

West Virginia Bridge Program: WVDOH Load Rating, Design and Repair

West Virginia's rugged terrain gives it a large inventory of steel bridges, truss bridges and long-span structures, including the New River Gorge Bridge. WVDOH's 2023 Bridge Load Rating Manual sets out a detailed list of West Virginia legal loads, ties rating timing to the inventory inspection, and requires posting based on strength rather than service limit states. This one-hour course covers those rules, the New River Gorge preservation work presented to the Southeast Bridge Preservation Partnership in Charleston in 2025, and WVDOH's Structure Directives for design and repair.

Learning objectives

- Apply the 2022 NBIS baseline to West Virginia practice
- Use the state DOT's intervals, critical finding and rating rules
- Coordinate inspection, load rating and posting
- Apply the state DOT's bridge design and repair standards

Why a West Virginia-specific course

Every bridge in West Virginia that carries a public road is inspected, inventoried and rated under one federal rule, the National Bridge Inspection Standards (NBIS) at 23 CFR Part 650 Subpart C, as rewritten in the final rule published May 6, 2022. The federal rule sets minimums. It deliberately leaves the "how" to each State transportation department, which must write and follow documented procedures for inspection intervals, critical findings, load rating, posting, closure, scour and quality control. In West Virginia that agency is the West Virginia Division of Highways (WVDOH). The documents WVDOH publishes are therefore the working rulebook for any engineer, inspector or consultant who signs, seals or reviews bridge work in the state.

Engineers who move between states, or consultants who work for several DOTs, routinely get tripped up by the differences: one state reduces the inspection interval when a component drops to 4, another waits until 3; one state rates for its own legal trucks that do not exist anywhere else; one state demands a load rating revision within a fixed number of days after a report is sealed. None of those details appear in the federal regulation. This course pulls the West Virginia specifics out of the WVDOH documents listed in the references, places them next to the federal baseline, and then follows the bridge through the four activities that matter in practice: design, inspection, repair and load rating.

Read this course as a map, not as a substitute for the documents. Every number below is tied to a named source and edition. This course relies on the WVDOH Bridge Load Rating Manual (2023) and the 2022 NBIS. WVDOH's separate inspection manual was not reviewed in full; inspection-specific items should be confirmed with WVDOH. If you are about to seal a rating, sign an inspection report or close out a critical finding, open the current edition and confirm the number there first.

The federal baseline you are measured against

Before looking at WVDOH's procedures it helps to restate exactly what the 2022 NBIS requires, because the state documents are written to satisfy (and often exceed) these paragraphs. The key provisions for day-to-day practice are:

- **Routine inspection interval (23 CFR 650.311(a)).** Bridges are inspected at regular intervals not to exceed 24 months. Bridges whose deck, superstructure, substructure or culvert is in poor-or-worse condition must be inspected at reduced intervals, and an owner may extend routine intervals to as much as 48 months when every federal criterion (good condition ratings, an inventory rating factor of at least 1.0, no fatigue-prone details, adequate vertical clearance and so on) is met, or up to 72 months under a documented risk-based method approved by FHWA.
- **Underwater inspections** are required at intervals not exceeding 60 months, with reduced intervals for poor underwater conditions and possible extension to 72 months under the federal criteria.
- **Nonredundant steel tension member (NSTM) inspections** are required at intervals not exceeding 24 months, with reduced intervals when NSTM condition is poor; the 2022 rule replaced the old "fracture critical member" vocabulary with NSTM.
- **Interval tolerance (650.311(e)).** An inspection is on time if it is done up to two months after the month it was due for intervals under 24 months, and up to three months after the due month for intervals of 24 months or more. Anything longer requires advance FHWA approval for rare and unusual circumstances.
- **Load rating (650.313(k)).** Each bridge is rated for safe load capacity under Sections 6 and 8 of the AASHTO Manual for Bridge Evaluation. Ratings must be completed as soon as practical but no later than 3 months after the initial inspection, and whenever a change is identified that warrants re-rating, such as a change in condition, reconstruction, new construction, or a change in dead or live load. Routine and special permit loads must be analyzed for each bridge they cross.
- **Load posting (650.313(l)).** Posting is required when legal or routine permit loads exceed what the bridge can carry. Posting must be made as soon as possible but no later than 30 days after a load rating determines the need, and missing or illegible posting signs must be corrected within 30 days of the inspection or notification that finds them.
- **Critical findings (650.313(q)).** Owners must document procedures that, at a minimum, treat as critical any finding that warrants full or partial closure, an NSTM coded 3 or less, a deck, superstructure, substructure or culvert coded 2 or less, or a channel or scour condition coded 2 or less. State DOTs must notify FHWA within 24 hours of discovering a critical finding on the National Highway System and provide monthly written status reports on every critical finding until it is resolved.

