence. If the worst defect in an area is in Condition State 3, then that portion of the element is in Condition State 3, regardless of how many other Condition State 2 defects share that space.

For cases where there are multiple defects in an area with the same condition state and therefore no worse condition state, a defect hierarchy is used (i.e., a "tie"). SCDOT has created a hierarchy to aid inspectors in assigning a defect in such situations. This hierarchy should be viewed as a guideline in deciding which defect is the most "important" in any given situation, not as a set of hard and fast rules. Ultimately, inspectors must use their own judgment.

One thing to keep in mind in selecting a controlling defect in a tie is the relative extent of the defects over the element. An example would be a situation where there is a steel girder with cracking and corrosion defects, both in Condition State 3. The cracking occurs in the last foot of the element, the corrosion over the last 10 feet. The two defects occur together only in the last foot. If the inspector decides corrosion controls, then 10 feet of Condition State 3 corrosion is reported and the cracking is not reported at all. If the inspector decides cracking controls, 9 feet of Condition State 3 corrosion and one foot of Condition State 3 cracking are reported. The second solution may be more suitable.

Elements with a unit of "Each" are handled differently. "Each" elements are viewed as a group of indivisible individuals. For example, with columns there can be one or two columns; there cannot be 1.5 columns. Each individual column is entirely in one and only one condition state. Each column can have one and only one defect assigned to the Element. If two Condition State 3 defects occur on an individual column, only one can be reported, regardless of the relative extent of the two defects. The inspector will need to decide which the bigger "threat" for that column is and report that defect on that column.

For example, take an interior bent with four reinforced concrete piles, which are inspected and found to be in the following conditions:

Column 1
Good Condition

Column 2
Good Condition

Column 3
Widespread spalls which are 0.5 inches deep and about 4 inches in diameter. (Condition State 3)
A large amount of cracking (approximately 0.012 inches wide) from top to bottom of the pile. (Condition State 2)

Column 4
Minimal amount of spalls which are over 1.5 inches deep and larger in diameter than 8 inches. (Condition State 2)
Extensive cracking (over 0.05 inches wide) along the full length of pile and very concentrated at the pile top. (Condition State 3)

Totals Reported for Element Inspection
Condition State 1 (CS1) = 2 EA (Columns 1 and 2)
Condition State 2 (CS2) = 1 EA (Column 4, spalling (CS2) controls over cracking (CS3))
Condition State 3 (CS3) = 1 EA (Column 3, spalling (CS3) controls over cracking (CS2))

All of the conditions must be reported in the textual section of the inspection report. As stated previously, inspectors must use their own judgment and use this only as a variable guide.

The following are the defects noted in hierarchy format to assist the inspector in determining which defect may take precedence over another when the condition states of two different defects for the same element are equal. As stated previously, inspectors must use their own judgment and use this only as a variable guide.

REINFORCED CONCRETE

Decks

- 1090 – Exposed Concrete Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1130 – Cracking
- 7000 – Damage
- 1190 – Abrasion/Wear

Superstructure

- 7000 – Damage
- 1900 – Distortion
- 1090 – Exposed Concrete Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1130 – Cracking

Substructure

- 7000 – Damage
- 1900 – Scour
- 4000 – Settlement
- 1090 – Exposed Concrete Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1130 – Cracking
- 1190 – Abrasion/Wear

PRESTRESSED CONCRETE

Decks

- 1100 – Exposed Prestressing
- 1090 – Exposed Concrete Spalls/Delaminations Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1110 – Cracking
- 7000 – Damage
- 1190 – Abrasion

Superstructure

- 7000 – Damage
- 1100 – Exposed Prestressing
- 1090 – Exposed Concrete Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1110 – Cracking

Substructure

- 7000 – Damage
- 6000 – Scour
- 4000 – Settlements
- 1100 – Exposed Prestressing
- 1090 – Exposed Concrete Rebar
- 1080 – Delamination/Spall/Patched Area
- 1120 – Efflorescence/Rust Staining
- 1110 – Cracking
- 1190 – Abrasion/Wear

TIMBER

Decks

- 1140 – Decay/Section Loss
- 7000 – Damage
- 1180 – Abrasion/Wear
- 1160 – Cracks
- 1170 – Split/Delamination
- 1020 – Connections
- 1150 – Check/Shake
- 1180 – Abrasion/Wear

Superstructure

- 7000 – Damage
- 1140 – Decay/Section Loss
- 1160 – Cracks
- 1170 – Split/Delamination
- 1020 – Connections
- 1150 – Check/Shake
- 1180 – Abrasion/Wear

Substructure

- 6000 – Scour
- 4000 – Settlement
- 1140 – Decay/Section Loss
- 7000 – Damage
- 1180 – Abrasion/Wear
- 1160 – Cracks
- 1170 – Split/Delamination
- 1150 – Check/Shake
- 1020 – Connections

JOINTS

- 2310 – Leakage
- 2320 – Seal Adhesion
- 2370 – Metal Deterioration or Damage
- 2330 – Seal Damage
- 2340 – Seal Cracking
- 2360 – Adjacent Deck or Header
- 7000 – Damage
- 2350 – Debris Impact

STEEL (ALL ELEMENTS)

- 6000 – Scour (Substructure Only)
- 4000 – Settlement (Substructure Only)
- 1010 – Cracking
- 1020 – Connection
- 1900 – Distortion
- 1000 – Corrosion
- 7000 – Damage

STEEL PROTECTIVE COATING

- 7000 – Damage
- 3440 – Effectiveness (Steel Protective Coatings) – Beam/Girder End Protective Coating Steel
- 3420 – Peeling/Bubbling/Cracking (Steel Protective Coatings) – Beam/Girder End Protective Coating Steel
- 3410 – Chalking (Steel Protective Coatings) – Beam/Girder End Protective Coating Steel
- 3430 – Oxide Film Duration Color/Texture Adherence (Steel Protective Coatings) – Beam/Girder End Protective Coating Steel

CONCRETE PROTECTIVE COATING

- 7000 – Damage
- 3540 – Effectiveness (Concrete Protective Coatings) – Beam/Girder End Protective Coating Concrete
- 3510 – Wear (Concrete Protective Coatings) – Beam/Girder End Protective Coating Concrete

MASONRY (ALL ELEMENTS)

- 6000 – Scour
- 4000 – Settlement
- 7000 – Damage
- 1640 – Masonry Displacement
- 1080 – Spalls/Delaminations/Patches
- 1620 – Split/Spall
- 1630 – Patched Area
- 1610 – Mortar Breakdown
- 1900 – Distortion
- 1120 – Efflorescence/Rust Staining

OTHER (ALL ELEMENTS)

- 6000 – Scour (Substructure Only)
- 4000 – Settlement (Substructure Only)
- 1900 – Distortion
- 7000 – Damage
- 1010 – Cracking
- 1020 – Connection
- 1220 – Deterioration
- 1120 – Efflorescence/Rust Staining
- 1080 – Spalls/Delaminations/Patches
- 1130 – Cracking
- 1000 – Corrosion

BEARINGS (ALL ELEMENTS)

- 7000 – Damage
- 2220 – Alignment

- 2210 – Movement
- 2240 – Loss of Bearing Area
- 2230 – Bulging/Splitting/Tearing
- 4000 – Settlement
- 1020 – Connection
- 1000 – Corrosion

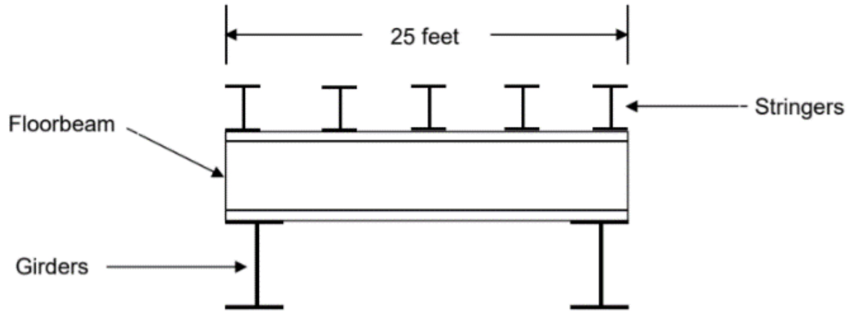
WEARING SURFACES

- 3230 – Effectiveness (Wearing Surface)
- 3210 – Delaminations/Spall/Patched Area/Pothole (Wearing Surface)
- 3220 – Crack (Wearing Surface)
- 7000 – Damage

12. ADDITIONAL GUIDANCE ON ELEMENT QUANTITIES

GIRDERS/STRINGERS/FLOOR BEAMS

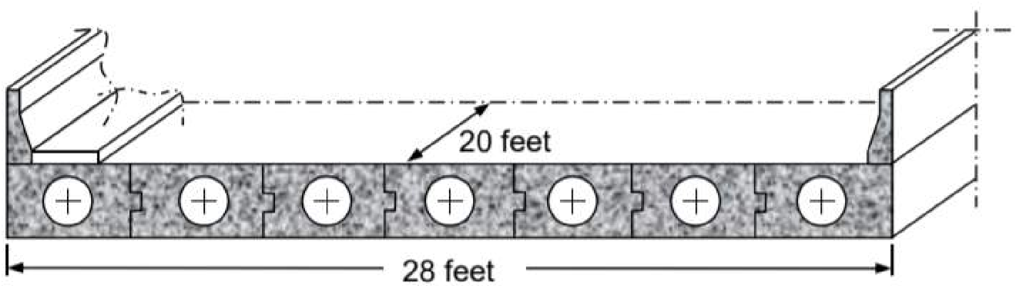
The figure below shows a two-girder bridge that is 50 feet long with three floorbeams that are 25 feet long each and five stringers.



Element #	Element Name	Quantity
107	Steel Open Girder/Beam	100 LF (2 x 50)
113	Steel Stringer	250 LF (5 x 50)
152	Steel Floor Beam	75 LF (3 x 25)

PRESTRESSED CONCRETE CLOSED WEB/BOX GIRDERS

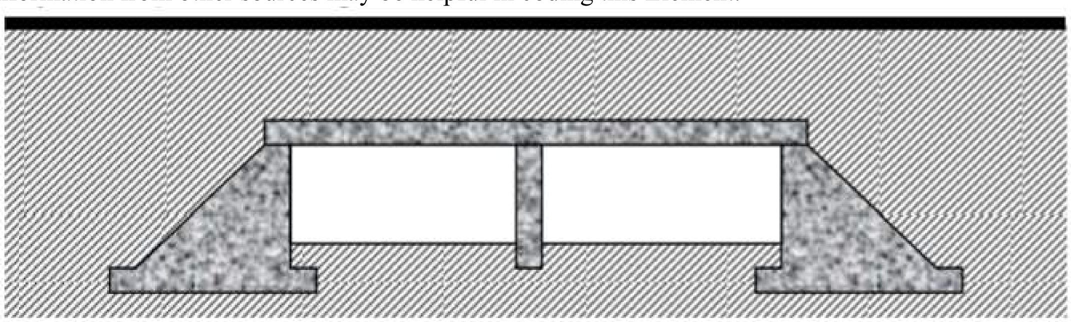
Element 104 is for both voided and unvoided Prestressed Concrete Girders/Slabs. These slabs should be coded as Element 104 - Prestressed Concrete Closed Web/Box Girders. A top flange Element is also needed. If there is a separate wearing surface it must also be coded so the riding surface can be assessed. Where the girders are not spread and the traffic rides directly on the structural element, regardless of the wearing surface, evaluation of the top flange is considered with element 15- Prestressed Concrete Top Flange or 16-Reinforced Concrete Top Flange. This configuration will NOT typically have a separate deck element.



Element #	Element Name	Quantity
104	Prestressed Concrete Closed Web/Box Girders	140 LF (7 x 20)
15	Prestressed Concrete Top Flange	560 SF (20 x 28)
801	Sidewalk	20 SF (1 x 20)
510	Wearing Surface	560 SF (20 x 28)

SLAB SPANS COVERED WITH FILL

This element also applies to Concrete Deck Arches covered with fill. Even though these structures are covered with fill, deck, superstructure, and substructure elements should be defined as appropriate. Element 65 should be used to report the condition of the slab. All or part of the top surface will not be visible for inspection, therefore the Element shall be assessed based on the available visible surface, top and/or bottom of the slab. If both top and bottom surfaces are not visible, the condition shall be assessed based on destructive and/or nondestructive testing or indicators in the materials covering the surfaces. Information from other sources may be helpful in coding this Element.



Element #	Element Name	Quantity
65	Other Slab	Area in SF
215	Reinforced Concrete Abutment	Length in LF
210	Reinforced Concrete Pier Wall	Length in LF

TRUSSES

Determining Quantities

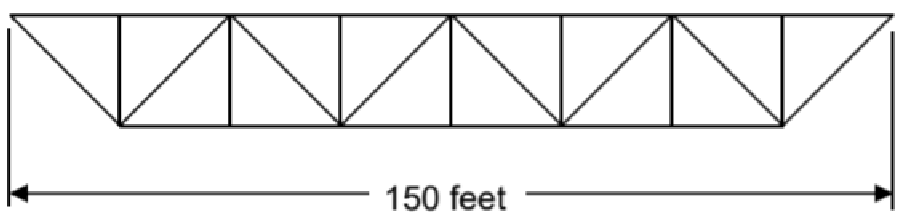
The superstructure of a truss bridge usually consists of two parallel trusses. The quantity is determined by calculating the combined length in linear feet of the parallel trusses. Diagonals, verticals, or cross bracing are not counted as additional quantities.

Total Length

The overall quantity is determined by the length of the bridge multiplied by the number of trusses in each span. See example below.

Deck Truss

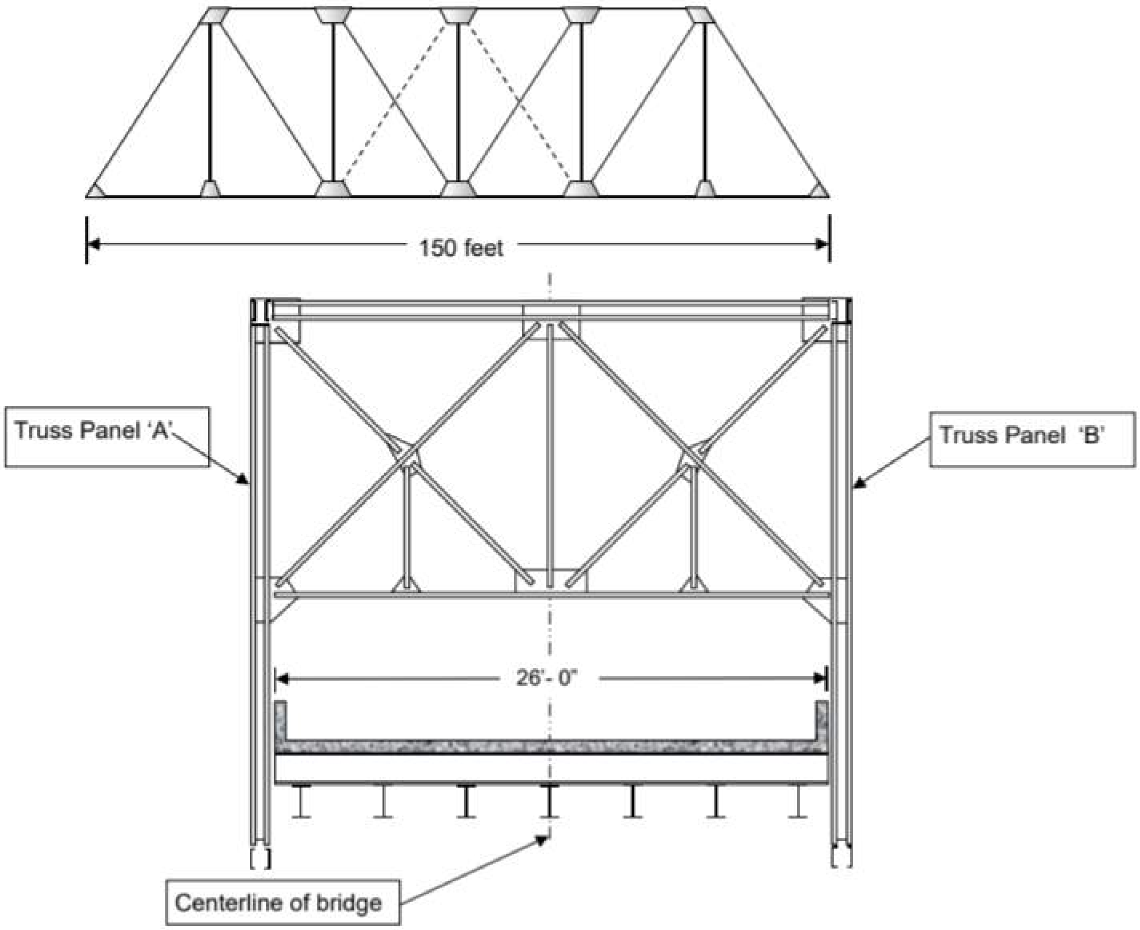
Note: Both Through and Deck trusses are coded using the same Element depending on the material type. The following example is a steel deck truss. Also note the bottom chords are no longer a separate element for through trusses.



Element #	Element Name	Quantity
120	Steel Truss (Regardless of type and protective system/paint)	300 LF (2 x 150)

Through Trusses (includes Pony Trusses)

The following example is for a steel through truss. Note the bottom chords are no longer a separate element for through trusses.



Trusses 'A' and 'B' are each 150 feet long.

Element #	Element Name	Quantity
12	Reinforced Concrete Deck	3900 LF (150 x 26)
113	Steel Stringer	1050 LF (7 x 150)
120	Steel Truss	300 LF (2 x 150)
162	Steel Gusset Plate	24 EA (2 x 12)
152	Steel Floorbeam	182 LF (7 x 26)

The length of the floor beam shown in this example is for illustration purposes only. The actual length of the floor beam should be measured in the field or determined from the plans. The above is not meant to signify all the Elements required for the structure above.

Deterioration

All deterioration is measured along the length of the bridge.

Diagonals

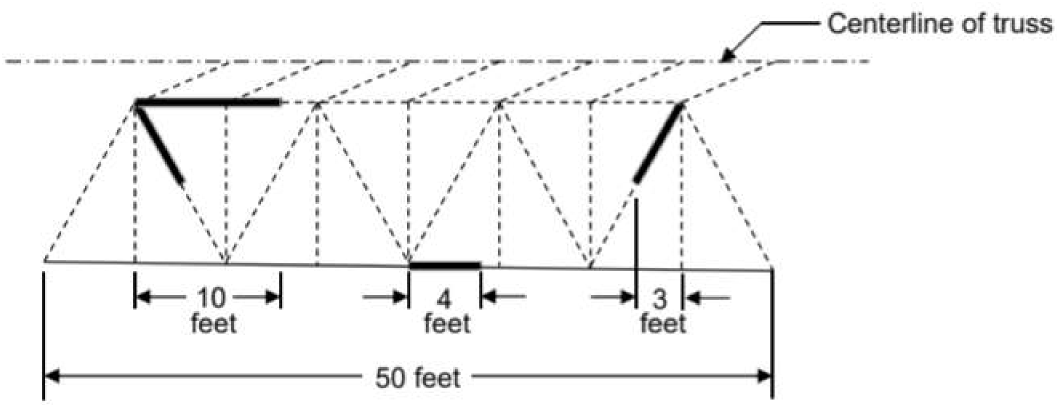
Deterioration of a diagonal member is measured along the length of the bridge and not along the diagonal. The quantity of a deteriorated section in diagonals and verticals that overlap deteriorated section(s) in other parts of the truss should not be double-counted. See example below.

Portals/Bracing

The quantities of deterioration of portals/bracing should be counted with the truss element. The quantity of a deteriorated section in portals/bracing that overlaps a deteriorated section(s) in other parts of the truss, with which it has been associated, should not be double-counted. The darkened areas in the sketch below indicate areas of deterioration on a member.

Through Truss (includes Pony Trusses)

The following example is a steel through truss. Quantities of deterioration should include both the left and right side trusses. Note that the deterioration should be measured along the horizontal projection. The severity of the deterioration is indicated by using the appropriate condition state. The quantities listed are the deteriorated portions of the truss.



Element #	Element Name	Quantity	Deterioration
120	Steel Truss	100 LF (2 x 50)	17 LF (10 + 4 + 3)

13. SCOUR DEFECT

Scour is defined as erosion or removal of streambed or bank material around substructure or foundation elements due to river or stream flow. Erosion of embankment material due to roadway runoff is not scour, and will not carry a scour defect.

The scour defect is only applied to the lowest exposed element at a support.

The following are definitions for Condition States 1 to 4 when using this section:

Conditions for which the scour defect is not used:

- Minor observed local scour around supports, typical of supports with silt and sandy soils.
- The channel bed elevations are close to as-built conditions.
- There are no exposed footings or the exposed footings are founded on non-erodible bedrock as determined by a structural review.
- Defects are not applied in CS1.

Condition State 2

- Observed scour is greater that the minor conditions noted above but less than the maximum column or pile lengths noted in this section.
- Scour is within the limits of a spread footing.
- Scour has been arrested with effective countermeasures.

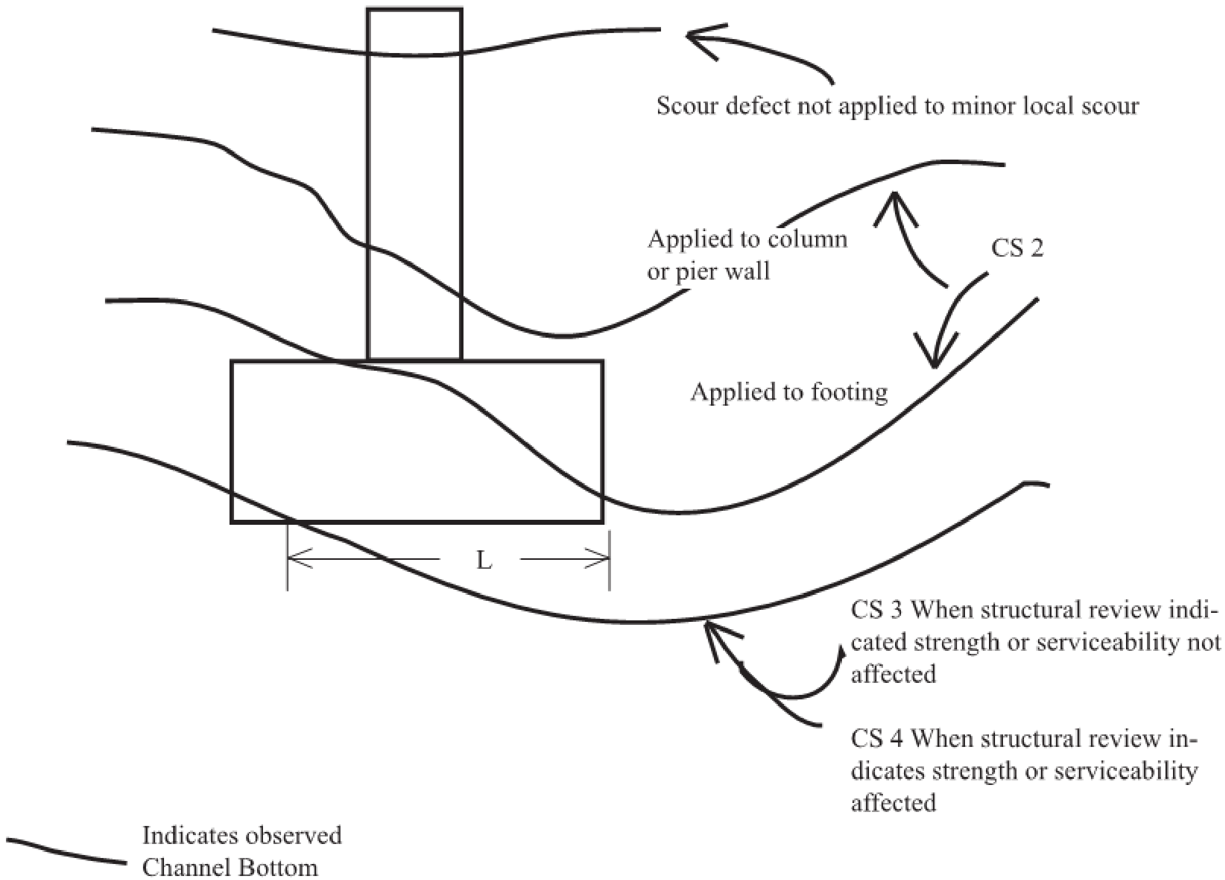
Condition State 3

- Scour exceeds the maximum lengths noted this section or is undermining
- A spread footing but a structural review has found that the condition does not affect the strength or serviceability of the structure.

Condition State 4

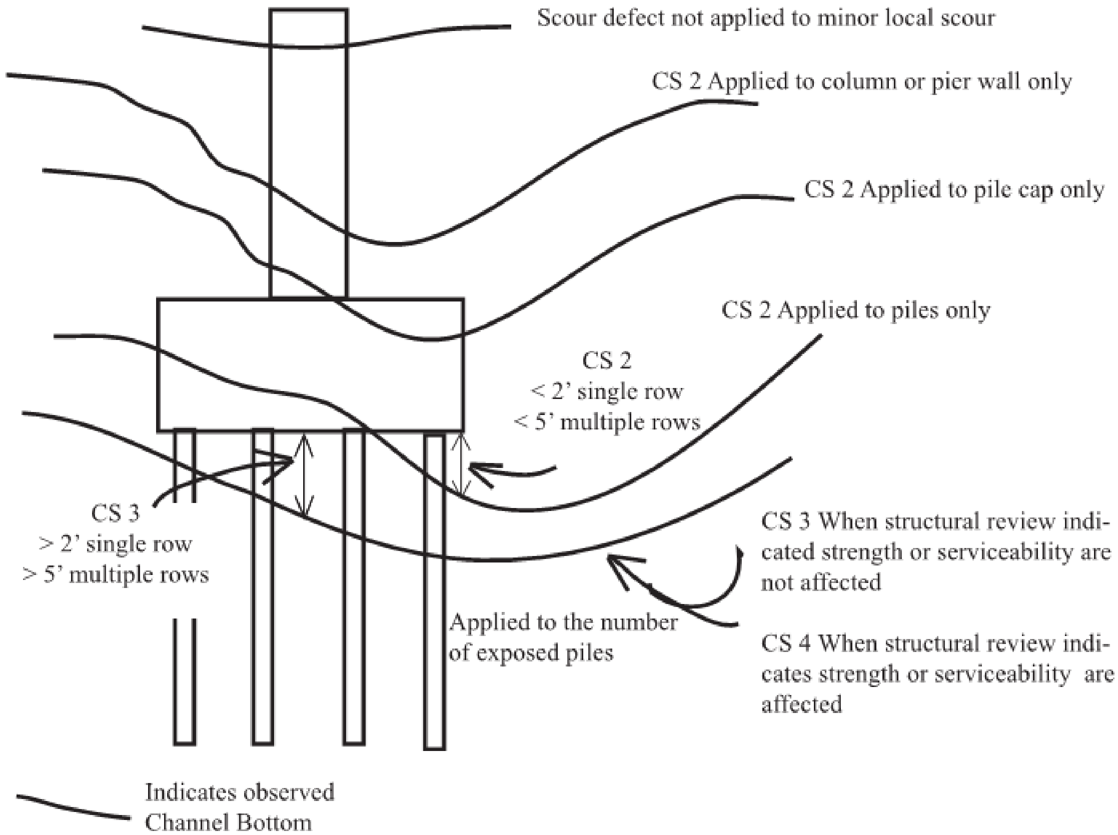
- Scour exceeds the maximum lengths noted in this section and a structural review is not yet completed or, a structural review has been completed and
- The scour impacts the strength or serviceability of the structure.
- Need for a Re-evaluation of Item 113 (Bridge Scour), Attachment 4.2
- SCDOT HQ will determine the stability of the structure. The scour assessment shall recommend the appropriate mitigation and condition state, either CS3 or CS4 when no countermeasures are in place or CS 2 when effective scour countermeasures are in place. When the scour assessment is not completed prior to the required time frame for report submittal, CS4 shall be used until the review has been completed.

SCOUR DEFECT CODING FOR SPREAD FOOTINGS



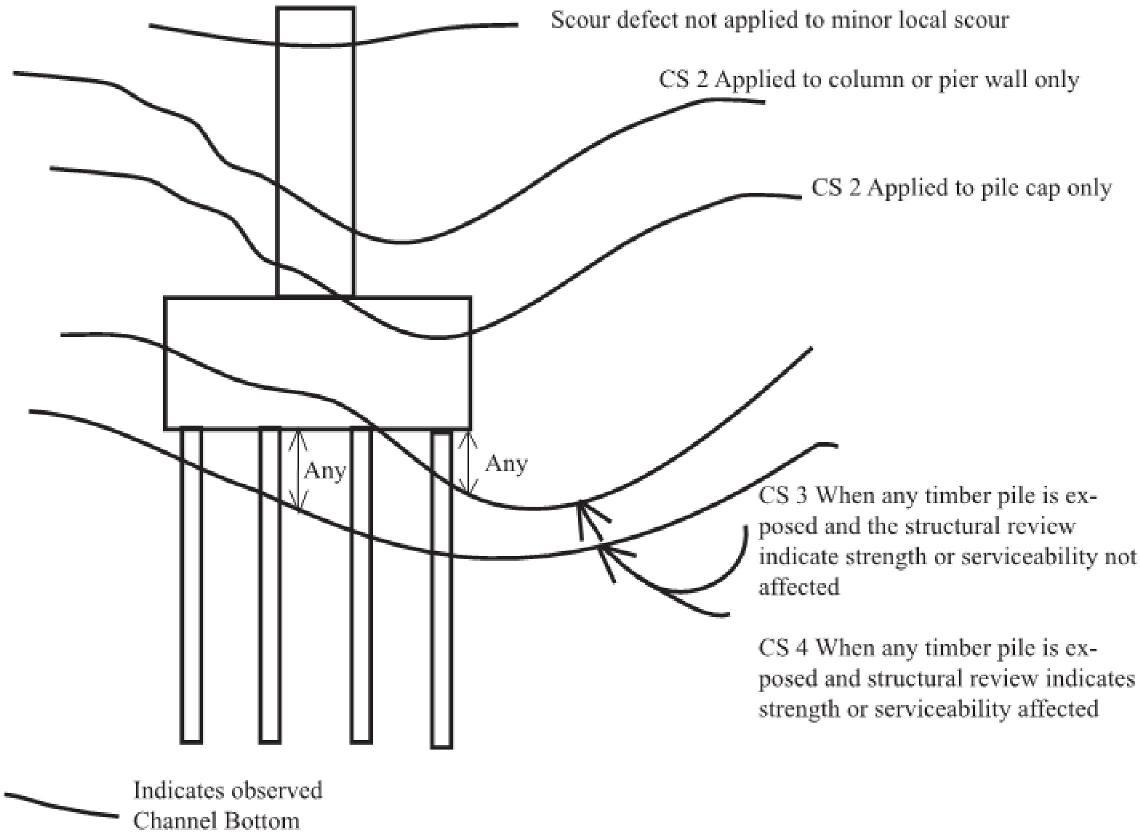
- Any undermined spread footing requires a structural review.
- The scour defect is not used for an exposed footing founded on non-erodable rock with no or insignificant undermining. A structural review should determine that the rock is non-erodable.
- The scour defect is applied to the length of undermined footing.

SCOUR DEFECT CODING FOR STEEL/CONCRETE PILES UNDER PILE CAP



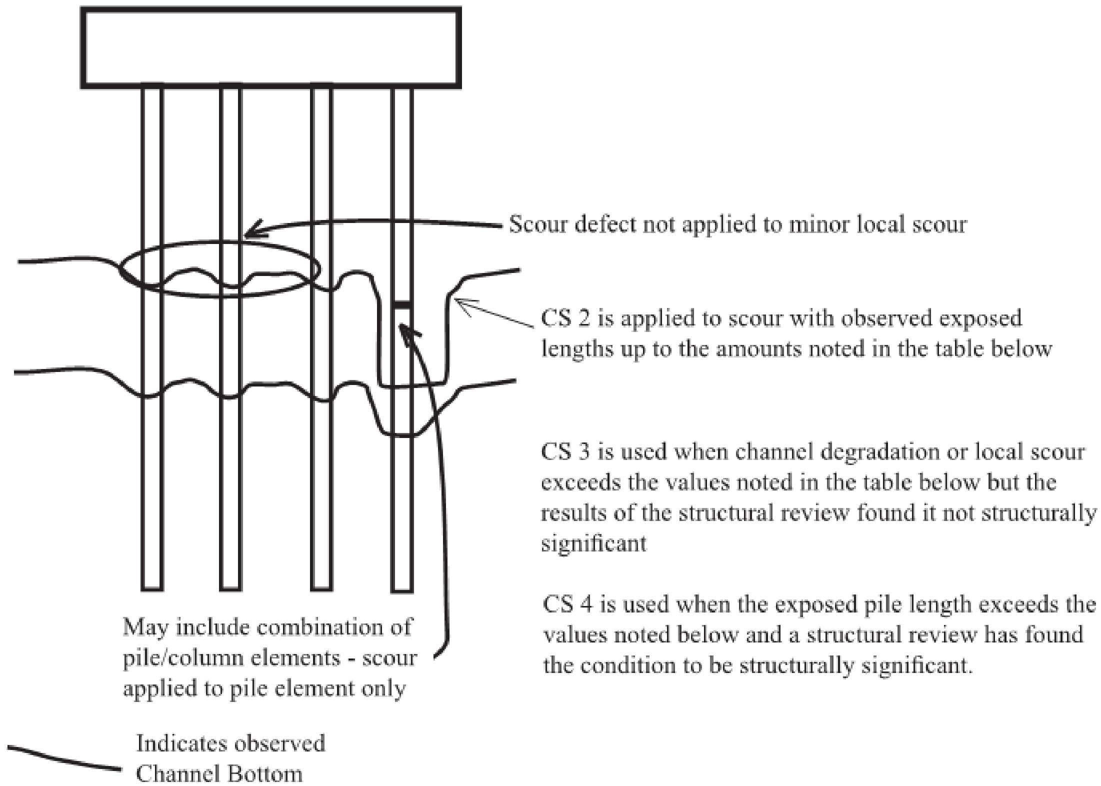
- Steel or concrete piles under a pile cap with an exposed length greater than 2 feet for a single row or 5 feet for multiple rows require a structural review.
- The scour defect is applied to the length of affected exposed pile cap or the number of exposed piles.

SCOUR DEFECT CODING FOR TIMBER PILES UNDER PILE CAP



- Any exposed timber pile under a pile cap requires a structural review.
- The scour defect is applied to the length of affected footing or the number of exposed piles.

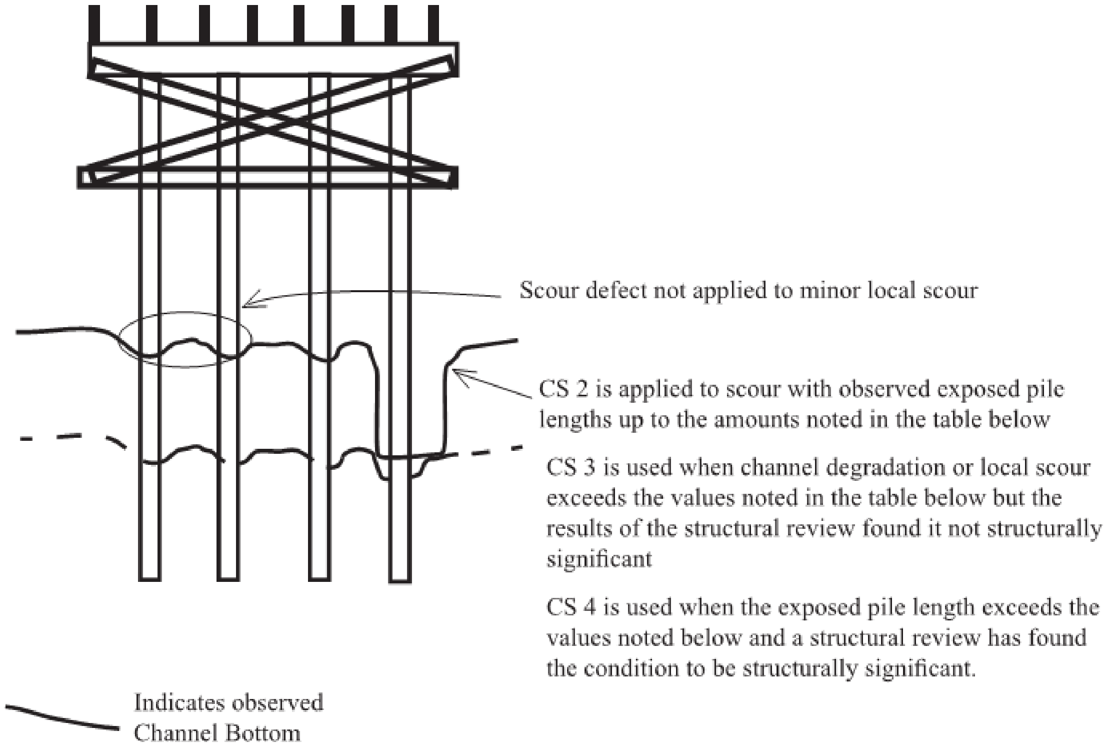
SCOUR DEFECT CODING FOR STEEL/CONCRETE BENT



- Steel or concrete piles, pile extensions, and CISS piles with exposed pile lengths exceeding those shown below require a structural review.
- The scour defect is applied to the number of piles in each condition state.

Maximum Exposed Length of Steel and Concrete columns or combined pile/column length when a pile has been extended with a column	
Column Diameter (Inches)	Maximum Observed Unbraced Length (feet)
12	22
15	26
18	34
20	38

SCOUR DEFECT CODING FOR TIMBER BENT



- Timber piles with exposed pile lengths exceeding those shown below require a structural review.
- The scour defect is applied to the number of piles in each condition state.

Maximum Exposed Length of Timber Piles in Bents	
Column Diameter (Inches)	Maximum Observed Unbraced Length (feet)
12	13
15	17

APPENDIX M

Appendix/Attachment Title

Coding Guide for NBI Items 06 and 07

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT has a specific convention for the coding of NBI Items 06 and 07. This convention is more prescriptive than the corresponding requirements in the *Coding Guide*.

Appendix/Attachment Description

In the event that an inspector discovers an error in the way NBI Items 06 and 07 are coded, Attachment 5.1 of the BIGD shall be used to correct data since the values in NBI Items 06 and 07 are controlled by RDS.

NBI ITEM 6 – FEATURE(S) INTERSECTED

This item is a 25 character alphanumeric field that is used to identify the feature(s) under the structure being inventoried. The 25th character is left blank. SCDOT has a specific convention for coding the data in the first 24 characters of this item. For coding purposes for Item 6, each of the 24 characters is referred to as follows, with **A** denoting the first character:

ABCDEFGHIJKLMNOPQRSTUVWX

NBI ITEM 7 – FACILITY CARRIED BY THE STRUCTURE

This item is an 18 character alphanumeric field that is used to identify the transportation facility being carried by the structure. SCDOT has a specific convention for coding the data in the 18 characters of this item. For coding purposes for Item 7, each of the 18 characters is referred to as follows, with **A** denoting the first character:

ABCDEFGHIJKLMNOPQR

TOOL TO DETERMINE ROADWAY NAMES

The coder shall use SCDOT Street Finder (see link in Chapter 1 of the BIGD) to determine road names and ownership. If the coder is unsure of which roadway name to use, the coder shall use Attachment 5.1 (Bridge Data Form for SCDOT Road Data Services) to request clarification.

TOOL TO DETERMINE WATERWAY NAMES

The coder shall use the topographic quadrangle maps available from the South Carolina Department of Natural Resources (DNR) or the SCDOT Geographic Information Systems (GIS) County Maps to determine official waterway names (see link in Chapter 1). The maps are organized by county.

ABBREVIATIONS

Every effort shall be made to keep abbreviations meaningful. It is understood that there may be situations where the feature/facility description conventions cannot be followed exactly (because of too many features/facilities and the limitation on the number of characters that can be entered). In these situations, the coder will attempt to provide as meaningful description as possible while attempting to adhere to the spirit of these conventions.

Also, when using STREET, ROAD, AVENUE, etc., as part of the feature name, the coder shall use the appropriate abbreviation: ST, RD, AVE or AV. However, when using RIVER, BROOK, STREAM, CREEK, MARSH, SWAMP, FLOODPLAIN, etc., as part of the feature name, **spell it out**, except where space limitations do not allow this. Then use the appropriate abbreviation such as “RIV” or “R” for RIVER. The proper coding of water features is important to management of the bridge asset list.

Acceptable abbreviations are included in Table 1 at the end of this Appendix.

When a compass designation is used as part of the street name, such as North Main Street, use only the first letter of the direction, for example: N MAIN ST. The exception would be when a compass direction is the official name of the facility: WEST ST.

For divided highways, specify the orientation of the barrel using the following abbreviation convention: northbound is abbreviated “NB”, “SB”, “EB” or “WB”. Do not use “NBL” for the abbreviation of “North Bound Lanes”; use only “NB”.

PUNCTUATION

Omit punctuation marks such as periods in the feature/facility description. For example, do not write "N.B."; use only "NB".

