

South Carolina Bridge Program Primer: BIGD and LRGD Roles

South Carolina's bridge program runs on two SCDOT guidance documents that every inspector, load rater and consultant working for the department needs to know: the Bridge Inspection Guidance Document (BIGD), published by the Bridge Maintenance Office (BMO), and the Load Rating Guidance Document (LRGD). This one-hour primer explains what each document does, who the key players are, how a finding in the field becomes a load rating request, how a load rating becomes a posting or a Critical Finding, and which South Carolina-specific numbers (time limits, triggers and thresholds) are easy to get wrong. It is based on the May 2026 BIGD and the August 2019 LRGD as obtained for this course, read alongside the federal National Bridge Inspection Standards (23 CFR 650 Subpart C). SCDOT updates these documents; always confirm the current edition before relying on any number here.

Learning objectives

- Describe the roles of the SCDOT BIGD and LRGD
- Explain the inspector-to-rater handoff
- Recognize SCDOT-specific accuracy locks
- Know where to verify current guidance

Two documents, one program

South Carolina's bridge program is built on federal law, but the day-to-day rules that an inspector or load rater follows come from two state documents. The **Bridge Inspection Guidance Document (BIGD)** governs how bridges are inspected, documented, flagged for repair and escalated. The **Load Rating Guidance Document (LRGD)** governs how bridges are load rated, checked and posted. Each one points to the other repeatedly, and the place where they meet (the handoff from the inspection team to the load rater and back) is where most of the state-specific requirements live.

The BIGD reviewed for this course is the May 2026 edition issued by the SCDOT Bridge Maintenance Office (BMO) in Columbia. It explains that SCDOT began its bridge inspection program in the 1970s and lists the goals of South Carolina's NBIS program. Chapter 2 lists six program objectives and explains that SCDOT inspects all public-road bridges in South Carolina other than federally owned bridges. Chapters 3 and 4 cover qualifications and inspection types; Chapter 7 covers repair recommendations, Critical Findings and follow-up actions such as load rating requests; Chapter 8 covers quality control and quality assurance.

The LRGD reviewed is the August 2019 edition. Its stated purpose (Section 1.1) is to define SCDOT's policies and procedures for load rating and posting of bridges within South Carolina, to provide uniformity in the load rating process and to ensure that all bridges are load rated as to their safe load carrying capacity. Section 1.2 makes it binding on SCDOT bridge staff and on consultants performing load rating and posting work for SCDOT. Questions about the referenced documents go to the State Bridge Maintenance Engineer (SBME) or a designated representative (Section 1.5), who is also the person who receives suggested revisions (Section 1.6).

Both documents sit beneath the federal framework. The NBIS (23 CFR 650 Subpart C) sets the national minimums for inspection, qualifications, load rating, posting and critical findings, and the AASHTO Manual for Bridge Evaluation (MBE) is

the technical basis for rating. The LRGD says plainly (Section 4.1) that load rating work is covered by the current MBE as modified by the LRGD. The practical lesson: when SCDOT is stricter or more specific than the federal rule, the SCDOT requirement controls for SCDOT work. When SCDOT is silent, the federal rule and the MBE still apply.

Related courses in this catalog: BR-I01 covers the 2022 NBIS rule, BR-I02 inspection types and intervals, BR-I03 critical findings at the federal level, BR-S01 the SNBI, BR-L01 the LRFR rating factor and BR-L03 load posting decisions.

Who does what in the BIGD

The BIGD (Section 2.1.3) organizes the program around a set of named roles. Knowing the acronyms is the first step to reading the document, because nearly every requirement is assigned to one of them.

- **BMO**: the Bridge Maintenance Office in Columbia, which administers the statewide program.
- **BIPM**: the Bridge Inspection Program Manager, identified as the Assistant Director of Bridge Management. The BIPM sets direction for the program, including the agenda for the annual QA meeting.
- **LRE**: the Bridge Load Rating Engineer.
- **BMQE**: the Bridge Management Quality Engineer; the BMQE or designee monitors inspection dates against required intervals and serves as the QA reviewer.
- **SBIS**: the State Bridge Inspection Supervisor.
- **DBE**: the District Bridge Engineer, who coordinates maintenance and repair in the district and is responsible for notifying non-SCDOT owners about Critical Findings on their bridges.
- **DBIS**: the District Bridge Inspection Supervisor. The DBIS is ultimately responsible for tracking and documenting Critical Findings from notification to resolution and makes the call on bridge closure.
- **BITL**: the Bridge Inspection Team Leader, who leads the field inspection, assigns repair priority flags, makes the initial Critical Finding classification, requests load ratings and signs the inspection report.
- **ABI**: the Associate Bridge Inspector, who does not have team leader status.

The LRGD adds its own cast: the **SBME** (State Bridge Maintenance Engineer) or designated representative, who approves alternative software, site assessments, posting avoidance measures and posting forms; the **EOR**, the engineer of record who certifies the rating; the **QC Engineer**; and the **QA Engineer**. The district side also includes the **DEA** (District Engineering Administrator), who coordinates public and stakeholder communication when a bridge is closed or weight restricted.