Every WVDOH rule in this course is one of three things: a restatement of these minimums, a stricter state choice (shorter interval, earlier trigger, extra legal vehicle), or a procedural detail the federal rule requires the state to define (who calls whom, which form, which database). Keeping that frame in mind makes the state documents far easier to read, and it tells you which numbers you can never relax: a state may be stricter than the NBIS but never looser.

Who may inspect and rate in West Virginia

The NBIS qualification rules in 23 CFR 650.309 apply in West Virginia exactly as they do everywhere else, and WVDOH adds its own documentation and assignment practices on top. The federal floor is worth knowing precisely, because consultants are routinely asked to prove it:

- **Program manager:** a registered Professional Engineer or a person with 10 years of bridge inspection experience, who has completed FHWA-approved comprehensive bridge inspection training with a score of at least 70 percent, and who completes a cumulative 18 hours of FHWA-approved refresher training in each 60-month period.
- **Team leader:** one of four paths: (i) a PE with 6 months of bridge inspection experience; (ii) 5 years of bridge inspection experience; (iii) an ABET-accredited bachelor's degree in engineering or engineering technology, a passed NCEES FE exam and 2 years of experience; or (iv) an ABET-accredited associate's degree and 4 years of experience. Every team leader also needs the FHWA-approved comprehensive course (70 percent or better) and 18 hours of

FHWA-approved refresher training every 60 months, and must give documentation to the program manager of each owner for whom they inspect.

- **NSTM team leader:** all team leader requirements plus an FHWA-approved NSTM inspection course with a passing assessment.
- **Underwater bridge inspection diver:** FHWA-approved underwater bridge inspection training with a passing assessment.
- **Load rating:** performed by, or under the direct supervision of, a registered professional engineer (650.309(d)).
- **Damage and special inspections:** the State must establish documented personnel qualifications for these inspection types.

West Virginia at a glance: the program and its documents

The **West Virginia Division of Highways (WVDOH)**, part of the West Virginia Department of Transportation, owns nearly all public road bridges in the state, because West Virginia's counties do not maintain roads. Its Operations Division and district bridge staff carry out inspections, and its Engineering Division handles load rating under the **WVDOH Bridge Load Rating Manual (2023)**. Load rating results are reported on WVDOH's load rating summary form (DS-25).

Inspection types you will see in the bridge file

The 2022 NBIS defines a set of inspection types, and WVDOH's scheduling, reporting and staffing are organized around them. Knowing which type you are performing tells you the scope, the qualifications required and which interval clock you are resetting:

- **Initial** inspection: the first inspection of a new, replaced or rehabilitated bridge (or one newly added to the inventory). It establishes the baseline condition, inventory data and the starting point for load rating, which must then be completed within 3 months.
- **Routine** inspection: the regularly scheduled inspection that determines physical and functional condition and identifies changes since the last inspection. Most of the bridge file is built from routine inspections.
- **Damage** inspection: an unscheduled inspection after an event such as a vehicle or vessel strike, flood, fire or earthquake, to assess the damage and decide on immediate action.
- **In-depth** inspection: a close-up inspection of one or more members, above or below water, to identify deficiencies not readily detectable in a routine inspection; it may use nondestructive evaluation.
- **Special** inspection: an inspection scheduled at the owner's discretion to monitor a particular known or suspected deficiency, for example a crack, settlement or scour condition being watched between routine inspections.
- **NSTM** inspection: a hands-on inspection of nonredundant steel tension members, led by an NSTM-qualified team leader.
- **Underwater** inspection: inspection of the underwater portion of a bridge substructure and surrounding channel that cannot be inspected visually at low water by wading or probing.
- **Service** inspection: a less intensive check by personnel with general knowledge of bridge maintenance or inspection, used to identify major deficiencies and safety issues between more thorough inspections where the owner's procedures call for it.

The NBIS also requires element-level condition data, collected under the AASHTO Manual for Bridge Element Inspection, for bridges on the National Highway System; many states, including several in the Southeast, collect element data on all

bridges. Element data drives bridge management and preservation decisions, while component condition ratings drive intervals, critical findings and federal performance measures. Inspectors need to do both well.