MULTIPLE FEATURES/FACILITIES

A forward slash (/) is used to distinguish between features/facilities which share a common right of way, and an ampersand (&) is used to distinguish between features/facilities which are on separate and parallel rights of way. See Figure 1 for an example of features/facilities sharing a common right of way. See Figure 2 for an example of features/facilities on separate and parallel rights of way. These figures are on the following pages. If the route has a local street name, it may be entered following the route number. This coding is not required and is only recommended if the local street name is commonly used in place of the route number. Lastly, if the route has an orientation (i.e. NB) as well as a local street name, enter the orientation abbreviation first, then the local street name, separating the two by a slash (/) but no spaces.

Examples of multiple street names including the route numbers and local names:

US 17 NB/SAV HWY

US 21/BLOSSOM ST

Generally, the following hierarchy list of precedence will be used when entering information for multiple features/facilities (also applies to later sections of this appendix):

1) Bodies of Water (rivers, streams, marshes, floodplains, etc.)
2) Interstates
3) US Routes
4) State Routes
5) County Routes
6) Local Routes
7) Railroads
8) Other (non-highway facilities or other information regarding a non-existent bridge)

Examples of combined features/facilities include the following:

I-185 / US 29 *(NBI 07)* over US 25 *(NBI 06)*

SC 81 *(NBI 07)* over SALUDA RIVER & S-4-143 *(NBI 06)*

Spaces between content (for combined features) may be removed as necessary based on the limitation to the number of characters allowed. Spaces shall not be removed between feature/facility names.

For example: SALUDA RIVER & S-4-143 could become SALUDA RIVER&S-4-143 but not SALUDARIVER & S-4-143.

Sometimes, it may be useful to add a description which is not an official street name. This description shall be added in parentheses. The example below includes a structure which leads to the Shaw Air Force Base in Sumter County.

For example: S-43-1488 (SHAW)

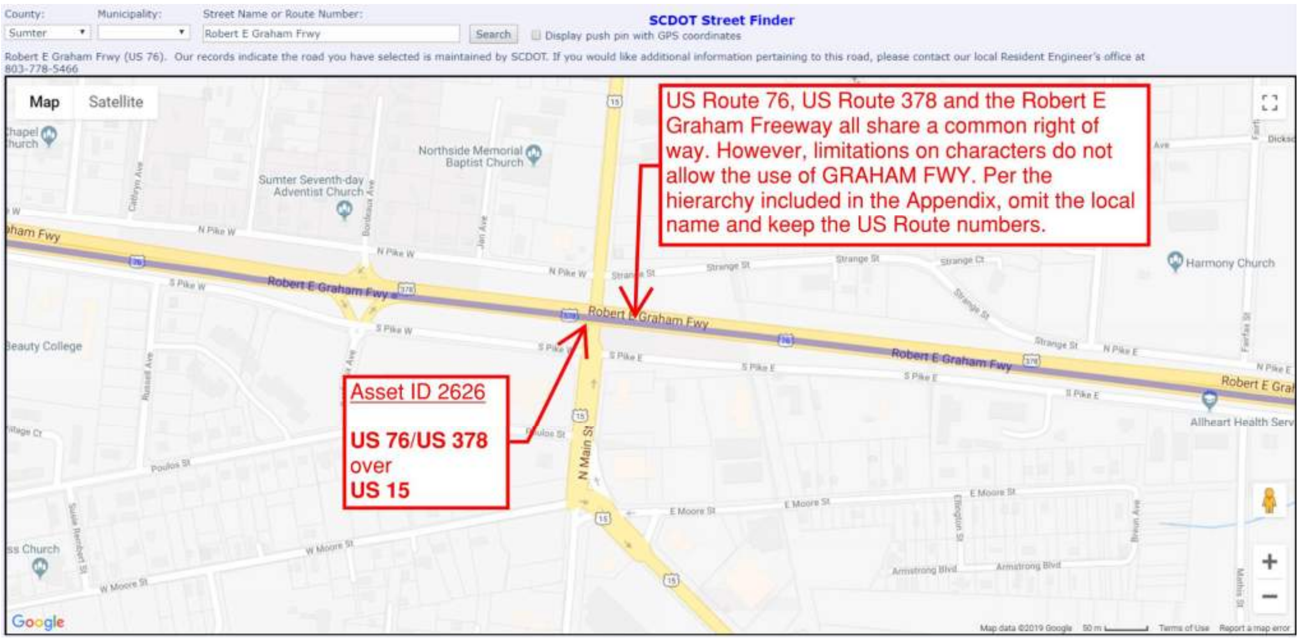


Figure 1: Example of facilities on a common right of way (Asset ID Number 2626)

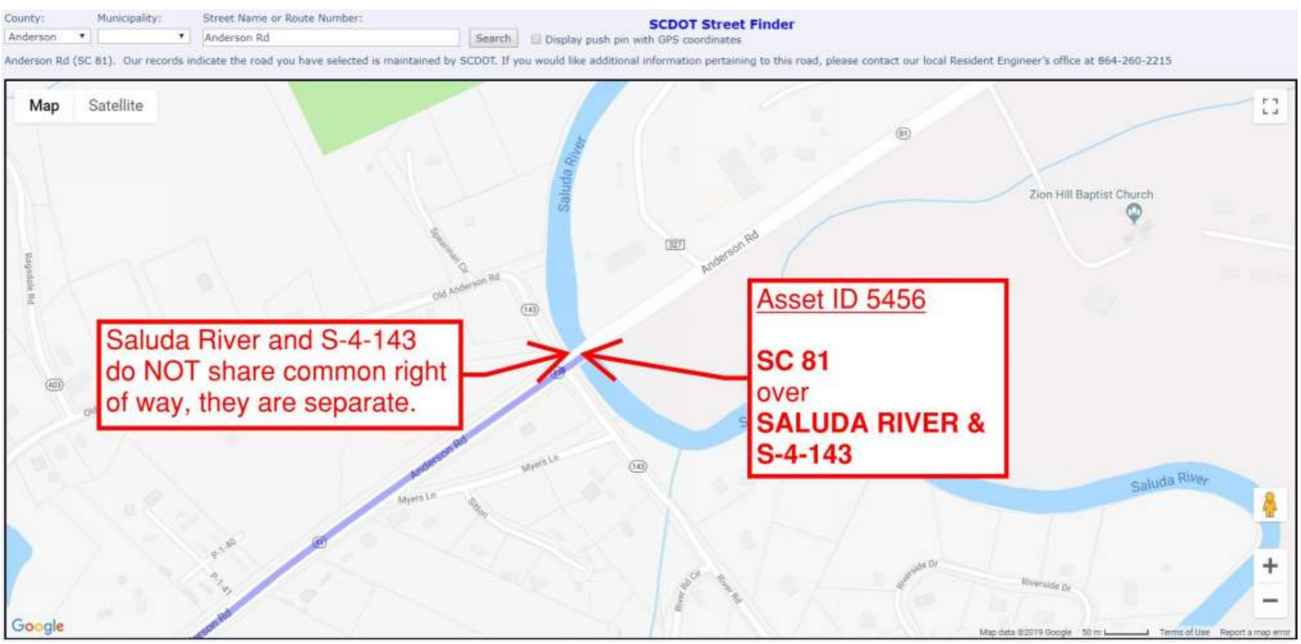


Figure 2: Example of facilities on separate and parallel rights of way (Asset ID Number 5456)

INTERSTATE ROUTES

The feature/facility code **AB** will be coded ***"I-",*** and the number of the interstate will be entered in subsequent spaces. Specify the orientation of the barrel, if only a single barrel is involved. If both barrels of an interstate are involved, omit all references to orientation.

For example: Interstate 185 Southbound: I-185 SB

For example: Interstate 185: I-185

The numbering of intestate routes follows a set convention. One and two digit numbered routes are the main interstate routes that stretch from state to state. Interstate numbers increase from west to east and from south to north.

Even two digit interstate numbers indicate west to east routes. Odd one/two digit interstate numbers indicate south to north routes. Two digit interstate numbers ending in 0 or 5 are used for routes that extend long distances, typically from coast to coast or border to border.

Three digit interstate numbers are used in urban areas and denote branches that originate on the main interstate routes. The first digit represents the type of branch and the second and third digits indicate the main interstate route from which the branch originates. If the first digit is even, then the route is a beltway or loop. If the first digit is odd, then the route is a spur that extends from a main route to a city or other location.

Since three digit interstates are primarily local branches, these numbers may be repeated from state to state. For example, there is an I-185 in South Carolina near Greenville and an I-185 in western Georgia

ON AND OFF RAMPS

The feature/facility code **ABCDE** will be coded ***"RAMP"*** for all on and off ramps in the system. The feature/facility code **FGH** will be coded ***"ON"*** for on ramps meaning the ramp carries traffic on to a feature/facility and **FGHI** will be coded ***"OFF "*** for off ramps meaning the ramp carries traffic off of a feature/facility.

For on and off ramps from a feature/facility higher on the hierarchy list to a feature/facility lower on the hierarchy list, the ramp name shall always include the feature/facility higher on the hierarchy list which the ramps connects to, regardless if the ramp is an on or off ramp.

For example: Asset ID Number 7908 carries an on ramp to Interstate 26 Eastbound which is also an off ramp from US Route 321 Southbound. Since the interstate is higher on the hierarchy list, Item 07 shall be coded: **RAMP ON I-26 EB**.

For on and off ramps and features/facilities at the same level on the hierarchy list, the feature/facility code shall match the feature/facility identified as having the lower number.

For example: Asset ID Number 8327 carries an on ramp to Interstate 526 Westbound which is also an off ramp from Interstate 26 Westbound. Since both interstates are on the same level on the hierarchy list, Item 07 shall be coded to match the route designated with a lower number. Item 07 shall be coded to match the lower number roadway, using I-26, **RAMP OFF I-26 WB**.

US ROUTES AND STATE ROUTES

The feature/facility code **ABC** will be coded ***"US "*** and the number of the US route will be entered in subsequent spaces. Likewise for state routes, the feature/facility code **ABC** will be coded ***"SC "*** and the number of the state route will be entered in subsequent spaces. Specify the orientation of the barrel, if only a single barrel is involved. If both barrels of a US Route or State Route are involved, omit all references to orientation.

For example: US Route 29: US 29

For example: US Route 521 Northbound: US 521 NB

For example: State Route South Carolina 385: SC 385

For example: State Route South Carolina 31 Southbound: SC 31 SB

SECONDARY, COUNTY AND LOCAL ROUTES

The feature/facility code up to **ABCDEFGHI** will be coded as noted below. Due to variations in the route number, all nine characters noted above may not be used. Regardless, see the requirements listed below:

- For secondary routes the feature/facility code **AB** will be coded ***"S-"***,
- For county routes the feature/facility code **AB** will be coded ***"C-"*** and
- For local routes the feature/facility code **AB** will be coded ***"L-"***.

Then, the South Carolina county number shall be used. For counties 1-9, the feature/facility code **C** will be coded as county numbers followed by a hyphen ***"-"***. For counties, 10-46, the feature/facility code **CD** will be coded as county numbers followed by a hyphen ***"-"***. See Appendix B of the BIGD.

If space is restricted, the South Carolina county number may be removed in these unique situations.

Then, the remainder of spaces carries the number of the county followed by a unique number for the particular road. As with the US Route and State Route, the use of the slash (/) is permitted for the use of the local name of some routes, and suffixes are permitted for use as needed.

For example: Secondary Route on Road Number 381 in Williamsburg County: S-45-381

For example: County Route on Road Number 1525 in Beaufort County: C-7-1526

For example: Local Route on Road Number 2129 in Orangeburg County: L-38-2129

For bridges connecting two counties, the coder shall determine which county is responsible for maintenance, and the bridge shall be coded accordingly. If both counties share responsibilities, both road names shall be used and combined with an equal sign ***"="***. The two roads shall be ordered alphanumerically.

For example: S-13-67=S-29-37*(NBI 07)* over Lynches River *(NBI 06)*

ROUTE SUFFIXES

If a Route has a suffix letter(s), such as a “ALT”, “SPUR”, “CON”, “BUS”, “BYP” or “A”, the suffix shall be after the route number

For example: SC 9 BUS

RAILROADS

See Appendix I of the BIGD regarding guidance on railroads in South Carolina. The guidance and maps in Appendix I can be used to accurately label railroads.

For highway bridges over railroads, the feature/facility code **ABC** in Item 06 will be coded ***"RR "*** and then the railroad company shall be entered. For railroad bridges over state-owned highways (which are only included in the inventory to confirm vertical clearances), the feature/facility code **ABCD** in Item 07 will be coded ***"RRO "*** and then the railroad company shall be entered.

When entering railroad company names, use the following abbreviations instead of the full name:

- Aiken Railway Company, LLC (AIKR)
- Carolina Coastal Railway (CLNA)
- Carolina Piedmont Railroad (CPDR)
- CSX Transportation (CSXT)
- Greenville & Western Railway Company (GRLW)
- Lancaster & Chester Railway Company (LC)
- Norfolk Southern Railway (NS)
- Palmetto Railways (PR), previously South Carolina Public Railways

- Pee Dee River Railway Corporation (PDRR)
- Pickens Railway Company (PICK)
- R.J. Corman Railroad (RJCS)
- South Carolina Museum (SCMZ)
- South Carolina Central Railroad Company (SCRF)

Enter the railroad company which provides the flagging services for inspection and is responsible for reviewing bridge plans affecting the railroad. This may or may not be the owner of the railroad right of way.

If a second railroad shares the tracks and is also granted the right to review bridge plans by the owner, this company will be entered second in the feature/facility description, separated from the first by a slash (/).

In addition to these active railroad companies, there have been others that have operated in South Carolina in the past. If a rail line was abandoned and not replaced by another facility, then Item 06 for the bridge over it (or Item 07 if the bridge is an abandoned railroad over a state-owned highway) should still reference the old railroad company that existed at the time of abandonment followed by (***"ABANDONED"***) or (***"ABAND"***) if space is limited.

REMOVED BRIDGES

For bridges that have been permanently removed without replacement, the Feature/Facility Description shall be the following:

- Item 06: Name of original facility/feature intersected
- Item 07: The facility/feature code will be stated as ***"REMOVED"***. This may be modified to provide additional information about historical circumstances regarding the removal of this bridge, if this information is available, such as:
    - WASHED OUT 1955
    - FILLED IN 1984

For bridges that have been functionally replaced by a structure with another Asset ID, the feature/facility shall be coded according to the following:

- Item 06: The facility/feature code will be stated as ***"REPLACED BY"*** followed by the Asset ID Number of the new structure which replaced the old structure. Since the structure is no longer in use, Item 06 is coded to direct attention to the new structure. Item 06 is not used to indicate the feature intersected in this instance.
- Item 07: The facility/feature code will be stated as ***"REMOVED"***. This may be modified to provide additional information about historical circumstances regarding the removal of this bridge, if this information is available, such as:
    - WASHED OUT 1955
    - FILLED IN 1984

OTHER BRIDGES

This is intended to cover any feature/facility that is neither a highway facility open to the public nor one of the other categories listed above. For bikeway facilities which are part of a named bike path, provide the official name following ***"BKY"***. For pedestrian bridges which are part of a pedestrian system, the name of the path should be included following the term ***"PED"***.

For example: PED USC AIKEN (pedestrian bridge which is part of pedestrian system at University of South Carolina at Aiken)

For bikeway and pedestrian bridges which are not part of named paths, specify ***"BKY"*** or ***"PED"*** followed by an ***"@"*** (at) sign and the closest parallel street.

For example: BKY @ BREAM RD (bikeway bridge with closest parallel street)

For example: PED @ SOUTH DR (pedestrian bridge with closest parallel street)

Table 1: ACCEPTABLE ABBREVIATIONS

Full Name	Option 1	Option 2	Unacceptable
ABANDONED	ABAND		
ALTERNATE	ALT		
AVENUE	AVE	AV	A
BIKEWAY	BKY		
BRANCH	BR		
BROOK	BRK	BK	
BUSINESS	BUS		
BYPASS	BYP		
CONNECTOR	CON		
COURT	CT		
CREEK	CRK	CR	
DRIVE	DR		
EASTBOUND	EB	E	E.B., EBL
FLOODPLAIN	FP		
FREEWAY	FWY	FY	
HIGHWAY	HWY	HY	
INTERSTATE	I-		I_, I *(space)*
MARSH	MSH		M
NORTHBOUND	NB	N	N.B., NBL
OVERFLOW	OVF		
PARKWAY	PKY		
PEDESTRIAN BR.	PED		
PLACE	PL		
RAILROAD	RR		R.R.
RIVER	RIV	R	
ROAD	RD		R
SC ROUTE*	SC		SC-, SC_
SOUTHBOUND	SB	S	S.B., SBL
STREAM	STR	SR	S
STREET	ST		S
SWAMP	SWP		
TRIBUTARY	TRIB	TR	
US ROUTE*	US		US-, US_
WESTBOUND	WB	W	W.B., WBL

* Note that US and SC Routes include a “ ” (space) before the route number; see Page M-5.

APPENDIX N

Appendix/Attachment Title

Average Daily Traffic Count Formulas & Example Calculations

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

ADT values for the roadway being carried shall be obtained through requesting traffic counts or from historical records and reported in the bridge inspection report.

If there are no traffic counts available from RDS or the traffic counts which are part of the SI&A data are significantly incorrect, then a manual vehicular and truck traffic count on the structure shall be undertaken.

The BITL shall use his/her judgment as to whether or not the traffic counts on the previous inspection report or provided from SCDOT are still relevant. This could depend on how old the count is, whether traffic patterns have changed for the area, etc. If the BITL suspects the counts may not represent current traffic conditions, then the team shall obtain a manual count as described in this Appendix.

Appendix/Attachment Description

The traffic counts can then be calculated using the formulas and example in this appendix. When complete, the BITL shall submit the counts to RDS who can perform actual traffic counts. Traffic count information is maintained in RIMS.

Traffic Count Formula for use when SCDOT Traffic Volumes are not provided or if the BITL recommends the update of SCDOT Traffic Volumes.

Definitions:

Rush Hour = 3hrs A.M. + 3hrs P.M. = 6 hrs (7 AM – 10 AM & 3 PM – 6 PM)
Off-Peak = Early AM = 3 hrs (4 AM – 7 AM)
Remaining = = 15hrs (10 AM – 3 PM & 6 PM – 4 AM)
= 24hrs

Off – Peak carries no traffic

Rush hour (6) hrs = 42% ADT
Remaining (15) hrs = 58% ADT

Instructions:

Take twelve-minute counts and extrapolate according to the above. Document and note actual time count was made. If twelve-minute counts are used, then a factor of 5 will be used to make the counts per hour, i.e. 5 X 12 = 60 min = 1 hour

Example #1:

Counts were taken at 11:00 AM (hour outside of rush hour and off-peak categories) for 12 minutes. The total vehicles counted were 50. Find the ADT.

50 (counted) X 5 (factor to convert to per hour based on twelve-minute counts) = 250 cars/hr
250 (cars/hr) X 15 (hours outside rush hour and off peak categories) = 3750 cars

Therefore, 3750/0.58 = 6466 ADT. Round up to 6500 ADT.

Example #2:

Counts were taken at 9:00 AM (hour inside rush hour category) for 12 minutes. The total vehicles counted were 75. Find the ADT.

75 (counted) X 5 (factor to convert to per hour based on twelve-minute counts) = 375 cars/hr
375 (cars/hr) X 6 (hours included in the "rush hour" category) = 2250 cars

Therefore, 2250/0.42 = 5375 ADT. Round up to 5400 ADT.

APPENDIX O

Appendix/Attachment Title

Example Critical Findings and Repair Recommendations

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Critical findings and repair recommendations shall be reported by inspectors according to Chapter 8.

Appendix/Attachment Description

Appendix O includes common examples both for critical findings (Urgent, Restrictive and Serious) and Repair Recommendations (Priority A, Priority B and Priority C) on bridges in South Carolina. The lists are not all-inclusive; final evaluation as to how to determine status of the deficiency is the responsibility of the BITL. The list on Page O-2 is not all-inclusive as a critical findings list. Special consideration shall be made by the BITL if the bridge involves the Interstate or NHS, for a bridge with ADT greater than 10,000 or for a bridge with recommendations for immediate work needed to prevent a substantial load reduction for safety of the traveling public.

Critical Finding Examples

Examples of a critical finding are listed below. Material specific critical findings are included on the following page.

Given the severity of a discovered deficiency, all of the items listed below may warrant bridge closure (urgent – red), bridge restriction (orange) or immediate maintenance work because of a safety related item (serious – yellow).

- A partial or complete collapse of a bridge,
- Bridges which are given a structural condition evaluation rating code of 3 or less; this includes:
  - NBI Item 58 (Deck)
  - NBI Item 59 (Superstructure)
  - NBI Item 60 (Substructure)
  - NBI Item 62 (Culvert)
- Bridges which are given any waterway rating of 3 or less; this includes:
  - NBI Item 61 (Channel and Channel Protection)
  - NBI Item 71 (Waterway Adequacy)
- Bridges which are given a current vulnerability status rating (NBI 113) of 2 or less,
- Bridges with a recommended inventory load rating of 6 tons or less,
- Any quantity of a non-redundant bridge element (including FCMs) placed in Condition State 4,
- Critical damage or a defect to main structural members which poses imminent danger to the structure and/or to public safety,
- Immediate work needed to prevent substantial reduction in safe load capacity,
- Loose, deteriorated or damaged expansion joints which may damage passing vehicles,
- Bridge railing is missing, damaged, deteriorated or no longer can contain and/or redirect vehicles,
- Pedestrian railing is missing or detached, potentially allowing a pedestrian to fall off the structure,
- Sidewalk walking surface with damage or deterioration presenting a hazardous condition to pedestrians,
- Serious mechanical, electrical, or hydraulic problems which have stopped or may stop the operation of a movable span or safety equipment,
- Loose or spalling deck material (such as concrete or timber) in imminent danger of falling onto traffic or pedestrians which could cause extensive damage or injury,
- Bridges which are damaged either by collision, natural event, fire or chemicals and the damage poses an imminent danger to the structure and/or to public safety,
- Bridges which are or may be prone to severe scour before, during or after a scour or hydraulic event, and the scour event may lead to bridge failure or partial bridge failure, or
- Drastic/excessive movement or vertical/horizontal displacement (e.g. sliding or deflection) in a major structural component or to the structure as a whole, including unstable foundations, which poses an imminent danger to the structure and/or to public safety.

Critical Finding Examples – Steel

- Significant damage, failure, unmitigated cracks or significant section loss of FCM such as severe corrosion in girder flanges, webs, in truss members, in gusset plates, and connections or a fatigue-prone detail such as certain welds,
- Members with deteriorated areas that have failed in buckling, crippling, etc., or make failure likely in the near future,
- Pin and hanger systems with severe deterioration or severe accumulation of debris or rust packing,
- Rocker bearings that are excessively tilted, exceeding the acceptable amount or bearing on the outer 1/4 width of the rocker.
- Primary structural member with completely fractured tension element due to fatigue, or
- Bottom flange cover plates with cracked welds at the end of a partial length welded cover plate for a steel girder or steel floorbeam.

Critical Finding Examples – Concrete

- Prestressed girder with broken strands or 100 percent section loss at high tension area,
- Non-composite prestressed adjacent box beams with cracking and rust-staining, strand loss, loss of camber, or torsional cracking,
- Severe loss of girder bearing area, where remaining area may no longer have capacity to support the girder under legal load,
- Reinforced concrete girder with damaged or deteriorated primary rebar with 100 percent section loss, with more bars affected at the same location,
- Reinforced concrete bent cap with broken primary rebar or 100 percent section loss, with more bars affected at the same location, or
- Concrete column or cap with significant structural cracking that is supporting a span with a fracture critical member.

Critical Finding Examples – Timber

- Bents with a majority of timber piles where the timber piles are mushroomed piles, piles hollowed with less than only decayed shell remaining, or with less than 1” of heartwood remaining,
- Through-loss in deck planks or broken planks in danger of breaking through,
- Primary structural member with multiple open cracks (splits) in high stress region, or crushing/decay leading to superstructure settlement, or
- Bents which have a loss of bearing capacity or soil retention with crushing, decay, or insect damage which may lead to failure.

General Bridge – Repair Recommendation Examples

Repair Recommendation – Priority A – "A Flags"

- Missing, incorrect or illegible weight limit signs,
- Missing, incorrect or illegible vertical clearance signs (when the field measured vertical clearance is 14'-6 or less),
- Missing or illegible narrow bridge or one lane bridge signs,
- Severe loss of bearing,
- Scouring of a foundation (generally greater than 30% of bearing area),
- Navigational lighting systems on the structure with failure (significant threat to structure given boat traffic),
- Lighting fixtures, signs, traffic signals, or utility poles with damaged, split or buckled sections, missing connections or with cracked welds at connections, or base plate connections with loose nuts,
- Significant scour damage, bank erosion or slope erosion which endanger the stability of substructure elements, or
- Hole in the deck (no immediate damage to traffic below).

Repair Recommendation – Priority B – "B Flags"

- Missing, incorrect or illegible vertical clearance signs (when the field measured vertical clearance is more than 14'-6),
- Loss of bearing,
- Scouring of a foundation (generally less than 30% of bearing area),
- Wearing surface failures which cannot wait for general maintenance, i.e. large pot holes,
- Leveling of approach slabs or excessive settlement to approach slabs or approach roadway to reduce impact loading on the structure,
- Mechanical, electrical, hydraulic problems which will affect the operation of a movable span or safety equipment if allowed to continue to deteriorate, or
- Navigational lighting systems on the structure with failure (some threat to structure given boat traffic),
- Regulatory or warning signs which are missing or worn, including delineators.

Repair Recommendation – Priority C – "C Flags"

- Other missing or worn signs, which are not regulatory or warning, such as informational signs,
- Damage to handrail, guardrail, attenuators, or parapets,
- Large spalls with exposed rebar,
- Slight substructure settlement,
- Frozen or rusted bearings,
- Channel maintenance required before significant scour may occur,
- Leaking or damaged expansion joints,

- Heavy dirt and debris around bridge bearings,
- Exposed coarse aggregate and/or exposed rebar due to abrasion in concrete deck,
- Clogged deck drains,
- Extensive dirt and debris on bridge deck,
- Navigational lighting systems on the structure with failure (no threat to structure given boat traffic),
- Highway lighting systems on the structure with lighting outages,
- Excess vegetation around bridge area limiting bridge inspection access,
- Heavy debris on caps, bridge seats or bents,
- Primary masonry members out of alignment,
- Primary masonry members with unsound patching, or
- Drift causing excess substructure pressure/scour.

Timber Bridge Components

Below are potential repair recommendations for bridge components which are timber.

Timber Repair Recommendation – Priority A – "A Flags"

- Deck boards with hole completely through, broken deck boards in traffic areas, (no immediate damage to traffic below),
- Cracked or broken timber stringers,
- Bearing loss/undermining due to scour on timber mud-sill footing (>30% loss of footing bearing area),
- Broken or severely decayed timber joists, or
- Mushroomed piles, piles hollowed with less than ½" shell remaining, or with less than 3" of heartwood remaining.

Timber Repair Recommendation – Priority B – "B Flags"

- Bearing loss/undermining due to scour on timber mud-sill footing (<30% loss of footing bearing area),
- Mushroomed piles, piles hollowed with less than 1½" shell remaining, or with less than 6" of heartwood remaining,
- Failed deck plank boards,
- Extensively decayed and crushed caps, crown strips, or sills,
- Missing/broken/damaged/loose/badly decayed rail posts, rail boards, and blockouts, or
- Loose deck boards.

Timber Repair Recommendation – Priority C – "C Flags"

- Split/decayed nailers,
- Decayed or unusual/excessive splits in timber joists,

- Decayed or unusual/excessive splits in caps and sills, but still intact and not subject to extensive crushing,
- Decayed/split piles but not in imminent danger of failure,
- Decayed timber wingwall system.
- Decayed or missing bulkhead boards with loss of fill,
- Bearing loss/undermining due to scour on timber mud-sill footing (<30% loss of footing bearing area),
- Excessive drift causing excess pressure/scour on bridge substructure, or
- Bracing boards for piles missing or not functioning on bents ≥ 12' high.

Concrete Bridge Components

Below are potential repair recommendations for bridge components which are concrete.

Concrete Repair Recommendation – Priority A – "A Flags"

- Deep and wide cracks (½" wide) in areas which compromise the structural integrity of the member,
- Severely deteriorated concrete sections, especially spalled concrete caps at girder bearing area which do not present an imminent safety concern,
- Severely sheared tee-beam ends which may be compromising the structural integrity of the beam,
- Severely deteriorated concrete sections which may be compromising the structural integrity of the beam, or
- Deck spalls below the top mat of reinforcing steel, which do not pose a hazard to traffic, or in danger of punching through.

Concrete Repair Recommendation – Priority B – "B Flags"

- Severely deteriorated concrete sections,
- Severely sheared tee-beam ends, or
- Deep and wide cracks (½" wide) in areas which may lead to a condition that could compromise the structural integrity of the member.

Concrete Repair Recommendation – Priority C – "C Flags"

- Spalled prestressed girder with exposed/deteriorating strands,
- Unsound patches with rust staining in prestressed concrete members,
- Previous unsatisfactory repairs (i.e. mortar or patches) of delaminated, spalled, or cracked concrete to prevent additional deterioration especially in the bearing areas,
- Slightly sheared tee-beam ends,
- Spalled reinforced concrete girder with exposed/deteriorating main rebar with section loss and more than one bar affected at same location on girder,
- Spalled/cracked columns with extensive spalls and areas of exposed rebar,
- Bearing loss/undermining due to scour on concrete spread footing (<30% bearing area), or

- Deep and wide cracks (½" wide) in areas which are not applicable to the condition listed under the Priority B – "B Flags" section.

Steel Bridge Components

Below are potential repair recommendations for bridge components which are steel.

Steel Repair Recommendation – Priority A – "A Flags"

- Beams, girders, or piles with deteriorated areas which are likely to cause localized failure, or have localized failure in buckling, crippling, etc. (redundant structures only with no safety risk),
- Impact damage to steel members which are likely to cause failure, or have failed in buckling, crippling, etc. (redundant structures only with no safety risk),
- Active measurable section loss in the tension zone on FCMs, or
- Primary structural members (beams/girders/steel piles) with active corrosion and over 75% section loss, (redundant structures only with no safety risk).

Steel Repair Recommendation – Priority B – "B Flags"

- Primary structural members (beams/girders/steel piles) with active corrosion and over 50% section loss, or
- Active minor (non-measureable or negligent) section loss in the tension zone on FCMs.

Steel Repair Recommendation – Priority C – "C Flags"

- Cracks or deterioration in secondary steel members,
- Spot painting primary structural steel members in need,
- Primary structural members (beams/girders/steel piles) with active corrosion and under 50% section loss,
- Secondary members (diaphragms, bracing, etc.) with 25% or more section loss,
- Bolted Field Splice: Missing bolts, active corrosion and 10% section loss,
- Dormant measurable section loss in the tension zone on FCMs,
- Unmitigated crack in a secondary steel member, or
- Cracked welds on steel grid deck.

Barrier Rail or Guardrail

Barrier Rail or Guardrail Repair Recommendation – Priority A – "A Flags"

- Serious damage to guardrail which may lead to issues with future public safety, or
- Guardrail connections to bridge railing, concrete barrier rebar, or guardrail that is detached.

Barrier Rail or Guardrail Repair Recommendation – Priority B – "B Flags"

- Impacted approach guardrail or end terminal/treatment within 75 feet of the bridge.

Barrier Rail or Guardrail Repair Recommendation – Priority C – "C Flags"

- Minor damage to guardrail,
- Failed paint system,

- Decayed or damaged wheel guard not presenting danger to vehicles, or
- Loose or missing connection shoe.

APPENDIX P

Appendix/Attachment Title

Common Inspection Shorthand and Abbreviations

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

To promote consistency across inspection reports prepared by SCDOT inspectors and consultant inspectors, SCDOT has developed this Appendix to contain the most common shorthand and abbreviations. These conventions should be used on inspection reports.

Appendix/Attachment Description

Changes to this Appendix shall happen as deemed necessary by the BIPM. Annually, the inspectors should recommend changes to the Appendix to the BIPM. This Appendix is sorted alphabetically.

Abbreviation	Definition	Abbreviation	Definition
A/C/F/W/A	Deck Panels Almost Cracked Full Width Across	EXP	Expansion
ABR	Abrasion	EXT	Exterior
ABUT	Abutment	FB	Floor Beam
ABV	Above	FL	Full Length
ADJ	Adjacent	FLG	Flange
ALUM	Aluminum	GL	Ground Line (Bridge over Land)
B*x*	Barrel Numbering	GP	Gusset Plate
B/T	Between	H	Helper Pile
BC	Bottom Chord	HL	Hairline Cracks
BEG	Beginning	INT	Interior
BF	Bottom Flange	JT	Joint
BH	Bolt Head	KE	Knife Edging
BIT	Bituminous	LAT	Lateral
BM	Beam	LEN	Length
BO	Steel Bolts Out or Missing	LHL	Longitudinal Hairline Cracks
BOT	Bottom	LONG	Longitudinal
BRG	Bearing	LT	Left
BS	Both Sides	MAJ	Major
BT	Bent	MC	Medium Cracks
C/BU	Build-up Debris on Cap	MID	Middle
C/F/W/A	Deck Panels Cracked Full Width Across	MIN	Minor
CÆ	Corrosion Hole (Provide Size)	ML	Mudline (Bridge over Water)
CF	Pile on Concrete Footing	MOD	Moderate
CH	Channel	MS	Metal Shim
CHAM	Chamfer	N	North
CJ	Construction Joint	NC	Narrow Cracks
CK	Timber Checking	NP	Member Needs Sandblast and Painting
CK/T	Timber Checking at Top of Pile	NS	Neoprene Shim
CL	Collar	P*x-x*	Pile Numbering
CL/N	Member Needs Collar	PAC	Patched Concrete
CL/R	Collar Needs Replacement	PB	Pile Bearing Deficiency
CN	Concrete Encased Pile	PC	Precast Concrete
COL	Column	PF	Paint Failure
CONN	Connection	PL	Plate
CONST	Construction	POP	Painted over Pitting
CONT	Continuous	PR	Pack Rust
CR	Crack or Cracking	PREV	Previous
CSAD	Crack at Bearing with Cap Saddle Installed	PS	Prestressed Concrete
CTR	Center	PX	Active Pitting
D	DIAGONAL	PY	Prying
D/GL	Decay at Ground Line (Only at Ground Line)	RC	Reinforced Concrete
D/T	Decay at Top of Pile (Only Top of Pile)	REC	Recommended
D/WS	Decay at Water Surface (Only at Water Surface)	RH	Rivet Head
DIA	Diaphragm	RR	Rip Rap
DLM	Area of Delamination	RS	Remaining Section
DS	Downstream	RT	Right
E	East	S	South
EDP	Exposed Drift Pin	SAD	Saddle Installed
EFF	Efflorescence	SAD/R	Requires Saddle
EL	Elevation	SF	Square Feet
EOC	Edge of Bent Cap	SIP	Stay-in-Place Forms
ERB	Exposed Reinforcing Bar	SM	Scuff Mark
ETC	Edge of Bent Cap to Center of Bent Cap	SM/GL	Scuff Mark at Ground Line

Abbreviation	Definition
SM/M	Scuff Mark at Middle of Pile
SM/T	Scuff Mark at Top of Pile
SM/WS	Scuff Mark at Water Surface
SP	Spall
SP*x*	Span Number
SP/C	Spall at Cap
SPA	Spaced, Spacing
SPL	Splice
SPT	Timber Splitting
SPT/C	Splitting at Collar
SPT/T	Timber Splitting at Top of Pile
SR	Surface Rust (Full Remaining Section)
STA	Station
STF	Stiffener
STR	Stringer
T/A	Tons per Axle
TC	Top Chord
TF	Top Flange
THL	Transverse Hairline Cracks
TR	Treated
TRANS	Transverse
TT	Treated Timber
TYP	Typical
UC	Unreinforced Concrete
US	Upstream
VEG	Vegetation / Vegetation Growth
VERT	Vertical
W	West
W/E	Exposed Reinforcing Bar with Efflorescence
W/R	Exposed Reinforcing Bar with Rust Staining
WC	Wide Cracks
WS	Water Surface
x"W x x"H	Area of Comment (Width by Height)

APPENDIX Q

Appendix/Attachment Title

Critical Security Bridges

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

As directed by ED-18, the BMO is required to maintain the list of Critical Security Bridges (CSB). Bridges which appear on the CSB list are considered to be security sensitive or vulnerable. ED-18 provides direction on the release of bridge plans and bridge information for persons outside SCDOT, persons inside SCDOT and persons under contract with SCDOT.

SCDOT uses bridge information to provide a criticality index of all the bridges listed in the National Bridge Inventory (NBI), and non-NBI bridges are not assessed. This index is calculated by the BMO. The criticality index formula accounts for several criteria that are measured using data available from the NBI.

The criteria incorporated into the formula were items SCDOT considered important, based, in part, upon the responses to an AASHTO/TRB Task Force survey that helped define and prioritize these criteria. The joint survey, titled "*Security and Emergency Response Survey of State Transportation Agencies*", was a cooperative effort of the AASHTO Task Force on Transportation Security and the TRB Task Force on Critical Transportation Infrastructure Protection. The criteria included the economic impact due to disruption of commerce, which is quantified in the SCDOT formula in terms of ADTT. General passenger transportation needs and risks to public safety are considered in terms of Total ADT and Detour Length. Connectivity, which represents the ripple effect within the highway system, is considered in terms whether the bridge in question represented an interstate crossing.

Another criterion is whether a damaged bridge could restrict permitted navigation access to important waterways maintained by the USCG. Given South Carolina's important role in contributing to support our nation's military, the inclusion of the bridge on the Strategic Highway Network, which functions as a system of primary routes for the movement of military personnel and supplies, is another consideration. Finally, consideration to any bridges on the list of the Bridges with Complex Components and consideration to any bridge on a SCDOT hurricane evacuation route is given.

As part of the formula, the relative importance given to each criterion can be adjusted by the use of an importance factor to reflect the significance SCDOT assigns. Should relative importance change in the future, the various importance factors can easily be changed and a new listing of CSBs can be made by the BMO. SCDOT's importance factors are included in Table 1. Figure 1 includes the criticality index formula. **Any bridges with a criticality index of 3.5 or higher shall be considered CSBs.**

Table 1 CSB Criteria and Importance Factors

Criteria	Importance Factor	Criteria	Importance Factor
ADTT Factor	1.0	USCG Navigation Factor	1.0
ADT Factor	1.0	Military Importance Factor	1.0
Detour Factor	1.0	Bridge Complexity Factor	1.0
Interstate Crossing Factor	1.0	Evacuation Route Factor	1.0

South Carolina Criticality Index Formula: The following equation represents the formula for determining a bridge's criticality index.

$$\textbf{Criticality Index} = \left(\frac{\text{ADTT}}{\text{Max. ADTT}}\right) x\ F_{ADTT} + \left(\frac{\text{ADT}}{\text{Max. ADT}}\right) x\ F_{ADT} + \left(\frac{\text{Detour x ADT}}{\text{Max. Detour x Max. ADT}}\right) x\ F_{DET} + \text{Interstate Intersection } x\ F_{INT} + (\text{Navigation Importance } x\ F_{NAV} + \text{Military Importance } x\ F_{MIL} + \text{Bridge Complexity } x\ F_{COMP} + \text{Evacuation Route } x\ F_{EVAC}$$

Figure 1 CSB Criticality Index Formula

South Carolina Basic Elements of the Formula: The South Carolina Bridge Criticality Formula has the following elements and definitions.

Commerce Criteria

- ADTT: Average Daily Truck Traffic based on NBI Item 109.
- Max. ADTT: The maximum ADTT for any bridge in South Carolina's (SC's) NBI.
- F_{ADTT}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Transportation Needs Criteria

- ADT: Average Daily Traffic based on NBI Item 29.
- Max. ADT: The maximum ADT for any bridge in SC's NBI.
- F_{ADT}: SCDOT defined Importance Factor which relates the relative importance of this criterion to the other criteria in the formula. See Table 1.
- Detour: Bypass or detour length based on NBI Item 19.
- Max. Detour: Maximum detour for any bridge in SC's NBI.
- F_{DET}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Interstate Connectivity Criteria

- Equals 2 if the bridge carries an interstate over an interstate.
- Equals 1 if the bridge carries an interstate over a non-interstate or if the bridge carries a non-interstate over an interstate.
- Equals 0 if the bridge neither carries an interstate nor crosses an interstate.
- F_{INT}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Navigational Access Criteria

- Navigation Importance: equals 1 if the bridge requires a USCG Permit based on NBI Item 38, or 0 if none is required.
- F_{NAV}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Military Movement Criteria

- Military Importance: equals 1 if the bridge is on the Strategic Highway Network based on NBI Item 100, or 0 if it is not.
- F_{MIL}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Bridge Complexity Criteria

- Bridge Complexity: equals 1 if the bridge is included in the Bridges with Complex Components list (Appendix C).
- F_{COMP}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Excavation Route Criteria

- Evacuation Route: equals 1 if the bridge is included in SCDOT's hurricane evacuation routes.
- F_{EVAC}: Importance Factor which relates the relative importance of this criterion to the other criteria. See Table 1.