A useful (informal) way to remember the structure is that the BITL sees the problem, the DBIS owns the escalation, the DBE owns the fix, the BMO owns the statewide data and quality, and the SBME owns load rating and posting policy decisions. When you are unsure who must act, the BIGD and LRGD almost always name the role explicitly; look for it rather than assuming.

Inspector qualifications in South Carolina

BIGD Section 3.1.2 and Table 2 set the qualifications for a BITL. In the edition reviewed, a BITL must:

1. Complete an FHWA-approved comprehensive bridge inspection training course and score at least 70 percent on the final exam.
2. Complete refresher training totaling 18 hours within each 60-month period.
3. Maintain documentation of the qualifications.

4. Meet one of four experience paths: a registered professional engineer with 6 months of bridge inspection experience; an engineer who has passed the FE exam, holds an ABET-accredited bachelor's degree in engineering and has 2 years of bridge inspection experience; a holder of an ABET-accredited associate's degree in engineering or engineering technology with 4 years of bridge inspection experience; or 5 years of bridge inspection experience.

Section 3.1.2.1 adds that more than 50 percent of the counted experience should actually be bridge inspection work. That is a South Carolina reading that matters when a candidate's resume mixes design, construction and inspection.

Specialty inspections add requirements. For underwater inspections, divers must be commercial divers meeting OSHA requirements; the team needs at least three ADCI-certified divers; and the underwater BITL must personally inspect at least 25 percent of the substructure units. For NSTM (nonredundant steel tension member) inspections, the BIGD requires the NHI course 130078 or 130078A, taken at least every 10 years. For complex bridges, qualifications must be submitted three months in advance, and the BIGD expects relevant prior experience: for stayed or segmental bridges, experience on roughly five similar bridges, and for movable bridges, five years of experience.

Two other qualifications connect directly to this course's theme. Section 3.1.6 requires QC and QA reviewers of inspection reports to meet BITL qualifications, so the reviewer is as qualified as the person reviewed. Section 3.1.7 requires that load ratings be performed by, or under the direct supervision of, a professional engineer licensed in South Carolina. BIGD Table 21 (Section 4.11) repeats that load ratings require an SC PE and states that the data are updated within three months of the load rating request.

BIGD Chapter 8 then makes keeping these qualifications current a quality-control item: before field work, the BITL must confirm that years and types of experience, training records and certifications are recorded, and the DBIS and consultant project managers must make sure their staff keep those records accurate. Inspectors keep their own experience log and copies of certifications. See BR-I09 for underwater inspection and BR-F02 for NSTM background.

Inspection types and intervals

BIGD Chapter 4 describes the inspection types and intervals, summarized in its Table 3. Element data must be collected on all bridges subject to the NBIS, on undersized bridges owned by SCDOT, on SCDOT-owned pedestrian and bikeway bridges and on other bridges as directed by the BIPM.

The routine inspection (Section 4.2, Table 4) is the workhorse. Its typical interval is 24 months. The BIGD states the permitted routine intervals as less than 12 months, 12 months, 24 months or 48 months, and the BITL determines the schedule and interval for a specific bridge. Routine procedures can differ greatly by bridge type; the BIGD gives bridges with timber piles and bridges with fatigue-prone details as examples. Bridge-specific procedures belong in the Bridge File.

The BITL is responsible for confirming all inspection intervals for the bridge. If the BITL adds, removes or changes the interval of an inspection, the reason must be noted in the inspection report. That is a recurring South Carolina theme: decisions are allowed, but they must be explained in writing.

A subtle rule concerns intervals shortened in the field. If, during an inspection, the inspector discovers a need to reduce the interval of that inspection or another scheduled inspection type, the affected inspections are not considered out-of-interval, but they must be completed or rescheduled within three months of the discovery. If they happen later than that, they become out-of-interval. The DBIS or consultant project manager is responsible for adherence to scheduled inspections; the BMQE or designee monitors conformance. The BIGD refers to separate procedures (Sections 4.17 and 4.18) for inspections that cannot be completed and for inspections completed out-of-interval.

The Bridge File (Section 2.2) supports all of this. Among other contents, the BIGD expects initial photographs to be updated every 10 years. During inspection preparation (Section 5.3), the BITL reviews the file, including load rating documents, before going to the field. That desk review is where the inspection program and the load rating program first meet.

Illustrative example: a BITL performing a 24-month routine inspection of a timber pile bent bridge finds new pile decay and decides the next routine inspection should be at 12 months. The BITL records the reason for the change in the report. If the same inspection also reveals a need for an underwater inspection sooner than scheduled, that underwater inspection must be completed or rescheduled within three months to avoid being out-of-interval. BR-102 covers the federal interval framework that these SCDOT rules sit within.