Inspection intervals in West Virginia

WVDOH applies the federal intervals: routine not to exceed 24 months (reduced for poor condition, extended to 48 months only where WVDOH criteria and federal criteria are met); NSTM not to exceed 24 months; underwater not to exceed 60 months; and the federal tolerance of two or three months depending on interval length. Given the state's many NSTM trusses and two-girder bridges, NSTM inspection is a large part of the workload.

Critical findings and urgent deficiencies in West Virginia

WVDOH applies the federal critical finding definition, with immediate notification to the district and to the State Bridge Engineer's staff, followed by WVDOH's FHWA notification within 24 hours for NHS bridges and monthly status reporting. Chapter 14 of the load rating manual identifies **Priority 1 members**, whose deterioration should prompt immediate engineering review of capacity and posting.

Load rating in West Virginia

Key points from the 2023 WVDOH Bridge Load Rating Manual:

- Load ratings must be completed by the time of the bridge's inventory (initial) inspection and reported on the DS-25.
- The load rating engineer evaluates whether a re-rating is needed after every inspection, considering changes in condition or dead load.
- West Virginia legal loads include the AASHTO specialized hauling vehicles SU4 through SU7, the West Virginia WV-2S2 and 3S2 trucks, lane-type loads, emergency vehicles EV2 and EV3, and the coal resource transportation system (CRTS) trucks SU-40 and SU-45.
- LRFD-designed bridges are rated by LRFR; timber and masonry structures may be rated by ASR or LRFR.
- Postings are based on the strength limit state, not service limit states.

The CRTS vehicles reflect West Virginia's coal haul routes, where heavier trucks may operate under special designation. Bridges on CRTS routes must be rated for those vehicles.

Posting, closure and signs in West Virginia

WVDOH posts bridges according to Chapter 14 of the load rating manual, using strength-based rating factors for legal and specialized vehicles. Required posting must be in place within 30 days of the rating determining the need, and missing or illegible signs must be replaced within 30 days. Inspectors verify signs at each inspection.

New River Gorge Bridge preservation (SEBPP 2025)

The 2025 Southeast Bridge Preservation Partnership meeting was held in Charleston, West Virginia, on April 28 to 30, 2025, and included presentations on the **New River Gorge Bridge**, a 3,030-foot structure with a 1,700-foot weathering steel arch completed in 1977. Burgess & Niple described preservation work including bird screens and drip bars to keep birds and water off steel, capping and sealing details, and work at roller bearings. Weathering steel forms a protective patina only when it can dry; areas kept wet by leaking joints, debris or bird droppings corrode like ordinary steel. West Virginia inspectors should

therefore report persistent wet areas, debris accumulation and leaking joints on weathering steel bridges, and should distinguish a tight, dark patina from flaking, laminar rust, which signals active section loss.

Rating older trusses and two-girder bridges

Many West Virginia bridges are older riveted trusses and two-girder or two-line systems. Rating them requires connection checks (gusset plates, rivets and pins), recognition of NSTMs, and attention to section loss at bearings and floor system connections. Inspectors should measure remaining thickness at pack rust and at gusset plates near the deck line, where moisture concentrates.

Load rating refresher: methods, vehicles and rating factors

Whatever state you work in, a load rating in the NBIS sense is an MBE rating. The 2022 rule incorporates Sections 6 and 8 of the AASHTO Manual for Bridge Evaluation by reference, so the federal requirement is method-neutral but procedure-specific. Three methods remain in use:

- **Load and Resistance Factor Rating (LRFR)**, MBE Section 6 Part A. Ratings are computed at design load (HL-93 inventory and operating), legal load and permit load levels using calibrated load factors, the condition factor and the system factor. Most states require LRFR for bridges designed by LRFD.
- **Load Factor Rating (LFR)**, MBE Section 6 Part B, using the HS-20 truck at inventory and operating levels. Still widely used for older bridges designed under the Standard Specifications.
- **Allowable Stress Rating (ASR)**, also in Part B, generally reserved for timber, masonry and certain older structures where LFR is not appropriate.

The basic rating factor equation is the same idea in every method: $RF = (\text{Capacity} - \text{factored dead load effects} - \text{other permanent effects}) / (\text{factored live load effect including impact})$. A rating factor of 1.0 or more means the bridge can carry the rated vehicle at that level; below 1.0, the vehicle exceeds capacity at that level. The rating in tons is the rating factor times the gross weight of the rating vehicle, which is why states insist that you report rating factors and not just tons.