Appendix/Attachment Description

For security reasons, the list of CSBs **is not publically available**. The list is maintained by the BMQE under the supervision of the SBME or ASBME. The list will be updated internally at SCDOT a minimum of once every 10 years at the discretion of the SBME. This Appendix does include:

- The criticality index formula,
- CSB criterion, and
- CSB importance factors.

APPENDIX R

Appendix/Attachment Title

Underwater Inspection Guidance Document

Appendix/Attachment Revision and Year:

Version 1.0, XXXX

Appendix/Attachment Introduction and Discussion

The Underwater Inspection Guidance Document provides statewide procedures for use during underwater inspections.

Appendix/Attachment Description

At the time of release of the Bridge Inspection Guidance Document, the Underwater Inspection Guidance Document is still under development.

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UNDERWATER INSPECTION GUIDANCE DOCUMENT IS CURRENTLY UNDER DEVELOPMENT

ATTACHMENT 2.1

Appendix/Attachment Title

Municipality-County Bridge Inspection Report Release Letter (No Repair Recommendations and No Critical Findings)

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT inspectors and/or consultants perform inspection of all municipality/county owned bridges which have spans of at least 20 feet.

The BITL is responsible for transmitting letters to the counties and municipalities. The DBIS needs to be involved, but the BITL shall prepare all correspondences. However, given the importance of the program, the DME should sign the letter after it is prepared by the BITL.

This letter is for a bridge inspection report with no repair recommendations and no critical findings.

The DBIS and DME should send it to county or municipal contacts as soon as possible.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors. The fillable fields in highlighted boxes shall be completed.

Once the DME electronically signs the form, the PDF will be saved and the fillable fields will be turned off.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME:
- DME (signer of letter), button to save letter as one page. Email to BITL for release.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)

BRIDGE INSPECTION REPORT FOR COUNTY/MUNICIPALITY-OWNED BRIDGE

City/Town/County/Municipality, South Carolina

FACILITY CARRIED/FEATURE INTERSECTED

LOCAL ROAD NAME/REFERENCE POINT

Asset ID Number:

Dear Mr./Mrs. :

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all county/municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges; the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

For your records, attached is the SCDOT Bridge Inspection Report for the county/municipality-owned bridges identified in the subject of this letter. The bridge inspection was performed on 01/01/1900 .

Inspectors did not find any repair recommendations or critical findings as defined in the SCDOT Bridge Inspection Guidance Document (BIGD) during this inspection. We recommend general upkeep as needed.

Questions regarding the bridge inspection may be directed to the District Bridge Inspection Supervisor (DBIS):

First Name and Last Name of DBIS

DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Sincerely,

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: DBIS, SCDOT BMO, Bridge File

Send to DME/ADME | Print | Save
Complete Form | Undo | Email to County

ATTACHMENT 2.2

Appendix/Attachment Title

Municipality-County Bridge Inspection Report Release Letter (Repair Recommendations Only, No Critical Findings)

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT inspectors and/or consultants perform inspection of all municipality/county owned bridges which have spans of at least 20 feet.

The BITL is responsible for transmitting letters to the counties and municipalities. The DBIS needs to be involved, but the BITL shall prepare all correspondences. However, given the importance of the program, the DME should sign the letter after it is prepared by the BITL.

This letter is for a bridge inspection report **with repair recommendations** and no critical findings.

The letter should be sent to county or municipality contacts as soon as possible.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors. The fillable fields in highlighted boxes shall be completed.

Once the DME electronically signs the form, the PDF will be saved and the fillable fields will be turned off.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME:
- DME (signer of letter), button to save letter as one page. Email to BITL for release:

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)

BRIDGE INSPECTION REPORT FOR COUNTY/MUNICIPALITY-OWNED BRIDGE

REPAIR RECOMMENDATIONS INCLUDED

City/Town/County/Municipality, South Carolina

FACILITY CARRIED/FEATURE INTERSECTED

LOCAL ROAD NAME/REFERENCE POINT

Asset ID Number:

Dear Mr./Mrs. :

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all county/municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on public bridges; the repair, rehabilitation or reconstruction of any bridges is the owner's responsibility.

For your records, attached is the SCDOT Bridge Inspection Report for the county/municipality-owned bridges identified in the subject of this letter. The bridge inspection was performed on 01/01/1900 .

Per the Bridge Inspection Guidance Document (BIGD), repair recommendations shall be sent to the bridge owner. Attached to this letter is the Highway Maintenance Management System Bridge Deficiency Report. See Chapter 8 of the BIGD for all requirements; action is required on A Flags within 30 days, B Flags within 90 days and C Flags within 365 days. Any maintenance performed by SCDOT is marked on the HMMS Report. A summary of recommendations is included here:

Questions regarding the bridge inspection may be directed to the District Bridge Inspection Supervisor (DBIS). You shall acknowledge receipt of this letter by emailing the DBIS.

First Name and Last Name of DBIS DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Sincerely,

Send to DME/ADME | Print | Save
Complete Form | Undo | Email to County

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: DBIS, SCDOT BMO, Bridge File

ATTACHMENT 2.3

Appendix/Attachment Title

Municipality-County Bridge No Longer Being Inspected Letter

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT Bridge Maintenance inspectors and/or consultants perform inspection of all municipality/county-owned bridges which have spans of at least 20 feet.

The DBIS is responsible for coordinating bridge inspection with the counties and municipalities in their respective district. However, given the importance of the program, the DME should sign the letter after it is prepared by the team under the DBIS or Consultant.

This letter should be used if a bridge has been closed by a municipality or county and SCDOT will no longer be inspecting the bridge. The letter also includes a requirement for the municipality or county to contact SCDOT when the bridge is reopened for initial inspection.

The DBIS or DME should send it to county or municipal contacts as soon as possible.

The letter must be completed before Asset ID retirement is requested. The letter must be placed in the bridge file.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors. The fillable fields in highlighted boxes shall be completed.

Once the DME electronically signs the form, the PDF will be saved and the fillable fields will be turned off.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME.
- DME (signer of letter), button to save letter as one page. Then return via email to DBIS for release.

Both checkboxes (acknowledgement of receipt and a note that the owner will inform SCDOT when the bridge is reopened) must be completed. The form may be returned via email to the DBIS.

If the form is not returned, the DBIS shall follow-up with the owner.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
COUNTY/MUNICIPALITY-OWNED BRIDGE **NO LONGER BEING INSPECTED**
City/Town/County/Municipality, South Carolina
FACILITY CARRIED/FEATURE INTERSECTED
LOCAL ROAD NAME/REFERENCE POINT
Asset ID Number:

Dear Mr./Mrs.

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges, the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

SCDOT is hereby notifying the owner/custodian of the bridge identified in the subject of this letter that **SCDOT is no longer inspecting the subject bridge** as the bridge is closed to the traveling public. Please complete the portion of the form, including both checkboxes, and return to the District Bridge Inspection Supervisor (DBIS). Contact the DBIS if you have questions regarding this correspondence:

First Name and Last Name of DBIS

DBIS Email Address email@scdot.org

If the bridge is reopened to the public, the NBIS, *23 CFR 650.315 (b)*, requires the bridge to be inspected within 180 days of bridge reopening. The owner/custodian is responsible for notifying the SCDOT DBIS to schedule initial inspections in accordance with the SCDOT Bridge Inspection Guidance Document (BIGD).

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Send to DME/ADME **Print** **Save**
Complete Form **Undo** **Email to County**

Sincerely,

First Name Last Name
Position (DME, ADME, DBIS, etc.)

TO BE COMPLETED BY SCDOT:		
Asset ID Number (NBI 08):	District (NBI 02): -	County (NBI 03): -
Location (NBI 09):	Route Carried (NBI 07):	Feature Crossed (NBI 06):

TO BE COMPLETED BY BRIDGE OWNER:
May be returned via mail or email, see DBIS email above.
Both checkmarks must be completed prior to returning to SCDOT.

☐ Owner of the Bridge (*Municipality or County*) has acknowledged receipt of this letter.
☐ Owner of the Bridge (*Municipality or County*) will notify SCDOT when the bridge has reopened and requires inspection within 180 days.

Bridge Owner:	Name:	Signature:	Date:

cc: DBIS, SCDOT BMO, Bridge File

ATTACHMENT 2.4

Appendix/Attachment Title

Municipality-County Bridge Critical Finding Memorandum

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT Bridge Maintenance inspectors and/or consultants perform inspection of all municipality/county-owned bridges which have spans of at least 20 feet.

The BITL is responsible for transmitting letters to the counties and municipalities. The DBIS needs to be involved, but the BITL shall prepare all correspondences. However, given the importance of the program, the DME should sign the letter after it is prepared by the BITL.

This attachment provides a sample letter for the transmittal of both of the following:

- Critical Findings Form (Attachment 5.5)
- Bridge Inspection Report

The inspector should send the Critical Findings Form to county or municipality contacts as soon as possible, within 1 day of discovery. Because of the short duration, the Bridge Inspection Report may not be attached to the first transmittal but still must be provided to the bridge owner.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME.
- DME (signer of letter), button to save letter as one page. Then return via email for release.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE INSPECTION, **ACTION REQUIRED, CRITICAL FINDING**
City/Town/County/Municipality, South Carolina

FACILITY CARRIED/FEATURE INTERSECTED

LOCAL ROAD NAME/REFERENCE POINT

Asset ID Number:

Dear Mr./Mrs. :

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

Attached is the: ☐ Critical Findings Form ☐ Bridge Inspection Report (if not provided, when it will be provided: 01/01/1900) for the municipality-owned bridge(s) identified in the subject of this letter.

The Critical Findings Form shall be completed and returned to SCDOT. The bridge inspection was performed on 01/01/1900.

The date of Critical Findings Notification is: 01/01/1900. This date appears on the Critical Findings Form. SCDOT expects that the action taken by the City/Town/County/Municipality is immediate.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges; the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

The SCDOT Bridge Maintenance Office (BMO) in Columbia shall notify the South Carolina Division of Federal Highway Administration of all Critical Findings found on public bridges in the state. The recommended timeframe for resolution of items is 30 days; FHWA requires action within 90 days. If necessary, temporary remediation of critical findings should be implemented immediately and may include full closure, partial closure, weight restriction, temporary shoring, etc.

The Critical Findings Form (Attachment 5.5) can be returned via mail or email to the District Bridge Inspection Supervisor (DBIS). Questions regarding the bridge inspection may be directed to the DBIS.

DBIS Contact: First Name and Last Name of DBIS DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Send to DME/ADME | Print | Save
Complete Form | Undo | Email to County

Sincerely,

____

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: DBIS, SCDOT BMO, Bridge File

ATTACHMENT 2.5

Appendix/Attachment Title

Municipality-County Bridge Critical Finding Reminder Memorandum

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

In the event that district inspectors determine the municipality, county, town or city has not performed action on a critical finding, a follow-up letter should be sent.

The BITL is responsible for transmitting letters to the counties and municipalities. The DBIS needs to be involved, but the BITL shall prepare all correspondences. However, given the importance of the program, the DME should sign the letter after it is prepared by the BITL.

Following the release of the Critical Finding, the inspector shall follow-up after 15 days with the municipality/county to confirm whether the actions recommended by the inspector have been completed.

The Critical Findings Form, Attachment 5.5, should be transmitted with this memorandum.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME.
- DME (signer of letter), button to save letter as one page. Then return via email for release.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE INSPECTION, **ACTION REQUIRED: FOLLOW-UP – CRITICAL FINDING**
City/Town/County/Municipality, South Carolina
FACILITY CARRIED/FEATURE INTERSECTED
LOCAL ROAD NAME/REFERENCE POINT
Asset ID Number:

Dear Mr./Mrs. :

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

SCDOT or a consultant working for SCDOT previously inspected the above subject bridge on 01/01/1900 and on 01/01/1900 provided a letter notifying you of a Critical Finding.

We are informing you that no action to resolve the deficiency has been taken place since we reported this critical finding in the last 15 days. Please inform this office with regards to the corrective action that has taken place as soon as possible. Also, please return the Critical Finding Verification Form attached with action taken.

Please be advised that a Critical Finding may affect the structural integrity of the bridge or may pose a potentially unsafe hazard for vehicular or pedestrian traffic. This type of repair shall be completed as soon as possible. Once again, a Critical Finding requires immediate corrective action. If necessary, temporary remediation of critical findings should be implemented immediately and may include full closure, partial closure, weight restriction, temporary shoring, etc.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges; the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

The SCDOT Bridge Maintenance Office (BMO) in Columbia is responsible for informing the South Carolina Division of Federal Highway Administration of all Critical Findings (and resolutions) found on public bridges in the state.

The Critical Findings Form (Attachment 5.5) can be returned via mail or email to the District Bridge Inspection Supervisor (DBIS). Questions regarding the bridge inspection may be directed to the DBIS.

DBIS Contact: First Name and Last Name of DBIS DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

| Send to DME/ADME | Print | Save |
| Complete Form | Undo | Email to County |

Sincerely,

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: DBIS, SCDOT BMO, Bridge File

ATTACHMENT 2.6

Appendix/Attachment Title

Municipality-County Bridge Critical Finding Action Taken by SCDOT

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT Bridge Maintenance inspectors and/or consultants perform inspection of all municipality/county-owned bridges which have spans of at least 20 feet.

The BITL is responsible for transmitting bridge inspection reports to the counties and municipalities. The DBIS needs to be involved, but the BITL shall prepare all correspondences. However, given the importance of the program, the DME should sign the letter after it is prepared by the BITL.

In the event that after 30 days the critical finding(s) have not been addressed, SCDOT maintenance may be required to perform a corrective action to take measures to safeguard the public.

In the event the SCDOT does any work on a municipality or county-owned bridge, the owner/custodian should be notified with the attached letter.

The Critical Findings Form (Attachment 5.5) shall still be attached to the letter including any actions taken and/or any critical findings remaining.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included as a PDF in this BIGD, and it is also available through the SCDOT BMO internet site as a Word document.

Use Automated Buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

- DBIS or Consultant BITL (preparer of the letter), button to send to DME.
- DME (signer of letter), button to save letter as one page. Then return via email to DBIS for release.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE INSPECTION, **CRITICAL FINDING ACTION PERFORMED BY SCDOT**
City/Town/County/Municipality, South Carolina
FACILITY CARRIED/FEATURE INTERSECTED
LOCAL ROAD NAME/REFERENCE POINT
Asset ID Number:

Dear Mr./Mrs.

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS. These bridges are scheduled to be inspected every two years unless a shorter duration is recommended.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges; the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

It has been at least 30 days since you were notified of critical findings discovered on the subject bridge following an inspection.

This letter is to notify you of actions taken by SCDOT maintenance. The following action(s) were taken as measures to safeguard the public:

- ☐ **Bridge Closed**
- ☐ **Lane(s) Closed**
- ☐ **Weight Restriction/Load Posting Signs Installed**
- ☐ **Vertical Clearance Signs Installed**
- ☐ **One Lane Bridge/Narrow Bridge Signs Installed**
- ☐ **Other Action Performed by SCDOT: ____**

While SCDOT performed the listed action(s), other critical findings may still require attention. See Critical Findings Form, Attachment 5.5.

The SCDOT Bridge Maintenance Office (BMO) in Columbia is responsible for informing the South Carolina Division of Federal Highway Administration of all Critical Findings (and resolutions) found on public bridges in the state.

Questions regarding this issue may be directed to the District Bridge Inspection Supervisor (DBIS):

DBIS Contact: First Name and Last Name of DBIS DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Send to DME/ADME | **Print** | **Save**
Complete Form | **Undo** | **Email to County**

Sincerely,

____

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: DBIS, SCDOT BMO, Bridge File

ATTACHMENT 2.7

Appendix/Attachment Title

Municipality-County Bridge Inventory List and Status

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT Bridge Maintenance inspectors and/or consultants perform inspection of all municipality/county-owned bridges which have spans of at least 20 feet.

This letter should be used to provide counties or municipalities the current bridges in the BMS which are coded as being owned by the local agency. This letter shall be prepared by the BMO and shall be signed by the BIPM. The BMO shall attach the bridge list to the signed letter. The letter shall then be provided to the District Office, DME and DBIS where the bridge is located for transmittal to the local agency.

This letter shall be sent at least once every five years to all local agency bridge owners.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors. The fillable fields in highlighted boxes shall be completed.

Once the BIPM electronically signs the form, the PDF will be saved and the fillable fields will be turned off.

Use automated buttons at the bottom of the letter. Automated buttons do not print, but use them as needed.

The checkbox (acknowledgement of receipt) must be completed by the bridge owner. The form may be returned via email to SCDOT.

If the form is not returned, the DBIS shall follow up with the owner.

EMAIL ADDRESS TO COUNTY:

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
COUNTY/MUNICIPALITY-OWNED BRIDGES
BRIDGE INVENTORY LIST AND STATUS
COUNTY/MUNICIPALITY:

As part of the South Carolina Bridge Inspection Program, SCDOT Bridge Maintenance performs the inspection and load ratings of all municipality-owned bridges that have a clear span of 20 feet or greater in accordance with NBIS.

South Carolina is federally required to apply the NBIS to all structures defined as highway bridges located on all public roads. Bridge inspection requirements are codified into federal law by *23 CFR 650*. While the SCDOT performs inspections on all public bridges, the repair, rehabilitation or reconstruction of any bridges is the owner/custodian's responsibility.

SCDOT is hereby notifying the owner/custodian that the attached list of bridges are currently in SCDOT's Bridge Management System and are owned by your agency. Your agency is responsible for the maintenance of the bridges attached to this letter.

The list of bridges also includes the most recent Inspection Date(s) for Routine, Underwater (if applicable), Fracture Critical (if applicable) and Special (if applicable). Inspection reports are provided by and available from SCDOT's District Office. Bridge inspection reports include repair recommendations (if any). Please contact the DBIS for information regarding inspection reports. The list of bridges includes bridge status, inventory ratings and operating ratings. Please contact the BMO for detailed information regarding bridge ratings. See FHWA's *Recording and Coding Guide for the SI&A of the Nation's Bridges* for explanation of codes.

Please review the list and inform the BMO and District Office via email:

1. if there additional bridges (with a clear span of 20 feet or greater) in your inventory not listed
2. if a bridge listed as open is actually closed
3. if a bridge is actually open but is listed as closed

BMO Email: berryej@scdot.org and DBIS Email:

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Sincerely,

____

TO BE COMPLETED BY BRIDGE OWNER: *May be returned via mail or email.* **Checkmarks must be completed prior to returning to SCDOT.**			
Owner of the Bridge (*Municipality or County*) has acknowledged receipt of this letter. Owner of the Bridge (*Municipality or County*) has reviewed letter and informed SCDOT of any corrections (if needed).			
Bridge Owner:	Name:	Signature:	Date:

cc: DBIS, SCDOT BMO, Bridge File

Bridge Inventory List and Status

Asset ID (NBI 08)	Owner (NBI 22)	District (NBI 02)	Facility Carried (NBI 07)	Feature Intersected (NBI 06)	Latitude (NBI 16)	Longitude (NBI 17)	Location (NBI 09)	Traffic Status (NBI 41)	Deck Condition (NBI 58)	Superstructure Condition (NBI 59)	Substructure Condition (NBI 60)	Culvert Condition (NBI 62)	Last Routine Inspection (NBI 90)	Last UW Inspection (NBI 93B)	Last FC Inspection (NBI 93A)	Last Special Inspection (NBI 93C)	Operating Rating Factor (NBI 64)	Inventory Rating Factor (NBI 66)

ATTACHMENT 3.1

Appendix/Attachment Title

Load Rating Request Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

If an inspection discovers a condition that warrants a load rating, this form shall be completed.

When it is determined that a structure may require a rating/ re-rating, the BITL shall prepare the request using the bridge rating/re-rating form. The form provides a checklist of items to be filled out and submitted from the BITL to the BIPM.

Most requests for bridge rating/re-rating originate from the BITLs, but may also be requested by any member of SCDOT Bridge Maintenance. The request shall contain the reason for the request. If a bridge is requested to be rated by someone other than a bridge inspector, a request form shall still be filled out to document why there is a need to rate the bridge. This will be sent to the BIPM.

There is an **URGENT/HIGH PRIORITY** checkbox on the form. This shall be used in emergency situations where a bridge load rating needs to be expedited. Some examples are a bridge hit, a member that has extensive section loss and has a stated operating rating capacity near statutory loading levels or some other emergency.

Section 5.5 of the BIGD discusses the requirements for when a bridge shall be load rated given the condition.

The BIPM shall review the request and the BIPM shall assign the structure to a rating consultant, if approved.

Appendix/Attachment Description

The requestor must indicate the reason for the rating or the load rating request.

Once the request is received by the BIPM, the **URGENT/HIGH PRIORITY** checkbox should be used to determine the urgency of fulfilling the request.

SCDOT

Request for Bridge Load Rating / Re-Rating Form

REQUIRED STRUCTURE INFORMATION – To be completed by party requesting rating.

ASSET ID NUMBER (08):	DATE OF LAST RATING # (411):	CONDITION OF LAST RATING NBI 58: ___ NBI 59: ___ NBI 60: ___ NBI 62: ___
STRUCTURE TYPE (MAIN, NBI 43): -	STRUCTURE TYPE (APPROACH, NBI 44): -	

Reason for Load Rating/Re-Rating Request:

- ☐ NBI Condition Rating Changed and is now 4 or below, Note change: ______
- ☐ Deck (NBI 58), Explain: ______
- ☐ Superstructure (NBI 59), Explain: ______
- ☐ Substructure (NBI 60), Explain: ______
- ☐ Culvert (NBI 62), Explain: ______
- ☐ New/Rehabilitated Bridge, Date of NBI Item 27: ______ Date of NBI Item 106: ______
- ☐ Previous Rating is Obsolete, Reason: ______

Load Rating Priority: ☐ URGENT/HIGH PRIORITY (check if emergency situation)

Remarks/Comments:

Name of Requestor: ______ Signature of Requestor: ______

Request Made By: - ______ District: - ______

Send to BMO

BIPM – Complete:

- ☐ Assign to consultant, Date: ______ Consultant: ______, Contract: ______
- ☐ Part of current design contract, Contract Number: ______
- ☐ Return to District, because: ______ ☐ Denied, because: ______

Remarks/Comments:

BIPM Signature: ______

Date Load Rating Complete: ______ (BMO Complete Date, Add to Bridge File)

Complete Form | Undo | Save | Print

ATTACHMENT 3.2

Appendix/Attachment Title

Exemption for BITL Status Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Section 3.1.1.2 contains the requirements for an individual to be considered a Bridge Inspection Team Leader (BITL). However, the Bridge Inspection Program Manager (BIPM) may designate an individual to BITL status who does not meet the requirements listed in Section 3.1.1.2. This exemption requires approval by the BITL and concurrence by FHWA; see Section 3.1.1.2.1.

Appendix/Attachment Description

The form shall include the individual's start date performing bridge inspection, the state date working in bridge design, maintenance or construction, any relatable experience. The form shall be completed before being approved by the BIPM. The BIPM shall then send to FHWA for concurrence.

SCDOT

Exemption for BITL Status Form

Name of Individual: ______________________________

Start Date of Performing NBIS Bridge Inspection: ______________________________

Number of years of NBIS Bridge Inspection Experience: ______________________________

Name(s) of BITLs Supervising Individual(s): ______________________________

Start Date of Bridge Design, Bridge Maintenance or Bridge Construction: ______________________________

Number of Years of Bridge Design, Bridge Maintenance or Bridge Construction Experience: ____________

Summarize Previous Experience, Courses/Classes, Certifications, Education (etc.):

BIPM Approval:

☐ BIPM has conducted an interview with the subject individual and approves of experience and education for BITL status.

Date of Interview: ________________

BIPM Comments (if any):

FHWA Concurrence:

FHWA Comments (if any):

☐ After 4 months from this date, a sample of the inspection reports completed by the BITL will be reviewed by the BIPM and FHWA to ensure report quality and determine if BITL certification will be retained.

Save | Print | Send to BIPM | Send to FHWA

ATTACHMENT 4.1

Appendix/Attachment Title

Consultant Inspection Request Form (CIRF)

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

If the number and/or complexity of the bridges to be inspected exceed the capabilities of the BITL, then the DBIS or Consultant PM shall request consultant assistance by completing and submitting a CIRF.

If a consultant is requesting another type of inspection using the CIRF, it shall be sent to the DBIS for review and concurrence prior to sending to the BMO. An example would be if a consultant recommends an underwater inspection for a bridge not currently receiving an underwater inspection. The consultant PM is responsible for completing the CIRF, sending it to the DBIS for concurrence, ensuring the CIRF is reviewed by the DBIS and (if warranted) sending it to the BIPM.

The CIRF shall be submitted to the BIPM for review and concurrence. CIRFs shall be submitted to the BIPM no later than the 15th of the month for inspections to be assigned for the following month.

If underwater inspection is requested, the inspector completing the form shall also note if Attachment 4.2 (Item 113 Re-evaluation) was also been completed.

The consultant inspection can also be requested for inspections not on a scheduled frequency. Inspections not on a scheduled frequency include but are not limited to damage, scour and safety.

There is an **URGENT/HIGH PRIORITY** checkbox on the form. This shall be used in emergency situations where a bridge consultant inspection needs to be expedited.

Appendix/Attachment Description

If SCDOT is requesting consultant assistance, the DBIS shall complete the form and the BIPM shall approve the request and coordinate for the consultant inspection.

Request for Consultant Bridge Inspection Form

REQUIRED STRUCTURE INFORMATION – To be completed by party requesting inspection.

ASSET ID NUMBER (08):	TYPE OF INSPECTION REQUESTED*:	DUE DATE (if one):
	-	

*If UW inspection is requested, has Attachment 4.2 (Item 113 Re-evaluation) been completed if needed? - ____

Inspection Priority: ☐ URGENT/HIGH PRIORITY (check if emergency situation)
Remarks/Comments:

Special equipment and requirements for this inspection (i.e. UBIU, Boat, Access, Traffic Control, Police Detail, RR, etc.)**:**

Please provide the latest copy of bridge SI&A information (*Bridge Inspection Report Form (BIRF)*), check box: ☐

Name of Requestor: ____________________ Signature of Requestor: ____________________

Request Made By: - ____________________ District: - _______

Send to BMO

DBIS Concurrence (Required for CIRF Use by a Consultant Inspector)

If request was made by a consultant, the DBIS shall review and concur with the request prior to sending to the BIPM.

DBIS Concurs: ☐ DBIS Does Not Concur: ☐ DBIS Signature:

BIPM – Complete:

Assign to consultant, Date: _____________ Consultant: ______________________, Contract: _________________

Return to District, because: ____

Denied, because: ____

Remarks/Comments:

BIPM Signature: ______________________________________

Save Print

ATTACHMENT 4.2

Appendix/Attachment Title

Scour Critical – Item 113 Re-evaluation Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

A discussion regarding the importance of revaluating NBI Item 113 is available in Section 5.3.4.3 of the BIGD. The BITL shall use this form to request the re-evaluation of Item 113. Underwater (UW) inspections shall be requested via Attachment 4.1. **Both this attachment and Attachment 4.1 can be completed.**

Appendix/Attachment Description

The BITL shall complete the form and it to the BIPM for review and to update Item 113 as needed.

The BIPM or designee is responsible for a change in the coding of Item 113.

Scour Critical – Item 113 Re-Evaluation Form

REQUIRED STRUCTURE INFORMATION			
ASSET ID NUMBER (NBI 08):	NBI Condition Ratings and Current Value of NBI Item 113 from Attached Inspection Report		
	NBI 60 (Substructure):	NBI 61 (Channel Protection):	NBI 113 (Scour Critical):

Request By: Company/Organization: ______________________________________

BITL: ____________________________ (Print Name) District:

Signed: ____________________________ Date: ________________

The BITL has inspected the above described bridge and prepared the attached inspection report and is recommending a re-evaluation of Item 113 – Scour Critical Bridges for the following reasons:

New structure (Initial Inspection)

Substructure scour repairs have been performed and/or streambed scour countermeasures have been installed on a structure that is scour critical. Note improvement:

____

Significant changes have occurred that have altered the stream bed or flow characteristics of the waterway

Please indicate what has occurred at the site:

- ☐ Natural scour improvements
- Channel changing course
- Evidence of erosion or scour around footings and embankments
- Large amount of debris around substructure
- Evidence or riprap, bank protection removed or altered
- Stream work performed by others that might change the hydraulic characteristic at the bridge
- Other: ____

UW inspection is requested and Attachment 4.1 has been completed.

Send to BMO

Bridge Maintenance Office Use – to be completed by: Bridge Inspection Program Manager (BIPM) (or designee)

BIPM (or designee): ______________________________________ (Print Name)

Signed: ____________________________ Date: ________________

☐ No change required ☐ Item 113 Coding change to: ☐

Complete Form | Undo | Save | Print

ATTACHMENT 4.3

Appendix/Attachment Title

Inspection Out-of-Frequency Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Any inspector or consultant working for SCDOT performing bridge inspection or in bridge maintenance may complete the Inspection Out-of-Frequency Form. The form may also be completed by the BMO.

The form shall be used to properly document any bridges that are out-of-frequency from the required inspection date or any bridges which are out-of-frequency from the required reporting date. This includes any weather-related delays such as flooding/hurricanes. Every bridge (inspection or report) which is out-of-frequency requires this form to be completed.

Either the DBIS from the district in which the bridge is located or the consultant project manager to whom the bridge is assigned must sign the attached form.

The BIPM, SBME or designee from the BMO must sign the attached form.

At a minimum, FHWA must acknowledge receipt of the form. FHWA may not approve the out-of-frequency notification from SCDOT.

Appendix/Attachment Description

The form shall be completed as required and stored in the bridge file. The form shall be attached to the inspection report when the out-of-frequency inspection report is completed.

The command buttons at the bottom of the form do not print. Please use as needed to send form to the applicable parties.

Inspection Out-of-Frequency Form

REQUIRED STRUCTURE INFORMATION		
ASSET ID NUMBER: (NBI 08)	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
STRUCTURE TYPE (MAIN, NBI 43): -	STRUCTURE TYPE (APPROACH, NBI 44): -	

INSPECTION OCCURRING OUT OF FREQUENCY	
SUBJECT INSPECTION TYPE: -	
INSPECTION DUE DATE **(IF INSPECTION IS LATE)**:	INSPECTION COMPLETION DATE (IF KNOWN):
REPORT DUE DATE **(IF REPORT IS LATE)**:	REPORT COMPLETION DATE (IF KNOWN):
WRITTEN EXPLANATION OUT OF FREQUENCY:	

NAME/POSITION OF PARTY NOTIFYING OUT-OF-FREQUCNY OCCURRENCE (*blank if made by DBIS or Consultant PM*)

Name: ______________________ Position: ______________________

Signed: ______________________

SCDOT DBIS from District where bridge is located OR Consultant Project Manager (Consultant Inspection Only), Signature Required:

Signed: ______________________

Comments:

SCDOT BIPM, Signature Required:

Signed: ______________________

Comments from SCDOT BIPM or from BMO:

FHWA ACKNOWLEDGEMENT AND/OR APPROVAL: ☐ Acknowledgement ☐ Approval

Signed: ______________________

Comments from FHWA:

Send to DBIS | Send to BIPM | Send to FHWA | Complete Form | Undo | Save | Print

ATTACHMENT 4.4

Appendix/Attachment Title

NDT Request Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

If a BITL needs to recommend NDT (non-destructive testing) to supplement a bridge inspection, this form shall be completed.

Appendix/Attachment Description

The BITL shall complete the form, the DBIS or consultant project manager shall sign the form, concurring with the request, and the BIPM shall approve the request and coordinate for the NDT work.

Request for Non-Destructive Testing (NDT)

REQUIRED INFORMATION			
ASSET ID NUMBER: (NBI 08)	NAME OF REQUESTOR (BITL):	REQUEST MADE BY: -	DISTRICT: (NBI 02) -

Type of Testing Requested (Select):

Steel:

- Dye Penetrant — Due Date: ______________
- Magnetic Particle — Due Date: ______________
- Radiography — Due Date: ______________
- Ultrasonic — Due Date: ______________
- Acoustic Emission — Due Date: ______________
- Eddy Current — Due Date: ______________

Concrete:

- Electrical Methods — Due Date: ______________
- Ground Penetrating Radar — Due Date: ______________
- Pachometer — Due Date: ______________
- Impact-Echo Testing — Due Date: ______________

Timber:

- Sonic Testing — Due Date: ______________
- Spectral Analysis — Due Date: ______________
- Ultrasonic Testing (UT) — Due Date: ______________
- Vibration — Due Date: ______________

BITL Signature: ____

To be filled out by the **DBIS (SCDOT Inspection)** or **Consultant Project Manager (Consultant Inspection)**:

I agree with the above request from the BITL
I do not agree with the above request from the BITL because: ______________________________

Signature: ____

To be filled out by the **BIPM**:

Assign to Consultant, Consultant: ________________Date: ___________ Contract No. ________

Assign to SCDOT Materials Lab, Date: ____________

Do not assign, because: ____

Returned it to Inspector because: ____

BIPM Signature: ____

Send to DBIS **Send to BIPM**

Complete Form Undo Save Print

ATTACHMENT 4.5

Appendix/Attachment Title

Scour Inspection (Post Storm) Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

This attachment is used to report post storm bridge damage/scour.

Appendix/Attachment Description

Record all required bridge data and note any damage found during the inspection. Consideration should be given to printing a large quantity of the forms ahead of a storm event so that inspectors may have them during scour inspections following a storm.

Scour Inspection (Post Storm) Form

REQUIRED INFORMATION		
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	PAGE OF
ROUTE: (NBI 07)	CROSSING: (NBI 06)	BRIDGE OWNER: (NBI 22) -

Inspectors: ☐ SCDOT ☐ **Consultant**: ______________________________

Team Leader: ____________________ **Assistants:** ______________________________

Bridge Currently: ☐ Open ☐ Closed

Storm Impact:

☐ Approach overtopped	☐ Water level into superstructure	☐ Bridge overtopped

Damage and Waterway Condition – Supplement with attached additional notes and sketches,

Bridge Deck Damage:

Superstructure Damage:

Substructure Damage:

Scour/Waterway, *confirm following were considered during scour/waterway inspection. Leave blank if N/A. Add notes below.*

Check	N/A	Component	Check	N/A	Component
☐	☐	End Bents	☐	☐	Bents
☐		Foundation Depth	☐	☐	Effectiveness/Condition of Scour Countermeasures
☐	☐	Substructure Location/Stream Alignment	☐	☐	Stream Aggradation or Degradation
☐	☐	Scour Depth at Bents	☐	☐	Upstream/Downstream Channel Stability
☐	☐	Debris Buildup	☐	☐	Lateral Movement of Stream
☐	☐	Bed and Bank Soil Material	☐	☐	Scour Plan of Action Followed

Scour/Waterway Notes:

If not open, can bridge be opened: ☐ *Yes* ☐ *Yes with minor repairs* ☐ *No*

Follow up Recommendation: ☐ *Additional Documentation/Inspection* ☐ *Minor Repairs*
☐ *Significant Repairs* ☐ *SBME Review*

ATTACHMENT 5.1

Appendix/Attachment Title

Bridge Data Form for SCDOT Road Data Services

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

This form shall be used for the following requests by bridge inspectors to RDS. District inspectors or consultant inspectors may contact SCDOT directly to request information or to request an information correction.

When the form is complete, it may be sent to planning directly using the submit buttons on the form.

Appendix/Attachment Description

The form is a one page form which has multiple sections. Only two parts will likely need to be completed by the inspector at one time.

Using this form to update bridge information is only for fields that cannot be changed without RDS, as shown in Appendix J. NBI Items which cannot be changed in BIO include: Items 1, 2, 3, 6, 7, 9, 11, 16, 17, 26, 101 and 104. In addition to these NBI Items, some SBI numbers cannot be changed in BIO, including but not limited to Items 311, 313, 419, 422 and 423.

The retirement of an Asset ID Number may only be requested when the bridge is closed to traffic permanently with no intentions to reopen or when a bridge is demolished. The retirement of an Asset ID Number shall not occur during the construction of a new bridge while the old bridge (with the old Asset ID Number) is still in service. The district and country where the bridge is located must accompany the request to retire an Asset ID Number.

SCDOT

Bridge Data Form

SECTION 1: CONTACT INFORMATION (Required)	
Name of Person Requesting Correction:	
Requestor's Email:	
Requestor's Phone:	
Requestor's Company: *(enter SCDOT if in-house)*	
Date of Request:	

SECTION 2: REQUEST ASSET ID NUMBER

District:	County:	Structure ID Number *(if known)*:	Old Asset ID *(if applicable)*:

LOCATION: *(Municipality, Distance from known Town/Landmark)*:	
FACILITY CARRIED: *(What the bridge carries)*:	
FEATURE INTERSECTED: *(What the bridge spans over)*:	

Feature(s) Intersected and Facility Carried should be per standardized naming guidance in Appendix M.

TRAFFIC STATUS: *(Is requested structure open to traffic?)*	

BRIDGE COORDINATES:

LATITUDE:		degrees		minutes		seconds	LONGITUDE:		degrees		minutes		seconds

SECTION 3: DATA CORRECTION
(Structure ID or Asset ID **Required**)
NBI Items which cannot be changed in BIO include at a minimum: Items 1, 2, 3, 6, 7, 9, 11, 16, 17, 26, 101, 104 and 419.

District:	County:	Structure ID Number *(if known)*:	Asset ID:

NBI ITEM NEEDING CORRECTION *See note in Instructions.*	INCORRECT DATA *Enter how the data appears currently.*	CORRECT DATA *Enter recommended correction to existing data.*	RDS RESPONSE?
(1) State Name			
(2) District			
(3) County			
(6) Feature(s) Intersected			
(7) Facility Carried			
(9) Location			
(11) Milepost			
(16) Latitude			
(17) Longitude			
(26) Functional Class			
(101) Parallel Structure			
(104) On NHS			
(419) Ramp			

SECTION 4: DATA REQUEST
(Structure ID or Asset ID **Required**)

District:	County:	Structure ID Number *(if known)*:	Asset ID *(if applicable)*:

DATA REQUESTED *(i.e. traffic count)*	

SECTION 5: ASSET ID RETIREMENT

District:	County:
OLD OR PREVIOUS ASSET ID(s):	NEW OR FUTURE ASSET ID(s) *(if known)*:

REASON FOR RETIREMENT: *Retirement of an Asset ID shall only occur when a bridge is closed to traffic permanently (with no plans to reopen) or a bridge is demolished.*

SCDOT ROAD DATA SERVICES RESPONSE *(will contact requester for additional info, if needed)*

ATTACHMENT 5.2

Appendix/Attachment Title

Request for Bridge Preparation Prior to Inspection

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

SCDOT Bridge Maintenance inspectors and/or consultants perform inspection of all state-owned and municipality/county-owned bridges which have spans of at least 20 feet.

The RME is responsible for cleaning state-owned bridges prior to the date of inspection to provide for easier access to inspection. Cleaning of the bridge prior to inspection also lowers the amount of flags (or critical deficiencies) that are logged by inspectors during the inspection of the bridge.

<u>This letter is to serve as a notification and subsequent confirmation from the RME that the bridge being inspected has been adequately cleaned.</u>

The DBIS and DME should send it to county contacts as soon as possible, at least 60 calendar days before planned inspection. An additional 15 days should be factored in for consultant inspections for the consultant to prepare this letter, then sent to the district inspectors, then the RME for a total of 75 calendar days before the inspection.

The DBIS should attach a list of all bridges (Asset ID Numbers and a tentative date for inspection) that need cleaning to this letter. Consultants shall prepare the same list.

Inspectors should directly coordinate with county or municipal maintenance, if possible, for municipality/county-owned bridges needing advanced bridge washing or vegetation control.

Appendix/Attachment Description

This sample letter may be updated as needed. The letter is included in this BIGD as a PDF, but a word document will also be provided to the various authors.

01/01/1900

City/Town/County/Municipality Maintenance or Highway Department
Address
City/Town, SC Zip Code

Attn: Highway Superintendent

EMAIL ADDRESS TO COUNTY: email@county.org

SUBJECT: BRIDGE INSPECTION PRE-INSPECTION MAINTENANCE
ACTION REQUIRED
COUNTY BEING INSPECTED: - ______________________ **IN DISTRICT:** - _______

Dear

Please be advised that a SCDOT Bridge Inspection Team or a Consultant Bridge Inspection Team working under contract with SCDOT plans to begin inspecting bridge(s) in the county listed above. Please refer to the attached list which includes **Asset ID Numbers** and a **"Date for Inspection"** for a general guideline as to the order and date (within a 30 day window) in which they will be inspected.

In an effort to reduce the number of critical findings or repair recommendations noted by the Bridge Inspection Team, general and routine maintenance items shall be completed prior to inspection. The following items should be completed.

- Clearing vegetation (i.e. around/under structure)
- Removing debris (i.e. around/under structure)
- Advanced bridge deck and/or drain washing
- Identify and schedule bridge/approach rail repairs
- General maintenance (i.e. clean deck, weep holes)

The completion of these items shall be done to protect inspectors and to ensure they are able to perform a compliant inspection. Failure to properly prepare for inspection may lead to potentially unsafe conditions and non-compliance with the FHWA Bridge Program.