The desk review: reading the load rating before the field

BIGD Section 5.3.1.3 sets out what a BITL must do with the load rating before inspecting. The BITL notes the last load rating date and the plans, assumptions and conditions used for the current rating. The inspection team is not required to review the full load rating, but at a minimum the BITL must review:

- the Load Rating Summary Form (LRSF);
- the Posting Form or Posting Recession Form, if one exists; and
- the labeling diagram included with the load rating.

The reason is practical. A load rating is only as good as its assumptions. If the rater assumed a certain section loss, a certain overlay thickness or a certain member arrangement, the inspector is the person best placed to see whether those assumptions still match the bridge. The labeling diagram matters because the LRGD (Section 5.5) requires every bridge, including new, widened and rehabilitated bridges, to have one, and subsequent inspections and load ratings must use the same labeling convention. If the inspector calls a girder G3 and the rater calls it G2, deterioration ends up in the wrong place in the analysis.

The BIGD also explains where load ratings come from. The first load rating is typically done during design, usually using the As-Let plans (the bid and construction contract plans). To update the bridge record to the As-Built condition, inspections must request a load rating after the initial inspection, including after each stage of phased construction.

If, during preparation, the inspector discovers that there is no load rating or that the rating needs to be updated, the BITL must submit a load rating request as soon as possible and no later than **five calendar days** from the discovery during the desk review. This five-day rule appears again in Chapter 7 and is one of the most important South Carolina-specific deadlines.

On the load rating side, the LRGD (Section 5.3) requires that inspection reports be reviewed before rating to identify deterioration or damage that must be accounted for, and it places on the load rater the responsibility to decide how documented losses affect capacity. Photographs and field measurements of losses should be in the inspection report. The two documents therefore create a loop: the inspector reads the rating assumptions; the rater reads the inspection findings; each relies on the other's documentation being specific.

When the BITL must request a load rating

BIGD Section 7.3.1 begins with a simple principle: all NBIS bridges shall have a load rating that reflects the current configuration and condition of the bridge. If none exists in the Bridge File, the inspector requests one. If As-Let or incorrect plans were used in the current rating, or another reason exists, the BITL submits a request within five calendar days of the discovery.

The BIGD then lists specific triggers. A new load rating shall be requested when:

- the superstructure, substructure or culvert condition rating (SNBI B.C.02, B.C.03 or B.C.04) has dropped from Good (7) to Fair (5), a two-point decrease, since the last load rating;
- any of those ratings drops to Poor (4) or Serious (3);
- on a bridge with timber piles, the substructure rating (B.C.03) drops to Fair (5), Poor (4) or Serious (3);
- a structural element has an increased quantity in Condition State 4 (see Table 31);
- the bridge is supporting increased dead load, such as a thicker overlay, since the previous rating;
- a repair or rehabilitation has been completed that could change a component condition rating, member capacity or load configuration; or
- the BITL determines a rating is required.

The request must be completed within five calendar days of the last day of the inspection, or five calendar days from discovery of the condition. Note that the timber pile trigger is stricter than the general trigger: for timber pile bridges, Fair alone is enough. That reflects how quickly timber piles can lose capacity to decay, brooming and loss of soil support.

Section 7.3.1.2 elaborates on timber piles: a rating should be requested when the substructure rating drops as described above, when deterioration, tipping or damage is detrimental to load capacity, or when soil loss (by scour or otherwise) could cause buckling or undermine friction support, or when decay or brooming could affect capacity. Sections 7.3.1.3 and 7.3.1.4 require timber decks and pier caps to be rated when deterioration or other structural issues could affect their capacity, and for timber decks also when loading changes, such as an added overlay. For pier caps, the geometry and its effect on the rating must be considered.

Section 7.3.1.1 addresses staged construction: for staged, phased or partial-width construction, a rating must be requested at the completion of each phase or stage, including intermediate stages of a partially demolished bridge that is open to traffic, and all such ratings must be completed within three months of the phase or stage opening to traffic.

Section 7.3.1.6 closes a gap. If QC or QA review finds that a BITL omitted a required request, the BITL must submit it, with a due date three months from the inspection date and a note recording the omission. If QC or QA comment resolution lowers a rating or condition state so that a rating becomes required, the due date is three months from when the comment was incorporated, with an explanatory note. See BR-I05 for condition ratings and BR-T01 for timber.

Condition State 4 and Table 31

BIGD Section 7.3.1.5 adds an element-level trigger. If a structural, non-deck element is found to meet the criteria for Condition State 4 (CS4), a load rating shall be requested; a repair recommendation or Critical Finding may also be submitted if required. Table 31 lists the elements for which a CS4 quantity requires a load rating request.

The list is long and covers nearly every primary load path element. It includes slabs (reinforced concrete, timber and other), closed box girders and open girders and beams of every material, stringers, floor beams, arches, steel main and secondary cables, steel pins and steel gusset plates, columns, towers, timber trestles, pier walls, abutments, pile caps and footings, piles of every material, pier caps (including split pier caps), and culverts of every material. It also includes the South Carolina-specific timber pile repair and support elements: timber pile under crutch, stubbed or spliced timber pile, wrapped timber pile, rebar repair timber pile, FRP repair timber pile, structural repair timber pile, temporary support, crutch bent, crutch beam and saddle.