Legal load ratings use the AASHTO legal vehicles (Type 3, Type 3S2, Type 3-3 and the lane-type legal loads), the specialized hauling vehicles SU4 through SU7, and the emergency vehicles EV2 and EV3 that FHWA required states to evaluate after the FAST Act of 2015 allowed heavier emergency vehicles on the Interstate System and reasonable access routes. Many states add their own legal or permit vehicles, and West Virginia is no exception; see the state-specific section above. Ratings that rely on engineering judgment, field evaluation or load testing must be documented in the rating file, and the rating must reflect the bridge's current condition as reported by the latest inspection, which is why the inspector-to-rater handoff is where most programs succeed or fail.

Quality control, quality assurance and the bridge file

The NBIS requires each State to maintain documented quality control (QC) and quality assurance (QA) procedures for inspection and load rating, and FHWA reviews compliance every year using its metrics for the oversight of the National Bridge Inspection Program. For a practitioner in West Virginia, QC and QA show up as concrete obligations:

- **QC is the producer's job.** A consultant or district team checks its own reports before submission: condition codes match the narrative and photos, element quantities add up, every deficiency has a recommendation, and every rating-relevant change has been flagged to the rater.

- **QA is the owner's job.** WVDOH or its agents independently re-inspect a sample of bridges, review sample reports and ratings, and track trends in coding. Expect QA findings to come back to the original team leader for correction.
- **The bridge file is the evidence.** Plans, inspection reports, photos, load rating calculations and models, posting documentation, scour evaluations and plans of action, and critical finding follow-up all belong in the file. If it is not in the file, an auditor will treat it as not done.
- **Load rating files carry a seal.** Because ratings must be performed by or under the direct supervision of a PE, the rating report is a sealed engineering document. Treat assumptions, condition factors and software versions as part of what you are sealing.

The most common QA findings across Southeastern programs are mundane: an inspection report that lowers a superstructure rating without a load rating review, a posting status in the database that does not match the signs in the field, a scour-critical bridge without a current plan of action, or a critical finding with no documented follow-up. Each one is a coordination failure between people who all did their own piece correctly. This course's scenario walks through how to avoid them in West Virginia.

Locally owned bridges

A large share of the bridges in West Virginia, as in every Southeastern state, belong to counties, cities and other local agencies rather than to the DOT. The NBIS places responsibility for all public-road bridges in the State (other than those owned by federal agencies and tribes) on the State transportation department, which may delegate functions to local owners but remains accountable to FHWA. In practice this means:

- The DOT sets the procedures, maintains the inventory and reports to FHWA, even when a county or consultant performs the inspection.
- Critical findings and posting needs on local bridges must still meet the federal timelines. The DOT's procedure will specify how the local owner is notified, how quickly it must act, and what the DOT does if it does not.
- Local owners often lack in-house bridge engineers. A consultant working for a county may be the only engineer who sees the bridge between inspections, so clear written recommendations, priorities and deadlines in the report matter more than usual.
- Posting and closure on local roads is carried out by the local owner's forces, and sign verification is part of the next inspection. Photograph every posting sign and note its legend.

Writing an inspection report a load rater can use

Most load rating errors start as inspection report gaps. In West Virginia, as elsewhere, the rater often never visits the bridge; the rating reflects whatever the report says. A report that a rater can actually use includes:

- **Quantified section loss.** Not "heavy corrosion at bearings" but the member, location (span, girder, distance from bearing), remaining web or flange thickness measured with calipers or a UT gauge, and the length affected.
- **Changes in dead load.** New overlays (type and thickness), added utilities, replaced railings, sidewalks, sound walls or signs. Dead load increases reduce rating factors directly.
- **Changes in structural behavior.** Frozen bearings, broken diaphragms, cracked or debonded prestressing strands, lost bearing area, settlement, pile damage or undermining. Say what the change means for the load path.
- **Measured geometry where plans are missing.** Member sizes, spacing, span lengths, deck thickness and any reinforcing visible at spalls. For concrete bridges without plans, many states (including Texas, as described in its own course) use special flow charts that depend on this data.

- **Posting signs as found.** Photographs of each sign, its legend, condition and location, and whether the legend matches the current rating and posting status.
- **An explicit request.** If the inspection changed anything that could affect capacity, write "load rating review requested" and say why. Do not assume someone will notice.

Equally, raters should push back when a report lowers a component rating without describing the cause, and should document in the rating file which inspection the rating reflects. The rating date and the inspection date belong side by side, so a later reviewer can see that the rating reflects current condition, as the NBIS requires.