Please sign, date and return this memo to indicate that these items have been completed.

RME____ Completion Date____________________

Questions regarding the inspection may be directed to the email address below. Please return this email to same email.

Contact: First Name and Last Name of DBIS Position: ________________________ Email: DBIS Email Address email@scdot.org

SCDOT is pleased to assist you in this matter of bridge safety to protect the citizens of South Carolina.

Send to DME/ADME | Print Letter Only | Save
Complete Form | Undo | Email to County

Sincerely,

____

First Name Last Name
Position (DME, ADME, DBIS, etc.)

cc: SCDOT BMO, Bridge File

Asset ID Number	Date for Inspection *(within 30 days)*	Route/Crossing Information *(if needed)*	Notes to County RME *(if needed)*

ATTACHMENT 5.3

Appendix/Attachment Title

Railroad Flagging Service Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

If railroad flagging is needed during a bridge inspection, this form shall be completed for invoicing purposes.

Appendix/Attachment Description

The BITL shall complete the form and maintain it in the Bridge File. The consultant shall also submit the form when invoicing to SCDOT.

Railroad Flagging Service Form

REQUIRED STRUCTURE INFORMATION		
ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
INSPECTION DATE:	BITL:	
INSPECTION TYPE: -		

Meeting Location: ______________________________

Date Of Service: ______________ Start Time: First Name ________ End Time: Mr./Mrs. ________

Print
Railroad Company: ______________________________

Print
Flag Person's Name: ______________________________

Print
Flag Person Supervisor's Name: ______________________________

Print
Flag Person's Work Address: ______________________________

______________________ ______________________ __________
Flag Person's Signature BITL's Signature Date

To Be Filled Out by BITL:

Invoice for the above work received on: ______________________

Invoice No.: ______________________

Submitted to SCDOT BMO on: ______________________

BITL's Signature: ______________________

Route to BIPM

Complete Form Undo Save Print

ATTACHMENT 5.4

Appendix/Attachment Title

Inspection Access, Procedures and Equipment Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

This form shall be kept in the bridge file for any bridges which have the following:

- Specific Inspection Procedure
    - Bridges with Complex Components
    - Bridges with FCMs
    - Bridges with FPDs
    - Bridges with Underwater Inspections
- Required Agency Coordination, Notification and/or Permits
- Specific Inspection Equipment
- Unique Characteristics to Notify Inspectors, Load Rating Engineers or Maintenance Staff

Inspection teams should review this form prior to any inspections and update the form as needed following the inspection. The form does not require an update every inspection or site visit unless something on the form needs updating.

There is a space on this form for the ProjectWise link to the Bridge Specific Inspection Procedure (BSIP) if the bridge has a more detailed procedure. See Attachment 5.28 for a template. If the template is used, this form must also be completed and the link to the template shall be placed on this form.

Appendix/Attachment Description

If the bridge requires a specific inspection procedure, this form may be used to note the requirement. The specific inspection procedure may be written on this form or the procedure may be referenced on this form if located elsewhere in the bridge file. Any required coordination/notification/permits should be listed on this form. Lastly, select any special inspection equipment used during the inspection of the bridge identified by the Asset ID Number. Add notes as needed for use by another entity (either SCDOT or consultant) that may inspect the structure. All fields do not have to be completed; complete all fields which may be necessary.

Inspection Access, Procedures and Equipment Form

REQUIRED INFORMATION			
ASSET ID NUMBER: (NBI 08)	NAME OF PERSON UPDATING FORM:	COMPANY OF PERSON:	DATE OF FORM UPDATE:

Bridge Specific Inspection Procedure (BSIP)
Select all that apply. Provide location for special inspection procedure if located on ProjectWise.

FHWA Complex Bridge		Long Span Steel (LSS) Bridge	
13 Suspension		Long Span Concrete (LSC) Bridge	
14 Stayed Girder		Multi-Span Main (MSM) Bridge	
15 Movable – Lift		Multi-Span Approach (MSA) Bridge	
16 Movable – Bascule		Bridge with NSTM (FCM)	
17 Movable – Swing		Bridge with Fatigue Critical Detail	
21 Segmental Box		Other:	

BSIP:

Place ProjectWise Link here to Bridge File location of BSIP:

Required Agency Coordination, Notification and/or Permits
Select all that apply. Include point of contact (if one) for required coordination/notification.

United States Coast Guard		**Police Detail**	
Division/Sector:		Department:	
Point of Contact:		Point of Contact:	
Phone Number:		Phone Number:	
Email Address:		Email Address:	
Railroad Entity		**Utility Entity**	
Name of Entity:		Name of Entity:	
Point of Contact:		Point of Contact:	
Phone Number:		Phone Number:	
Email Address:		Email Address:	
Traffic Control		**Other:**	
Company/Group:		Company/Group:	
Point of Contact:		Point of Contact:	
Phone Number:		Phone Number:	
Email Address:		Email Address:	

Notes:

Inspection Access, Procedures and Equipment Form

Specific Inspection Equipment
Select all that apply.

Safety Boat		Confined Space Access	
Bucket Boat		UBIU (Snooper)	
Rigging / Staging / Scaffolding		Manlift / Scissor Lift	
Industrial Rope Access		Remotely Operated Vehicle (ROV)	
Ring Buoy		Video Pole	
Borescope		Unmanned Aerial Systems (UAS)	
Other:		Other:	
Comments:			

Specific Inspection Procedure
Select all that apply.

Ultrasonic		Ground-Penetrating Radar	
Infrared Thermography		Radiographic Testing	
Impact Echo		Electromagnetic Methods	
Rebound & Penetration Methods		Acoustic Emissions Testing	
Dye Penetrant		Magnetic Particle	
Eddy Current		Boring or Drilling	
Underwater Imaging:		Other:	
Comments:			

Bridge Location Information
Complete if needed.

Parking for Inspection Vehicles:
Upload Bridge Map or Location Map:

ATTACHMENT 5.5

Appendix/Attachment Title

Critical Findings Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Critical Findings Form shall be used to notify SCDOT (or other bridge owner) of a critical finding and track follow-up actions in accordance with the *23 CFR 650.313*.

Sometimes reporting of a critical finding cannot wait until the bridge inspection report can be submitted or until the Critical Findings Form can be completed. An oral report (normally via a telephone call) must be given to the DME, the RME and/or the BMO. If an oral report is immediately given, it shall be noted in Part II.

The procedure for transmitting the form is listed on the next page. Transmittals are done via email according to Part V. The Critical Findings Form is automatically routed to the BMO, DME, ADME and DBIS. There are fields on the form for other email addresses to be entered. The form will include those emails on the distribution list when the form is transmitted.

Copies of the Critical Findings Notification shall be attached to the bridge inspection report when submitted by either SCDOT inspectors or consultant inspectors. The completed Critical Findings Form shall be uploaded to the Bridge File per the BFP.

Appendix/Attachment Description

Complete as Part of Critical Findings Notification:

- Part I – General Bridge Information
- Part II – Note if there were any Immediate Actions Performed
- Part III – Describe how the Critical Finding(s) was discovered
- Part IV – List of Critical Finding(s)

Complete as Part of Critical Findings Follow-up Actions:

- Part VI – Describe Action Plan to Address Critical Finding(s)
- Part VII – Update on Action Plan
    - Indicate if Critical Finding(s) are Addressed or Resolved (See Section 8.3)
- Part VIII – Post Action Summary / Close Critical Finding(s)
    - Indicate if Critical Finding(s) are Addressed or Resolved (See Section 8.3)

Upload Photographs as needed; see Page 2 of 2 of the Critical Findings Form.

Critical Findings Form

Part I – Bridge Data *Complete at all times with bridge data.*

Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection or Site Assessment Date:	
District # (NBI 02):	-	Feature Intersected (NBI 06)			
County (NBI 03):	-	Bridge Owner (NBI 22):	-	C.F. Reporting Date:	

Part II – Immediate Actions Performed *Complete when applicable.*

- ☐ Bridge Collapse
- ☐ Structural Damage or Failure
- ☐ Bridge Hit or Impact
- ☐ Phone Call Made to DME, RME and/or BMO (indicate below)
- ☐ Approach Failure
- ☐ Delam. Conc. over Traffic
- ☐ Flooding/Scour
- ☐ Load Rating Request Form (Attachment 3.1) Completed
- ☐ Bridge Closed
- ☐ Lane(s) on Bridge Closed
- ☐ Other Immediate Action Taken: ____

Complete for Oral Report *(if performed)*
Date/Time of Oral Report of Critical Finding: ________________________ / ________________________
Name(s) and position(s) that Critical Findings has been reported to:

Immediate Actions Taken /Other Comments:

Part III – *Describe how the Critical Finding was discovered, if not during a planned inspection.*

☐ Critical Finding was discovered during a planned inspection (routine, underwater, non-redundant tension member, special, etc.)

Part IV – *Note Critical Findings, include Type, Description and Photo Number (using photo form on Page 2)*

Critical Finding Type	Critical Finding Description	Photo # (See Pg. 2)
-		
-		
-		
-		

Part V – *Note Critical Findings, include Type, Description and Photo Number (using photo form on Page 2)*

1. This transmittal section shall be used to report critical findings
2. Prior to the submittal of this form, the form should be reviewed by the reporting party. Photos are required for Critical Findings, use Page 2.
3. The reporting party shall electronically sign below using the reporting party signature line prior to submitting.
4. The reporting party shall submit the signed form using the "Submit Critical Finding" button. Parts I to IV should be completed to report.
5. The date submitted should appear in the heading "Critical Findings Report Date".
6. The "Transmit Update on Action Plan" shall be used at any time to update interested parties on follow-up actions (Parts VI to VIII).

The Critical Findings Form is automatically routed to the BMO, DME, ADME and DBIS. Enter other email addresses you wish to send this form to below:

ELECTRONIC SIGNATURE (Reporting Party):

Report Critical Findings:

Transmittal Critical Findings Update on Action Plan:

Part VI – Describe Action Plan

Describe the specific steps of the action plan, include dates and responsible person for each action.

Critical Findings Form

Bridge Data - *Completed on Page 1*

Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection or Site Assessment Date:	
District # (NBI 02):	-	Feature Intersected (NBI 06):			
County (NBI 03):	-	Bridge Owner (NBI 22):	-	C.F. Reporting Date:	

Part VII - Periodic Update of Action Plan

Use Transmittal Button on Page 1

Describe each type of repair / actions taken, include reference to Part V. Include dates, responsible parties, company/orgs, etc. Indicate if any Critical Findings are Open, Addressed or Resolved.

Critical Finding Description	Status (Open, Addressed or Resolved)
	-
	-
	-
	-

Part VIII – Post Repair/Action Update **(Resolved Critical Findings)**

Use Transmittal Button on Page 1

Certify work has been performed (either repair or action), bridge has been re-inspected (if needed), restriction lifted.

- ☐ Maintenance Inspection Performed by BITL, include date:
- ☐ Attachment 5.24 Completed, if bridge was closed
- ☐ Load Rating Request Form (Attachment 3.1) Completed
- ☐ Lane/Shoulder Restriction Removed

Critical Findings Form Photographs

Use Attachment 5.20 if additional space for photographs is needed.

Photo #: ___ Date: ____________ ☐ Original Inspection ☐ Maintenance Inspection
Caption:

Photo #: ___ Date: ____________ ☐ Original Inspection ☐ Maintenance Inspection
Caption:

Photo #: ___ Date: ____________ ☐ Original Inspection ☐ Maintenance Inspection
Caption:

Photo #: ___ Date: ____________ ☐ Original Inspection ☐ Maintenance Inspection
Caption:

ATTACHMENT 5.6

Appendix/Attachment Title

Repair Recommendations Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Repair Recommendations Form shall be used to notify SCDOT of the need for any repairs. The form shall be completed only for consultant performed inspections. The form is a spreadsheet which shall be completed by the consultant performing the inspection and then sent to the DBIS in the district where the bridge is located. The DBIS shall enter repair recommendations into HMMS.

The use of the buttons on this spreadsheet require marcos to be enabled in your version of Microsoft Excel.

Appendix/Attachment Description

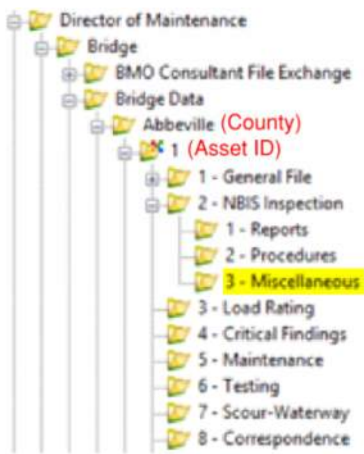
The form allows the input of several Asset IDs at once. The consultant may enter in as many repair recommendations as needed. The consultant shall only enter data in the yellow cells. White cells will auto-populate.

Column 10 shall include the applicable HMMS Deficiency Code; see BIGD Table 8.9.2.

Column 11 shall include the deficiency description including the approximate quantity of element to be repaired along with the location of the element to be repaired.

Column 12 shall indicate whether a Pile Repair Report (Attachment 5.27) is needed for a given repair recommendation.

Because the Repair Recommendations Form is submitted before the inspection report, photographs will not immediately be available for DBIS review. To provide photographs of the repair recommendation, the consultant shall add photos to the Photograph Form (Attachment 5.20) or another form with captioned photographs and upload the captioned photographs to ProjectWise. Once uploaded, the hyperlink to ProjectWise shall be placed in Column 13. The DBIS will have access to this link. Per the Bridge File Policy, these photographs shall be placed in "Miscellaneous" Folder under the NBIS Inspection Folder in the Bridge File; see image below.



Using the ProjectWise Advanced Document Creation Wizard, the document type selected shall be "*InspecMisc_Photo*" and the Freeform shall be "*RepairRec*". This form does not need to be uploaded to BIO when the inspection report is submitted, but photographs of repair recommendation shall be included with all other inspection photographs as required by Section 5.4.4.2.

Using Microsoft Excel, a hyperlink shall be input to link back to the document uploaded to ProjectWise. The Text to Display in the hyperlink shall be "Link_ #####" where ##### represents the Asset ID.

Once complete, the consultant inspector shall send the spreadsheet to the DBIS. The DBIS or designee will review and provide a response with a completed spreadsheet. The completed spreadsheet shall be used to create the forms to be uploaded to BIO. By clicking the "PDF for BIO Upload", a PDF will be generated for each unique Asset ID listed on the spreadsheet. Each PDF will be uploaded to BIO for the applicable Asset ID.

Attachment 5.6 - Repair Recommendations Spreadsheet

SCDOT

Name of Consultant		Consultant BITL:		Consultant BITL Email Address:		SCDOT District:		Date Sent to DBIS:

1) The Repair Recommendations Form shall submitted to the DBIS responsible for the bridge(s) by the consultant inspectors no later than seven calendar days following the completion of an inspection.
2) The consultant inspectors shall complete the yellow cells. The DBIS shall complete the blue cells. The white cells will auto-populate with NBI information as of the publish date of the BIGD.
3) The consultant inspectors shall determine (with input from the DBIS) what counties will require the completion of the Pile Repair Report (Attachment 5.27) for any piles requiring repair.
4) The DBIS (or designee) will review the information and input items in HMMS. The DBIS will indicate if the repair recommendation was added to HMMS and add his or her initials to the right most column and return the spreadsheet to the consultant.
5) The use of the buttons on this spreadsheet require marcos to be enabled in your version of Excel.
6) Photographs shall be uploaded to ProjectWise and linked below (see Instruction Sheet). Photographs for the inspection report shall be prepared per BIGD Section 5.4.4.2.
7) When attaching repair recommendations to the inspection report, only completed rows per Asset ID shall be uploaded to BIO. Use button on the right to generate PDFs.

Consultant: Send Spreadsheet to DBIS

DBIS: Return to Consultant

Consultant: PDF for BIO Upload

Section to be Completed by Consultant													<	>	Completed by DBIS		
No.	Asset ID (NBI 08)	Structure Number	District (NBI 02)	County (NBI 03)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	Bridge Owner (NBI 22)	Date of Inspection	Flag Type (A, B, C)	HMMS Deficiency Code	Deficiency Description *(include approximate quantity & location for maintenance to be aware of the deficiency)*	Pile Repair Report Needed? (A5.27)	ProjectWise Link to Photos for Repair Recommendations	Consultants Complete Section to Left	District Bridge Inspection Staff Completes Section to Right	Is Repair Rec. already in HMMS?	Was Repair Rec. input into HMMS?	DBIS Initials When Returned

ATTACHMENT 5.7

Appendix/Attachment Title

Scour Stream Ground Profile

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document stream and ground profile during the inspection as a highway crosses over waterways/floodways. Recording the stream and ground profile during inspections can track the movement of the channel/ground below the bridge and is helpful in identifying scour conditions. A sample of a completed stream and ground profile is included.

Appendix/Attachment Description

Stream and ground depths shall be measured at bents and the midpoint of the stream and recorded from a fixed point on the structure. The point of measurement is termed the benchmark. This vertical datum is typically the top of barrier, rail, curb or deck.

Measurements from prior inspections shall be recorded on the sketch to aid in identifying stream migration and scour effects. The measurements from prior inspections shall then be compared against the measurements from the most recent inspection.

The method of measurement shall be included on the sketch sheet and included in the "Method to Measure Scour" field. Common methods are listed, but the inspector may enter his/her own.

The horizontal offset of where a measurement is taken should also be noted. This shall be included to reference any soundings taken up or down a channel. This will create a defined stream profile. The most common horizontal offset benchmark is the centerline of the bridge. The offset to the left side and right side would then be half the width of the bridge superstructure.

For the station direction, there are two options for the orientation of the bridge which would be determined when traveling in the direction of the inventory route (increasing mile markers). The field contains the parameters of "Increasing" (stations increasing in the direction of the route) or "Decreasing" (stations decreasing in the direction of the route).

The bent direction should be compared to station direction. If the bent numbering increases or decreases, it should be noted on the sketch sheet. Unless there is a special reason, the bent direction should always be increasing.

If the riverbed slope adjacent to bents is protected, it shall also be noted on the sketch. Various types of slope protection are included. If there is no protection (for example dirt, grass or unmaintained bank), "No Protection" shall be included. The stations of the area of protection shall also be included; if there is no protection, then the stations of the unprotected bank shall be included.

Variations of this sketch sheet are included for bridges up to seven spans. For bridges of eight spans or more, the "Any Span" configuration of the sketch sheet can be used.

Horizontal and vertical blockage from debris, rafts, dams or other obstructions shall be noted on the sketch sheet.

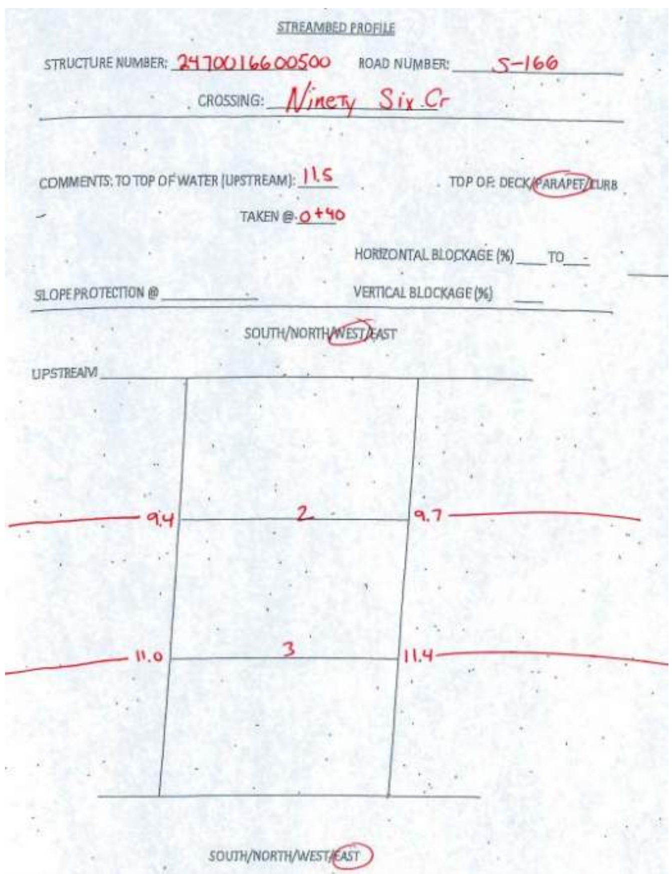
The maximum superstructure depth shall be determined from either field measurement from a benchmark to the bottom of the superstructure or by referencing the existing bridge plans. If unable to measure, state in "Notes" section.

Sample Bridge for Scour Stream Ground Profile

Asset ID Number: 2369

S-24-166 over Ninety Six Creek in Greenwood County

Photo from March 2017 inspection



STREAMBED PROFILE

STRUCTURE NUMBER: 2470016600500 ROAD NUMBER: S-166

CROSSING: Ninety Six Cr

COMMENTS: TO TOP OF WATER (UPSTREAM): 11.5 TOP OF: DECK/PARAPET/CURB

TAKEN @ 0+40

HORIZONTAL BLOCKAGE (%) ___ TO ___

SLOPE PROTECTION @ ___ VERTICAL BLOCKAGE (%) ___

SOUTH/NORTH/WEST/EAST

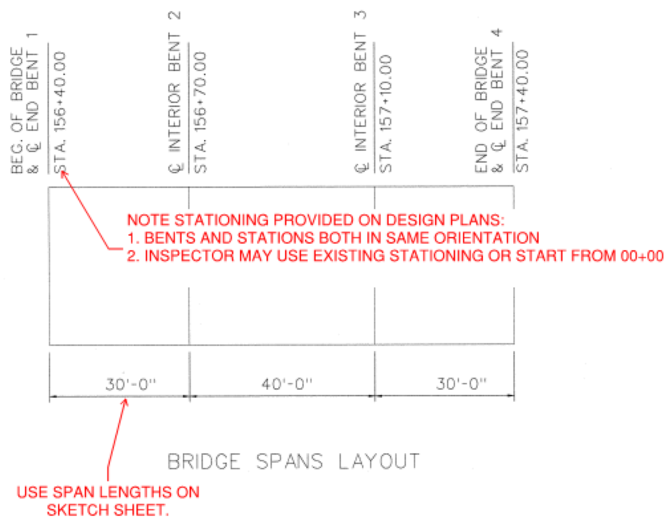
UPSTREAM

9.4 2 9.7

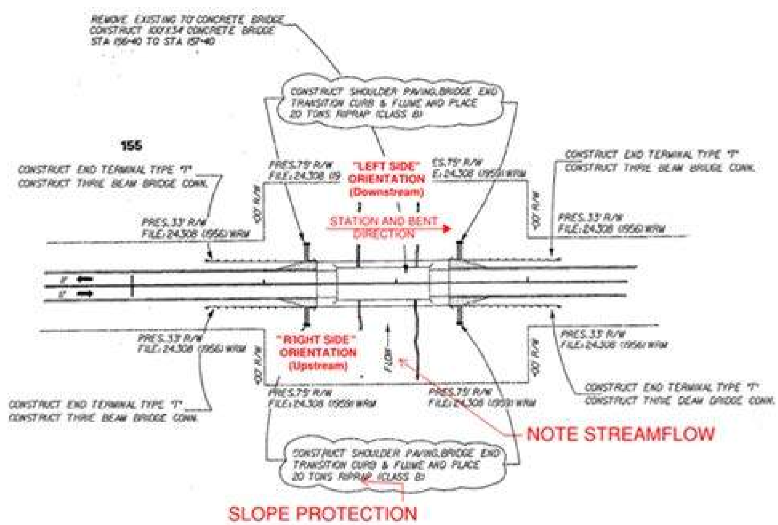
11.0 3 11.4

SOUTH/NORTH/WEST/EAST

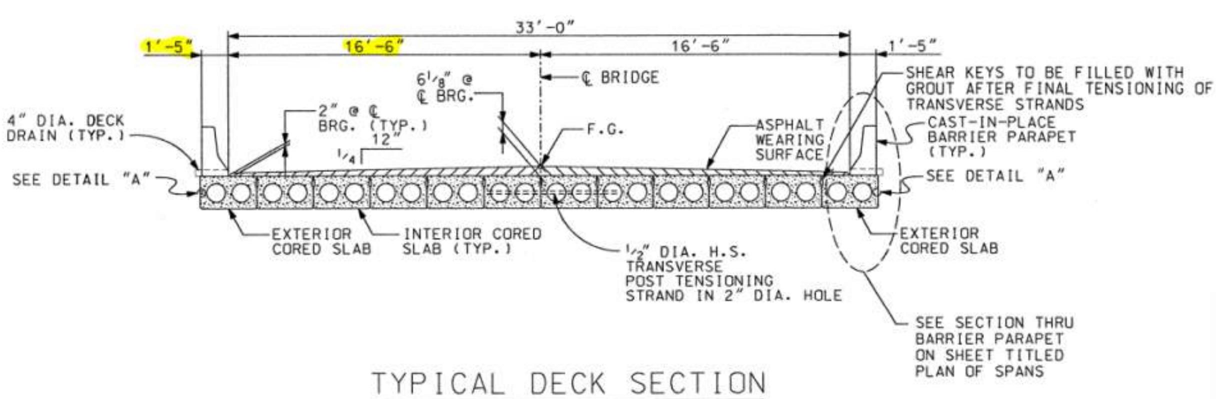
Scour Stream Ground Profile from March 2017 inspection (this inspection is assumed as "previous inspection" in the subsequent example)



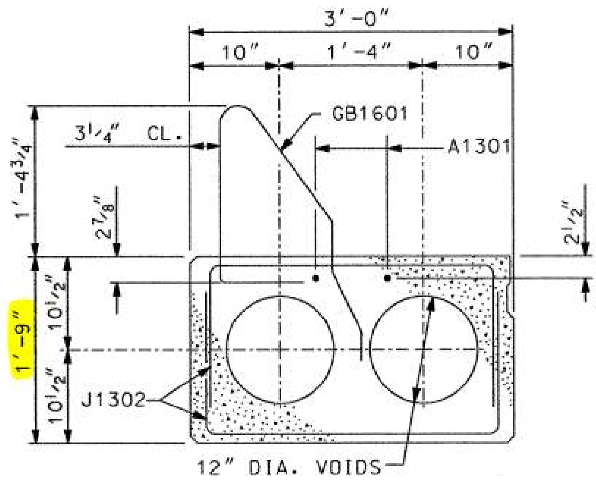
Span Layout from Bridge Plans



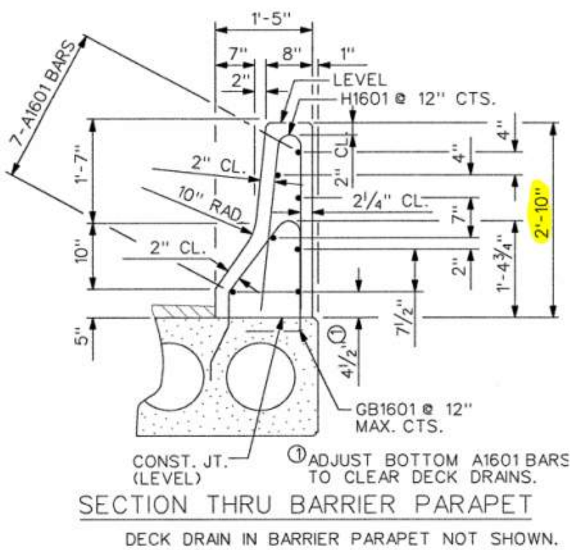
General Bridge Plan from Bridge Plans



Deck Section from Bridge Plans (Horizontal Offset of 17'-11" Used on Sketch Sheet)



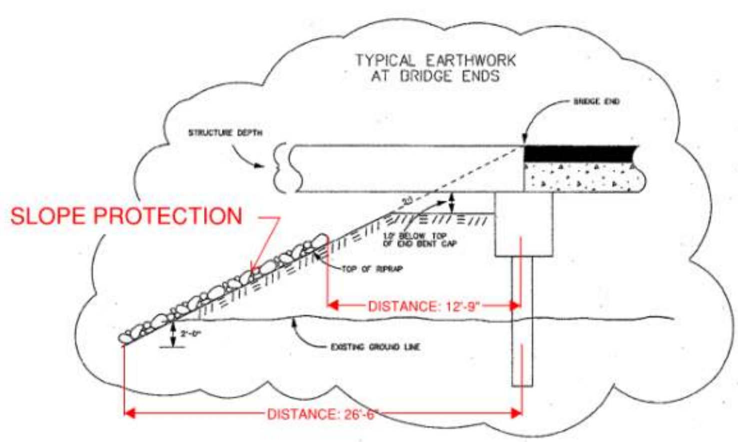
Slab Section from Bridge Plans (Beam Height used for Superstructure Height)



Parapet Section from Bridge Plans

Total Superstructure Height = 1’-9” + 2’-10” = **<u>4’-7”</u>**

(Top of Parapet to Bottom of Beam)



Slope Protection from Bridge Plans (can be field measured)

Steps used to Complete Stream and Ground Profile (*Example notes included in red, see attached)*

1. Complete top section with bridge and inspection information including method of sounding used

   Assume a weighted tape was used for this sample inspection.

2. Determine orientation for measurements including vertical and horizontal benchmarks, bent stationing and stationing for direction of roadway. Fill in horizontal offsets to measurement points.

   Horizontal datum is centerline of bridge, offsets are ½ of the distance from parapet edge to the centerline of the deck. Top for parapet is used for vertical datum. All measurements taken from top of parapet. Both the roadway stationing and the bents are the increasing direction. The flow direction is from the right side to the left side so the right side is the upstream side.

   INSPECTOR HAS CHOICE TO USE BRIDGE STATIONING OR HIS/HER OWN STATIONING. *Most inspectors will use their own stationing and not use bridge stationing.*

3. Determine Maximum Superstructure Height

   Used bridge plans to determine 4'-7" as the height from the top of the parapet to the bottom of the slab/beam.

4. Determine Slope Protection

   This example uses bridge plans to determine dimensions of rip rap and then applies stationing but this can also be field measured.

5. Determine blockage in channel for vertical and horizontal orientation. Consider the entire channel width and height when determining approximate percentage. These percentages may be used to track hydraulic flow and for maintenance.

6. Measure scour elevations at determined points including the bents and at midstream. If there is no channel/water at some bents, sounding elevations may be omitted. Previous sounding elevations shall be included. If no previous elevation is included, use "N/A" or may be left blank.

   This example uses "N/A" when the previous inspection did not include relevant information.

7. Measure water surface elevation at midstream.

Example of Completed Scour Stream Ground Profile

SCOUR STREAM & GROUND PROFILE *(3 Spans)*

BIGD Attachment 5.7
Version 1.0, SEPT2020
Page 3 of 9

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR:	UPSTREAM SIDE OF BRIDGE:
2369	S-24-166	Ninety Six Creek	N/A	Weighted Tape	Right Side

GATHER TOPSIDE BRIDGE INFORMATION:

ASSUMED BENCHMARK: *(vertical datum)* Top of Barrier	STATION DIRECTION: *(roadway)* Increasing	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = 4'-7"
OFFSET BENCHMARK: *(horizontal datum)* C/L Deck or Roadway	BENT DIRECTION: Increasing	From: Top of Parapet
OFFSET DISTANCE UPSTREAM: 17'-11"	OFFSET DISTANCE DOWNSTREAM: 17'-11"	To: Bottom of Beam

GATHER UNDER BRIDGE INFORMATION:

VERTICAL BLOCKAGE (%)	0%	HORIZONTAL BLOCKAGE (%)	0%

RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)

SLOPE PROTECTION (1) Type: Rip Rap	FROM STATION: 0+13 TO STATION: 0+26
SLOPE PROTECTION (2) Type: Rip Rap	FROM STATION: 0+73 TO STATION: 0+87

MIDSTREAM MUDLINE AND WATER SURFACE:

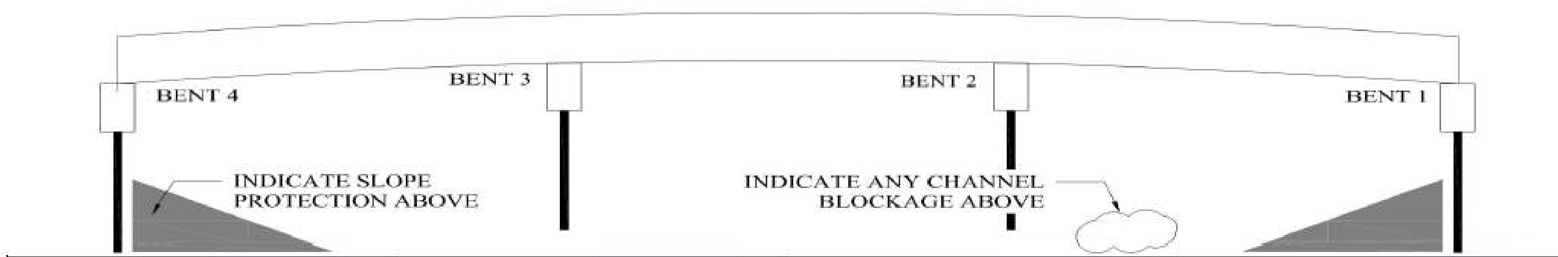
Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE	DOWNSTREAM SIDE OF BRIDGE
STA: 0+40	STA: 0+40
WATER SURFACE: 11.5 or NO WATER:	WATER SURFACE: 11.6 or NO WATER:
PREV. WATER SURFACE: N/A	PREV. WATER SURFACE: N/A
MUDLINE (ML) 12.5 PREV. ML: N/A	MUDLINE (ML) 12.6 PREV. ML: N/A

STA = STATION (ex 0+00) ML= MUDLINE
WS= WATER SURFACE PREV= PREVIOUS
US= UPSTREAM DS = DOWNSTREAM

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:



BENT #4 @ STA: 1+00	BENT #3 @ STA: 0+70	BENT #2 @ STA: 0+30	BENT #1 @ STA: 0+00
UPSTREAM ML: 0	UPSTREAM ML: 12.0	UPSTREAM ML: 10.4	UPSTREAM ML: 0
US ML (PREV): 0	US ML (PREV): 11.0	US ML (PREV): 9.4	US ML (PREV): 0
DOWNSTREAM ML: 0	DOWNSTREAM ML: 11.8	DOWNSTREAM ML: 11	DOWNSTREAM ML: 0
DS ML (PREV): 0	DS ML (PREV): 10.8	DS ML (PREV): 10	DS ML (PREV): 0

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(1 Span)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:		
ASSUMED BENCHMARK:*(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE:
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	H = __________ 
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	From: - ______________ To: -

GATHER UNDER BRIDGE INFORMATION:			
VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	
RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)			
SLOPE PROTECTION (1) Type: -		FROM STATION: __________ TO STATION: __________	
SLOPE PROTECTION (2) Type: -		FROM STATION: __________ TO STATION: __________	

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE

STA: __________
WATER SURFACE: __________ or NO WATER: ☐
PREV. WATER SURFACE: __________
MUDLINE (ML) __________ PREV. ML: __________

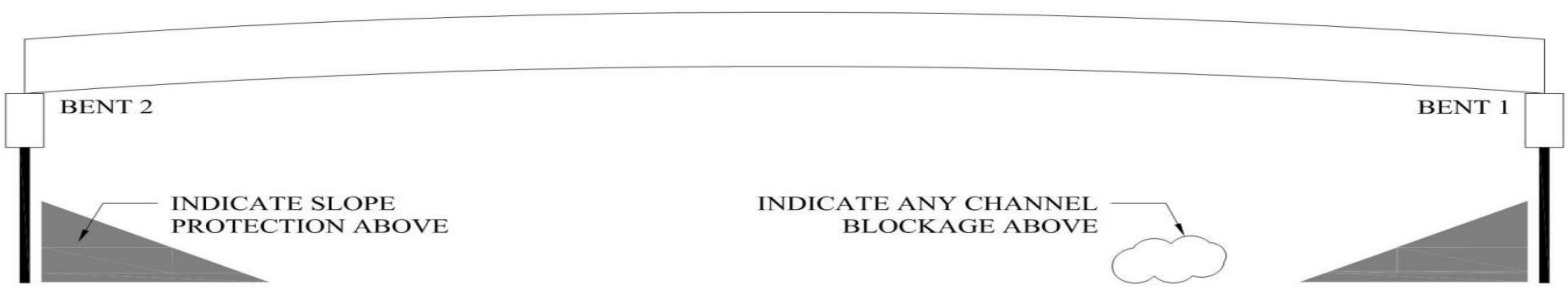
DOWNSTREAM SIDE OF BRIDGE

STA: __________
WATER SURFACE: __________ or NO WATER: ☐
PREV. WATER SURFACE: __________
MUDLINE (ML) __________ PREV. ML: __________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:



BENT #2 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

BENT #1 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

Complete Form | Undo | Save | Print

SCOUR STREAM & GROUND PROFILE *(2 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:		
ASSUMED BENCHMARK: *(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	From: - ____________
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	To: -

GATHER UNDER BRIDGE INFORMATION:			
VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	
RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)			
SLOPE PROTECTION (1) Type: -		FROM STATION: ________ TO STATION: ________	
SLOPE PROTECTION (2) Type: -		FROM STATION: ________ TO STATION: ________	

MIDSTREAM MUDLINE AND WATER SURFACE:

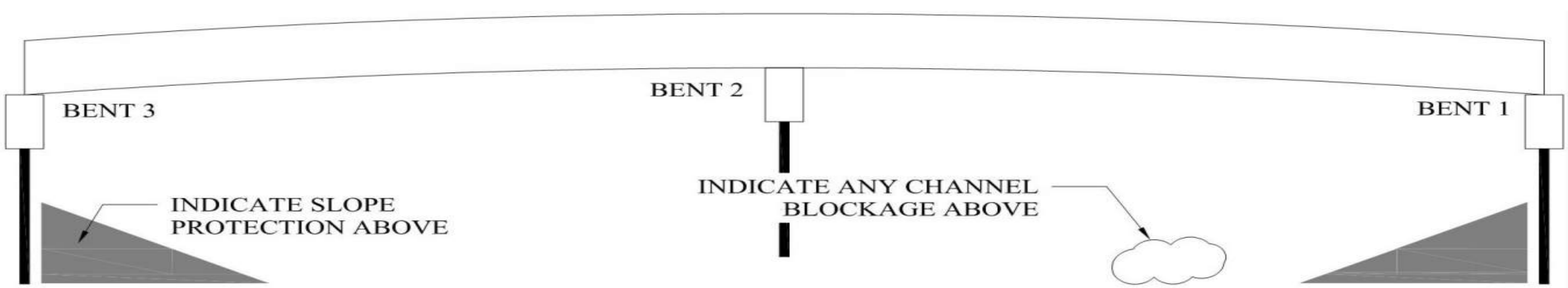
Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE	DOWNSTREAM SIDE OF BRIDGE
STA: ________	STA: ________
WATER SURFACE: ________ or NO WATER: ☐	WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________	PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________	MUDLINE (ML) ________ PREV. ML: ________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:



BENT #3 @ STA: ________	**BENT #2** @ STA: ________	**BENT #1** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(3 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:			GATHER UNDER BRIDGE INFORMATION:	
ASSUMED BENCHMARK: *(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________	VERTICAL BLOCKAGE (%)	HORIZONTAL BLOCKAGE (%)
			RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)	
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -		SLOPE PROTECTION (1) Type: -	FROM STATION: ________ TO STATION: ________
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	From: - ________ To: -	SLOPE PROTECTION (2) Type: -	FROM STATION: ________ TO STATION: ________

MIDSTREAM MUDLINE AND WATER SURFACE:

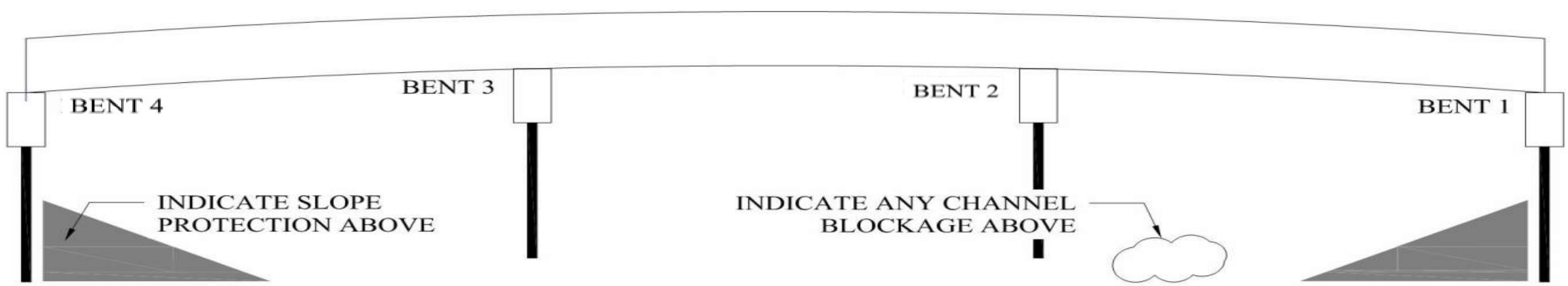
Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE	DOWNSTREAM SIDE OF BRIDGE
STA: ________	STA: ________
WATER SURFACE: ________ or NO WATER: ☐	WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________	PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________	MUDLINE (ML) ________ PREV. ML: ________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:



BENT #4 @ STA: ________	**BENT #3** @ STA: ________	**BENT #2** @ STA: ________	**BENT #1** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(4 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:

ASSUMED BENCHMARK: *(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	From: - ________
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	To: -

GATHER UNDER BRIDGE INFORMATION:

VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	

RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)

SLOPE PROTECTION (1) Type: -	FROM STATION: ________ TO STATION: ________
SLOPE PROTECTION (2) Type: -	FROM STATION: ________ TO STATION: ________

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE

STA: ________
WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________

DOWNSTREAM SIDE OF BRIDGE

STA: ________
WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________

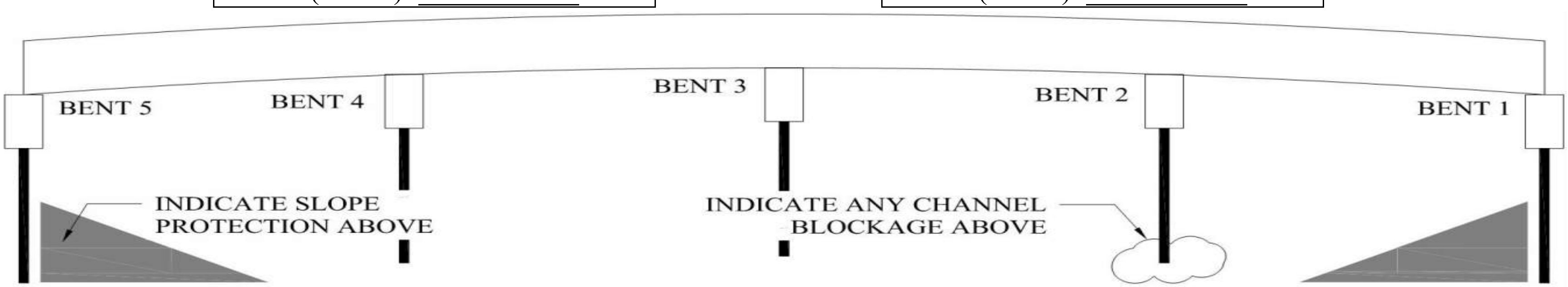
STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:

BENT #4 @ STA: ________
UPSTREAM ML: ________
US ML (PREV): ________
DOWNSTREAM ML: ________
DS ML (PREV): ________

BENT #2 @ STA: ________
UPSTREAM ML: ________
US ML (PREV): ________
DOWNSTREAM ML: ________
DS ML (PREV): ________



BENT #5 @ STA: ________
UPSTREAM ML: ________
US ML (PREV): ________
DOWNSTREAM ML: ________
DS ML (PREV): ________

BENT #3 @ STA: ________
UPSTREAM ML: ________
US ML (PREV): ________
DOWNSTREAM ML: ________
DS ML (PREV): ________

BENT #1 @ STA: ________
UPSTREAM ML: ________
US ML (PREV): ________
DOWNSTREAM ML: ________
DS ML (PREV): ________

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(5 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:

ASSUMED BENCHMARK: *(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	From: -
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	To: -

GATHER UNDER BRIDGE INFORMATION:

VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	

RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)

SLOPE PROTECTION (1) Type: -	FROM STATION: ________ TO STATION: ________
SLOPE PROTECTION (2) Type: -	FROM STATION: ________ TO STATION: ________

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE

STA: __________
WATER SURFACE: _________ or NO WATER: ☐
PREV. WATER SURFACE: _________
MUDLINE (ML) _________ PREV. ML: _________

DOWNSTREAM SIDE OF BRIDGE

STA: __________
WATER SURFACE: _________ or NO WATER: ☐
PREV. WATER SURFACE: _________
MUDLINE (ML) _________ PREV. ML: _________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

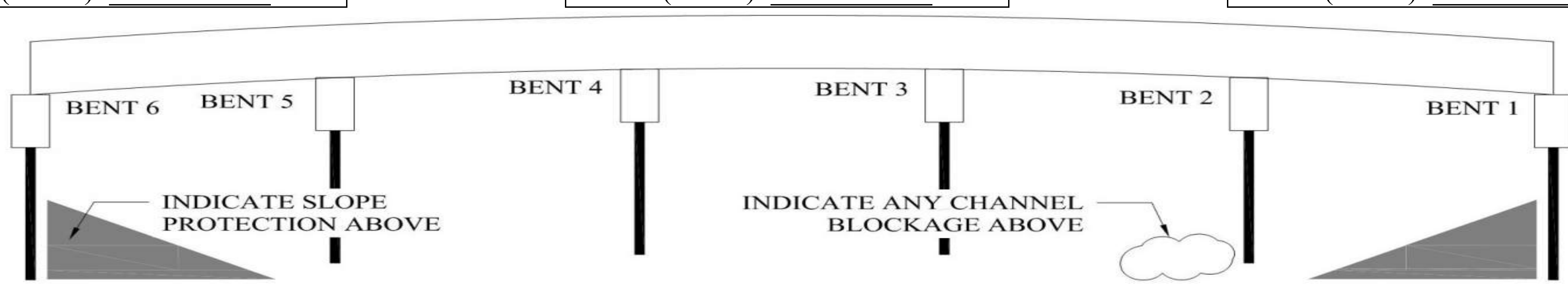
ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:

BENT #6 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

BENT #4 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

BENT #2 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________



BENT #5 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

BENT #3 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

BENT #1 @ STA: __________
UPSTREAM ML: __________
US ML (PREV): __________
DOWNSTREAM ML: __________
DS ML (PREV): __________

Complete Form | Undo | Save | Print

SCOUR STREAM & GROUND PROFILE *(7 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:		
ASSUMED BENCHMARK:*(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________ From: - ________ To: -
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	

GATHER UNDER BRIDGE INFORMATION:			
VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	
RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)			
SLOPE PROTECTION (1) Type: -		FROM STATION: ________ TO STATION: ________	
SLOPE PROTECTION (2) Type: -		FROM STATION: ________ TO STATION: ________	

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

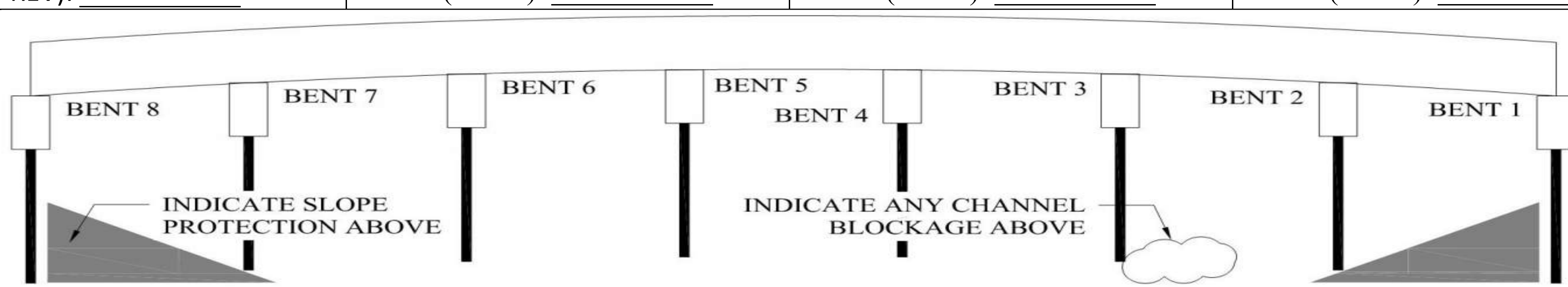
UPSTREAM SIDE OF BRIDGE	**DOWNSTREAM SIDE OF BRIDGE**
STA: ________	STA: ________
WATER SURFACE: ________ or NO WATER: ☐	WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________	PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________	MUDLINE (ML) ________ PREV. ML: ________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:

BENT #8 @ STA: ________	**BENT #6** @ STA: ________	**BENT #4** @ STA: ________	**BENT #2** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________



BENT #7 @ STA: ________	**BENT #5** @ STA: ________	**BENT #3** @ STA: ________	**BENT #1** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(6 Spans)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:

ASSUMED BENCHMARK: *(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE: H = ________
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	From: - ________
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	To: -

GATHER UNDER BRIDGE INFORMATION:

VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	
RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)			
SLOPE PROTECTION (1) Type: -		FROM STATION: ________ TO STATION: ________	
SLOPE PROTECTION (2) Type: -		FROM STATION: ________ TO STATION: ________	

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE

STA: ________
WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________

DOWNSTREAM SIDE OF BRIDGE

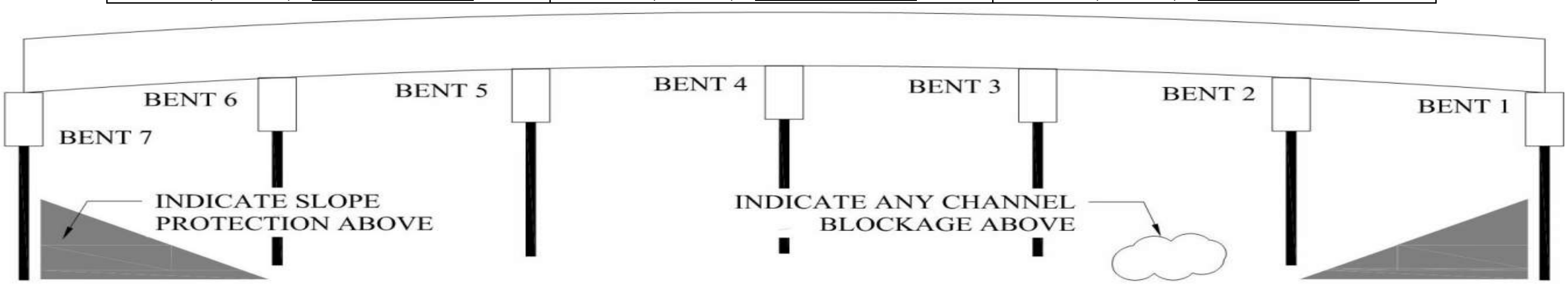
STA: ________
WATER SURFACE: ________ or NO WATER: ☐
PREV. WATER SURFACE: ________
MUDLINE (ML) ________ PREV. ML: ________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:

BENT #6 @ STA: ________	**BENT #4** @ STA: ________	**BENT #2** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________



BENT #7 @ STA: ________	**BENT #5** @ STA: ________	**BENT #3** @ STA: ________	**BENT #1** @ STA: ________
UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________	UPSTREAM ML: ________
US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________	US ML (PREV): ________
DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________	DOWNSTREAM ML: ________
DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________	DS ML (PREV): ________

Complete Form | Undo | Save | Print

SCOUR STREAM & GROUND PROFILE *(Any Span)*

ASSET ID (08):	ROUTE CARRIED (07):	CROSSING (06):	INSPECTION TIME: *Tidal Bridge Only*	METHOD TO MEASURE SCOUR: -	UPSTREAM SIDE OF BRIDGE: -

GATHER TOPSIDE BRIDGE INFORMATION:		
ASSUMED BENCHMARK:*(vertical datum)* -	STATION DIRECTION: *(roadway)* -	MAXIMUM HEIGHT OF SUPERSTRUCTURE:
OFFSET BENCHMARK: *(horizontal datum)* -	BENT DIRECTION: -	H = ________ From: - ________
OFFSET DISTANCE UPSTREAM:	OFFSET DISTANCE DOWNSTREAM:	To: -

GATHER UNDER BRIDGE INFORMATION:			
VERTICAL BLOCKAGE (%)		HORIZONTAL BLOCKAGE (%)	
RECORD BLOCKAGE ON THIS FORM OR IN INSPECTION REPORT (BETGD)			
SLOPE PROTECTION (1) Type: -		FROM STATION: ________ TO STATION: ________	
SLOPE PROTECTION (2) Type: -		FROM STATION: ________ TO STATION: ________	

MIDSTREAM MUDLINE AND WATER SURFACE:

Inspector to determine in field, use field judgment to determine location for midstream sounding. 1 Water Surface Measurement Needed per Upstream/Downstream.

UPSTREAM SIDE OF BRIDGE

STA: ________

WATER SURFACE: ________ or NO WATER: ☐

PREV. WATER SURFACE: ________

MUDLINE (ML) ________ PREV. ML: ________

DOWNSTREAM SIDE OF BRIDGE

STA: ________

WATER SURFACE: ________ or NO WATER: ☐

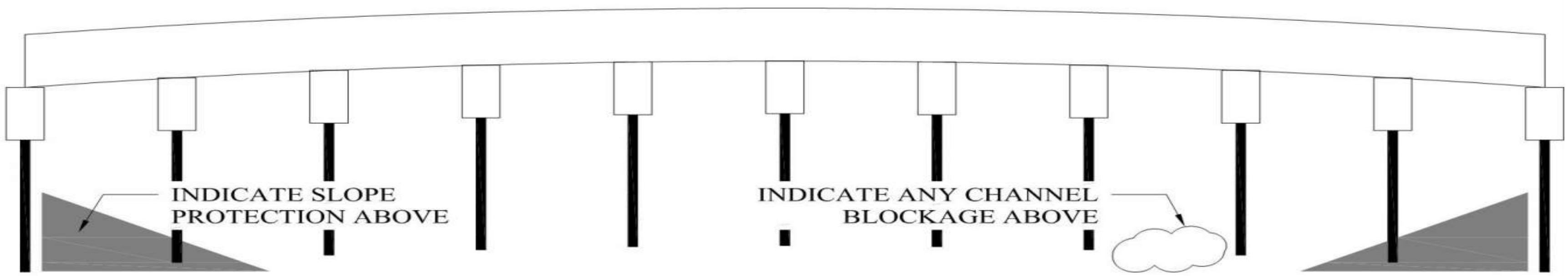
PREV. WATER SURFACE: ________

MUDLINE (ML) ________ PREV. ML: ________

STA = *STATION (ex 0+00)* **ML**= *MUDLINE*
WS= *WATER SURFACE* **PREV**= *PREVIOUS*
US= *UPSTREAM* **DS** = *DOWNSTREAM*

ALL SOUNDINGS TO MUDLINE
(UW INSPECTION MAY BE REQUIRED IF UNABLE TO MEASURE)

NOTES:



NUMBER OF SPANS ON BRIDGE: ________ PAGE: ____ OF ____

BENT NUMBER	STATION	UPSTREAM MUDLINE	UPSTRM ML (PREV)	DOWNSTREAM MUDLINE	DWSTRM ML (PREV)

Complete Form | Undo | Save | Print

SCDOT SCOUR STREAM & GROUND PROFILE *(Any Span)*

ASSET ID (08):	NUMBER OF SPANS ON BRIDGE:	*SEE PREVIOUS PAGE FOR ADDITIONAL INFORMATION*	PAGE: ____ OF ____

BENT NUMBER	STATION	UPSTREAM MUDLINE	UPSTRM ML (PREV)	DOWNSTREAM MUDLINE	DWSTRM ML (PREV)

Duplicate Page | Complete Form | Undo | Save | Print

ATTACHMENT 5.8

Appendix/Attachment Title

Damage Inspection Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Damage Inspection Form can be used for insurance related purposes.

This form is normally used for inspections for significant structure impacts. If impact damage is discovered during other inspections, the BITL shall determine if this form needs to be used or if damage can just be noted in the inspection report.

The Damage Inspection Form shall be sent to the DME (so long as a Critical Finding is not reported; if a Critical Finding is reported the BMO shall be notified).

Appendix/Attachment Description

In the event of a damage inspection, the BITL shall submit the form to BMO and DME. When needed, the report should include:

- Accident Patrol Report
- Bridge Inspection Report
- Critical Findings Report
- Photographs

The BMO and DME will forward the above documentation to the appropriate parties. Any maintenance or repair recommendations shall be logged into HMMS by the DBIS or BITL. Consultants shall use the Repair Recommendations Form. This form does not replace the need to use the Critical Findings Form, if needed.

If a bridge is damaged during the course of an existing awarded construction project, the BMO and DME will coordinate repairs as needed with the RME or RCE.

Damage Inspection Form

ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
INSPECTION DATE:	BITL:	BRIDGE OWNER (NBI 22): -

Gather as much information as possible in shaded box. If not possible to obtain, use “N/A”.

APPROXIMATE TIME OF IMPACT:	DATE OF IMPACT:	APPROXIMATE WEATHER AT IMPACT:

LANES CLOSED ON FACILITY CARRIED (NBI 07)?

LANES CLOSED ON FEATURE INTERSECTED (NBI 06)?

PARTIES CONTACTED BY SCDOT BRIDGE MAINTENANCE? (ex. Owner, EMS, etc.)

CONTROLLING MINIMUM VERTICAL CLEARANCE (XX'-XX")
WITH LOCATION AND ADDITIONAL PERTINENT INFORMATION

Documents also obtained or completed by BITL:

Accident Report (Police), if written	-	**Bridge Inspection Report, if written**	-
Critical Findings Form, if reported	-	**Photos included, use Attachment 5.20 or Page 2 of this Attachment**	-

Sketch *(Use Attachment 5.26 if needed)*

Notes:

Page ___ of ___

Complete Form | Undo | Save | Print

Email to DME (Only if NOT a Critical Finding)

Damage Inspection Form

Bridge Data - *Completed on Page 1*					
Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection Date:	
District # (NBI 02):	-	Feature Intersected (NBI 06):		BITL:	
County (NBI 03):	-	Bridge Owner (NBI 22):	-	Location (NBI 09):	

Damage Inspection Form Photographs

Use Attachment 5.20 if additional space for photographs is needed.

Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:

ATTACHMENT 5.9

Appendix/Attachment Title

Steel Superstructure Damage Inspection Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Steel Superstructure Damage Inspection Form can be used for insurance related purposes to determine the extent of damage induced to a steel beam as part of an impact hit. This form helps determine the severity and extent of damage to the steel beam superstructure after an over height bridge hit.

This form is normally used for inspections for significant structure impacts. If impact damage is discovered during other inspections, the BITL shall determine if this form needs to be used or if damage can just be noted in the inspection report.

The Damage Inspection Form shall be sent to the DME (so long as a Critical Finding is not reported; if a Critical Finding is reported the BMO shall be notified).

Appendix/Attachment Description

In the event of an impact to a steel beam, the BITL shall submit the form to BMO and DME. When needed, the report should include:

- Accident Patrol Report
- Bridge Inspection Report
- Critical Findings Report
- Photographs

BMO and DME will forward the above documentation to the appropriate parties. Any maintenance or repair recommendations shall be logged into HMMS by DBIS or BITL. Consultants shall use the Repair Recommendations Form. This form does not replace the need to use the Critical Findings Form, if needed.

If a bridge is damaged during the course of an existing awarded construction project, the BMO and DME will coordinate repairs as needed with the RME or RCE.

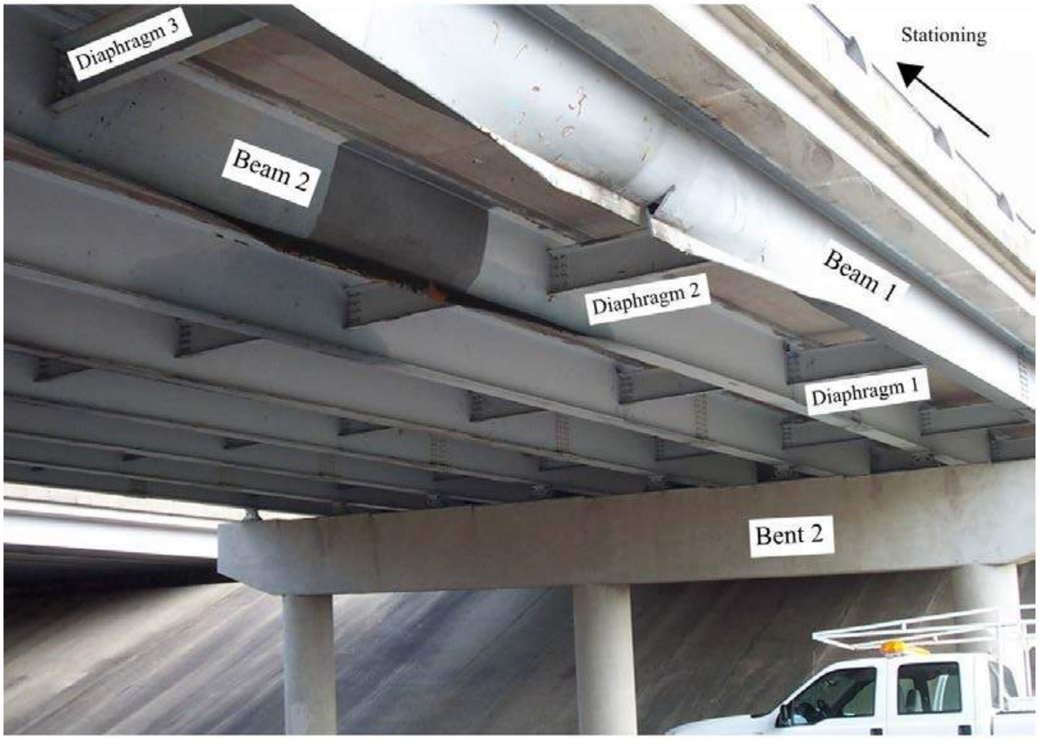
An example of the completed Tables 1 and 2 is included in this Attachment on the following page.

Example of Completed Tables 1 and 2

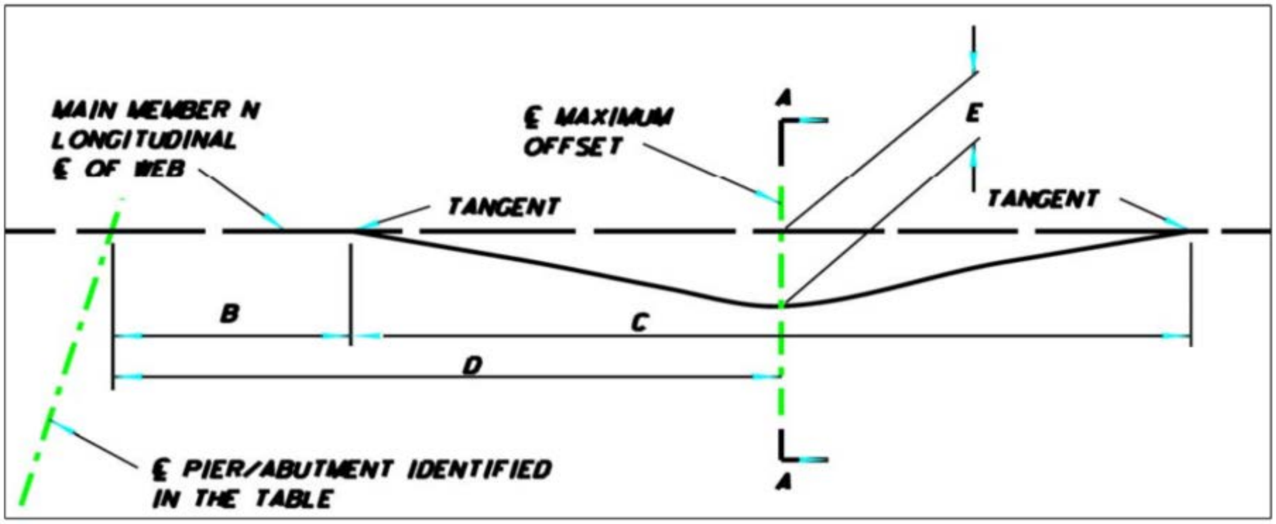
Table No. 1 - Damaged Main Member										
Beam Number	**Damaged Section of Beam**	**Span Number**	**Bent Reference**	**B**	**C**	**D**	**E**	**F1**	**F2**	**G**
1	BOT FL	2	BT 2	20'	15'	27.5'	4"	6"	6"	2"

Table No. 2 – Damaged Secondary Member (i.e..crossframe)			
Between Beams	**Bent Reference** *(for N)*	**N**	**Notes of Damage** *(Loss of Connection, Cracking, Displacement, etc..?)*
1-2	2	2	Loss of Connection

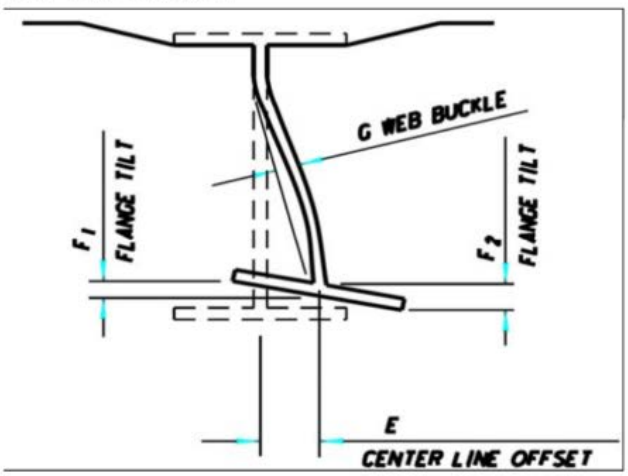
N = number of cross frames (upstation) from the referenced bent



Use for Table 1



Use for Table 1



Section A-A

Negative E Values are bent left
Negative F Values are bent down
Negative G values are bent left

Damage Inspection Form
Steel Beam Superstructure

ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
INSPECTION DATE:	BITL:	BRIDGE OWNER (NBI 22): -

<u>Gather as much information as possible in shaded box. If not possible to obtain, use "N/A".</u>

APPROXIMATE TIME OF IMPACT:	DATE OF IMPACT:	APPROXIMATE WEATHER AT IMPACT:

LANES CLOSED ON FACILITY CARRIED (NBI 07)?

LANES CLOSED ON FEATURE INTERSECTED (NBI 06)?

PARTIES CONTACTED BY SCDOT BRIDGE MAINTENANCE? (ex. Owner, EMS, etc.)

CONTROLLING MINIMUM VERTICAL CLEARANCE (XX'-XX")
WITH LOCATION AND ADDITIONAL PERTINENT INFORMATION

<u>Documents also obtained or completed by BITL:</u>

Accident Report (Police), if written	-	**Bridge Inspection Report, if written**	-
Critical Findings Form, if reported	-	**Photos included, use Attachment 5.20 or Page 2 of this Attachment**	-

Tables 1 & 2 below are to be completed to note the damage from the impact. See diagrams on instruction pages for referenced locations.

Table No. 1 - Damaged Main Member

Beam Number	Damaged Section of Beam	Span Number	Bent Reference	B	C	D	E	F1	F2	G

Table No. 2 – Damaged Secondary Member (i.e..crossframe)

Between Beams	Bent Reference *(for N)*	N	Notes of Damage *(Loss of Connection, Cracking, Displacement, etc..?)*

N = number of cross frames (upstation) from the referenced bent

<u>Notes:</u>
____
____
____
____

Page ___ of ___

Complete Form | Undo | Save | Print

Email to DME (Only if NOT a Critical Finding)

Damage Inspection Form
Steel Beam Superstructure

Bridge Data - *Completed on Page 1*					
Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection Date:	
District # (NBI 02):	-	Feature Intersected (NBI 06):		BITL:	
County (NBI 03):	-	Bridge Owner (NBI 22):	-	Location (NBI 09):	

Damage Inspection Form Photographs

Use Attachment 5.20 if additional space for photographs is needed.

Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:

ATTACHMENT 5.10

Appendix/Attachment Title

Concrete Superstructure Damage Inspection Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Concrete Superstructure Damage Inspection Form can be used for insurance related purposes to determine the extent of damage induced to a concrete beam as part of an impact hit. This form helps determine the severity and extent of damage to the concrete beam superstructure after an over height bridge hit.

This form is normally used for inspections for significant structure impacts. If impact damage is discovered during other inspections, the BITL shall determine if this form needs to be used or if damage can just be noted in the inspection report.

The Damage Inspection Form shall be sent to the DME (so long as a Critical Finding is not reported; if a Critical Finding is reported the BMO shall be notified).

Appendix/Attachment Description

In the event of an impact to a concrete beam, the BITL shall submit to BMO and DME. If needed, the report should include:

- Accident Patrol Report
- Bridge Inspection Report
- Critical Findings Report
- Pictures

BMO and DME will forward the above documentation to the appropriate parties. Any maintenance or repair recommendations shall be logged into HMMS by DBIS or BITL. Consultants shall use the Repair Recommendations Form. This form does not replace the need to use the Critical Findings Form, if needed.

If a bridge is damaged during the course of an existing awarded construction project, the BMO and DME will coordinate repairs as needed with the RME or RCE.

An example of the completed Tables 1 and 2 is included in this Attachment on the following page.

Example of Completed Tables 1 and 2

Table No. 1 – Damaged Main Member

Beam Number	Damaged Section of Beam	Span Number	Length of Spall	Height of Spall	Depth of Spall	Exposed Reinforcing Bars?	Damaged Pre-stress Strand?	Damaged Reinforcing Bars?	Cracking?	Member Displace-ment?
4	BOT FL	3	24"	16"	Full	Yes	Yes	Yes	Yes	No

Table No. 2 – Damaged Secondary Member

Between Beams	Bent Reference *(for N)*	N	Damaged Section of Beam	Notes of Damage *(Spalling, Cracking, Displacement, Reinf. Exposed)*
3-4	Bent 3	2	Dia.	Cracking at Beam 4 / Dia. Conn.

N = number of cross frames (upstation) from the referenced bent

Damage Inspection Form
Concrete Beam Superstructure

ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
INSPECTION DATE:	BITL:	BRIDGE OWNER (NBI 22): -

Gather as much information as possible in shaded box. If not possible to obtain, use "N/A".

APPROXIMATE TIME OF IMPACT:	DATE OF IMPACT:	APPROXIMATE WEATHER AT IMPACT:

LANES CLOSED ON FACILITY CARRIED (NBI 07)?

LANES CLOSED ON FEATURE INTERSECTED (NBI 06)?

PARTIES CONTACTED BY SCDOT BRIDGE MAINTENANCE? (ex. Owner, EMS, etc.)

CONTROLLING MINIMUM VERTICAL CLEARANCE (XX'-XX")
WITH LOCATION AND ADDITIONAL PERTINENT INFORMATION

Documents also obtained or completed by BITL:

Accident Report (Police), if written	-	**Bridge Inspection Report, if written**	-
Critical Findings Form, if reported	-	**Photos included, use Attachment 5.20 or Page 2 of this Attachment**	-

Table No. 1 – Damaged Main Member

Beam Number	Damaged Section of Beam	Span Number	Length of Spall	Height of Spall	Depth of Spall	Exposed Reinforcing Bars?	Damaged Pre-stress Strand?	Damaged Reinforcing Bars?	Cracking?	Member Displace-ment?

Table No. 2 – Damaged Secondary Member

Between Beams	Bent Reference *(for N)*	N	Damaged Section of Beam	Notes of Damage *(Spalling, Cracking, Displacement, Reinf. Exposed)*

Additional Notes:

N = number of cross frames (upstation) from the referenced bent

Page ___ of ____

Complete Form | Undo | Save | Print

Email to DME (Only if NOT a Critical Finding)

Damage Inspection Form
Concrete Beam Superstructure

Bridge Data - *Completed on Page 1*					
Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection Date:	
District # (NBI 02):	-	Feature Intersected (NBI 06):		BITL:	
County (NBI 03):	-	Bridge Owner (NBI 22):	-	Location (NBI 09):	

Damage Inspection Form Photographs

Use Attachment 5.20 if additional space for photographs is needed.

Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:
Photo #: ___ Date: ____________ Caption:	Photo #: ___ Date: ____________ Caption:

ATTACHMENT 5.11

Appendix/Attachment Title

Deck Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of the deck. Noting condition and locations of deterioration observed provides further detail to personnel reviewing the inspection reports and can help in identifying infrastructure maintenance priorities.

The user shall select if the notes are applicable to top of deck, bottom of deck or bottom of soffit. The user may also enter their own orientation for the sketch sheet.

Types of decks:

- Panel Deck by Panel Number (Page 1)
- Panel Deck by Panel Number, non-visual (Page 2)
- Panel Deck by Bay Number (Page 3)
- Flat Slab (Page 4)

Appendix/Attachment Description

The inspector shall label the spans and panels as per the labeling diagram. The condition of the deck shall be documented and described on the sketch. Further notation may be made by numerically labeling the deterioration on the sketch and further describing the conditions in the provided notes section on the sketch sheet if space is confined on the sketch sheet.

Deck Sketch Sheet

Asset ID Number (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of the top side and bottom side of the deck. See abbreviations listed in Appendix P. Sketch Configuration: **DECK PANEL (by panel number)**	SELECT ORIENTATION: -

SPAN # **PANEL #**

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = _________________________ _____ = _________________________ _____ = _________________________

_____ = _________________________ _____ = _________________________ _____ = _________________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

Deck Sketch Sheet

Asset ID Number (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of the top side and bottom side of the deck. See abbreviations listed in Appendix P. Sketch Configuration: **DECK PANEL (by panel number)**	SELECT ORIENTATION: -

Span: ____	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
Span: ____	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
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	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
Span: ____	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:
	Panel ___, Notes:

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = __________________________ _____ = __________________________ _____ = __________________________
_____ = __________________________ _____ = __________________________ _____ = __________________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

SCDOT

Deck Sketch Sheet

Asset ID Number (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of the top side and bottom side of the deck. See abbreviations listed in Appendix P. Sketch Configuration: **DECK PANEL (by bay number)**	SELECT ORIENTATION: -

SPAN # **Bay #**

____	____	____	____	____	____	____	____	____
____								
____								
____								
____								
____								
____								

____ ____ ____ ____ ____ ____ ____ ____ ____

Beam #

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = ________________________ _____ = ________________________ _____ = ________________________

_____ = ________________________ _____ = ________________________ _____ = ________________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

Deck Sketch Sheet

Asset ID Number (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of the top side and bottom side of the deck. See abbreviations listed in Appendix P. Sketch Configuration: **FLAT SLAB**	SELECT ORIENTATION: -

SLAB #

SPAN #

______ ______

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = _____________________________ _____ = _____________________________ _____ = _____________________________

_____ = _____________________________ _____ = _____________________________ _____ = _____________________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

ATTACHMENT 5.12

Appendix/Attachment Title

Prestressed Concrete Member Deterioration Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of prestressed concrete members. Sketching and dimensioning the deterioration observed provides further detail to personnel reviewing the inspection reports and can help in identifying infrastructure maintenance priorities.

Given subspecialty to deterioration and widespread use across the state, a cored beam superstructure is shown and a prestressed I-beam is shown as part of these sketch sheets.

Appendix/Attachment Description

The inspector shall label the span, beam ID, and bents as per the labeling diagram. The condition of the prestressed concrete member shall be documented and described on the sketch. A cross section of the prestressed concrete member at the beam ends and at midspan shall be sketched to show the beam section and the deteriorated condition observed during the inspection.

If the bridge inspected contains multiple beams needing sketch sheets, the inspector shall use 1 sketch sheet per beam of the bridge. For example, if there are two beams needing a sketch sheet, then there will be 2 pages of sketch sheets, “Page 1 of 2” and “Page 2 of 2”.

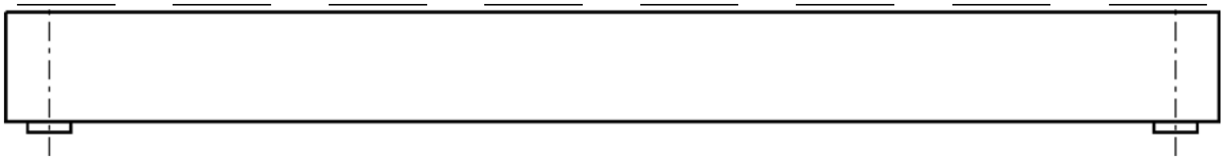
The use of the revision triangle (△) is to show information updated from the previous inspection report.

SCDOT

Prestressed Concrete Member Deterioration Sketch Sheet

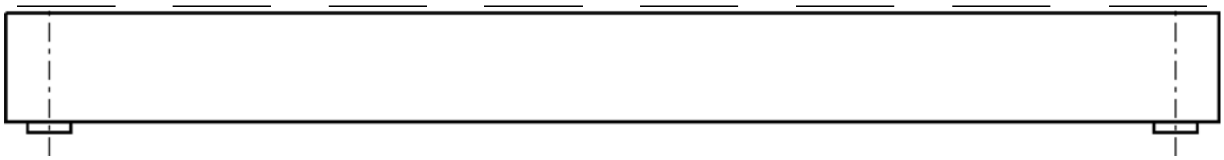
REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

BENT #: _______________ BENT #: _______________



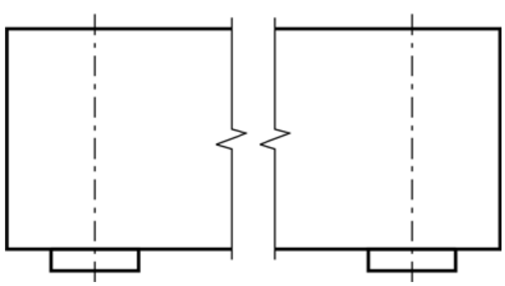
ELEVATION: _________

BENT #: _______________ BENT #: _______________



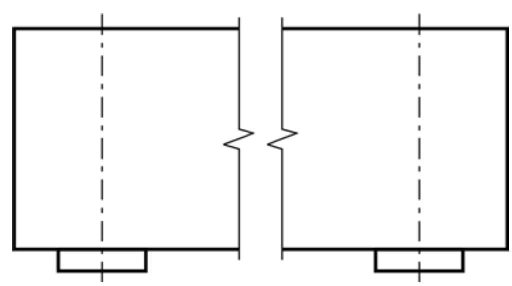
ELEVATION: _________

℄ BENT #: ____ ℄ BENT #: ____

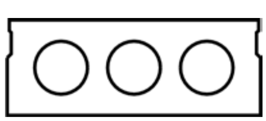


ELEVATION: BEAM ENDS AT BEARINGS

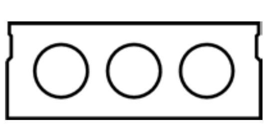
℄ BENT #: ____ ℄ BENT #: ____



ELEVATION: BEAM ENDS AT BEARINGS



BEAM SECTION AT BENT: ______



BEAM SECTION AT MIDSPAN

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand, Add Additional Abbreviations (if needed):

____ = ___________________ ____ = ___________________
____ = ___________________ ____ = ___________________
____ = ___________________ ____ = ___________________

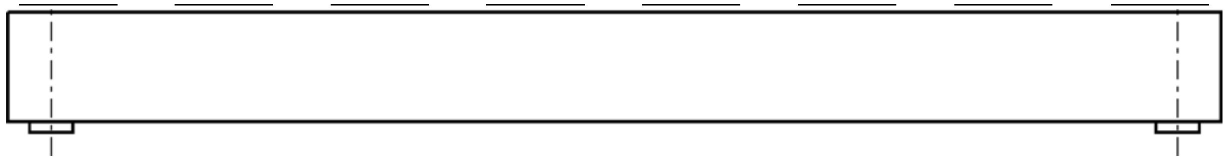
NOTES:

Duplicate Page | Complete Form | Undo | Save | Print

Prestressed Concrete Member Deterioration Sketch Sheet

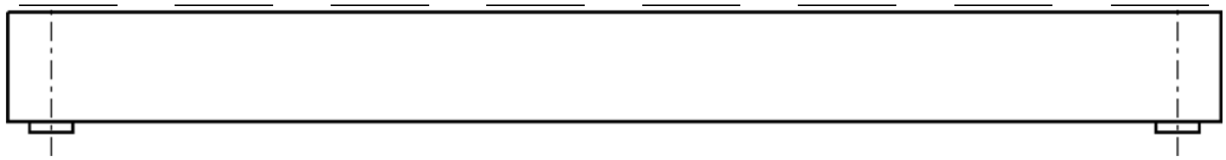
REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

BENT #: _______________ BENT #: _______________



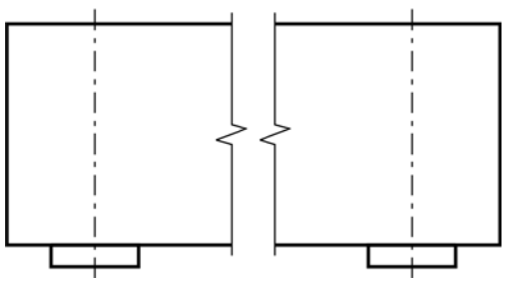
ELEVATION: _________

BENT #: _______________ BENT #: _______________



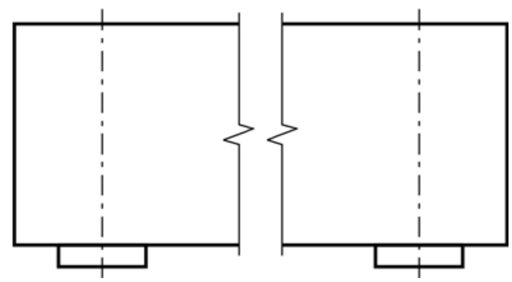
ELEVATION: _________

℄ BENT #: ____ ℄ BENT #: ____

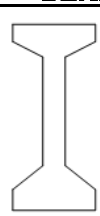


ELEVATION: BEAM ENDS AT BEARINGS

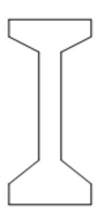
℄ BENT #: ____ ℄ BENT #: ____



ELEVATION: BEAM ENDS AT BEARINGS



BEAM SECTION AT BENT: ______



BEAM SECTION AT MIDSPAN

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand, Add Additional Abbreviations (if needed):

____ = ___________________ ____ = ____________________
____ = ___________________ ____ = ____________________
____ = ___________________ ____ = ____________________

NOTES:

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ATTACHMENT 5.13

Appendix/Attachment Title

Reinforced Concrete Member Deterioration Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of reinforced concrete members. Sketching and dimensioning the deterioration observed provides further detail to personnel reviewing the inspection reports and can help in identifying infrastructure maintenance priorities.