Table 31 carries an important footnote for abutments: if abutment elements are used only for lagging or for retaining approach fill and embankments, they are not considered structural elements. A structural element must transmit vertical loads to the foundation, not only lateral loads. That distinction prevents unnecessary rating requests for retaining-only components while keeping true load-bearing abutments in the trigger list.

Why an element-level trigger in addition to the component condition triggers? Because a single badly deteriorated member can control capacity long before the overall superstructure or substructure rating drops two points. A component rating summarizes the whole; element condition states capture quantities. One gusset plate or one pile in CS4 might not move the component rating, but it can move the load rating.

Illustrative example: a routine inspection of a continuous steel girder bridge finds that the superstructure rating stays at 6, but the inspector records a new CS4 quantity on element 162 (steel gusset plate) at a connection with pack rust and section loss. The component trigger is not met, but the Table 31 trigger is. The BITL submits a load rating request within five calendar days and considers whether a repair recommendation or Critical Finding is also warranted. BR-I04 covers element-level inspection and BR-L05 covers gusset plate rating.

Repair recommendations and priority flags

BIGD Section 7.1 requires the BITL to assign a priority flag to observed defects that need corrective action. Priority flags are based on the time frame in which the owner should complete the repair. Table 30 sets the guideline time frames:

- **Priority A:** 30 calendar days.
- **Priority B:** 90 calendar days.
- **Priority C:** 365 calendar days (12 months).

The table notes that these timelines are guidelines. Repair recommendations are required only on SCDOT-owned bridges. Inspectors must review previous repair recommendations before an inspection. If a BITL has previously recommended a repair, another recommendation is submitted with an updated date, and if the flag type has escalated, the lower flag is closed and a new, higher priority flag is used.

The relationship between Priority A flags and Critical Findings is a frequent source of confusion. The BIGD is explicit: there is overlap, a Critical Finding is considered a Priority A flag, but not every Priority A flag is a Critical Finding. A Priority A flag alone shall not be used for findings classified as Critical Findings, because Critical Findings must be reported under FHWA policy. Another note says that an inspection with only Priority B or C flags has follow-up actions but is not treated as an inspection with follow-up actions requiring an expedited report schedule.

For Priority C, the BIGD asks BITLs to use industry knowledge of maintenance operations and to list only deficiencies that are actually needed on the bridge within the next 12 months. That keeps the repair list credible; a list inflated with nice-to-have items dilutes the ones that matter.

After repairs (Section 7.1.2), status is checked at the next inspection unless a maintenance inspection is needed. The DBE should tell the DBIS about a repair that would update bridge data, and the maintenance inspection must be done so that the data can be updated within three months. Owners of non-SCDOT bridges may notify the DBE that repairs are complete, and a maintenance inspection may follow. The LRGD ties posting to this system too: Section 19.5 notes that installation of posting signs is recorded as a repair recommendation under the BIGD.

Critical Findings, the South Carolina way

The NBIS defines a Critical Finding as a structural or safety-related deficiency that requires immediate action to ensure public safety, and requires owners to notify FHWA and track the finding. BIGD Section 7.2 adopts that definition and adds SCDOT's own: a deficiency of a bridge component, found visually or by rating evaluation, of such severity that it might critically threaten public safety, compromise structural stability, or create irreparable damage that shortens the bridge's life.

The BIGD classifies Critical Findings by priority: Bridge Closure; Lane or Shoulder Closure; Structural Defect/Repair (Non-Closure); Structural in Load Rating (Non-Closure); and Non-Structural/Safety (Non-Closure). The BITL who discovers the finding makes the initial classification, which can change over the life of the finding.

Discovery can come from inspectors, load rating engineers, hydraulic engineers, maintenance crews or the public. Examples include scour, fire, deterioration, vehicle impact, floods and earthquakes. Whenever there is an imminent threat requiring an immediate response, the deficiency is a Critical Finding whether or not it was resolved on the spot.

South Carolina sets explicit condition-based triggers (Section 7.2.2.1). A Critical Finding shall be documented if a field condition changes so that the bridge receives a rating of **3 or less** for deck, superstructure, substructure or culvert (SNBI B.C.01 through B.C.04), the NSTM inspection condition rating (B.C.14) or the underwater inspection condition rating (B.C.15), or a channel or scour condition rating (B.C.09 or B.C.10) of 3 or less. Compare this with the federal minimum categories in 23 CFR 650.313(q), covered in BR-I03 and BR-X01; learners should check the federal list and the SCDOT list side by side rather than assuming they match.

There is also a load rating trigger (Section 7.2.2.2). If a completed load rating yields a controlling legal load (SNBI B.LR.07) that results in a load restriction of **6 tons or less**, a Critical Finding shall be documented, unless the bridge is already posted for 17 tons or less. Existing signs showing 6 tons or less are not, by themselves, a reason for a new Critical Finding. FHWA has set 3 tons as the absolute minimum gross live load capacity; a load rating below 3 tons gross requires closure.