Southeast hazards: flood, hurricane, salt and trucks

Southeastern bridge programs share a set of hazards that shape how WVDOH inspects and rates. Recognizing them helps you anticipate what a reviewer will look for in a West Virginia report:

- **Flood and scour.** Intense rainfall and long periods of high water make scour the leading cause of bridge failure in the region. Post-event damage inspections, plans of action and channel soundings compared across inspections are core skills.
- **Hurricanes and storm surge.** Coastal and Gulf states inspect after hurricanes for unseated superstructures, damaged bearings, debris impact, scour and fender damage; the inspection program usually activates a pre-planned emergency response.
- **Chloride and marine exposure.** Splash zones, tidal piles and decks in coastal areas suffer corrosion-driven cracking and spalling of concrete and section loss of steel. Cracks parallel to corners of concrete members are a classic sign of corrosion underneath.
- **Heavy trucks and specialized haulers.** Logging, agriculture, aggregate, coal and port traffic put heavy short-wheelbase vehicles on rural bridges, which is why many Southeastern states rate their own legal trucks and why SU4 to SU7 ratings and posting matter.
- **Timber and older local bridges.** Many counties still maintain timber bridges and older concrete bridges without plans, which need careful measurement and often conservative ratings.

These hazards also explain why several states in the region adopt intervals shorter than the federal maximums for scour-critical, posted or poor-condition bridges.

Preservation lessons from the Southeast Bridge Preservation Partnership

The **Southeast Bridge Preservation Partnership (SEBPP)** is a regional partnership of state DOTs, FHWA, industry and academia, part of the national bridge preservation partnership network supported by the National Center for Pavement Preservation (NCPPI). Its annual meetings are the best place to see what Southeastern DOTs are actually doing to keep bridges out of poor condition. Several presentations are directly useful to inspectors and raters:

- **Tennessee deck and joint preservation (SEBPP, Atlanta, April 2012).** TDOT's Brian Egli described Tennessee's four deck overlay types: a 3 1/4-inch asphalt overlay with a waterproofing membrane, a 4 1/2-inch reinforced concrete overlay placed after hydrodemolition with a long (about 120-hour) wet cure, a 1 1/2-inch polymer-modified concrete overlay, and a 3/8-inch thin epoxy overlay. Each changes dead load and deck condition, which is exactly the kind of change an inspector should flag for the rater.
- **North Carolina arch feasibility study (SEBPP, April 2017).** NCDOT's John Sloan, PE, presented a study of the Pee Dee River arch bridge. Lessons included eliminating joints where possible, recognizing that cracks parallel to a corner

indicate corrosion of the underlying bar (so crack injection is not the right repair), and using concrete jackets to protect substructure units at the waterline.

- **New River Gorge Bridge preservation (SEBPP, Charleston, West Virginia, April 2025).** Burgess & Niple presented preservation of the 1,700-foot weathering-steel arch, including measures to keep birds and water off steel (bird screens, drip bars), capping and sealing details, and jacking work at roller bearings. Weathering steel only performs when it can dry; inspectors should report persistent wet areas and debris.

The SEBPP held a joint meeting with the Western Bridge Preservation Partnership in Denver in March 2026, and its next meeting is planned for Biloxi, Mississippi, in March 2027. Presentations are posted by the partnership after each meeting and make useful further reading. The common thread across all of them is that preservation decisions depend on inspection data that is quantified, photographed and consistent from cycle to cycle.

SNBI coding: what changes on the inspection form

The 2022 NBIS adopted FHWA's Specifications for the National Bridge Inventory (SNBI, March 2022), which replaces the 1995 Coding Guide. States are transitioning their data systems so that SNBI data is submitted to FHWA; inspectors and raters in West Virginia will see both vocabularies in older files, manuals and checklists for several years.

The changes that matter most for inspectors and raters are these:

- Component condition items keep the familiar 0-9 scale but are renumbered: Deck Condition is B.C.01, Superstructure B.C.02, Substructure B.C.03 and Culvert B.C.04 (formerly Items 58, 59, 60 and 62).
- Channel and waterway behavior is split into separate items: Channel Condition (B.C.09), Channel Protection Condition (B.C.10) and Scour Condition (B.C.11), with Scour Vulnerability (B.AP.03) taking over much of the role of the old Item 113 coding. Underwater Condition is B.C.15.
- Load rating data is reported per rating method and vehicle, with rating factors rather than the old inventory and operating tonnages alone, and the posting status is reported in its own data group (for example B.PS.01, Load Posting Status).
- Inspection events are recorded with their own type, date and interval items (the B.IE group), which is how FHWA's compliance metrics now test whether each inspection type was done on time.
- Span-level data (B.SP items such as span material and span type) feed the extended-interval and risk-screening rules that several Southeastern states, including those discussed in this course series, now use to decide who qualifies for 48-month routine intervals.