Given subspecialty to deterioration and widespread use across the state, tee beam superstructure is shown and slab is shown as part of these sketch sheets. The deck sketch sheet may also be used instead of the slab if more practical; see Attachment 5.11.

Appendix/Attachment Description

The inspector shall label the span, beam ID, and bents as per the labeling diagram. The condition of the reinforced concrete member shall be documented and described on the sketch. A cross section of the reinforced concrete member at the beam ends and at midspan may also be used to illustrate deterioration.

For flat slab structure types the inspector shall label the span and bents and make notes on the topside and underside plan views. A fascia elevation has been included for use if warranted. Further notation may be made by numerically labeling the deterioration on the sketch and further describing the conditions in the provided notes section on the sketch sheet.

If the bridge inspected contains multiple members needing sketch sheets, the inspector shall use 1 sketch sheet per member of the bridge. For example, if there are two members needing a sketch sheet, then there will be 2 pages of sketch sheets, “Page 1 of 2” and “Page 2 of 2”.

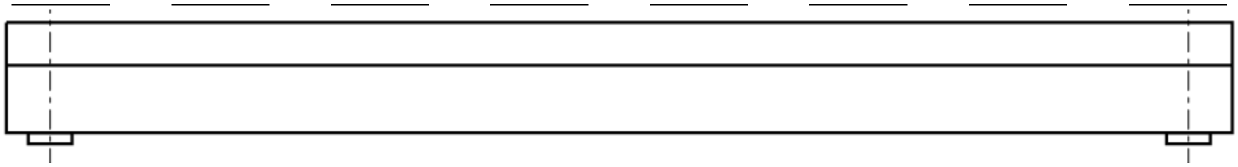
The use of the revision triangle (△) is to show information updated from the previous inspection report.

SCDOT

Reinforced Concrete Member Deterioration Sketch Sheet

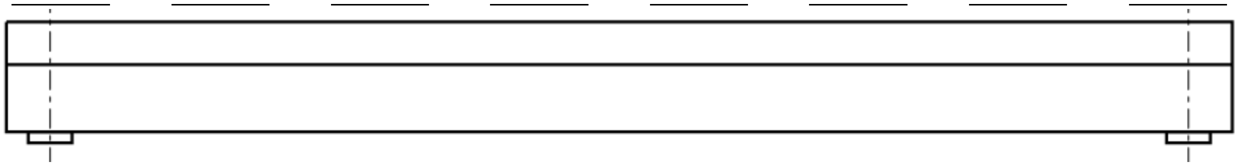
REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

BENT #: _______________ BENT #: _______________



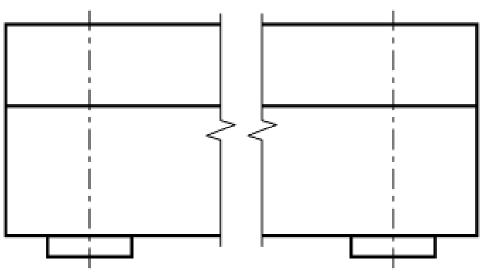
ELEVATION: _______________________

BENT #: _______________ BENT #: _______________

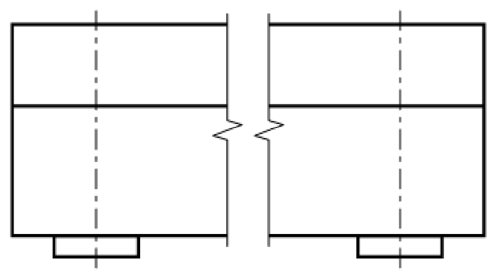


ELEVATION: _______________________

℄ BENT #: ____ ℄ BENT #: ____

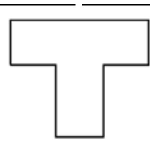


℄ BENT #: ____ ℄ BENT #: ____

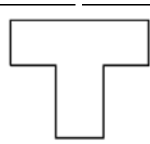


ELEVATION: BEAM ENDS AT BEARINGS

ELEVATION: BEAM ENDS AT BEARINGS



BEAM SECTION AT BENT: ______



BEAM SECTION AT MIDSPAN

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand, Add Additional Abbreviations (if needed):

____ = ____________________ ____ = ____________________
____ = ____________________ ____ = ____________________
____ = ____________________ ____ = ____________________

NOTES:

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SCDOT

Reinforced Concrete Member Deterioration Sketch Sheet

REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

BENT #: _______________ BENT #: _______________

TOP SIDE – FLAT SLAB

BENT #: _______________ BENT #: _______________

BOTTOM SIDE – FLAT SLAB

BENT #: _______________ BENT #: _______________

ELEVATION: ____________________________

BENT #: _______________ BENT #: _______________

ELEVATION: ____________________________

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand,
Add Additional Abbreviations (if needed):

____ = _________________ ____ = _________________ ____ = _________________

____ = _________________ ____ = _________________ ____ = _________________

NOTES:

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ATTACHMENT 5.14

Appendix/Attachment Title

Steel Member Deterioration Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of the steel members. Sketching and dimensioning the deterioration observed provides further detail to personnel reviewing the inspection reports and can help in identifying infrastructure maintenance priorities.

Appendix/Attachment Description

The inspector shall label the span, beam ID, and bents as per the labeling diagram. The condition of the steel member shall be documented and described on the sketch. A cross section of the steel member at the beam ends and at midspan may also be used to illustrate deterioration.

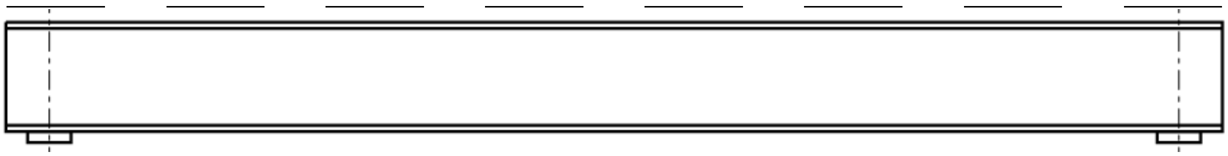
If the bridge inspected contains multiple members needing sketch sheets, the inspector shall use 1 sketch sheet per member of the bridge. For example, if there are two members needing a sketch sheet, then there will be 2 pages of sketch sheets, “Page 1 of 2” and “Page 2 of 2”.

The use of the revision triangle (△) is to show information updated from the previous inspection report.

Steel Member Deterioration Sketch Sheet

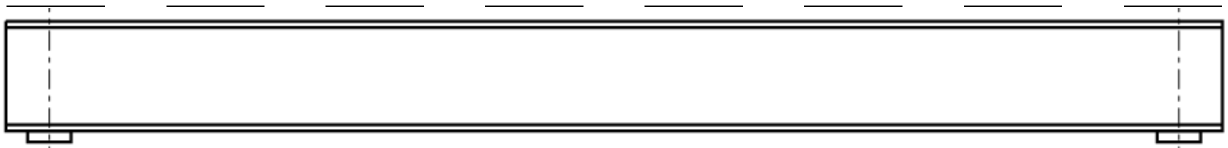
REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

BENT #: ______________ BENT #: ______________



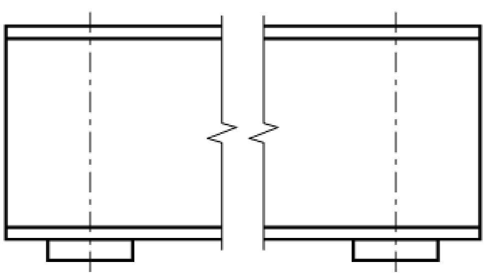
ELEVATION: ____________________________

BENT #: ______________ BENT #: ______________



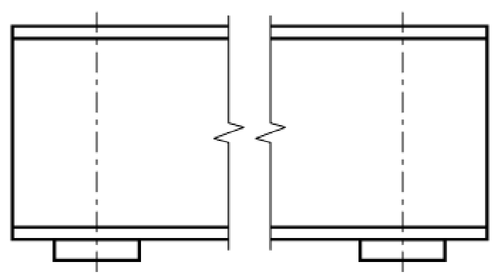
ELEVATION: ____________________________

℄ BENT #: ____ ℄ BENT #: ____

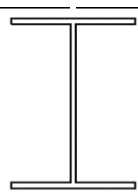


ELEVATION: BEAM ENDS AT BEARINGS

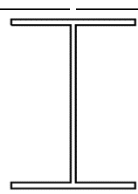
℄ BENT #: ____ ℄ BENT #: ____



ELEVATION: BEAM ENDS AT BEARINGS



BEAM SECTION AT BENT: ______



BEAM SECTION AT MIDSPAN

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand, Add Additional Abbreviations (if needed):

____ = ____________________ ____ = ____________________

____ = ____________________ ____ = ____________________

____ = ____________________ ____ = ____________________

NOTES:

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ATTACHMENT 5.15

Appendix/Attachment Title

Rigid Frame Deterioration Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of a concrete rigid frame or steel rigid frame structure. Sketching and dimensioning the deterioration observed provides further detail to personnel reviewing the inspection reports and can help in identifying infrastructure maintenance priorities.

Appendix/Attachment Description

The inspector shall label the span, beam ID, and bents as per the labeling diagram. The condition of the concrete or steel rigid frame shall be documented and described on the sketch. For concrete rigid frames, the condition of the concrete on the interior faces shall be noted and documented. For both rigid frame types, deterioration should be labelled and elaborated on in the notes section provided on the sheet.

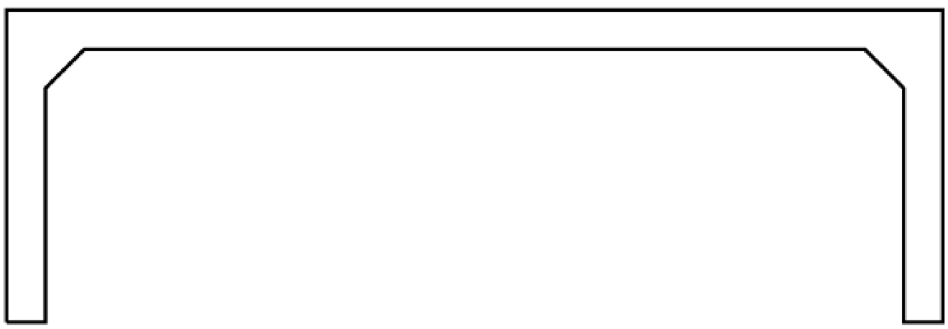
If the bridge inspected contains multiple members needing sketch sheets, the inspector shall use 1 sketch sheet per member of the bridge. For example, if there are two members needing a sketch sheet, then there will be 2 pages of sketch sheets, "Page 1 of 2" and "Page 2 of 2".

The use of the revision triangle (△) is to show information updated from the previous inspection report.

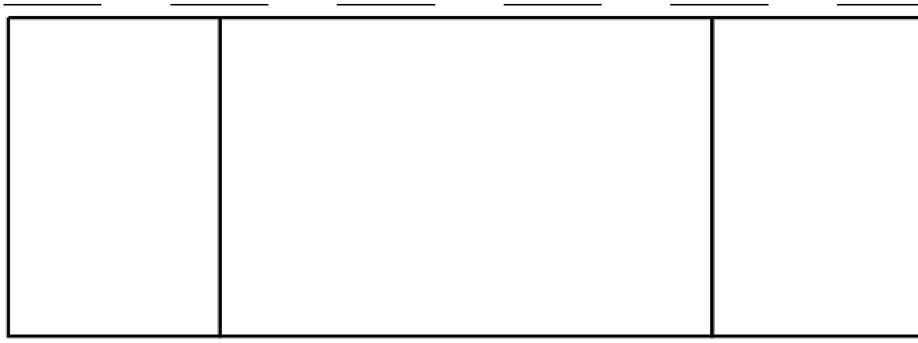
Rigid Frame Deterioration Sketch Sheet

REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF

ELEVATION: ______________________________



ELEVATION: ______________________________



INTERIOR FACE DE-ENVELOPED PLAN

ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand,
Add Additional Abbreviations (if needed):

____ = ______________ ____ = ______________ ____ = ______________

____ = ______________ ____ = ______________ ____ = ______________

NOTES:

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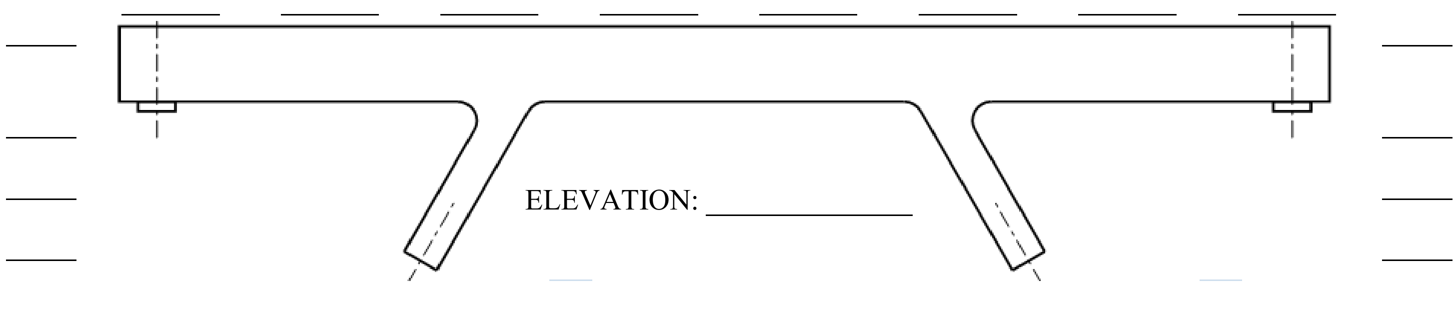
Rigid Frame Deterioration Sketch Sheet

REQUIRED INFORMATION				
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	SPAN	BEAM ID	PAGE OF



ABBREVATIONS:

See Appendix P for Common Inspection Abbreviations and Shorthand, Add Additional Abbreviations (if needed):

____ = ____________________ ____ = ____________________

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NOTES:

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ATTACHMENT 5.16

Appendix/Attachment Title

Fracture Critical Member (FCM) Inspection Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this form is to document the condition of the FCMs. Documenting the deterioration observed through detailed remarks provides further detail to personnel reviewing the fracture critical member inspection reports and can help in identifying infrastructure maintenance priorities.

Appendix/Attachment Description

The inspector shall identify **ONLY** fracture critical members as prescribed in the BIGD. The condition of the FCMs shall be documented and described in detail in the remarks section of this form. Pictures of the members inspected shall also be taken and photograph files shall be logged using Attachment 5.20, the Photograph Form.

FRACTURE CRITICAL MEMBER INSPECTION FORM

ASSET ID NUMBER: (NBI 08)	COUNTY (NBI 03): -	DISTRICT # (NBI 02): -	90: ROUTINE INSP DATE:	93a: FCM INSP DATE:	PAGE	OF

FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):	LOCATION (NBI 09):

STRUCTURE TYPE (MAIN, NBI 43): -	STRUCTURE TYPE (APPROACH, NBI 44): -
BITL NAME:	TEAM MEMBERS (NAMES):

FRACTURE CRITICAL MEMBER(S): **(list only unique FCM Members)**

	MEMBER Include Member Sizes if not on plans or labeling diagram (only unique FCMs)	LOCATION OF CORROSION, SECTION REMAINING (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC. NOTE ALL DEFICIENCIES	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	ANY CRACKS ?	RATE WELD CONDITION (0-9 OR N/A)
A			-	-	-	N/A
B			-	-	-	N/A
C			-	-	-	N/A
D			-	-	-	N/A
E			-	-	-	N/A
F			-	-	-	N/A
G			-	-	-	N/A
H			-	-	-	N/A

List of field tests performed:

ENTER NBI (59 and 60) CONDTIONS:	NBI #59	NBI #60
(Overall Previous Inspection Condition)		
(Overall Current Condition)		

INSPECTION PROCEDURES FOLLOWED FROM FCM INSPECTION PLAN: *(Note recommended changes to FCM Inspection Plan)*

CONFIRM THAT INSPECTION PROCEDURES WERE FOLLOWED FROM FCM INSPECTION PLAN: -

ADDITIONAL REMARKS/NOTES:

Duplicate Page | Complete Form | Undo | Save | Print

ATTACHMENT 5.17

Appendix/Attachment Title

Bent Cap and Bearing Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document the condition of the inspected bent caps and bearings. Sketching and dimensioning the deterioration observed provides further detail to personnel reviewing the inspection reports and can help in prioritizing infrastructure maintenance.

Types of bent, cap and bearing sketch sheets:

- Single Bent Cap (Page 1)
- Plan View (Bents/Caps) (Page 2)
- Plan View (Caps/Saddles) (Page 3)
- Eight Pile Bent Sketch (Page 4)
- Seven Pile Bent Sketch (Page 5)
- Six Pile Bent Sketch (Page 6)
- Five Pile Bent Sketch (Page 7)
- Four Pile Bent Sketch (Page 8)

Appendix/Attachment Description

The inspector shall label bents, caps, beams and bearings as per the labeling diagram. The condition of the bearings shall be noted. Limits of bent cap deterioration conditions shall be sketched, dimensioned, and labeled using abbreviations.

Bent Cap and Bearing Sketch Sheet

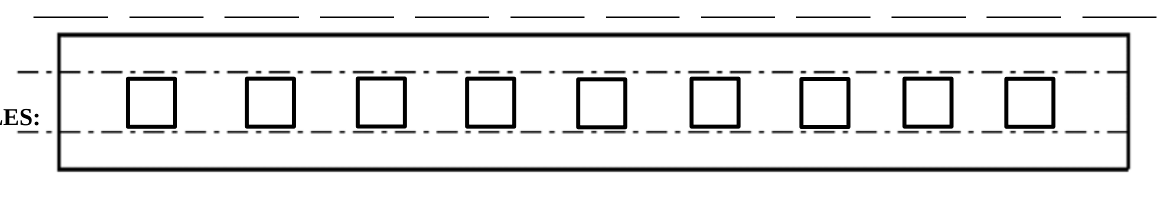
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording bent cap deterioration and bearing condition observed during the inspection. Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

BENT NUMBER: ________

PLAN VIEW (OF CAP)

Place abbreviation in approximate deficiency area

LABEL BEAMS/PILES:



UPSTATION

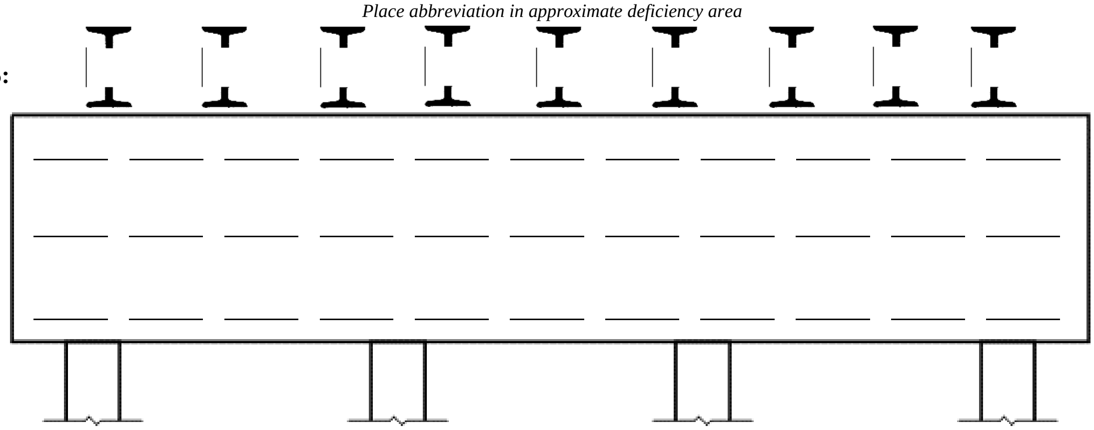
DOWNSTATION

BENT ELEVATION (LOOKING)

Place abbreviation in approximate deficiency area

LABEL BEAMS:

LABEL PILES:



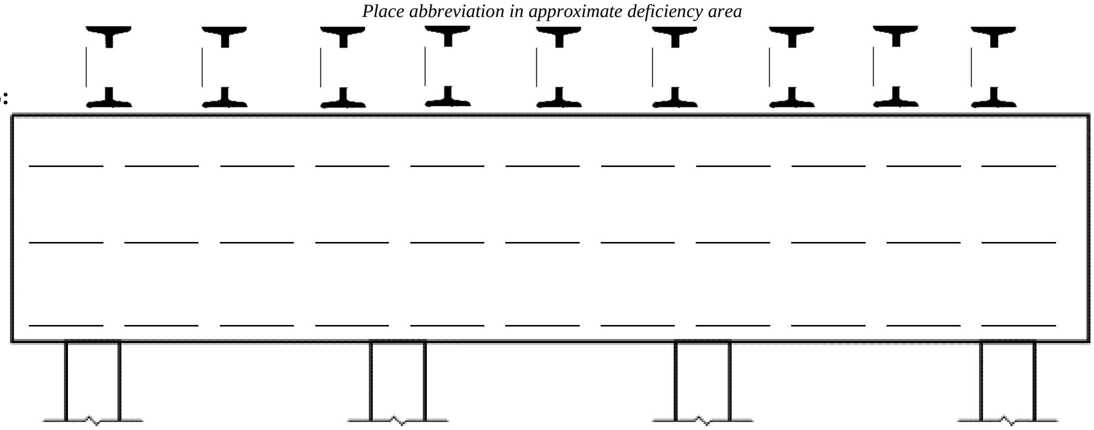
PILE/BEAM NUMBERING

BENT ELEVATION (LOOKING)

Place abbreviation in approximate deficiency area

LABEL BEAMS:

LABEL PILES:



PILE/BEAM NUMBERING

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = _________________________ _____ = _________________________ _____ = _________________________

_____ = _________________________ _____ = _________________________ _____ = _________________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

Bent Cap and Bearing Sketch Sheet

Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording bent cap deterioration and bearing condition observed during the inspection. Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

BEAM #: ___ ___ ___ ___ ___ ___

BENT ____

BENT ____

BENT ____

BENT ____

BENT ____

BENT ____

BENT ____

BENT ____

BENT ____

BEAM #: ___ ___ ___ ___ ___ ___

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = __________________________ _____ = __________________________ _____ = __________________________

_____ = __________________________ _____ = __________________________ _____ = __________________________

Notes:

Page _____ of _____

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Bent Cap and Bearing Sketch Sheet

Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording saddle condition and deterioration observed during the inspection. Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

TEE BEAM OR REGULAR BEAM NUMBER

BENT # ______ ______ ______ ______

See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = ____________________ _____ = ____________________ _____ = ____________________

_____ = ____________________ _____ = ____________________ _____ = ____________________

Notes:

Page _____ of _____

Duplicate Page | Complete Form | Undo | Save | Print

Bent Cap and Bearing Sketch Sheet

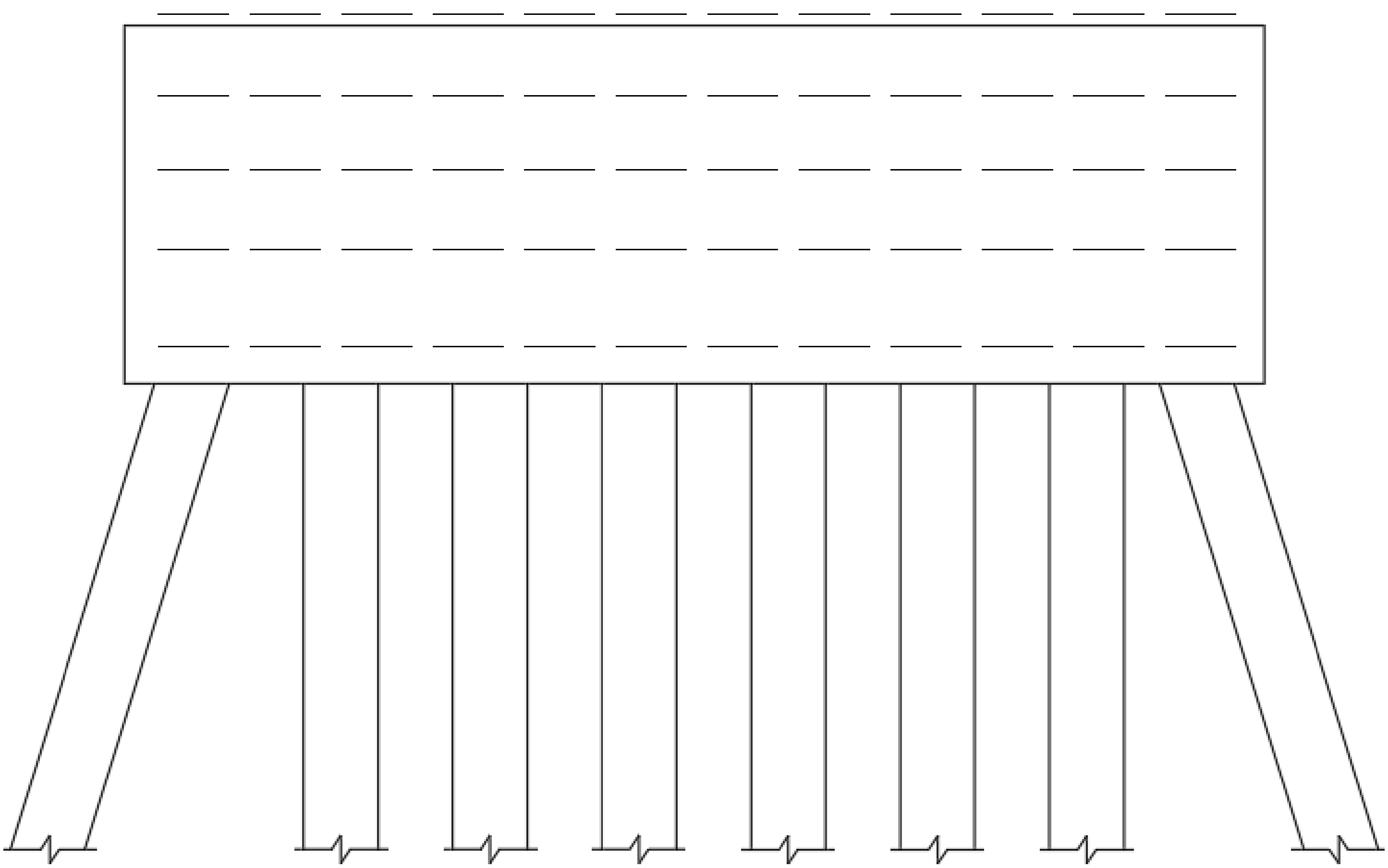
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of bent caps. **Pile condition shall be recorded on Attachment 5.18.** Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

Eight Pile Bent

BENT NUMBER: ________

BENT ELEVATION (LOOKING ________)

Place abbreviation in approximate deficiency area or sketch deficiency by hand or in PDF editor over the lines.



See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = _________________________ _____ = _________________________ _____ = _________________________

_____ = _________________________ _____ = _________________________ _____ = _________________________

Notes:

Page _____ of _____

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Bent Cap and Bearing Sketch Sheet

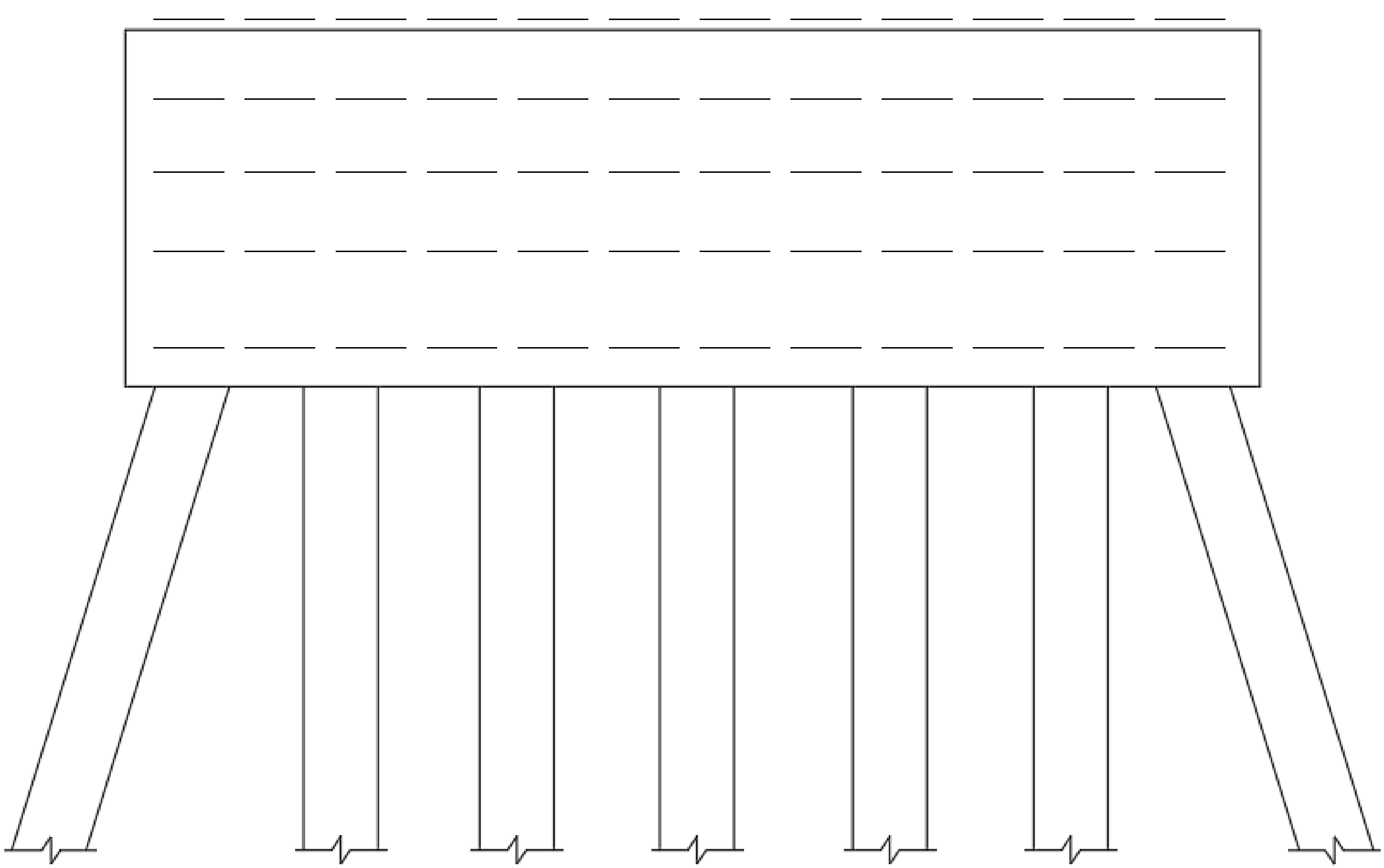
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of bent caps. **Pile condition shall be recorded on Attachment 5.18.** Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

Seven Pile Bent

BENT NUMBER: ________

BENT ELEVATION (LOOKING ________)

Place abbreviation in approximate deficiency area or sketch deficiency by hand or in PDF editor over the lines.



See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = __________________________ _____ = __________________________ _____ = __________________________
_____ = __________________________ _____ = __________________________ _____ = __________________________

Notes:

Page _____ of _____

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Bent Cap and Bearing Sketch Sheet

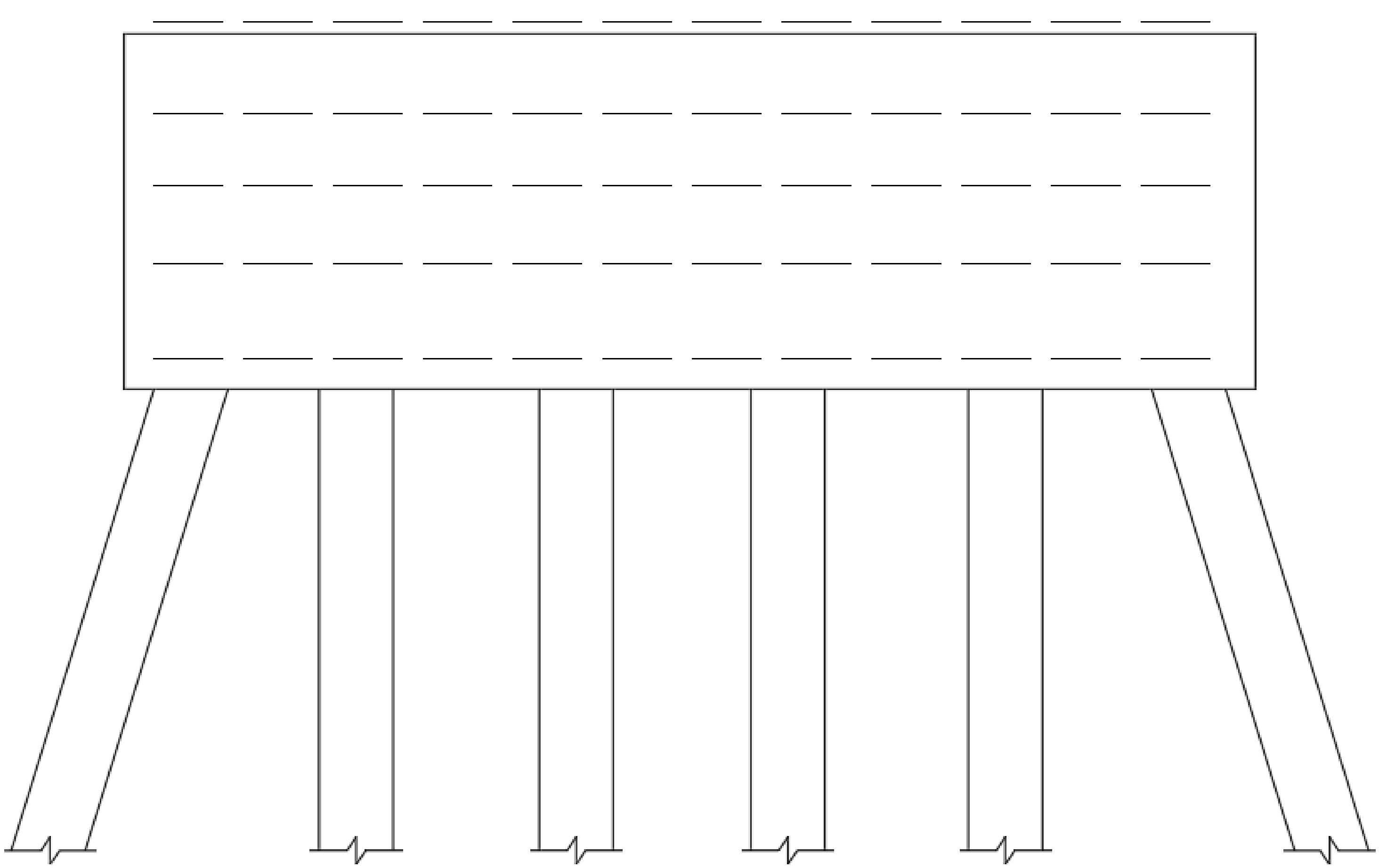
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of bent caps. **Pile condition shall be recorded on Attachment 5.18.** Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

Six Pile Bent

BENT NUMBER: ________

BENT ELEVATION (LOOKING ________)

Place abbreviation in approximate deficiency area or sketch deficiency by hand or in PDF editor over the lines.



See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = __________________________ _____ = __________________________ _____ = __________________________

_____ = __________________________ _____ = __________________________ _____ = __________________________

Notes:

Page _____ of _____

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Bent Cap and Bearing Sketch Sheet

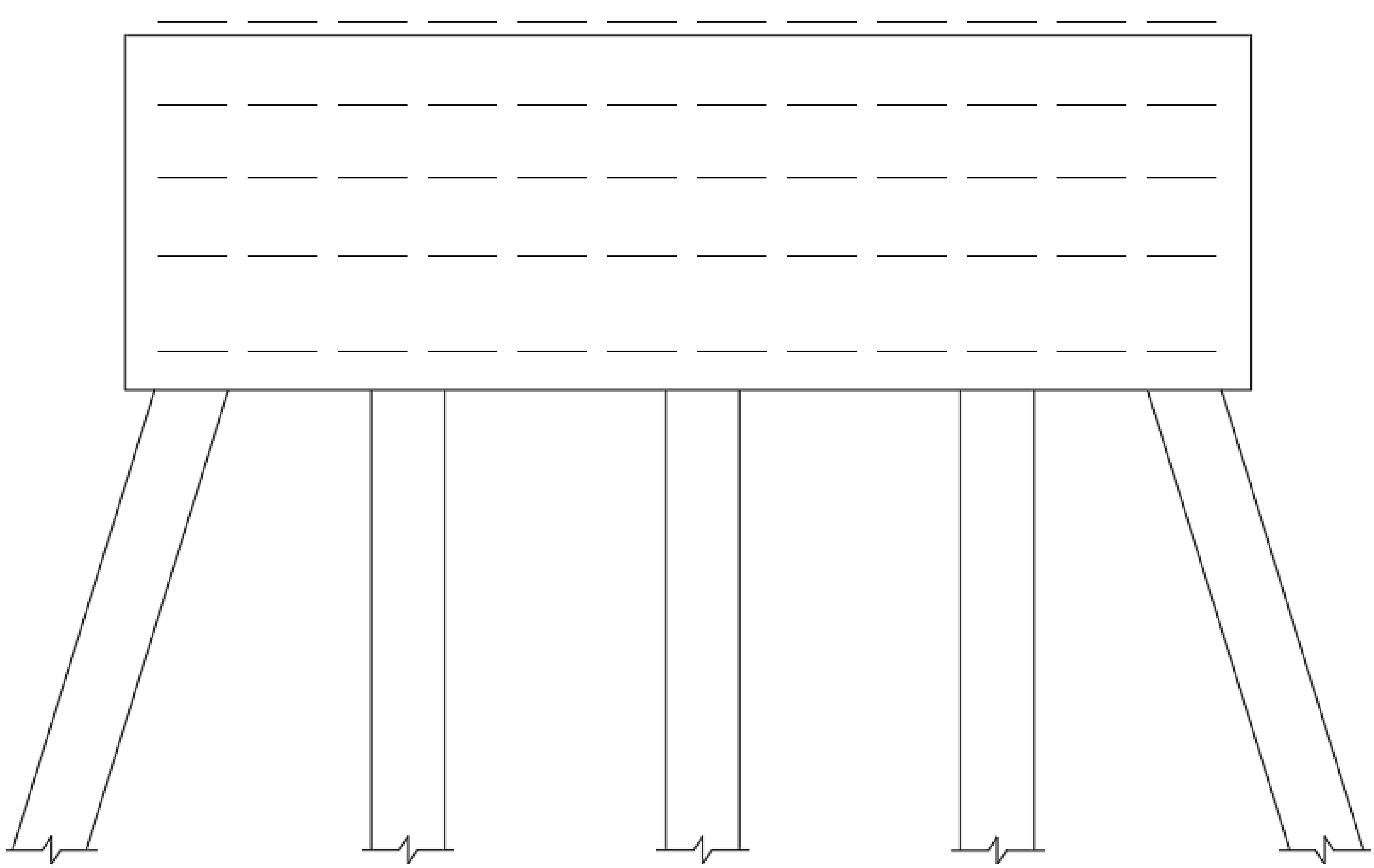
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of bent caps. **Pile condition shall be recorded on Attachment 5.18.** Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

Five Pile Bent

BENT NUMBER: ________

BENT ELEVATION (LOOKING ________)

Place abbreviation in approximate deficiency area or sketch deficiency by hand or in PDF editor over the lines.