Documentation starts immediately (Section 7.2.3). The BITL must not wait; the first duty is to protect the public, which can mean posting, lane closure or bridge closure. SCDOT keeps an emergency contact list for each district. The DBIS or designee confirms the Critical Finding, and FHWA must be notified within **24 hours** of discovery. Every month SCDOT sends FHWA a status report on all resolved, unresolved and addressed Critical Findings (Section 7.2.9).

Closure, addressed and resolved

BIGD Section 7.2.6.1 describes closure. If a structure is in imminent danger of collapse, the inspector shall close it to traffic. Where closure is the action chosen to address a Critical Finding, the bridge must be closed within 30 days of discovery. The sequence in the BIGD is: the DBIS has ultimate responsibility to decide whether closure is needed and whether the bridge stays closed, opens with restrictions or opens without restrictions; the BITL first contacts the DBIS with the recommendation; the DBIS informs the DBE, and the bridge may be closed temporarily with inspection vehicles, traffic devices or other means until maintenance installs closure signs; the DBIS informs the BMO; the BITL updates the Load Posting Status and Posting Status Change Date and requests a load rating if needed; the BITL drafts the Critical Finding documentation for the DBIS; and the DBIS approves it so FHWA is notified within 24 hours. The DEA coordinates public and stakeholder communication and reviews the district's stakeholder list at least yearly.

Supporting actions have their own clocks. When a load rating is part of the response, preliminary results are generally requested within 5 days of discovery (Section 7.2.6.2). Maintenance must be notified by the DBIS within 1 day (Section

7.2.6.4). Scheduling a load rating or a future inspection is never, by itself, an action that addresses a Critical Finding, although a completed rating may show that the finding is no longer needed.

The BIGD distinguishes two statuses (Section 7.2.7). An **addressed** Critical Finding is one where the owner has acted to protect the public, for example with temporary closure, lane or load restriction or shoring. Critical Findings must be addressed within **30 days** of discovery, and an estimated date for addressing must be reported. A **resolved** Critical Finding has a permanent solution: permanent repair, long-term closure, permanent posting, permanent barriers or replacement. If a bridge is closed to resolve a finding, it must be closed indefinitely; short closures (generally under three months) do not resolve it. Some findings go straight to resolved.

The **Critical Finding Posting** deserves special attention. Per the LRGD, a bridge may receive a temporary 3-ton interim posting before a load rating is done. This can address a finding if it removes the immediate safety concern, but it cannot resolve the finding. A load rating request must be submitted within 24 hours, concurrent with the finding; the BMO should review and distribute it within two business days; and the expedited rating, including QC, should be complete within 15 days of the inspection. A 3-ton posting that comes from an approved calculated load rating is not a Critical Finding Posting, and that finding can be resolved once signs are in place. A finding tied to a load rating can be resolved when the controlling legal load restriction is more than 6 tons and the BITL and DBIS agree the safety issue is gone.

For reopening (Section 7.2.7.2.1), the DBE tells the DBIS the target date for removing closure signs, a maintenance inspection should occur after repairs and within 7 days of reopening, and the BITL records reopening data, updates posting status and considers a new load rating. For non-SCDOT bridges, the DBE notifies the owner and follows up at the midpoint of the follow-up period (15 days); if the owner fails to act, SCDOT may need to close the bridge.

Inside the LRGD: who may rate and how it is checked

LRGD Chapter 3 sets the people and quality rules. Load ratings and checks must be performed by people familiar with the MBE and the LRGD. At minimum, the person performing the rating or the check must be a PE licensed in South Carolina or work under the supervision of one. The rating is certified by the PE serving as engineer of record (EOR), who may be the rater or checker but **shall not be the QC Engineer**. The QC and QA Engineers must be licensed PEs, familiar with the process, and independent of the person who did the rating.

Section 3.1 requires an independent detailed check of every rating, documented on the QC Checklist by the person who did the check. The QC Engineer ensures the checks were done and documented and performs a cursory review (in the LRGD's words, do the results make sense). Section 3.4 defines a check: confirm the assumptions, verify the equations and calculations, and check the arithmetic, possibly with an independent mirror set of calculations. With software, the checker verifies all input, confirms that the capacity summary reflects the analysis, and is satisfied with the program's suitability. Discrepancies are documented and resolved with the original rater.

QC (Section 3.5.1) is performed by the consultant who did the rating; the LRGD notes that consultants typically perform all of SCDOT's ratings. QC confirms that a formal check was done, reviews assumptions and methods, confirms deterioration was accounted for, confirms the LRSE summarizes the results correctly and completes the QC Engineer box on the LRSE. Consultants use a standardized QC checklist and submit a QC tracking spreadsheet monthly.

QA (Section 3.5.2) must be done by a **different consultant** than the one that did the rating. QA is performed monthly on a sample of ratings submitted the prior month. It reviews the QC documentation and the LRSE, confirms each QC comment was

resolved, checks consistency among consultants and completes the QA Engineer box. Bridges are prioritized for QA by category; the list in the 2019 LRGD begins with fracture critical bridges and then scour critical bridges.