The practical lesson for a West Virginia inspector is to code from the SNBI specification and the current WVDOH field guidance, not from memory of the Coding Guide. A wrong condition code is no longer just a data error: under the 2022 rule, codes of 2 or less automatically meet the federal critical finding definition, codes at or below the state's reduced-interval threshold change the inspection schedule, and the posting status item is checked by FHWA against the load rating. Coding has consequences.

Permit loads and overweight vehicles

The 2022 NBIS added an explicit requirement that owners analyze routine and special permit loads for each bridge those loads cross, to verify that the bridge can safely carry them (23 CFR 650.313(k)(3)). For West Virginia practitioners this has several consequences:

- **Routine permits** (annual or blanket permits for vehicles that exceed legal limits but follow standard configurations) must be supported by ratings for the routine permit vehicle on every bridge the permit allows them to use. If a bridge cannot carry the routine permit load, it must be posted or restricted for that load even if it carries legal loads.
- **Special (single-trip) permits** for superloads require a bridge-by-bridge analysis along the route, often with restrictions such as crossing at crawl speed, centered on the bridge, with no other traffic in the span.
- **Rating factors matter more than tons.** A permit analysis compares the specific vehicle's axle loads and spacing with the bridge's capacity; a single tonnage cannot capture that.
- **Inspection must keep up.** A permit route analysis is only as good as the condition data behind it. When an inspection reduces a component rating or finds section loss on a bridge used by heavy permit traffic, the permit office needs to know as quickly as the posting office does.

In the SNBI, the routine permit load evaluation is reported in its own item, and the extended-interval criteria used by several states (including WVDOH where it uses them) require that the routine permit evaluation shows no restriction. Raters should therefore treat the state's routine permit vehicle as a standard part of every rating, not an afterthought.

Closing and reopening a bridge

The NBIS requires each State to develop and document criteria for closing a bridge, considering condition and load-carrying capacity for each legal vehicle (23 CFR 650.313(m)). The MBE adds the long-standing rule of thumb that a bridge that cannot safely carry a minimum gross live load of 3 tons must be closed. In practice, closure decisions in West Virginia follow a sequence every practitioner should know:

- **Recognize.** The inspector identifies a condition that may require closure (collapse or partial collapse, loss of bearing, severe undermining, a critical NSTM crack, a rating below the closure threshold) and treats it as a critical finding.
- **Notify immediately.** Phone first, then write. The owner's representative with authority to close the road must hear about it the same day; the State then meets its own FHWA notification duty.
- **Close physically and in the data.** Barricades and signs go up; the bridge's posting status in the inventory changes to closed; a damage or special inspection documents the closed condition.
- **Repair or replace.** Engineering evaluation, repair design, construction and inspection follow, with a load rating for the repaired condition.
- **Reopen with evidence.** A new inspection and load rating establish that the bridge can carry traffic, with or without posting. The file should show who authorized reopening and on what basis.

Closed bridges are not out of the program. They remain in the inventory, and their barricades and signs must still be checked. Several states also inspect closed bridges on a fixed cycle to confirm that barriers are functioning.

Ten common mistakes, and how to avoid them

Reviewers of Southeastern bridge programs see the same problems again and again. Use this list as a self-check before you submit a West Virginia report or rating:

- Lowering a component rating without describing the defect that justifies it.
- Describing section loss qualitatively, with no thickness measurement or location.
- Failing to request a load rating review after a condition change or added dead load.
- Coding from memory of the 1995 Coding Guide instead of the SNBI and current state guidance.
- Missing the reduced-interval trigger, so a poor-condition bridge stays on a 24-month cycle.

- Treating a critical finding as a routine maintenance recommendation, with no same-day notification.
- Leaving the posting status in the database out of step with the signs in the field.
- Not photographing posting signs, or not noting that a sign is missing or illegible (which starts a 30-day clock).
- Letting a scour plan of action go stale after channel changes or countermeasure work.
- Assuming a delegated local owner will act without a documented follow-up date.

None of these mistakes requires advanced engineering to avoid. They are documentation and communication failures, and they are the issues that most often turn an otherwise sound program into an FHWA compliance finding.

A team leader's field checklist

Before leaving a West Virginia bridge site, a team leader should be able to answer yes to each of these questions. The list pulls together the federal requirements and the WVDOH practices described in this course:

- Have I confirmed the inspection type, the scheduled interval and the due month, and noted any reason the next interval should change?
- Did I inspect every member required for this inspection type, including hands-on access where the type or the owner's procedures require it?
- Is every condition code supported by a written description of the controlling defect, with location, size and photographs?
- Have I recorded element quantities by condition state where element data are collected?
- Did I measure section loss, crack lengths, spall areas, scour depths and clearances rather than estimating them?
- Have I checked every posting sign, recorded its legend and condition, and compared it with the current posting status in the file?
- Did I note any new dead load, damage, repairs or temporary supports since the last inspection, and request a load rating review if needed?
- Did I check the channel against the last soundings and the scour plan of action, if the bridge is over water?
- Have I identified anything that may be a critical finding, and made the same-day phone call before leaving the site?
- Have I written maintenance recommendations with a priority the owner understands, and sent them to the right person?

Teams that use a checklist like this one consistently produce files that survive quality assurance review and FHWA metric assessments. The checklist takes five minutes; correcting a deficient file after the fact can take far longer, and an undetected problem can cost much more.

Questions to ask before your first project in West Virginia

Consultants and local agency engineers new to West Virginia work can avoid most early problems by asking WVDOH a short set of questions before the first inspection or rating is due:

- Which version of the inspection manual, load rating manual and coding guidance applies to this contract, and where are revisions announced?
- Which inspection software and data templates do you require, and who enters or approves the data?
- Which state legal, permit and emergency vehicles must every rating include, and in what software format do you want the model delivered?
- Who do we call, at what phone number, for a possible critical finding outside business hours?
- What are the deadlines for draft and final reports, posting recommendations and inventory updates?

- What qualifications must team leaders, NSTM inspectors, divers and load raters document, and how should the documentation be submitted?
- How are local owners notified of recommendations, and who follows up if they do not act?

Write the answers down and keep them in the project file. They become the basis for your quality control plan and make the state's expectations visible to every member of the team, including new staff who join mid-contract.

Bridge design in West Virginia: WVDOH standards

West Virginia bridge design is governed by the **WVDOH Structure Directives**, the successor to the WVDOH Bridge Design Manual (retitled and approved by the WVDOH Standards Committee on July 6, 2022). The Structure Directives Master Manual covers bridge development, LRFD design criteria, superstructures, foundations, scour and plan preparation, supported by the WVDOH Standard Details Book (Volume 3 for bridge details, including the 1800-series bearing details).

- **Steel-heavy inventory.** Deep valleys favor steel plate girders, trusses and arches; designers must address fatigue, fracture-critical (NSTM) members and redundancy.
- **Bearings.** WVDOH standard bearing sheets specify laminated elastomeric bearings of 60-durometer elastomer designed by AASHTO LRFD Method B.
- **Heavy loads.** New designs must be rated for WVDOH legal loads, including coal resource transportation vehicles, as listed in the 2023 Bridge Load Rating Manual.

Bridge repair in West Virginia

WVDOH district bridge crews and contractors perform repairs; major rehabilitation is designed by WVDOH or consultants. Common West Virginia work includes steel painting and section repair, truss member and floor system repairs, deck replacement, joint and bearing replacement, and landslide-related substructure work. The New River Gorge Bridge preservation work presented at the 2025 SEBPP meeting in Charleston illustrates large-scale painting and access challenges on long spans.

Because WVDOH posts on strength rather than service limit states, any repair to a deteriorated steel member should be followed by a revised strength rating by a structural engineer.

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 WVDOH work in West Virginia crosses that line, call the structural engineer before the crew mobilizes, not after.

Designing a repair in West Virginia: the structural engineer's workflow

Repair work is where design, inspection and load rating meet. In West Virginia a sound repair project follows a predictable sequence, and skipping a step is the most common cause of a repair that has to be redone or a rating that no longer matches the bridge.

- **Start from the inspection record.** Pull the latest routine and special inspection reports, element quantities, photos and any critical finding history from the WVDOH bridge file. Measure section loss and spall extents yourself if the report

does not quantify them well enough to design from.

- **Decide whether the repair is structural.** Cosmetic patching and sealing can usually proceed under maintenance standards. Anything that restores or changes section, alters support or continuity conditions, adds dead load (overlays, jackets, heavier rail) or temporarily removes capacity during construction needs a structural engineer's design and seal.
- **Use WVDOH standards first.** Check whether WVDOH already has a standard repair detail, special provision or approved product list for the work. Non-standard details normally need agency review.
- **Check construction stages.** Many failures happen during repair: removing deteriorated concrete from a pier cap or cutting out a corroded web plate reduces capacity before the new material is placed. Specify shoring, traffic restrictions or a temporary posting for the construction stage when needed.
- **Close the loop with the rater.** Send as-built dimensions, materials and added dead load to the load rater. Under the NBIS the rating must be updated within 3 months of a change that warrants it, and a capacity-restoring repair may allow a posting to be removed.
- **Close the loop with the inspector.** Document the completed repair so the next inspection codes the elements correctly and any open critical finding can be closed in the WVDOH system.

The question field crews ask most often is when to call the structural engineer. The short answer in West Virginia, as everywhere: whenever the repair touches capacity, load path or dead load, whenever section loss or cracking is worse than the report describes, and whenever a critical finding is involved.

Scenario: one bridge, start to finish, in West Virginia

An inspection on a coal haul route finds new section loss in a floor beam end connection. The load rating engineer re-rates for WV legal loads, emergency vehicles and the CRTS SU-45, and finds the bridge cannot safely carry SU-45. Under the manual's strength-based posting rules the bridge is posted for the CRTS vehicle within 30 days, and the DS-25 is updated.

Verify before you rely on it

This course was assembled from the public WVDOH documents listed in the references, reviewed in October 2026. This course relies on the WVDOH Bridge Load Rating Manual (2023) and the 2022 NBIS. WVDOH's separate inspection manual was not reviewed in full; inspection-specific items should be confirmed with WVDOH.

Before you rely on any number in this course for real work, check four things: (1) is there a newer edition, interim memo or instructional bulletin from WVDOH; (2) does the owner of the bridge (state, county, city, toll authority or federal agency) have its own adopted procedures; (3) has your contract or task order imposed a different deliverable schedule; and (4) has WVDOH issued a newer design manual, memorandum or standard repair detail since this review. When the state document and this course disagree, the state document wins. When the state document and the NBIS disagree, the stricter requirement controls, and you should raise the conflict with the WVDOH bridge program manager in writing.

Items this course could not confirm from public sources are listed in the course flags and are written cautiously in the text. They are not hidden: an honest "verify this" is more useful to a practicing engineer than a confident number that turns out to be wrong.

Key takeaways

- The NBIS sets federal minimums; WVDOH procedures may be stricter but never looser.
- WVDOH requires load ratings by the inventory inspection and reports them on the DS-25.

- West Virginia legal loads include WV-2S2, 3S2, EV2/EV3, SU4-SU7 and CRTS trucks SU-40 and SU-45.
- WVDOH posts on the strength limit state, and SEBPP 2025 highlighted weathering-steel preservation on the New River Gorge Bridge.
- WVDOH design: Structure Directives (2022, successor to the Bridge Design Manual) and Standard Details Book Vol. 3.
- SEBPP presentations from Tennessee, North Carolina and West Virginia show how preservation work changes dead load and condition, so inspectors must flag it for raters.
- Federal load rating deadline: no later than 3 months after initial inspection or after a change that warrants re-rating; posting within 30 days of the need.

References

1. 23 CFR Part 650, Subpart C — National Bridge Inspection Standards (final rule published May 6, 2022)
2. FHWA, Specifications for the National Bridge Inventory (SNBI), FHWA-HIF-22-017, March 2022
3. AASHTO, The Manual for Bridge Evaluation, 3rd Edition, 2018 (with interim revisions)
4. WVDOH, Bridge Load Rating Manual, 2023
5. WVDOH Structure Directives Master Manual (2022, current version)
6. WVDOH Standards Committee Meeting minutes, July 6, 2022
7. Egli, B. (TDOT), Preserving Tennessee's Bridge Decks and Joints, Southeast Bridge Preservation Partnership meeting, Atlanta, GA, April 2012
8. Sloan, J., PE (NCDOT), Pee Dee River arch bridge feasibility study, Southeast Bridge Preservation Partnership meeting, April 2017
9. Burgess & Niple, New River Gorge Bridge preservation, Southeast Bridge Preservation Partnership meeting, Charleston, WV, April 28-30, 2025
10. eCFR, 23 CFR 650.311 and 650.313 (current text reviewed October 25, 2026)

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