See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = _________________________ _____ = _________________________ _____ = _________________________

_____ = _________________________ _____ = _________________________ _____ = _________________________

Notes:

Page _____ of _____

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Bent Cap and Bearing Sketch Sheet

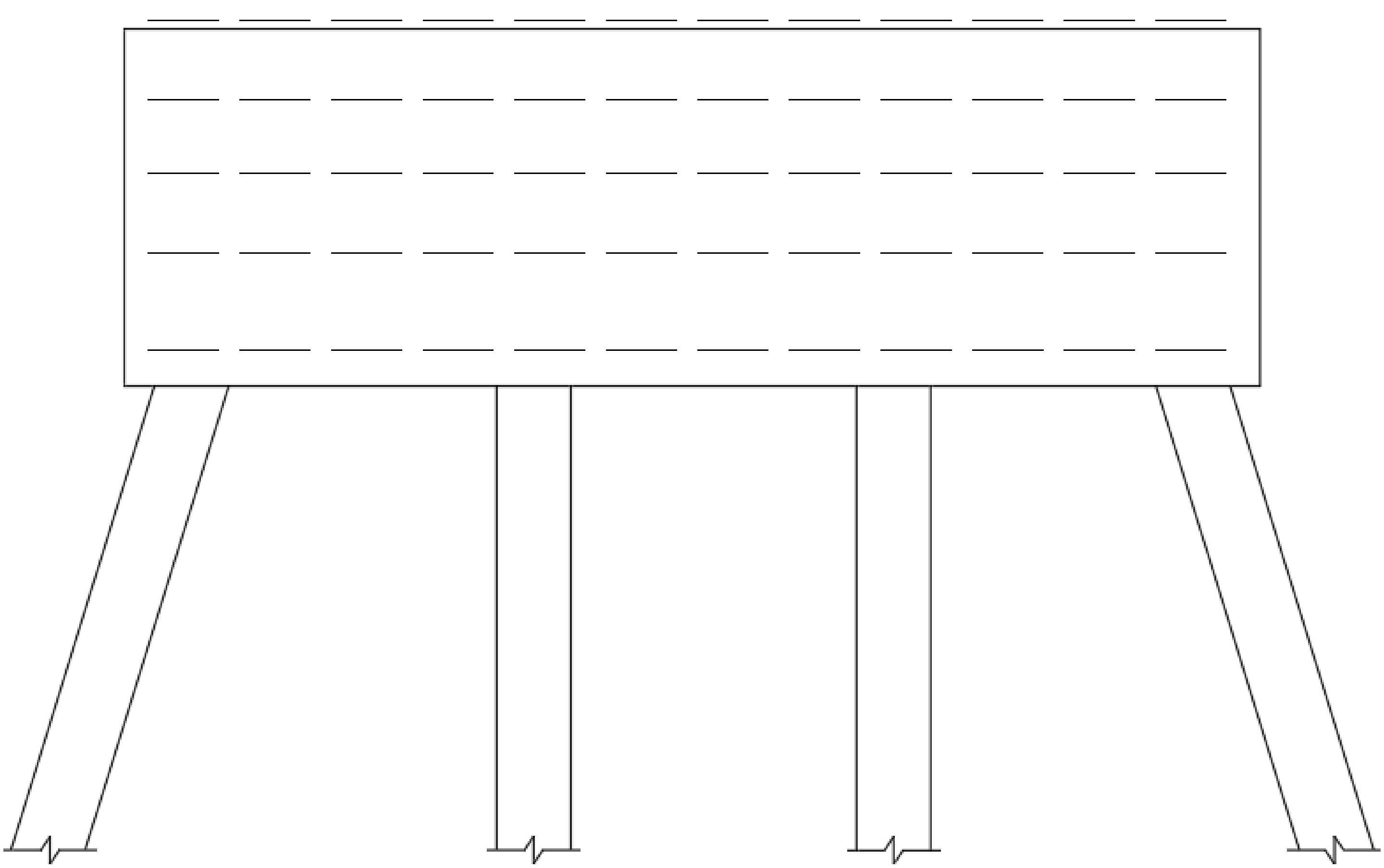
Asset ID (08):	Sketch Instructions: This sketch sheet is used to aid inspectors in recording the condition of bent caps. **Pile condition shall be recorded on Attachment 5.18.** Components shall be identified as shown in the labeling diagram. Limits of observed conditions may also be illustrated and dimensioned on the sketches below. See abbreviations below. Use additional pages if additional components are present and need a sketch.

Four Pile Bent

BENT NUMBER: ________

BENT ELEVATION (LOOKING ________)

Place abbreviation in approximate deficiency area or sketch deficiency by hand or in PDF editor over the lines.



See Appendix P for Common Inspection Abbreviations and Shorthand, add Additional Abbreviations (if needed):

_____ = __________________________ _____ = __________________________ _____ = __________________________

_____ = __________________________ _____ = __________________________ _____ = __________________________

Notes:

Page _____ of _____

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ATTACHMENT 5.18

Appendix/Attachment Title

Pile Section Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The sketch sheet is used on bridges with bents supported by exposed pile elements. The purpose of this sketch sheet is to document the condition of the inspected piles based on the approximate remaining section of the pile. A pile that is spliced shall be noted as such on the sketch sheet. A pile that has a stud-up shall be noted as such on the sketch sheet.

Appendix/Attachment Description

The inspector shall label bents and piles as per the labeling diagram. The pile material shall be noted along with the percentage of pile section remaining. Previous inspection measurements shall be transferred to the current inspection sheet to document any change in pile section between inspections. The condition of piles should also be documented.

Pile Section Sketch Sheet

Asset ID (08):	Were decayed or deteriorated piles marked in field by the bridge inspector? -	Page ____ of ____

Sketch Instructions: *This sketch sheet is used to aid inspectors in recording the remaining pile section and condition of piles during the inspection of the substructure. The bents and piles shall be identified as shown in the labeling diagram. Pile material, condition and an estimated percentage of pile section should be recorded. Note any access restrictions to the bents. If pile is spliced or has a stud-up, indicate so. See abbreviations in Appendix P. Use additional pages if needed.*

If full length of pile is decayed, inspector shall note controlling percentage remaining.

PILE DIAMETER:	6”	7”	8”	9”	10”	11”	12”	13”	14”
PILE AREA (SQ IN):	28	38	50	64	79	95	113	133	154

BENT #	PILE #						
______	**PILE NUMBER:**						
	Pile Material:	-	-	-	-	-	-
	Spliced or Stud-up?	-	-	-	-	-	-
	Prev. Pile % Rem:						
	Pile % Remain:						
	Pile % Loss:						
	Additional Pile Condition Notes:						
	Other Notes for Bent:						
______	**PILE NUMBER:**						
	Pile Material:	-	-	-	-	-	-
	Spliced or Stud-up?	-	-	-	-	-	-
	Prev. Pile % Rem:						
	Pile % Remain:						
	Pile % Loss:						
	Additional Pile Condition Notes:						
	Other Notes for Bent:						
______	**PILE NUMBER:**						
	Pile Material:	-	-	-	-	-	-
	Spliced or Stud-up?	-	-	-	-	-	-
	Prev. Pile % Rem:						
	Pile % Remain:						
	Pile % Loss:						
	Additional Pile Condition Notes:						
	Other Notes for Bent:						
______	**PILE NUMBER:**						
	Pile Material:	-	-	-	-	-	-
	Spliced or Stud-up?	-	-	-	-	-	-
	Prev. Pile % Rem:						
	Pile % Remain:						
	Pile % Loss:						
	Additional Pile Condition Notes:						
	Other Notes Bent:						
______	**PILE NUMBER:**						
	Pile Material:	-	-	-	-	-	-
	Spliced or Stud-up?	-	-	-	-	-	-
	Prev. Pile % Rem:						
	Pile % Remain:						
	Pile % Loss:						
	Additional Pile Condition Notes:						
	Other Notes for Bent:						

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ATTACHMENT 5.19

Appendix/Attachment Title

Textual Data – Written Description Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The SCDOT Bridge Report Inspection Form (BIRF) has various textual fields called the Bridge Element Group Textual Data (BEGTD) that are available for input. However, the form may restrict the number of characters allowed for input.

In the event the inspector needs additional space for his/her inspection report, this overflow form shall be used; the inspector shall write "*See attached form for textural data.*" in the SCDOT BEGTD when the overflow form is used to contain all written documentation.

To simplify reporting, the inspector shall not use both the textural data in the inspection form and the overflow form. Several forms may be used if one form is not enough.

Appendix/Attachment Description

The forms, when completed, can be both uploaded to BIO and attached to the compiled inspection report in PDF format. The dropdown in the title section contains all of the fields from the BEGTD. Inspectors may also enter their own title.

Textual Data – Written Description Form

ASSET ID NUMBER (NBI 08):	INSPECTION DATE:	BITL:
TITLE: -		

Page ____ of _____

Complete Form | Undo | Save | Print

ATTACHMENT 5.20

Appendix/Attachment Title

Photograph Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

All photographs used in the inspection report require a caption. Since the BIO does not allow captions to be added and the amount of files may slow down the application, this form may be used to display all photographs from an inspection with their captions. The captions for all photographs shall include a description of the photograph and the date the photograph was taken.

The caption field for each photograph shall include specific words so photos of unique circumstances can be found in future queries. These key words do not have to be used in any specific order or consecutively. Common key words which may be used to find photographs of a particular issue are shown in Figure 1, see attached page. Captions can be as long as needed. Sample captions are included for reference only. The inspector may enter in his or her own custom caption.

Appendix/Attachment Description

Additional pages may be added to include more photographs. One completed PDF with photos may be uploaded to the BIO.

This form is also used by consultant inspectors to provide photographs of repair recommendations to district bridge inspection prior to report submittal according to the process outlined in Section 8.7.1.1.2 and using Attachment 5.6. The form with only photographs of repair recommendations is uploaded to the Bridge File but is not submitted in the inspection report.

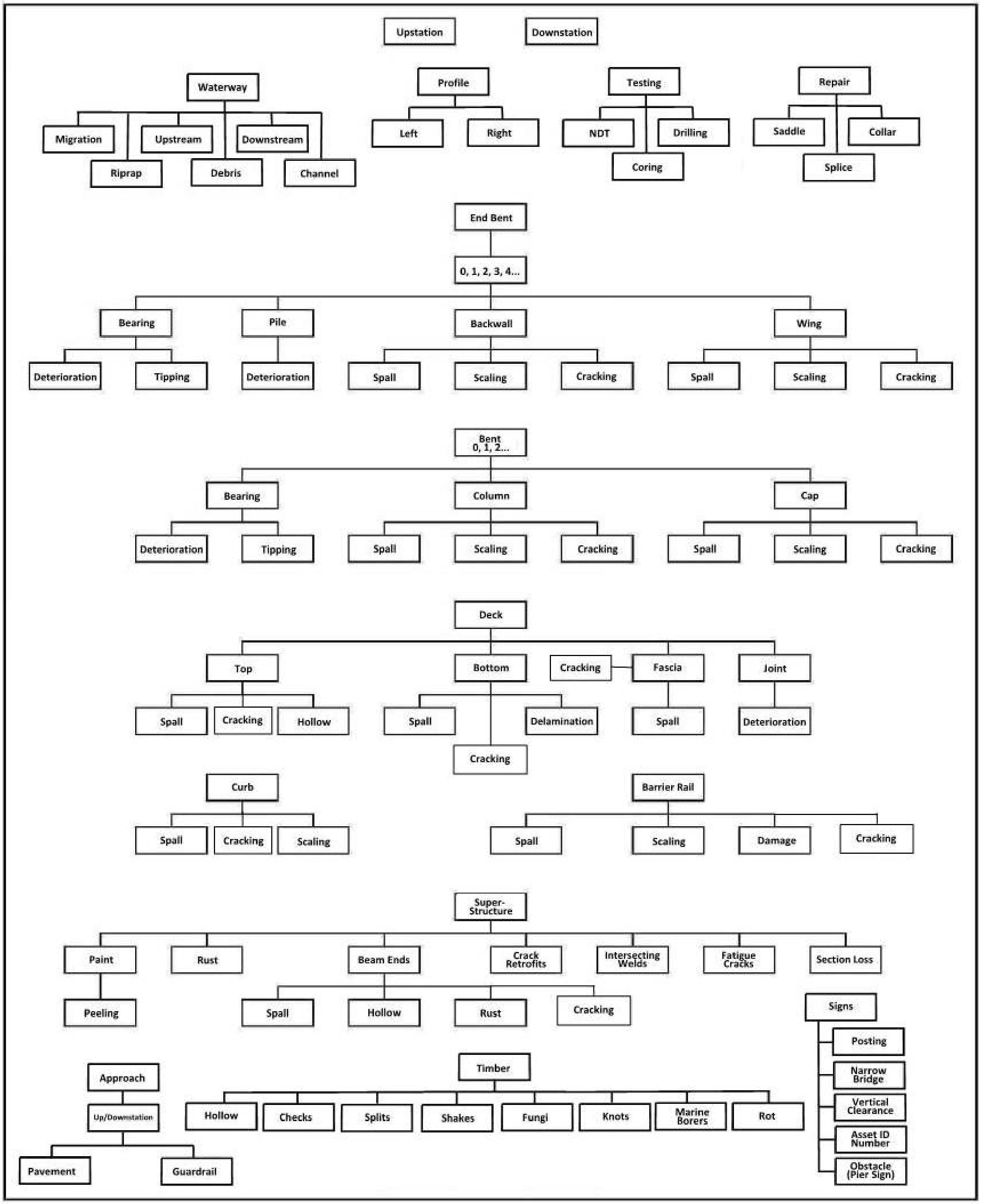


Figure 2: Common Photo Caption Key Words

Photograph Form

Asset ID Number:	Click here to enter text.	Bridge Inspection Date:	Click here to enter text.

#	Choose an item or enter a caption.	#	Choose an item or enter a caption.
#	Choose an item or enter a caption.	#	Choose an item or enter a caption.
#	Choose an item or enter a caption.	#	Choose an item or enter a caption.

Save This Document

PDF This Form

Add Page (Works on Pg 1 Only)

Page # of Page #

Consultant: For Repair Rec.? ☐

ATTACHMENT 5.21

Appendix/Attachment Title

Culvert Profile Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this sketch sheet is to document conditions of culverts during inspection.

Recording the profile during inspections can track the movement of the channel/ground below the culvert and is helpful in identifying scour conditions. The measurements (or drops) for the culvert may be from the bottom of the culvert up or from the top of the culvert down. The method of measurement and the orientation (or datum) of measurement must be selected on the sketch sheet.

Additional culvert measurements shall be taken during the inspection such as blockage (percentage), hydraulic opening, culvert "superstructure" height. Culvert length (headwall to headwall) shall be reported as NBI Item 52. Diagrams on these sketch sheets are for box culverts but can be used for arch culverts. Use maximum hydraulic height and diameter for opening dimensions.

Appendix/Attachment Description

All culverts shall be documented using the Culvert Profile Sketch Sheet as stated in Chapter 6.

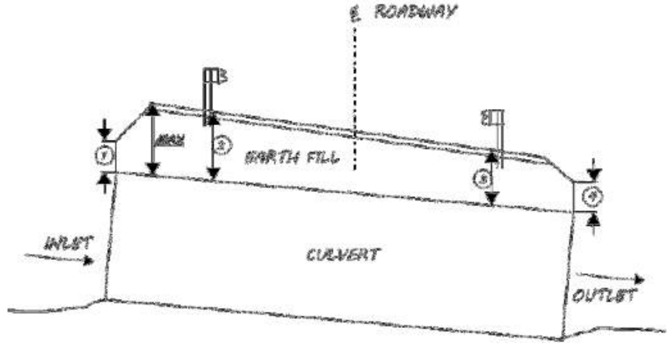
The Culvert Profile Sketch Sheet shall note measurements during the current inspection and also the measurements at the same location from the previous inspection of the structure.

The fill depth at different locations along the length of a culvert must be measured for all culvert types during initial inspections and confirmed during all other inspections. This information is needed for both live and dead load calculations used for the load rating. The fill depths shall be documented on the Culvert Profile Sketch Sheet. The following shall have a fill depth on the Culvert Profile Sketch Sheet. The numbers correlate to the numbers used on the figure below.

In addition, the maximum fill shall be noted on the Culvert Profile Sketch Sheet. Maximum fill may be the same measurement as one of the four measurements noted above. See Section 6.1.5 regarding when estimating fill is acceptable.

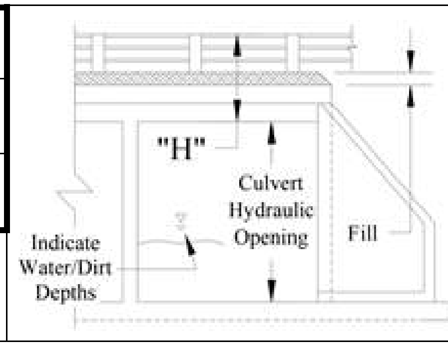
The figure below shows a culvert and the location of the fill measurements which are to be measured or confirmed during inspection. The fill on arch culverts should be taken from the top of culvert at crown upwards.

All methods of measurement shall be consistent from inspection to inspection. Atypical methods of measurement shall be noted as a BSIP and noted using Attachment 5.4.



1. Culvert Inlet
2. Edge of Roadway on Inlet Side of Roadway
3. Edge of Roadway on Outlet Side of Roadway
4. Culvert Outlet

Culvert Profile Sketch Sheet – One Barrel (1)

Asset ID (08):	**Debris/Raft/Dam Max. Blockage of Flow** (*Use Clearance Diagrams below for buildup of sediment)*	
Time (*Tidal Only)*:	Max. Percentage Horizontal Blockage of a Barrel _____ @ Barrel # **1** or No Blockage: ☐	
If **No Water Flow**, check: ☐	Max. Percentage Vertical Blockage of a Barrel: _____ @ Barrel # **1** or No Blockage: ☐	
Culvert Hydraulic Opening: *Use Maximum Culvert Dimensions* Horz: ______ Vert: ______	**Culvert "H": Measured** from: - ___________ ___________ to: - ___________	

INLET

Barrel # **1**

Water Depth: _____
Dirt Depth: _____

Previous Inspection:
Water Depth: _____
Dirt Depth: _____

OUTLET

Barrel # **1**

Water Depth: _____
Dirt Depth: _____

Previous Inspection:
Water Depth: _____
Dirt Depth: _____

Measurements for Clearance Diagrams to Water/Dirt Depths

from - __________ of - __________ to Dirt/Water Line

Culvert Length *(Headwall to Headwall)*

Confirm length has been recorded as NBI Item 52: ☐

Culvert Undermining

(Top View, Sketch *(by hand)* Areas of Undermining/Scour

Inlet

Barrel #: _____

Outlet

Method of Undermining/Scour Determination: - ________________

Culvert Fill

Measured from **Soffit/Top of Headwall** to **Ground Line**
(Completing each of the five fill locations is not required)
See Section 6.1.5 when estimating fill is acceptable.

Fill at Outlet ______________

Roadway Edge (Outlet Side) ______________

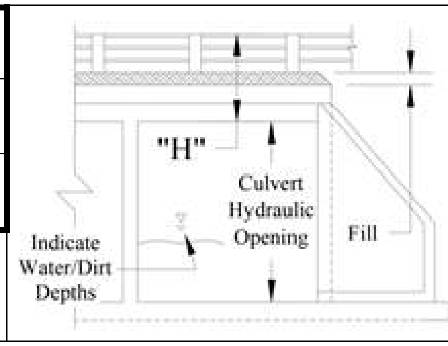
Roadway Edge (Inlet Side) ______________

Fill at Inlet ______________

Maximum Fill ______________

Complete Form | Undo | Save | Print

Culvert Profile Sketch Sheet – Two Barrels (2)

Asset ID (08):	**Debris/Raft/Dam Max. Blockage of Flow** (*Use Clearance Diagrams below for buildup of sediment*)	
Time (*Tidal Only*):	Max. Percentage Horizontal Blockage of a Barrel ______ @ Barrel # - _____ or No Blockage: ☐	
If **No Water Flow**, check: ☐	Max. Percentage Vertical Blockage of a Barrel: ______ @ Barrel # - _____ or No Blockage: ☐	
Culvert Hydraulic Opening: *Use Maximum Culvert Dimensions* Horz: ______ Vert: ______	**Culvert "H": Measured** from: - ____________ ____________ to: - ____________	

INLET

Barrel # -	Barrel # -
Water Depth: _____	Water Depth: _____
Dirt Depth: _____	Dirt Depth: _____
Previous Inspection:	*Previous Inspection:*
Water Depth: _____	Water Depth: _____
Dirt Depth: _____	Dirt Depth: _____

OUTLET

Barrel # -_____	Barrel # -_____
Water Depth: _____	Water Depth: _____
Dirt Depth: _____	Dirt Depth: _____
Previous Inspection:	*Previous Inspection:*
Water Depth: _____	Water Depth: _____
Dirt Depth: _____	Dirt Depth: _____

Measurements for Clearance Diagrams to Water/Dirt Depths

from - __________ of - __________ to Dirt/Water Line

Culvert Length *(Headwall to Headwall)*

Confirm length has been recorded as NBI Item 52: ☐

Culvert Undermining

(Top View, Sketch *(by hand)* Areas of Undermining/Scour

Inlet

Barrel #: - _____	Barrel #: - _____

Outlet

Method of Undermining/Scour Determination: - ________________

Culvert Fill

Measured from **Soffit/Top of Headwall** to **Ground Line**
(Completing each of the five fill locations is not required)
See Section 6.1.5 when estimating fill is acceptable.

Fill at Outlet _______________

Roadway Edge (Outlet Side) _______________

Roadway Edge (Inlet Side) _______________

Fill at Inlet _______________

Maximum Fill _______________

Complete Form | Undo | Save | Print

Culvert Profile Sketch Sheet – Three Barrels (3)

Asset ID (08):

Time (*Tidal Only*):

If **No Water Flow**, check: ☐

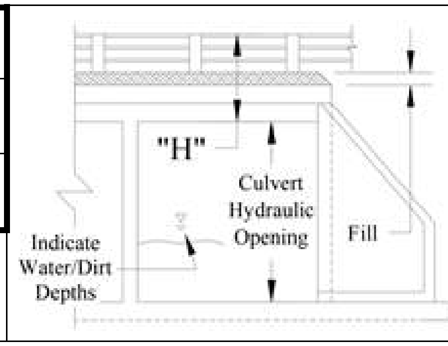
Debris/Raft/Dam Max. Blockage of Flow
(*Use Clearance Diagrams below for buildup of sediment*)

Max. Percentage Horizontal Blockage of a Barrel
______ @ Barrel # - _____ or No Blockage: ☐

Max. Percentage Vertical Blockage of a Barrel:
______ @ Barrel # - _____ or No Blockage: ☐

Culvert Hydraulic Opening:
Use Maximum Culvert Dimensions
Horz: ______ Vert: ______

Culvert "H": Measured from: - ____________
____________ to: - ____________



INLET

Barrel # - _____	Barrel # - _____	Barrel # - _____
Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____

OUTLET

Barrel # - _____	Barrel # - _____	Barrel # - _____
Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____

Measurements for Clearance Diagrams to Water/Dirt Depths

from - __________ of - __________ to Dirt/Water Line

Culvert Length *(Headwall to Headwall)*

Confirm length has been recorded as NBI Item 52: ☐

Culvert Undermining
(Top View, Sketch *(by hand)* Areas of Undermining/Scour

Inlet

Barrel #: - _____	Barrel #: - _____	Barrel #: - _____

Outlet

Method of Undermining/Scour Determination: -

Culvert Fill

Measured from **Soffit/Top of Headwall** to **Ground Line**
(Completing each of the five fill locations is not required)
See Section 6.1.5 when estimating fill is acceptable.

Fill at Outlet ______________

Roadway Edge (Outlet Side) ______________

Roadway Edge (Inlet Side) ______________

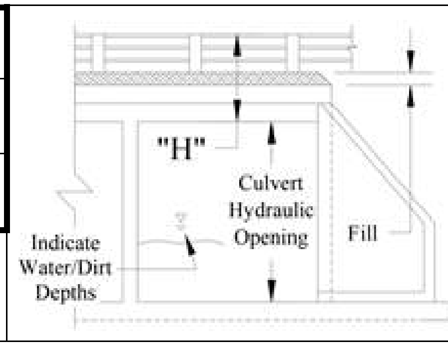
Fill at Inlet ______________

Maximum Fill ______________

Complete Form | Undo | Save | Print

Culvert Profile Sketch Sheet – Four Barrels (4)

Asset ID (08):	**Debris/Raft/Dam Max. Blockage of Flow** *(Use Clearance Diagrams below for buildup of sediment)*	
Time (*Tidal Only*):	Max. Percentage Horizontal Blockage of a Barrel _____ @ Barrel # -_____ or No Blockage: ☐	
If **No Water Flow**, check: ☐	Max. Percentage Vertical Blockage of a Barrel: _____ @ Barrel # -_____ or No Blockage: ☐	
Culvert Hydraulic Opening: *Use Maximum Culvert Dimensions* Horz: ______ Vert: ______	**Culvert "H": Measured** from: -__________ __________ to: -__________	



INLET

Barrel # -_____	Barrel # -_____	Barrel # -_____	Barrel # -_____
Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____

OUTLET

Barrel # -_____	Barrel # -_____	Barrel # -_____	Barrel # -_____
Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____	Water Depth: _____ Dirt Depth: _____ *Previous Inspection:* Water Depth: _____ Dirt Depth: _____

Measurements for Clearance Diagrams to Water/Dirt Depths

from -__________ of -__________ to Dirt/Water Line

Culvert Length *(Headwall to Headwall)*

Confirm length has been recorded as NBI Item 52: ☐

Culvert Undermining

(Top View, Sketch *(by hand)* Areas of Undermining/Scour

Inlet

Barrel #: -_____	Barrel #: -_____	Barrel #: -_____	Barrel #: -_____

Outlet

Method of Undermining/Scour Determination: -________________

Culvert Fill

Measured from **Soffit/Top of Headwall** to **Ground Line**
(Completing each of the five fill locations is not required)
See Section 6.1.5 when estimating fill is acceptable.

Fill at Outlet ______________

Roadway Edge (Outlet Side) ______________

Roadway Edge (Inlet Side) ______________

Fill at Inlet ______________

Maximum Fill ______________

Complete Form | Undo | Save | Print

Culvert Profile Sketch Sheet – Five or More Barrels (5+)

Asset ID (08):

Time (*Tidal Only*):

If **No Water Flow**, check: ☐

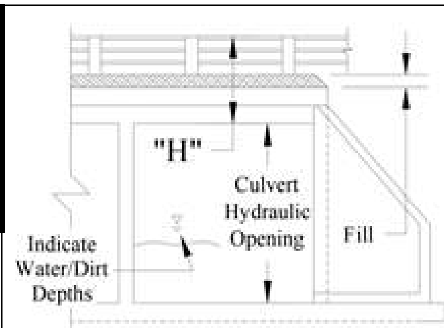
Culvert Hydraulic Opening:
Use Maximum Culvert Dimensions
Horz: ______ Vert: ______

Debris/Raft/Dam Max. Blockage of Flow
(*Use Clearance Diagrams below for buildup of sediment*)

Max. Percentage Horizontal Blockage of a Barrel
______ @ Barrel # _____ or No Blockage: ☐

Max. Percentage Vertical Blockage of a Barrel:
______ @ Barrel # _____ or No Blockage: ☐

Culvert "H": Measured from: - ___________
___________ to: - ___________



INLET

Barrel # _____	Barrel # _____	Barrel # _____	Barrel # _____	Barrel # _____
Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____

OUTLET

Barrel # _____	Barrel # _____	Barrel # _____	Barrel # _____	Barrel # _____
Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____	Water Depth: ____ Dirt Depth: _____ *Previous Inspection:* Water Depth: ____ Dirt Depth: _____

Measurements for Clearance Diagrams to Water/Dirt Depths

from - __________ of - __________ to Dirt/Water Line

Culvert Length *(Headwall to Headwall)*

Confirm length has been recorded as NBI Item 52: ☐

Culvert Undermining
(Top View, Sketch *(by hand)* Areas of Undermining/Scour

Inlet

Barrel #: _____	Barrel #: _____	Barrel #: _____	Barrel #: _____	Barrel #: _____

Outlet

Method of Undermining/Scour Determination: -

Culvert Fill

Measured from **Soffit/Top of Headwall** to **Ground Line**
(Completing each of the five fill locations is not required)
See Section 6.1.5 when estimating fill is acceptable.

Fill at Outlet ______________

Roadway Edge (Outlet Side) ______________

Roadway Edge (Inlet Side) ______________

Fill at Inlet ______________

Maximum Fill ______________

>5 Barrels? # Barrels Total: _____ Page ___ of ___

Duplicate Page | Complete Form | Undo | Save | Print

ATTACHMENT 5.22

Appendix/Attachment Title

Bridge Joint Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Proper function or condition of deck joints is reported by preparing a bridge plan view sketch along with a table to summarize the joint opening or condition. The joint opening is the distance available for bridge movement, and this value shall change with temperature changes. The air temperature shall be documented, and the joint opening shall be measured in three locations (2 feet from the left and right gutter lines and at the bridge centerline). The condition of the joint can also be recorded.

The table (Table 1) below indicates the typical application for several types of expansion joints used by SCDOT as stated in the SCDOT BDM. This table also provides the maximum joint opening of these typical joints. The most widespread joints used on SCDOT bridges are compression seals and strip seals. Standard drawings of each of these widespread joints are included below as noted on SCDOT standard bridge details.

Table 1: Typical Expansion Joints

Joint Type	Typical Maximum Joint Opening (inches)	Usage
Compression Seal	3½	Common joint, preferred joint where bridge skew is ≤ 30°, see Figure 2.
Strip Seal	4	Common joint where compression seals are not applicable, see Figure 3.
Open Finger Plate	> 4	Where large movements are anticipated
Modular Expansion	> 4	Where large movements are anticipated and the drainage requirements of finger joints are undesirable or if skew and curvature are larger than the requirements of finger joints
Asphaltic Plug	< 2	Used on bridge rehabilitation projects only
Silicone Rubber Sealant	< 2	Cored Slab Bridges and Sleeper Slabs

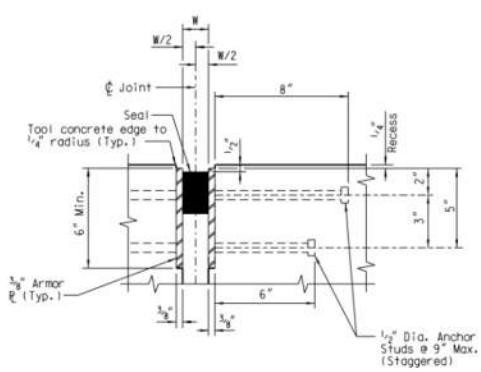


Figure 1: Typical Compression Seal Joint

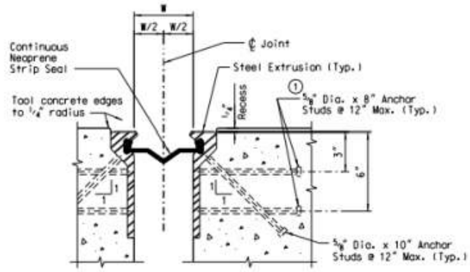


Figure 2: Typical Strip Seal Joint

Appendix/Attachment Description

The Bridge Joint Sketch Sheet should be completed as determined by the BITL on bridges with expansion joints. Given traffic condition, an inspector may measure joint openings only at the gutterline or edge of roadway or just in the middle of bridge. Measurements at each location are NOT required.

SCDOT

Bridge Joint Sketch Sheet

ASSET ID NUMBER:	BITL	TEMPERATURE	DATE	PAGE
Only include joints at the bents where the condition needs to be reported. *This same form can be used year after year. Include the BITL, temperature when measured and the year to the right. Update information each year for the joints below. Add joint as needed.* *Add additional pages as needed.*				

BENT NUMBER	JOINT OPENING AT:			JOINT TYPE	JOINT CONDTION *(LEAKAGE, DEBRIS, TORN, ETC.)*	ADDITIONAL REMARKS
	LEFT GUTTER	CENTERLINE	RIGHT GUTTER			

Duplicate Page | Complete Form | Undo | Save | Print

PAGE: _____ OF _____

ATTACHMENT 5.23

Appendix/Attachment Title

AASHTO Element Table Worksheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose for this table is to use in conjunction with the *AASHTO MBEI*. As inspectors examine each element of a structure, they can use this table to help quantify and rate its conditions respectively.

This worksheet is optional and not required for use.

Appendix/Attachment Description

The inspector may define the elements and quantify by type, length, defects and conditions.

AASHTO Element Table Worksheet

ASSET ID (NBI 08):	INSPECTION DATE:	BITL:

Element #	Description	Quantity	Units	CS1	CS2	CS3	CS4

Complete Form | Undo | Save | Print

Page ____ of ____

ATTACHMENT 5.24

Appendix/Attachment Title

Closed Bridge Re-opening Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The process of opening a closed bridge shall involve:

- SCDOT HQ BMO
- DME (or district maintenance staff)
- BITL (SCDOT or consultant); including DBIS

This process involves multiple approvals. The attached form should be used to document this process to confirm actions have been completed before a bridge is reopened.

Appendix/Attachment Description

A BITL shall update NBI Item 41 after this form is complete. District maintenance should open the bridge after this form is complete. NBI Item 41 shall NOT be changed until this form is complete and placed in the Bridge File.

Closed Bridge Re-opening Form

REQUIRED STRUCTURE INFORMATION		
ASSET ID NUMBER (08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):

Only after this form has been completed will a Bridge Inspection Team Leader (BITL) change the status of the bridge in the SCDOT Bridge Management System (BMS) and district maintenance remove bridge closure signs. The completed form shall be placed in the Bridge File.

Repairs and Repair Plans (*if needed/if produced*)

- ☐ Repair Plans have been produced ☐ N/A
- ☐ As-Built Repair Plans have been produced ☐ N/A
- ☐ Repair Plans have been reviewed, signed and sealed by a South Carolina P.E. ☐ N/A
- ☐ Repair Plans have been provided to the BMO to upload to the SCDOT Plan Library ☐ N/A
- ☐ Suggested repairs have been completed ☐ N/A

Bridge Rating *(if applicable)*

- ☐ The structure has been rated in accordance w/ *SCDOT Load Rating Guidance Document (LRGD)* ☐ N/A
- ☐ Maintenance staff has installed load posting and weight restriction signs (if applicable) ☐ N/A

Bridge Inspection

- ☐ The structure has been inspected in accordance with the *Bridge Inspection Guidance Document (BIGD)* ☐ N/A
- ☐ The bridge inspection report has been written and provided to the SCDOT BMO ☐ N/A

Verification Signatures (All Three Required)

Bridge Inspection Team Leader (BITL): ______________________________ (Print Name)

Signed: ____ Date: _______________

District Maintenance Engineer (DME): ______________________________ (Print Name)

Signed: ____ Date: _______________

Bridge Inspection Program Manager (BIPM) (or designee): ______________________________ (Print Name)

Signed: ____ Date: _______________

Bridge Opening Approval

Check Box: ☐

Has NBI Item 41 been updated? ☐ BITL Initials: ______

Remarks/Comments:

ATTACHMENT 5.25

Appendix/Attachment Title

Bridge Inspection Quality Control Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The bridge inspection report and all related items are to be routed by the BITL to the QCR for review. The QCR shall complete the Bridge Inspection Quality Control Form as required by Chapter 9.

Appendix/Attachment Description

The Bridge Inspection Quality Control Form shall be completed for every bridge inspection report.

Two forms are included, one for SCDOT performed inspections and one for consultant performed inspections.

Bridge Inspection QC Form (SCDOT Inspection)

REQUIRED STRUCTURE AND INSPECTION INFORMATION	
ASSET ID (08):	TEAM LEADER:
INSPECTION TEAM MEMBERS:	INSPECTION TYPE: -
QUALITY CONTROL REVIEWER (QCR): (DBIS or other BITL) (Print Name):	

INSPECTION REPORT	1) ☐ **SI&A:** Reviewed Report Form SI&A Data (specifically ratings for NBI 58, 59, 60, 62, 71, 72	
	2) ☐ **Textual:** Reviewed the textual sections of the report for consistency and errors	
	3) ☐ **Element-Level:** Element Condition States/Defects reviewed and are consistent with NBI Items	
	4) ☐ **Photographs:** Reviewed photographs included in report, all included per BIGD 5.4.4.2	
	5) ☐ **Previous Inspection Report:** Reviewed against previous inspection, if there is no previous: N/A:	☐
	6) ☐ **Sketch Sheets/Attachments:** Required items are included (BIGD 5.4.4.2) & reviewed, or if N/A:	☐
	7) ☐ **Condition Rating (58, 59, 60 or 62) 5 or Less:** A photograph or attachment is included, or if N/A:	☐
OTHER	8) ☐ **HMMS:** Needed maintenance logged in HMMS AND HMMS output attached to report, or if N/A:	☐
	9) ☐ **Critical Finding(s):** If critical finding found, the Critical Findings Form was submitted, or if N/A:	☐
	10) ☐ **Requests to BMO (HQ):** Load Rating and/or Scour Re-Evaluation Request(s) sent, or if N/A:	☐
	11) ☐ **Posting:** Need for load posting / weight restriction signs were coded as "Priority A Flag" - if N/A:	☐
	12) ☐ **Signs:** Need for height clearance or narrow bridge signs were coded as "Priority A Flag" - if N/A:	☐

Initial Inspection Only: ☐ QCR has reviewed initial element quantities for Element-Level
Initial Inspection Only: ☐ QCR has reviewed inventory photos, correctly stored in Bridge File
FCM Inspection Only: ☐ Correct documentation was included, BSIP followed, required access gained
Complex Bridge Only: ☐ BSIP followed

QC Review Comments: *(use another page if additional comments)*

1	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
2	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
3	QC Subject: - QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
4	QC Subject: - QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐

QC Review Complete

Signed and Dated by QC Reviewer: ______ (Upload to BIO)

Complete Form | Undo | Save | Print

SCDOT

Bridge Inspection QC Form (Consultant Inspection)

REQUIRED STRUCTURE AND INSPECTION INFORMATION	
ASSET ID (08):	TEAM LEADER:
INSPECTION TEAM MEMBERS:	INSPECTION TYPE: -
CONSULTANT NAME:	
QUALITY CONTROL REVIEWER (QCR): (Print Name):	

INSPECTION REPORT	1) ☐ **SI&A:** Reviewed Report Form SI&A Data (specifically ratings for NBI 58, 59, 60, 62, 71, 72	
	2) ☐ **Textual:** Reviewed the textual sections of the report for consistency and errors	
	3) ☐ **Element-Level:** Element Condition States/Defects reviewed and are consistent with NBI Items	
	4) ☐ **Photographs:** Reviewed photographs included in report, all included per BIGD 5.4.4.2	
	5) ☐ **Previous Inspection Report:** Reviewed against previous inspection, if there is no previous: N/A:	☐
	6) ☐ **Sketch Sheets/Attachments:** Required items are included (BIGD 5.4.4.2) & reviewed, or if N/A:	☐
	7) ☐ **Condition Rating (58, 59, 60 or 62) 5 or Less:** A photograph or attachment is included, or if N/A:	☐
OTHER	8) ☐ **Repair Recommendations:** Repair Recommendation Form completed and sent to DBIS, or if N/A:	☐
	9) ☐ **Critical Finding(s):** If critical finding found, the Critical Findings Form was submitted, or if N/A:	☐
	10) ☐ **Requests to BMO (HQ):** Load Rating and/or Scour Re-Evaluation Request(s) sent, or if N/A:	☐
	11) ☐ **Posting:** Need for load posting / weight restriction signs were coded as "Priority A Flag" - if N/A:	☐
	12) ☐ **Signs:** Need for height clearance or narrow bridge signs were coded as "Priority A Flag" - if N/A:	☐

Initial Inspection Only: ☐ QCR has reviewed initial element quantities for Element-Level
Initial Inspection Only: ☐ QCR has reviewed inventory photos, correctly stored in Bridge File
FCM Inspection Only: ☐ Correct documentation was included, BSIP followed, required access gained
UW Inspection Only: ☐ Correct documentation was included, BSIP followed, required access gained
Complex Bridge Only: ☐ BSIP followed

QC Review Comments: *(use another page if additional comments)*

1	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
2	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
3	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐
4	QC Subject: - ______ QC Comment: ______ BITL Response to Comment: ______ QC Comment Closed? ☐

QC Review Complete

Signed and Dated by QC Reviewer: ______ **(Upload to BIO)**

Complete Form | Undo | Save | Print

ATTACHMENT 5.26

Appendix/Attachment Title

Blank Inspection Sketch Sheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The purpose of this blank sketch sheet is to document the conditions observed during any inspection.

Appendix/Attachment Description

Various standard sketch sheets are included in the BIGD. This sketch sheet shall be used if no other standard sketch sheets are applicable.

Hand sketches may be drawn or written descriptions may be used.

Blank Inspection Sketch Sheet

REQUIRED INFORMATION		
ASSET ID NUMBER: (NBI 08)	INSPECTION DATE:	PAGE OF

Duplicate Page | Complete Form | Undo | Save | Print

ATTACHMENT 5.27

Appendix/Attachment Title

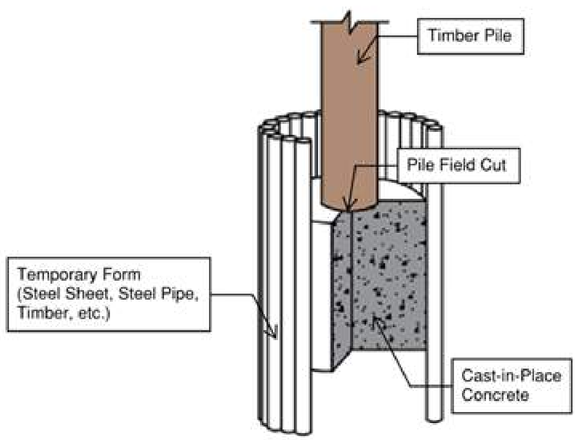
Pile Stud-Up Planning Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Pile Stud-Up Planning Form is required for use by **some** district maintenance offices. A pile stud-up is a common repair technique for severely deteriorated timber piles which are field cut from a deterioration point downwards. The pile is then surrounded with formwork and concrete is placed in the area of the removed pile. See the figure schematic below.



The stud-up repair on a pile is not the same as a pile splice repair.

Appendix/Attachment Description

This form requires the inspector to provide field information to the maintenance crews for the repair to be performed. Without this important information, an additional trip to the bridge is required.