On software (Section 3.3), the 2019 LRGD requires AASHTOWare BrR, version 6.8.3, for all structure types it supports. Other software requires SBME approval through the BMO Approvals Form, with a preferred list in the appendix; Excel and Mathcad do not need pre-approval. Alternative software must be validated with hand calculations of key portions or an independent program. Because software versions change frequently, treat the version number as one of the items to confirm in the current edition. BR-X01 discusses the ethics of independent checking.

LRGD methods, data and policy points

LRGD Section 6.9.3 sets method selection. All bridges are rated by LRFR initially. For alternative results, bridges should be rated by LFR, except that timber and masonry bridges should use ASR, and bridges designed after October 1, 2010 shall not be rated by LFR or ASR without SBME approval. The 2019 LRGD says NBI items 63, 64, 65 and 66 should be based on LRFR results, while item 70 may be based on LRFR, LFR or ASR. Items 63 and 65 are coded 8 unless a load test was performed with BMO permission (coded 4) or engineering judgment was used (coded 5). These are pre-SNBI NBI item numbers; under SNBI the corresponding data are reported in the B.LR items, so confirm current coding instructions.

Section 6.9.4 limits field evaluation and documented engineering judgment to cases where plans are unavailable for reinforced or prestressed concrete structures, or where severe deterioration is found in the superstructure or substructure with a condition rating not higher than three. Documentation must include supporting calculations and assumptions at critical locations, and all reasonable efforts should be made to base ratings on calculated values.

Several policy points are easy to overlook:

- Dead load (Section 6.3): use AASHTO LRFD unit weights absent better information, but increase normal weight concrete from 145 pcf to 150 pcf to account for reinforcing steel.
- Loads considered (Section 6.2): generally only permanent and vehicular loads; environmental loads such as wind, temperature, stream flow and earthquake only when unusual conditions warrant.
- Emergency vehicles (Section 2.3.3): should always be included in the rating analysis. BR-L02 covers legal loads, SHVs and EVs.
- New bridges (Section 4.4): rated by the designer by LRFR before opening; an Asset ID (five digits) is requested at Preliminary Plans; the rating package is delivered with Final Plans and updated for as-built changes, or the EOR certifies that the original rating remains accurate.
- Data (Chapter 5): the rater decides how reliable each source is; erroneous inventory data found during rating must be corrected and reported to the BMO with the Data Correction Form; a Site Assessment needs prior SBME approval when plans and reports are not enough.
- Rehabilitation (Section 4.6): if the existing rating is inaccurate or did not account for reported deterioration, a new rating is performed.

The LRGD also places a duty on load raters in the field: if a rater finds a defect during a Site Assessment that qualifies as a Critical Finding, notification is the rater's responsibility. Unless immediate phone notification is needed, the rater reports to the district and the BMO within one calendar day using the BIGD's Critical Findings Form. The 2019 LRGD refers to Critical Findings in Chapter 8 of the BIGD; in the 2026 BIGD reviewed for this course, Critical Findings are in Section 7.2. That kind of cross-reference drift is a reason to check both documents' current editions together.

Posting under the LRGD

LRGD Chapter 19 governs posting. Following MBE Sections 6A.8.2 and 6B.7.2, restrictive posting is required when the maximum legal load under state law exceeds a bridge's safe capacity. Before recommending posting, the rater should discuss posting avoidance options with the SBME. The LRGD balances safety against the hardship that posting causes for emergency responders, industry and agriculture, listing factors such as the bridge's criticality, traffic character, likelihood of overweight vehicles, enforceability, detour length, commercial impact and alternatives such as strengthening or replacement.

Posting avoidance (Section 19.2) means applying engineering principles to modify the MBE procedures through variances and, where appropriate, exceptions. The LRGD lists refined analysis (finite element analysis, load testing or material testing with SBME approval, using tested strengths taken as the mean minus 1.65 standard deviations, not the average); waiving a controlling LRFR Service III rating below 1.0 for prestressed concrete when the latest inspection shows no shear or flexural distress and the SBME approves, but never where salt is prevalent (coastal and mountainous regions); trying ASR or LFR when LRFR gives a rating factor below 1.0 (subject to the post-2010 restriction); and, only with careful justification and field verification, including traffic barrier stiffness. Avoidance techniques may not be used in designing new bridges, which must be designed not to need posting.

The procedure (Section 19.3) has its own clocks. If avoidance would not help, the rater submits the Bridge Signing/Posting Form, which the SBME or designee should approve within 10 business days. If avoidance is proposed, the rater submits the BMO Approvals Form, noting the timeframe if it will take more than 60 days; the BMO should respond within 10 business days. If rejected, the posting form is due within 3 business days. If accepted, the measure should be complete within 60 days, or a new form must explain the delay. If avoidance still leads to posting, the posting form is due within 3 business days of the rating being signed. Once approved, posting signs shall be installed within **30 days** of SBME approval of the form, with QA running concurrently. BMO may take temporary measures at any time if safety is a concern. Compare these internal deadlines with the federal posting timing in 23 CFR 650.313(c), covered in BR-I01 and BR-L03, and confirm how SCDOT reconciles them today.

Section 19.5 lists South Carolina posting practice: gross weight, axle weight or both are the most enforceable limits; the minimum gross posting is 3 tons, and bridges that cannot carry 3 tons gross shall be closed; posting loads are based on AASHTO and South Carolina legal loads, whichever governs, depending on whether the bridge is on the Interstate; with ASR or LFR the Operating capacity is the posting limit; the 2019 LRGD states that current practice is to post using ASR or LFR; sign R12-6-48 is the primary sign, with R12-7-60 below it for axle restrictions and R12-6.1-48 for advance warning at the nearest intersections with detour signs; the DEA coordinates communication before restrictions are placed; and sign installation is a repair recommendation. Inspectors must photograph posting signs at each routine inspection so raters can confirm they match the rating (Section 19.6).

Quality control, quality assurance and FHWA oversight

BIGD Chapter 8 frames QC and QA for inspections. Its objectives are to establish and monitor personnel qualifications, increase data consistency, standardize documentation and prioritization of findings, identify unclear guidance and improve communication among consultants, districts and headquarters. The BIGD stresses that quality starts before the formal process, with scheduling, pre-visit reviews and equipment checks.

QC (Section 8.2) enforces procedures so inspection and documentation stay at or above NBIS and SCDOT requirements. QA (Section 8.3) measures the program as a whole. Its purpose is not to fix a specific report but to monitor and adjust statewide requirements. QA is an independent function led by the BMQE or designee as QA Reviewer, who may use consultants.

Reports are selected for QA in priority order: bridges with a Poor or worse bridge condition classification; bridges with poor or worse scour condition; bridges receiving NSTM inspection; bridges carrying the National Highway System; bridges with scour vulnerability C or D or unknown foundations; bridges with a span of 125 feet or more or 25 or more spans; bridges with complex features; and all remaining bridges. For each category, QA is performed on **10 percent** of reports submitted each month, and the QA Reviewer also reviews the earlier QC review. Each year the BMO holds a QA meeting, with an agenda set by the BIPM, to review issues from past inspections and any Technical Notes issued that year.

Section 8.4 reminds everyone that FHWA may audit the program at any time and reviews it at least once a year, and that all members must cooperate. Together with the LRGD's QC/QA chain, which requires independent checks, consultant QC and a different consultant for QA, South Carolina's program builds in multiple independent views of each high-risk bridge.

For individual engineers, this structure has a clear meaning: your work will be read by someone else. Write assumptions down, explain changes to intervals and ratings, keep training and certification records current, and resolve review comments in writing. When reviewers find an omitted load rating request, the BIGD requires the omission to be noted in the request. The system is designed to learn from mistakes, not hide them.

Accuracy locks and verifying current guidance

This course uses the term *accuracy locks* for South Carolina-specific numbers that are easy to confuse with federal or generic values. Lock these in, and then verify them against the current edition before you rely on them:

- Load rating request: within **5 calendar days** of discovery or of the last day of inspection.
- Rating triggers: a two-point drop from 7 to 5; a drop to 4 or 3; Fair (5) or worse substructure on timber pile bridges; added CS4 on Table 31 elements; added dead load; or repairs.
- Critical Finding condition trigger: any listed SNBI rating of **3 or less**.
- Critical Finding load trigger: controlling legal load restriction of **6 tons or less**, unless already posted at 17 tons or less; under 3 tons gross means closure.
- FHWA notice within **24 hours**; addressed within **30 days**; maintenance notified within 1 day; preliminary rating results generally within 5 days; Critical Finding Posting rating complete within 15 days.
- Repair flags: A 30 days, B 90 days, C 365 days (guidelines).
- Posting signs installed within **30 days** of SBME approval of the posting form; minimum posting 3 tons.
- Staged construction ratings within 3 months of opening each stage.
- QA sample: 10 percent per category per month.
- Concrete unit weight for rating: 150 pcf.

Some of these numbers differ from what an engineer trained elsewhere may expect, and a few differ from the federal minimums, usually by being stricter or more specific. Never assume a number from another state or from the federal rule applies to SCDOT work without checking.

The documents also have known version issues. The 2019 LRGD uses NBI item numbers (63 through 70) while the 2026 BIGD uses SNBI items such as B.LR.07. The 2019 LRGD cites Critical Finding procedures in a BIGD chapter that has since been renumbered. Its required BrR version is a 2019 value. Forms and checklists live in appendices and online links that change. To verify current guidance, use the SCDOT Bridge Maintenance Office's published documents and Technical Notes, ask the SBME or designated representative as the LRGD directs, and compare against the current text of 23 CFR 650 Subpart C and the MBE edition SCDOT has adopted.

Licensure questions are separate. The LRGD requires South Carolina PE licensure or supervision for rating work, and individual engineers must also meet the South Carolina board's own rules, which this course did not review. BR-X01 covers the ethics framework that sits around these technical obligations.

Bridge design in South Carolina: SCDOT standards

South Carolina bridge design is governed by the **SCDOT Bridge Design Manual** together with the **Bridge Design Memoranda** that SCDOT issues to update it, the **SCDOT Seismic Design Specifications for Highway Bridges**, and the SCDOT Geotechnical Design Manual. The base specification is the AASHTO LRFD Bridge Design Specifications as modified by those documents. Three features make South Carolina design distinctive:

- **Seismic design is a first-order issue.** The Charleston earthquake of 1886 and the Coastal Plain's soft, liquefiable soils mean SCDOT has its own seismic specification rather than relying only on the AASHTO Guide Specifications. Designers classify bridges by operational importance, develop site-specific or code response spectra, and evaluate liquefaction and lateral spreading at coastal sites. Expect seismic detailing (confinement, seat widths, capacity-protected elements) to drive substructure sizing in the Lowcountry even on ordinary stream crossings.
- **Coastal durability.** Bridges near salt water need increased cover, low-permeability concrete and corrosion-resistant strategies, and the designer must consider storm surge and wave loads for low coastal crossings, consistent with the AASHTO Guide Specifications for Bridges Vulnerable to Coastal Storms.
- **Prestressed concrete is the default.** Most new SCDOT bridges use precast prestressed beams or cored slabs on pile bents, with steel reserved for long spans and curved alignments. Standard drawings and memoranda control beam sections, bearing details and deck geometry.
- **Load rating at design.** New bridges are rated per the SCDOT Load Rating Guidance Document so the inventory and operating values, including the South Carolina legal loads, are in the bridge file when the structure opens.

Because memoranda revise the manual frequently, the first task on any SCDOT project is to collect every memorandum issued since the manual date and confirm which apply to your letting date.

Bridge repair in South Carolina

SCDOT bridge repair is driven by the Bridge Maintenance Office using inspection findings coded under the BIGD. Typical South Carolina repairs include pile jacketing and encasement of deteriorated timber and concrete piles in tidal water, replacement of timber pile bents on secondary routes, cored-slab shear key and joint repairs, deck patching and overlays, and joint elimination or replacement. Timber substructures are common in the state's older secondary-road inventory, so pile posting, sistering and replacement are frequent work items.

Repairs that change section capacity, add dead load, or alter support conditions require a structural engineer's design and a load rating update under the LRGD, and the rater must receive the as-built details. Emergency repairs after a critical finding follow the critical finding procedure in the BIGD: secure the public first, then design the permanent fix.

Across the Southeast, repair decisions follow the same chain: the inspection report documents the defect and its quantity, the bridge owner's maintenance or bridge unit prioritizes it, and a structural engineer decides whether the repair affects load-carrying capacity. If it does, the repair is designed and sealed, the load rating is revisited, and the as-built condition goes back into the bridge file. When SCDOT work in South Carolina crosses that line, call the structural engineer before the crew mobilizes, not after.

Key takeaways

- The BIGD governs inspection, repair flags, Critical Findings and follow-up; the LRGD governs load rating, checking and posting; both sit beneath the NBIS and MBE.
- The BITL reviews the LRSEF, posting form and labeling diagram before inspecting and must request a load rating within 5 calendar days of finding a need.
- Rating triggers include a 7-to-5 drop, any drop to 4 or 3, Fair or worse on timber pile substructures, new CS4 on Table 31 elements, added dead load and repairs.
- SCDOT documents a Critical Finding for listed SNBI ratings of 3 or less, or a rating giving 6 tons or less unless already posted at 17 tons or less; under 3 tons gross means closure.
- FHWA must be notified within 24 hours; findings must be addressed within 30 days; a Critical Finding Posting can address but never resolve a finding.
- LRGD ratings require SC PE involvement, an independent check, consultant QC and QA by a different consultant; the EOR cannot be the QC Engineer.
- Posting follows a documented approval process with posting avoidance options, a 3-ton minimum and sign installation within 30 days of SBME approval.
- Confirm every number here against the current SCDOT editions; the 2019 LRGD predates SNBI and refers to older BIGD chapter numbers.

References

1. SCDOT, Bridge Inspection Guidance Document (BIGD)
2. SCDOT, Load Rating Guidance Document, 2019
3. 23 CFR Part 650, Subpart C — National Bridge Inspection Standards (final rule published May 6, 2022)
4. SCDOT Bridge Maintenance Office, Bridge Inspection Guidance Document (BIGD), May 2026 edition as reviewed
5. SCDOT, Load Rating Guidance Document (LRGD), August 2019 edition as reviewed
6. SCDOT Bridge Design Manual and Bridge Design Memoranda (scdot.org, reviewed October 2026)
7. SCDOT Seismic Design Specifications for Highway Bridges

Study text only; the final quiz is taken online. Verify all references against the edition your agency has adopted.