Consultants recommending a stud-up repair on a pile shall inquire to the DBIS if this Form is required by district or county maintenance where the bridge is located. **If required, the form shall be emailed to the DBIS along with the Repair Recommendations Form (Attachment 5.6).** This form does not need to be included in the report but a summary of the stud-up repair shall be included in Attachment 5.6 as the stud-up repair shall be placed in HMMS for maintenance.

SCDOT inspectors recommending a stud-up repair will coordinate as needed with their maintenance staff.

The use of this form is only required if requested by the DBIS or by SCDOT maintenance staff.

SCDOT

Pile Stud-Up Planning Form

Bridge Data *Complete at all times with bridge data.*

Asset ID (NBI 08):		Facility Carried (NBI 07):		Inspection Date:	01/01/1900
District # (NBI 02):	-	Feature Intersected (NBI 06):		Consultant:	
County (NBI 03):	-	Bridge Owner (NBI 22):	-	Consultant BITL:	

Indicate Bent(s) of Recommended Repair(s):

Indicate Piles(s) of Recommended Repair(s); were the piles marked (tape, paint, etc.) in the field?

Are the Stud-Ups, Pile Splices or Other Pile Repairs already on piles at the bent(s) where repair is recommended?

Indicate Approximate Water Level:

Indicate Length of Pile to be CUT from Mudline:

Is there cross bracing on the bent where repair is needed?

Indicate Length of Pile to REMAIN from Pile Top:

Is a float or access boat needed?

Indicate Approximate Form Height Needed:

Is Traffic Control needed for repair?

Indicate Form Type:

Summary of the Work

Pile Stud-Up Planning Transmittal

1. This transmittal section shall be used to transmit the Pile Stud-Up Planning Form to the DBIS.
2. Prior to the submittal of this form, the form should be reviewed by the reporting party.
3. The reporting party shall electronically sign below using the reporting party signature line prior to submitting.
4. The reporting party shall submit the signed form using the "Transmit Planning Form to DBIS" button.

ELECTRONIC SIGNATURE (Reporting Party):

Transmit Planning Form to DBIS:

Transmit

DBIS Confirmation of Receipt

1. This Section shall be used to confirm the receipt of the Pile Stud-Up Planning Form from the DBIS.
2. The DBIS shall electronically sign below using the DBIS signature line after receiving this document.

ELECTRONIC SIGNATURE (DBIS):

ATTACHMENT 5.28

Appendix/Attachment Title

Bridge-Specific Inspection Procedure Template

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Detailed bridge-specific inspection procedures (BSIPs) may require additional documentation outside of the limits of Attachment 5.4. If this is the case, this template may be used to develop the BSIP. When complete, the BSIP shall be saved to the Bridge File according to the BFP.

If this template is used, the Attachment 5.4 form must also be completed, and the link to the template shall be placed on the space on Attachment 5.4 for the ProjectWise link to the BSIP.

Appendix/Attachment Description

This template is a guide, but it is recommended for use across South Carolina to maintain a uniform practice of documenting BSIPs. At the time of release of the Bridge Inspection Guidance Document, Attachment 5.28 is still under development.

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ATTACHMENT 5.28 IS CURRENTLY UNDER DEVELOPMENT

ATTACHMENT 9.1

Appendix/Attachment Title

Inspection Team Qualification Tracking Log

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The inspection team qualification tracking log is used to track the experience and training for bridge inspection personnel. At a minimum, this log must be updated annually by the DBIS or consultant project manager. The form serves as a way for the DBIS or consultant project manager to maintain and log inspector qualification information for the following:

- Years and Types of Experience
- Training Completed
- Certifications and Registration

For SCDOT inspection staff, this log must be updated by the DBIS. The log must be submitted by the DBIS to the BMO (including the BIPM and BMQE) annually.

For consultant inspection staff, this log must be updated as more inspections are performed with new personnel throughout the contract. The consultant inspection program manager shall submit the log to the BMO (including the BIPM and BMQE) annually.

All certifications and registrations shall be sent to the SCDOT BMO at HQ annually.

Appendix/Attachment Description

The attachment is available as an electronic spreadsheet.

Enter Name for Each Person in District / at Consultant	**Full Name** Last, First Middle												
Background Information	**SCDOT District or Consultant**												
	Professional Engineer *Indicate State and PE Number*												
	First Year of Bridge Inspection Experience												
	Total Number of Years of Inspection Experience *(As January of Current Year)*												
	Total Number of Years of SCDOT Inspection Experience *(As January of Current Year)*												
Active NHI or FHWA Classes	**Year of Most Recent Bridge Inspection Course**												
	NHI Course No. 130055 Safety Inspection of In-Service Bridges (Two Week Class) *Enter Year Most Recent Course*												
	NHI Course No. 130053 Bridge Inspection Refresher Training (3 Day Class) *Enter Year Most Recent Course*												
	NHI Course No. 130078 Fracture Critical Inspection Techniques Training for Steel Bridges *Enter Year Most Recent Course*												
	NHI Course No. 130087 Inspection and Maintenance of Ancillary Highway Structures *Enter Year Most Recent Course*												
	NHI Course No. 130091 Underwater Bridge Inspection *Enter Year Most Recent Course*												
	NHI Course No. 135047 Stream Stability & Scour at Bridges *Enter Year Most Recent Course*												
	FHWA Introduction to Element-Level Bridge Inspection *Enter Year Most Recent Course*												
Former NHI or FHWA Classes	**FHWA/NHI Economical & Fatigue Resistant Steel Bridges Details** *Enter Year of Course*												
	FHWA/NHI Welding Inspection for Steel Bridges Fabrication *Enter Year of Course*												
	FHWA/NHI Culvert Inspection Training *Enter Year of Course*												
	FHWA/NHI Bridge Management Training Inspection Session *Enter Year of Course*												
Nondestructive Testing (NDT)	**PT Liquid Penetrant Testing** *Enter Year Completed & Expiration (if one)*												
	American Society of Nondestructive Testing (ASNT) *Indicate Level for PT*												
	MT Magnetic Particle Testing *Enter Year Completed & Expiration (if one)*												
	American Society of Nondestructive Testing (ASNT) *Indicate Level for MT*												
	UT Ultrasonic Testing *Enter Year Completed & Expiration (if one)*												
	American Society of Nondestructive Testing (ASNT) *Indicate Level for UT*												
	RT Radiographic Testing *Enter Year Completed & Expiration (if one)*												
	American Society of Nondestructive Testing (ASNT) *Indicate Level for RT*												
Other	**Permit-Required Confined Space Training** *Indicate Year and Level of Training*												
	Association of Diving Contractors International (ADCI) Certification *Indicate Year and Level of Training*												
	Society of Professional Rope Access Technicians (SPRAT) Training *Indicate Year and Level of Training*												
	OSHA 10-Hour *Enter Year of Course*												
	Mobile Elevating Work Platforms (MEWP) Training *Enter Year of Course, Training and Level*												
	Railroad Safety and/or Security Training *Enter Year of Training*												
	First Aid Training *Enter Year of Course*												
	CPR Training *Enter Year of Course*												

Use Additional Sheets for Additional Comments (Registration, Notes, Certifications, Training, etc.)

ATTACHMENT 9.2

Appendix/Attachment Title

Field Review Quality Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

During a field review, which is outlined in Section 9.2.2.2, the DBIS shall complete the Field Review Quality Form. This quality form is meant to assist the DBIS in the field review, but is not all-inclusive. Additional information should be attached to this document and combined, if needed. The completed Field Review Quality Form shall then be released within 30 days from the date of the field review to the district staff, BIPM and BMQE for review.

This form, at a minimum, shall also be used by the BMQE to review the field operations of the consultant BITLs as outlined in Section 9.2.3.3.

Appendix/Attachment Description

The Field Review Quality Form shall be completed at least twice per year for each SCDOT BITL. The completed Field Review Quality Form shall be released by the DBIS to the BITL being reviewed, the BIPM and BMQE. This form shall be released within 30 days from the date of the field review.

Field Review Quality Form

DISTRICT (NBI 02): -______ DATE OF INSPECTION:______________________TIME:__________

ASSET ID (NBI 08):____

BITL: ____

TEAM MEMBER(S):____

TYPE OF INSPECTION: -____

BRIDGE LOCATION (NBI 09): ____

FACILITY CARRIED (NBI 07): ____

FEATURE INTERSECTED (NBI 06): ____

1. Did the team arrive at the bridge in a timely manner? ☐ Yes ☐ No

Comments: ____

2. Rate the degree to which the team sets-up to inspect the bridge:

☐ Satisfactory ☐ Needs Improvement ☐ Unsatisfactory

Comments: ____

3. Rate the degree to which the team is properly equipped for the inspection:

☐ Satisfactory ☐ Needs Improvement ☐ Unsatisfactory

Comments: ____

4. Rate the degree to which team members observe safety rules and wear proper safety equipment:

☐ Satisfactory ☐ Needs Improvement ☐ Unsatisfactory

Comments: ____

5. Rate the degree to which the Bridge Inspection Team Leader (BITL) performed the on-site safety briefing:

☐ Satisfactory ☐ Needs Improvement ☐ Unsatisfactory

Comments: ____

Field Review Quality Form

6. What method of access was used for the inspection (Ladder, Boat, UBIU, etc.)?

____

7. Was this access method appropriate? ☐ Yes ☐ No

Comments: ____

8. Rate whether the inspection was sufficiently thorough enough to serve its desired purpose:

☐ Satisfactory ☐ Needs Improvement ☐ Unsatisfactory

Comments: ____

9. Additional comments:

____

____

____

☐ Check Box if any responses above were "Unsatisfactory"

DBIS (BMQE or other BITL) (the reviewer) (**Required**): _______________________

Signature: _______________________ Date: _______________

BITL Acknowledgement of Receipt (**Required**)

Signature: _______________________ Date: _______________

BMQE (or designee) Acknowledgement of Receipt (**Required**)

Signature: _______________________ Date: _______________

ATTACHMENT 9.3

Appendix/Attachment Title

Independent Inspection Check Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The Independent Inspection Check consists of a formal re-inspection by the DBIS of a randomly selected bridge that was previously inspected by another BITL.

The work of each BITL shall be reviewed twice per year, each review occurring at a different bridge from the previous, and is then compared to the actual field conditions. All discrepancies are discussed with all inspection staff working in a district, and the BITL shall be notified of the results of the independent inspection. Changes, revisions or updates to previously completed bridge inspection reports shall be performed in accordance with the provisions in Chapter 5.

The DBIS shall complete the Independent Inspection Check Form which is available in this attachment, and additional information should be attached to this document and combined if needed. The completed Independent Inspection Check Form shall be released to the BITL, the BIPM and the BMQE within 30 days of the independent inspection for review.

Conditions may change on a bridge between the time of the subject inspection and the independent inspection. For this reason, the DBIS is encouraged to complete the independent inspection around 30 to 60 days following a bridge inspection. An example of something which may change are signs posted at the bridge site, a sign may have been removed or vandalized following the subject inspection, the QC Reviewer is to use discretion in these situations regarding points assigned for applicable sections.

Appendix/Attachment Description

The Independent Inspection Check Form shall be completed at least twice per year, each review occurring at a different bridge from the previous, for each BITL.

In the event the DBIS is serving as a BITL, another DBIS from another district will perform the field quality check. In the event that another SCDOT district is required to assist with this independent inspection, the DBIS from the district needing QC shall coordinate directly with another SCDOT district. The inspector performing the Independent Inspection Check is responsible for coordinating this second inspection including inspection scheduling, coordination and access.

The completed Independent Inspection Check Form shall be released by the DBIS to the BITL, the BIPM and BMQE. This form shall be released within 30 days from the date of the field check.

SCDOT

Independent Inspection Check Form

REQUIRED STRUCTURE INFORMATION		
ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
SUBJECT INSPECTION DATE:	SUBJECT BITL:	
INSPECTION TEAM MEMBERS:		
SUBJECT INSPECTION TYPE: -		
DBIS (QC Reviewer) (Print Name):		

Part 1 - General Information Review

Review each question below and record the score in the applicable cell. At the conclusion of the independent inspection, add up the total score. Record the score below.

	Review Category	Yes	No	N/A	Possible Score	Score
1	**Structure Types:** Are Main Structure Type (NBI 43A) and Approach Structure Type (NBI 44A) correct?	☐	☐	☐	0 or 10 pts	
2	**Railings:** Is the selected coding of Bridge Rail (NBI 36A), Transitions (NBI 36B), Approach Guardrail (NBI 36C) and Approach End Guardrail (NBI 36C) acceptable?	☐	☐	☐	0 or 10 pts	
3	**Weight Restriction**: Load limit (NBI 66) bridge posting is in place (NBI 70); if not, is it recommended with HMMS "A Flag" or has the Load Rating Request Form been completed? (*Sign may have been removed following inspection, QC Reviewer to use discretion*)	☐	☐	☐	0 or 10 pts	
4	**Scour Critical**: Is the NBI 113 (Scour Critical) code acceptable; if not has the Item 113 - Re-evaluation Form been completed?	☐	☐	☐	0 or 10 pts	
5	**Narrow Bridge/One-Lane Bridge**: According to NBI Items (51, 28A, 102 and 41), "Narrow Bridge" or "One-Lane Bridge" signs are posted; if not, is it recommended with HMMS "A Flag"? (*Sign may have been removed following inspection, QC Reviewer to use discretion*)	☐	☐	☐	0 or 10 pts	
6	**Inspection Team Qualifications**: According to NBIS and the SCDOT BIGD, the inspection team had the proper qualifications.	☐	☐	☐	0 or 20 pts	
7	**Deficit Reporting (Critical Findings and/or HMMS Documentation/Input)**: Critical Findings (if found) were properly reported using notification procedures and follow-up procedures required by SCDOT. Required maintenance and repair items are properly documented and they address specific issues such as deterioration.	☐	☐	☐	0 or 10 pts	
					TOTAL =	0
					TOTAL POSSIBLE SCORE =	***80***
					70% OF TOTAL POSSIBLE SCORE (ACCEPTABLE SCORE) =	***56***
					ACCEPTABLE?	☐

Independent Inspection Check Form

Part 2 - Measurement Review

The QC Reviewer is to inspect the bridge and provide his or her condition ratings below. The QC Reviewer should compare their own measurements to the measurements from the subject inspection and record the score in the applicable cell. At the conclusion of the independent inspection, add up the total score. Record the score below.

Review Category				*within 10% or 12 in. (whichever is greater)*			Possible Score	Score
Measurement		Subject Inspection	QC Check	Yes	No	N/A		
1	**NBI Item 48:** Span Length			☐	☐	☐	0 or 10 pts	
2	**NBI Item 50:** Structure Length			☐	☐	☐	0 or 10 pts	
3	**NBI Item 51:** Curb-to-Curb Roadway Width			☐	☐	☐	0 or 10 pts	
4	**NBI Item 52:** Deck Out-to-Out Width			☐	☐	☐	0 or 10 pts	
5	**NBI Item 53:** Vertical Clearance Above Deck			☐	☐	☐	0 or 10 pts	
6	**NBI Item 54B:** Underclearance (Right)			☐	☐	☐	0 or 10 pts	
7	**NBI Item 54C:** Underclearance (Left)			☐	☐	☐	0 or 10 pts	
8	**NBI Item 55:** Lateral Clearance			☐	☐	☐	0 or 5 pts	
							TOTAL =	
							TOTAL POSSIBLE SCORE =	*75*
							70% OF TOTAL POSSIBLE SCORE (ACCEPTABLE SCORE) =	*52*
							ACCEPTABLE SCORE?	☐

Part 3 – Condition and Appraisal Review

The QC Reviewer is to inspect the bridge and provide his or her condition ratings below. The QC Reviewer should compare their own ratings to the ratings from the subject inspection and record the score in the applicable cell. At the conclusion of the independent inspection, add up the total score. Record the score below.

Review Category				*within 1 ±*			Possible Score	Score
Measurement		Subject Inspection	QC Check	Yes	No	N/A		
1	**NBI Item 58:** Deck			☐	☐	☐	0 or 10 pts	
2	**NBI Item 59:** Superstructure			☐	☐	☐	0 or 10 pts	
3	**NBI Item 60:** Substructure			☐	☐	☐	0 or 10 pts	
4	**NBI Item 61:** Channel			☐	☐	☐	0 or 10 pts	
5	**NBI Item 62:** Culvert			☐	☐	☐	0 or 10 pts	
6	**NBI Item 71:** Waterway Adequacy			☐	☐	☐	0 or 10 pts	
7	**NBI Item 72:** Roadway Alignment			☐	☐	☐	0 or 5 pts	
							TOTAL =	
							TOTAL POSSIBLE SCORE =	*65*
							70% OF TOTAL POSSIBLE SCORE (ACCEPTABLE SCORE) =	*45*
							ACCEPTABLE SCORE?	☐

Part 4 – Additional Inspection Items

Review each question below and record the score in the applicable cell. At the conclusion of the independent inspection, add up the total score. Record the score below.

	Review Category	Yes	No	N/A	Possible Score	Score
1	**FCMs:** FCMs were identified and noted on the Fracture Critical Member Inspection Form.	☐	☐	☐	0 or 10 pts	
2	**Fatigue Details:** Fatigue-prone details were identified and noted in the inspection report.	☐	☐	☐	0 or 10 pts	
3	**Steel Section Loss**: Reported section loss was reasonable (within 10%) on steel members.	☐	☐	☐	0 or 10 pts	
4	**Concrete Deterioration**: Reported deterioration sizes were reasonable (within 10%) on concrete members.	☐	☐	☐	0 or 10 pts	
5	**Timber Deterioration**: Reported deterioration conditions were noted on timber members.	☐	☐	☐	0 or 10 pts	
6	**Cracking**: Cracking notes in the inspection report were reasonable for structural condition and structure type.	☐	☐	☐	0 or 10 pts	
					TOTAL =	
					TOTAL POSSIBLE SCORE =	***60***
					70% OF TOTAL POSSIBLE SCORE (ACCEPTABLE SCORE) =	***42***
					ACCEPTABLE SCORE?	☐

Part 5 – Element-Level Evaluation

The QC Reviewer is to review the inspection report for the elements used during the element-level evaluation of the structural members. The QC Reviewer should review the overall quantity provided for the element, the condition states assigned and any defect. The QC Reviewer should compare their own findings to the findings from the subject inspection and record the score in the applicable cell. At the conclusion of the independent inspection, add up the total score. Record the score below.

	Review Category			*within 10%* Yes	No	N/A	Possible Score	Score
1	**Deck/Slabs** **Element Number: _____ Element Name: ______________________________________**							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
2	**Superstructure** **Element Number: _____ Element Name: ______________________________________**							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	

Part 5 – Element-Level Evaluation (continued)

Review Category				within 10% Yes	within 10% No	within 10% N/A	Possible Score	Score
3	Substructure Element Number: _____ Element Name: ______							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
4	Culvert Element Number: _____ Element Name: ______							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
5	Other* 1: ______ Element Number: _____ Element Name: ______							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
6	Other* 2: ______ Element Number: _____ Element Name: ______							
	Overall Quantity	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 5 pts	
	Condition State 1	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 2	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 3	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
	Condition State 4	SUBJECT INSPECTION:	QC:	☐	☐	☐	0 or 3 pts	
							TOTAL =	
							TOTAL POSSIBLE SCORE =	*102*
							70% OF TOTAL POSSIBLE SCORE (ACCEPTABLE SCORE) =	*71*
							ACCEPTABLE SCORE?	☐

* The DBIS performing the QC review may select two other elements from the other element categories at his or her discretion. These other categories may include bearings, joints, approach slabs, bridge rails or wearing surface/protective systems. The selected element should be applicable to the bridge, if possible.

INDEPENDENT INSPECTION CHECK FORM

SCORING SHEET

Part 1 - General Information Review (Passing Score: 56), Reviewer's Score: ____

☐ Acceptable ☐ Unacceptable ☐ N/A

Part 2 - Measurement Review (Passing Score: 52), Reviewer's Score: ____

☐ Acceptable ☐ Unacceptable ☐ N/A

Part 3 - Condition & Appraisal Review (Passing Score: 45), Reviewer's Score: ____

☐ Acceptable ☐ Unacceptable ☐ N/A

Part 4 - Additional Inspection Items (Passing Score: 42), Reviewer's Score: ____

☐ Acceptable ☐ Unacceptable ☐ N/A

Part 5 - Element-Level Evaluation (Passing Score: 71), Reviewer's Score: ____

☐ Acceptable ☐ Unacceptable ☐ N/A

DBIS (the QC reviewer) (**Required**): ____________________________

Signature: ______________________________ Date: _______________

BITL Acknowledgement of Receipt (**Required**)

Signature: ______________________________ Date: _______________

SCDOT HQ Bridge Maintenance Office (BMO) Acknowledgement of Receipt (**Required**)

Signature: ______________________________ Date: ________________

ATTACHMENT 9.4

Appendix/Attachment Title

District Quality Meeting Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The DBIS shall conduct quarterly quality meetings (four per year) with the bridge inspection staff in each district. These meetings will be used to help ensure consistency in the bridge inspection program, provide training, and keep the staff updated on current inspection activities. These district quality meetings will recap ongoing QC efforts including field reviews, field QC checks, QC checking of bridge inspection reports and maintaining inspection equipment in their inventory.

During these quarterly staff meetings, the DBIS and the district inspectors will confirm they have all required bridge inspection equipment in their inventory.

Consultants are not required to complete Attachment 9.4. Consultants shall indicate their process for discussing QC efforts and for maintaining equipment in their QC Plan; see BIGD Section 9.2.3.1.2.2.

Appendix/Attachment Description

A meeting sign-in sheet, a list of required topics and the checklist of required equipment are included in this form. This form shall be released by the DBIS or consultant PMs to the BIPM and BMQE within 30 calendar days from the meeting.

SCDOT

District Quality Meeting Form

SCDOT District: ____ SCDOT DBIS: ____________________Date of Quality Meeting: _______________

Attendees:

Topics (indicate if topic was discussed or not)	Discussed	Not Discussed
Bridge Inspection Safety (**Required for discussion**)		
Personnel Training		
Bridge Inspection Procedures (Site Specific)		
Bridge Inspection Reporting and Documentation		
Quality Control		
Field Quality Review Forms (**Required for discussion**)		
Independent Inspections (**Required for discussion**)		
QC Checking of Bridge Inspection Reports (**Required for discussion**)		
Additional Topic:		
Additional Topic:		

Standard Inspection Equipment Checklist

General Access	**Y/N**	**Inspection**	**Y/N**	**Measuring**	**Y/N**
Hip Wader		Camera		6-Foot Rule Ruler	
Chest Wader		Hammer		Probing Rod	
Brush Hook – Sickle		Scraper		Level	
Extension Ladder		Flashlight/Headlamp		100-Foot Tape	
Machete		Wire Brush		Thermometer	
Magnifying Glass		Binoculars		Length Measuring Wheel	
		Inspection Mirror		Plumb Bob/Protractor	
		Shovel		Vertical Clearance Device	
		Screwdriver		Crack Gauge	
		Drill, Sealant and Caulk		Calipers	
		Sounding Chain		D-Meter	
		Incremental Borer		Sonar Depth Finder/Fathometer	
		Probing Rod		Compass	
Note Taking	**Y/N**	**Personal Protection**	**Y/N**	**Miscellaneous**	**Y/N**
Inspection Forms		Hard Hat		Drinking Water	
Extra Paper		High Visibility Vest		Sunblock	
Laptop/Tablet Computer		Safety Glasses / Goggles		Insect Repellent	
Field Binder		First Aid Kit		Knee Pads	
Clip Board		Safety Shoes/Boots		Extra Batteries	
Calculator		Work Gloves		Utility Belt or Tool Belt	
Writing Instruments:		Ear Protection		Utility Bag	
Keel		Dust Mask / Respirator		Eye Wash Bottle	
Sharpie / Paint Stick		Two Way Radio		Chargers	
Spray Paint		Harness/ Lanyard		Reference Manuals	
Plans / Labeling Diagrams		Life Jackets		Phone Numbers	

Additional Discussion/Comments:

DBIS Signature: ___________________________________ Date sent to BIPM & BMQE: _______________

Complete Form | Undo | Print | Save | Send to BMO

ATTACHMENT 9.5

Appendix/Attachment Title

Quality Control Tracking Spreadsheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

As described in Section 9.2.4, the DBIS in each district and consultant Program Managers shall complete the QC Tracking Spreadsheet to list initial, routine, special, underwater and fracture critical inspections completed in the queried month. Other inspection types do not have to be placed in the QC Tracking Spreadsheet.

A timeline for the inspection report submittal and quality reviews is included in the BIGD as Figures 9.2.4.1 and 9.2.4.2

Appendix/Attachment Description

Underwater inspections shall leave the columns for “Bridges with FCMs” and “Bridges with Complex Components” blank on the QC Tracking Spreadsheet. Fracture critical inspections shall leave the columns for “Scour Critical Bridges” blank on the QC Tracking Spreadsheet. Special inspections shall leave the columns blank which were not applicable to the subject of the special inspections on the QC Tracking Spreadsheet.

Based on the Asset ID Number, the remainder of selected SI&A data will populate the QC Tracking Spreadsheet from the database source spreadsheet. The data is current through the release date of the BIGD. Contact BMO for updates.

9.5_Quality Control Tracking Spreadsheet.xlsm

DBIS or Consultant PM:	SCDOT District Office or Consultant:	Month Year of Query:

1) Enter the name of the DBIS or consultant project manager, the name of the SCDOT district or consultant and the month-year for which this query is. The query is likely for a previous month and may not be the current month when submitted. Today's date will auto-populate.

2) Yellow Columns: Enter Asset ID (Column 2), NBI Condition from Most Recent Inspection (Columns 10a-10d), "Y" if there was a Critical Finding (Column 13), and Applicable Dates (Columns 14-16). Column 10 will automatically calculate.

3) Send Spreadsheet to BMQE once data from inspections from selected month is entered.

Today's Date: 8/23/2020

No.	Asset ID (NBI 08)	District (NBI 02)	County (NBI 03)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	Year Built (NBI 27)	Bridge w/ FCM? (NBI 92A)	Scour Critical (NBI 113)	(58, 59, 60, 62) Lowest NBI Condition	NBI Condition Deck (NBI 58)	NBI Condition Superstructure (NBI 59)	NBI Condition Substructure (NBI 60)	NBI Condition Culvert (NBI 62)	Bridge w/ Complex Comp.?	On NHS ? (NBI 104)	Critical Finding Flag?	Date of Inspection	Date of Bridge Inspection QC Form	Date Routed to SCDOT BMO

ATTACHMENT 9.6

Appendix/Attachment Title

Quality Assurance Tracking Spreadsheet

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

QA reviews shall be performed on a monthly basis for all bridge inspections submitted by SCDOT inspectors and consultants. A list of each inspection performed in the previous month will be sent to the BMQE by the DBIS or consultant PM. The separate lists will be combined by the BMQE using the attached QA Tracking Spreadsheet.

The QAR will place all pertinent data it into a master QA Tracking Spreadsheet to determine which bridges will be assigned for QA. The information will be filtered by various priority categories, which can be seen in Section 9.3.3 of the BIGD.

For each category, QA review shall be performed on 10% of the bridge inspection reports submitted the previous month, and the actual bridges selected shall be determined by a random number generator. If the input to the master QA Tracking Spreadsheet is not identical to the input of the QC Tracking Spreadsheet, the random number generator will not run.

A sample input page from the QA Tracking Spreadsheet is included in this attachment.

Appendix/Attachment Description

For the queried month, the QAR will use the SCDOT BMS and the QC Tracking Spreadsheets provided from the DBIS or consultant project manager to create one QA Tracking Spreadsheet.

Following the creation of a QA Tracking Spreadsheet of all bridges subject to QA, seven separate categories of bridges will be created by the automated spreadsheet attached and arranged according to the criteria in Section 9.3.3.

Once the seven separate spreadsheets are created, a random number generator will be used by the automated spreadsheet. This spreadsheet will determine which bridges are selected for QA.

If a bridge falls into more than one category and is randomly selected more than once, it will be replaced in the lowest-priority category. No less than one bridge shall be reviewed for each category if the sample lot for the category is less than 10 inspections (unless there are no bridges for the category during the specific month).

9.6_Quality Assurance Tracking Spreadsheet_V1.0.xlsm

No.	Asset ID (NBI 08)	District (NBI 02)	County (NBI 03)	Facility Carried (NBI 07)	Feature Crossed (NBI 06)	Year Built (NBI 27)	Bridge w/ FCM? (NBI 92A)	Scour Critical? (NBI 113)	(58, 59, 60, 62) Lowest NBI Condition	Bridge w/ Complex Comp.?	On NHS? (NBI 104)	Critical Finding Flag?	Date of Inspection	Date of Bridge Inspection QC Form	Date Routed to SCDOT BMO	Random Number for QA Selection	Bridge Selected for QA?	QA Review Performed

ATTACHMENT 9.7

Appendix/Attachment Title

Bridge Inspection Quality Assurance Form

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

The BMQE has primary responsibility for QA and shall oversee the QA initiative. QA shall be an independent function which is primarily executed by the BMQE. This BMQE, or designee, will serve as the QAR. The QAR reviewer shall complete the Bridge Inspection Quality Assurance Form for all selected bridges and save it per the BFP.

Appendix/Attachment Description

The Bridge Inspection Quality Assurance Form shall be completed for every sampled bridge. The process for sampling is documented in the BIGD Section 9.3.3. The procedure for consultant inspectors to perform quality assurance is described using the process outlined on the following page.

Consultant QA Process

Step 1 – Inspection consultant completes QC review.

Step 2 – Finalized inspection reports generated in BIO by inspection consultant. Do not use the ***"Routed for Peer QA"*** selection and leave the reports assigned to the BITL who performed the inspection.

Step 3 – Inspection consultant adds all bridges for month to A9.5 (QC Spreadsheet) and inspection consultant emails completed A9.5 to QA consultant w/ BMO cc'ed.

Step 4 – QA consultant inputs QC Spreadsheet(s) (A9.5) into QA Tracking Spreadsheet (A9.6).

Step 5 – QA consultant runs "randomizer" in A9.6 and notes the reports selected for QA review.

Step 6 – QA consultant performs QA review using Bridge Inspection QA Form (A9.7), using the Worklist function within BIO to access the reports and all necessary attachments. (The QA consultant will not enter the live BIO update screen at any time during the QA process.)

Step 7 – QA consultant will complete A9.7 (Bridge Inspection Quality Assurance Form) during the QA review. If outstanding comments remain, the form shall be unsigned. A9.7 shall be uploaded to BIO by the QA consultant using BIO's upload feature. The QA consultant will email copies of all A9.7 forms to the designated QCR for the inspection consultant.

Step 8 – The inspection consultant will review and address any comments provided by the QA consultant. Once comments are addressed, the inspection consultant will email the QA consultant with a response addressing all QA comments.

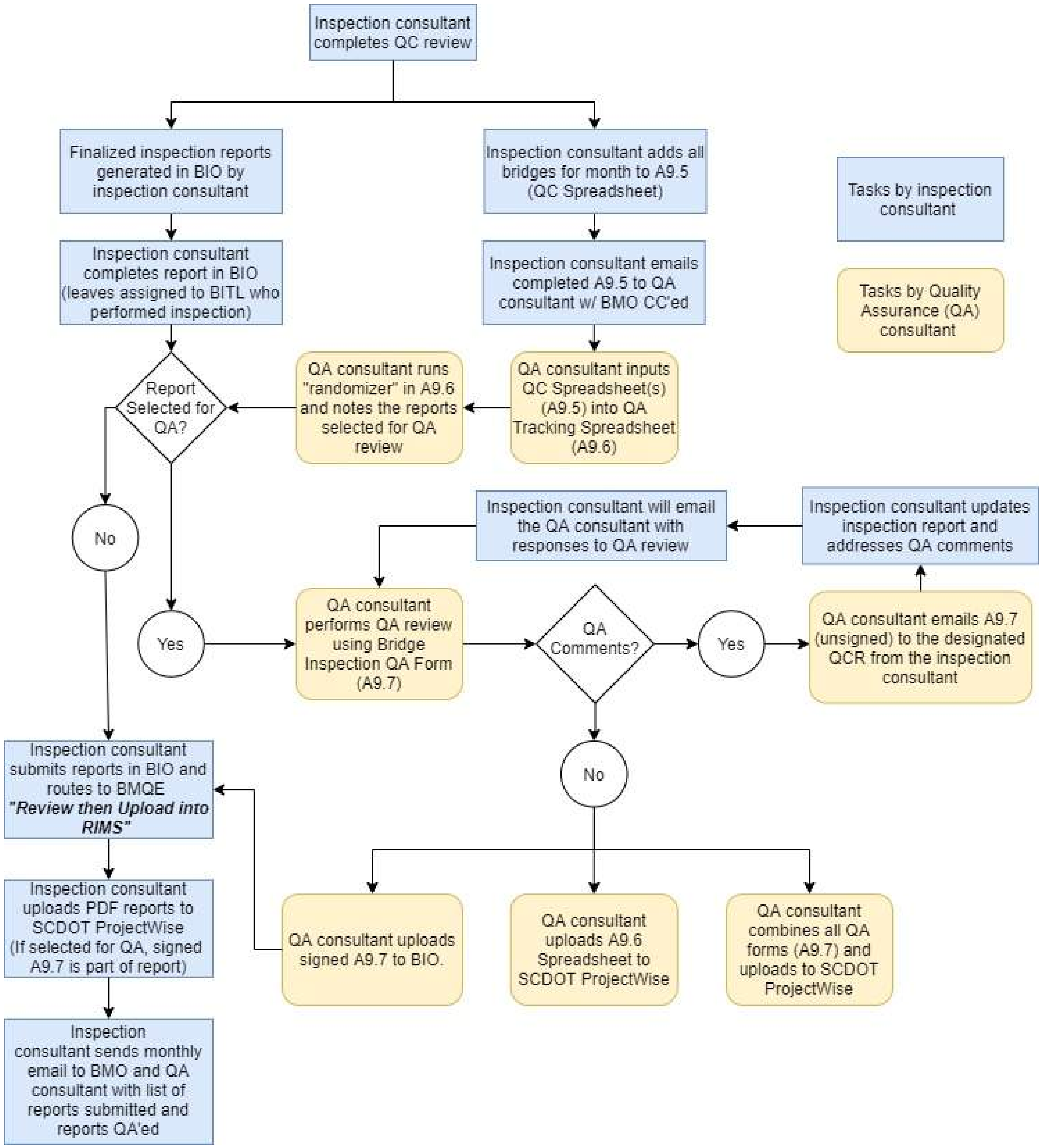
Step 9 – Upon resolution of comments, the QA consultant shall sign A9.7 and attach the signed form in BIO using BIO's upload feature.

Step 10 – The inspection consultant will submit all bridges inspected from the month for which the QA reviews have been completed, revised as needed with comments addressed, to Rodrick Tucker in headquarters. Bridges which were not selected for QA can also be submitted. Submittal includes routing in BIO and uploading PDFs into ProjectWise; in BIO, select for routing: ***"Review then Upload to RIMS"***.

Step 11 – Inspection consultant sends monthly email to BMO and QA consultant with summary of reports submitted and QA'ed.

Step 12 – The QA consultant shall upload the completed A9.6 (spreadsheet) noting QA has been performed to SCDOT ProjectWise. The QA consultant shall combine all signed QA Forms (A9.7) into one PDF and upload to SCDOT ProjectWise. These files shall be placed in the QA folder. For inspection consultants, enter "00" for "District". The freeform shall include the month of inspections subject to QA and the name of the inspection consultant. For example, if ABC Engineers' inspections from August were subject to QA in October, the following files would be uploaded to ProjectWise.

- 00-A9.6_InspecQATracker-Aug-ABC-2020-10-23.xlsx
- 00-A9.7_InspecQAForm-Aug-ABC-2020-10-23.pdf


Inspection consultant completes QC review
Finalized inspection reports generated in BIO by inspection consultant
Inspection consultant adds all bridges for month to A9.5 (QC Spreadsheet)
Tasks by inspection consultant
Inspection consultant completes report in BIO (leaves assigned to BITL who performed inspection)
Inspection consultant emails completed A9.5 to QA consultant w/ BMO CC'ed
Tasks by Quality Assurance (QA) consultant
Report Selected for QA?
QA consultant runs "randomizer" in A9.6 and notes the reports selected for QA review
QA consultant inputs QC Spreadsheet(s) (A9.5) into QA Tracking Spreadsheet (A9.6)
No
Inspection consultant will email the QA consultant with responses to QA review
Inspection consultant updates inspection report and addresses QA comments
Yes
QA consultant performs QA review using Bridge Inspection QA Form (A9.7)
QA Comments?
Yes
QA consultant emails A9.7 (unsigned) to the designated QCR from the inspection consultant
Inspection consultant submits reports in BIO and routes to BMQE ***"Review then Upload into RIMS"***
No
Inspection consultant uploads PDF reports to SCDOT ProjectWise (If selected for QA, signed A9.7 is part of report)
QA consultant uploads signed A9.7 to BIO.
QA consultant uploads A9.6 Spreadsheet to SCDOT ProjectWise
QA consultant combines all QA forms (A9.7) and uploads to SCDOT ProjectWise
Inspection consultant sends monthly email to BMO and QA consultant with list of reports submitted and reports QA'ed

Bridge Inspection Quality Assurance Form

REQUIRED STRUCTURE INFORMATION		
ASSET ID NUMBER (NBI 08):	DISTRICT # (NBI 02): -	COUNTY (NBI 03): -
LOCATION (NBI 09):	FACILITY CARRIED (NBI 07):	FEATURE INTERSECTED (NBI 06):
SUBJECT INSPECTION DATE:	SUBJECT BITL:	
INSPECTION TEAM MEMBERS:		
SUBJECT INSPECTION TYPE: -		
QC REVIEW DATE:	QUALITY CONTROL REVIEWER (QCR):	
QUALITY ASSURANCE REVIEWER (QAR) (Print Name):		
QUALITY ASSURANCE FIELD RELATED TO THIS INSPECTION (Select):		

- ☐ Has the Bridge Inspection Quality Control Form been completed? Were boxes not checked or comments made? If so, have all comments been addressed and/or resolved?
- ☐ Is the "Reviewed by" box on the Bridge Inspection Form Cover Sheet completed with the QCR's name?
- ☐ Is the date in "Reviewed by" box consistent with the date on which the Bridge Inspection Quality Control Form was completed?
- ☐ The QAR has completed a page-turn of the bridge inspection report to review for any overall corrective actions to improve the Bridge Inspection Program; recommended corrective actions for future discussion are listed below for inclusion in future Annual QA Meeting or Annual QA Report.
- ☐ The next scheduled inspection(s) NBI Items 90 to 93 are accurate and appropriate based on the condition of the bridge.
- ☐ A load rating was not requested, load rating was requested or a load rating is scheduled based on the condition of the bridge.
- ☐ There were no critical findings or critical findings have been appropriately reported per the BIGD.
- ☐ There were no repair recommendations or repair recommendations have been properly reported to HMMS.
- ☐ BIGD requirements were followed for requirements if NBI Condition Rating (58 to 62) is 5 or below; including sketch, photograph, load rating requirements and inspection frequency.

QA REVIEW COMMENTS OR FUTURE CORRECTIVE ACTIONS:

Signed: ____ **Date:** ____________________

Complete Form | Undo | Print | Save

ATTACHMENT 9.8

Appendix/Attachment Title

Consultant QC Plan Review Checklist

Appendix/Attachment Revision and Year:

Version 1.0, 2020

Appendix/Attachment Introduction and Discussion

Per BIGD Section 9.2.3.1.2.2, each consultant shall submit a QC Plan to the BIPM. The BIPM or designee shall review the plan in accordance with the requirements of the BIGD.

Appendix/Attachment Description

This checklist summarizes the requirements of the BIGD which shall be included in the QC Plan developed by the consultants performing inspections under contract with SCDOT. The checklist is not all-inclusive but shall be used as a guideline for the BIPM or their designee during their review. When the review is complete, the checklist shall be added to the QC Plan as the cover page, and the QC Plan shall be uploaded per the BFP. The BIPM or his or her designee shall identify any common quality issues from QC Plans for discussion during the annual quality meeting discussed in BIGD Section 9.3.3.2.

Consultant QC Plan Review Checklist

Name of Consultant	
Consultant Contract No.	
Date QC Plan Submitted	
Revision Number of QC Plan	
Name of BIPM or Designee Reviewing	

Satisfactory	Needs Improvement	Not Submitted	Not Applicable	Consultant QC Plan Component
☐	☐	☐	☐	Compliance with Applicable Documents (BIGD, NBIS, etc.)
☐	☐	☐	☐	Personnel Responsible for Management and QC Identified *Role of Each Individual Identified (PM, QCR, BITL, Inspector, etc.)*
☐	☐	☐	☐	QCR Identified with Demonstrated Same Experience as BITL
☐	☐	☐	☐	Process(es) to Monitor Quality and Address Issues
☐	☐	☐	☐	Process(es) to Maintain Inspection Equipment listed in BIGD *Table 5.1.5.1 Standard Inspection Equipment* *Table 5.1.5.2 Standard Underwater Inspection Equipment*
☐	☐	☐	☐	Process(es) to Monitor Subconsultant(s) Quality Program
☐	☐	☐	☐	Process(es) to Comply with File Retention Requirements (BIGD 2.2.1.2.2)

Reviewer Notes/Comments: