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# A Management Plan for Historic Bridges In Virginia: The 2024 Update

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**Final Report VTRC 26-R03**

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*A Management Plan for Historic Bridges in Virginia*, published in 2001, identified the management and treatment needs for historic bridges in Virginia (i.e., bridges individually eligible for or listed on the National Register of Historic Places) that were under some measure of state purview. Updates to the plan at 5-year intervals are now required by a 2016 interagency programmatic agreement between the Federal Highway Administration, the U.S. Army Corps of Engineers, Norfolk District, the Tennessee Valley Authority, the Advisory Council on Historic Preservation, the Virginia State Historic Preservation Officer, and the Virginia Department of Transportation (VDOT). This study, the latest update of the 2001 Management Plan, focuses on the 33 Management Plan bridges now under VDOT ownership or purview.

The study, including Appendix B, identifies practices to manage and treat these historic bridges. Technical elements include eyebar deterioration, coatings for metal truss bridges, masonry stabilization, compatible mortar, dismantling pin-connected truss bridges for rehabilitation, and truss bridge capacity. Longer term management issues include threats to bridges posed by modern vehicles, the decision to reduce such traffic on certain historic bridges, the identification of potential alternative uses for such bridges, and nominations of bridges to the National Register of Historic Places. VDOT is actively using the management concepts presented herein. For example, six of the 33 historic bridges have been repaired or rehabilitated during the past 7 years, and another three historic bridges (through trusses in Brunswick and Wythe counties and a deck truss in Bedford County) are expected to be rehabilitated soon.

The Management Plan provides essential information for maintaining historic bridges. For example, the majority (19 of 33) of the historic bridges have some form of stone masonry, and repairs of such structures require specialized methods. Such information helps VDOT provide answers to questions raised by the public and advocacy groups and helps minimize delays of VDOT projects. The stringent standards for defining which bridges are historic, supported by this Plan and the affiliated Historic Structures Task Group, yield a relatively small group of historic bridges, saving VDOT roughly $40,000 to $160,000 annually. The study also recommends that the Virginia Transportation Research Council, with input from the appropriate VDOT district structure and bridge offices, complete the National Register nominations that are now in progress for two bridges and nominate at least one additional National Register-eligible bridge noted herein.

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**FINAL REPORT**

# A MANAGEMENT PLAN FOR HISTORIC BRIDGES IN VIRGINIA: THE 2024 UPDATE

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In Cooperation with the U.S. Department of Transportation
Federal Highway Administration

Virginia Transportation Research Council
(A partnership of the Virginia Department of Transportation
and the University of Virginia since 1948)

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## ABSTRACT

*A Management Plan for Historic Bridges in Virginia*, published in 2001, identified the management and treatment needs for historic bridges in Virginia (i.e., bridges individually eligible for or listed on the National Register of Historic Places) that were under some measure of state purview. Updates to the plan at 5-year intervals are now required by a 2016 interagency programmatic agreement between the Federal Highway Administration, the U.S. Army Corps of Engineers, Norfolk District, the Tennessee Valley Authority, the Advisory Council on Historic Preservation, the Virginia State Historic Preservation Officer, and the Virginia Department of Transportation (VDOT). This study, the latest update of the 2001 Management Plan, focuses on the 33 Management Plan bridges now under VDOT ownership or purview.

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**FINAL REPORT**

# A MANAGEMENT PLAN FOR HISTORIC BRIDGES IN VIRGINIA: THE 2024 UPDATE

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## INTRODUCTION

*A Management Plan for Historic Bridges in Virginia*, originally published in 2001 (Miller et al., 2001), identified the management and treatment needs for 55 historic bridges in Virginia (bridges that were individually eligible for or listed on the National Register of Historic Places and were under some measure of state purview [i.e., that had state structure numbers and were in the state inventory]. This plan was acknowledged by the historic bridge preservation and bridge engineering communities as one of the most effective such plans in the United States. When the plan was completed and implemented, it included recommendations that it be reviewed and updated at least every 10 to 15 years. The 2001 Management Plan was undertaken at the request of the Virginia Department of Transportation (VDOT) State Structure and Bridge Engineer to serve as a management tool for historic bridges under VDOT's purview. It was produced by the Virginia Transportation Research Council (VTRC) in concert with VDOT's Structure and Bridge Division and district structure and bridge engineers and the Virginia Historic Structures Task Group (HSTG) (the interagency group that advises VDOT and other applicable state and federal agencies on questions of historic significance and management of transportation-related structures under VDOT's purview).

The first update of the 2001 Management Plan was undertaken in two phases during the 2010s and constituted an initial scoping phase and a subsequent main phase. The scoping phase, which included collection of information on the current conditions of the bridges that were included on the plan, was completed in 2014 (Miller and Wallingford, 2014). The main phase of this first update was completed in 2017 (Miller, 2018). The main phase of the update entailed collecting information on the current status of the bridges on the Management Plan, including any major changes in the period between the publication of the 2001 Management Plan and 2017. The main phase of the update also addressed management and maintenance issues and updated the recommendations regarding these historic structures provided in the 2001 Management Plan. The 2017 update also included a significant adjustment in the number of bridges actively included on that updated Management Plan. In addition to five bridges that were removed from the plan because of demolition or dismantling, 15 bridges that were under municipal or railroad ownership—and, thus, over which VDOT had extremely limited purview—were taken off the active Management Plan list and placed into a separate Inactive Status category. These bridges were not further updated in the 2017 and subsequent Management Plans, which brought the number of active bridges on the Management Plan to the 35 bridges covered in the 2017 update.

Updates to the Management Plan at 5-year intervals are now required by a 2016 interagency programmatic agreement titled "Programmatic Agreement Among the Federal Highway Administration, the U.S. Army Corps of Engineers, Norfolk District, the Tennessee Valley Authority, the Advisory Council on Historic Preservation, the Virginia State Historic Preservation Officer, and the Virginia Department of Transportation Regarding Transportation Undertakings Subject to Section 106 of the National Historic Preservation Act of 1966," hereafter, 2016 interagency Programmatic Agreement ("Programmatic Agreement," 2016). This agreement covers the management of cultural resources, including bridges, in Virginia. Stipulation III of the agreement specifically treats the management of bridges.

Three additional bridges were added to the Management Plan in 2018 (hereafter, 2018 addendum). These structures are included in the current report. In addition, between 2018 and 2024, five bridges were removed from the plan—three because of demolition and two because of removal from state ownership and associated moving to new locations.

The 2024 update constitutes the latest update of the 2001 Management Plan. This update includes information from the 2017 update and the 2018 addendum and includes the 33 Management Plan bridges now under VDOT ownership or purview. The 2024 update includes information on the current status of the Management Plan bridges, including any major changes occurring between 2017 and 2024. Such changes included changes in National Register status, changes in ownership status, major completed and proposed maintenance and rehabilitation work, damage, deterioration, and in a few cases, dismantling, moving, or demolition of the structure. This update also addresses current management issues and includes expanded and updated maintenance recommendations, plus updates of the recommendations regarding these historic structures provided in the 2001 and 2017 Management Plans.

## PURPOSE AND SCOPE

The purpose of this study was to provide the 2024 update of the original (2001) Management Plan for historic bridges in Virginia, as required by the 2016 interagency Programmatic Agreement ("Programmatic Agreement," 2016). The current update follows the first (2017) update and the 2018 addendum that added three more bridges to the plan. The scope of the current update encompasses the bridges included in the 2001 Management Plan and that currently are under VDOT ownership and are managed by VDOT, plus the three bridges added in the 2018 addendum, for 33 bridges in total.

## METHODS

Three tasks were conducted to achieve the study objective:

1. *Collect information on the current status of the bridges noted in the 2001 Management Plan (Miller et al., 2001), the 2017 Update to the Management Plan (Miller, 2018), and the three bridges added in the 2018 addendum* that are under VDOT purview. VDOT's Structure and Bridge Division and VDOT district structure and bridge offices were

initially contacted via email concerning this information. District structure and bridge engineers were queried as to the current status of the bridges in the 2001 plan, the 2017 update, and the 2018 addendum within their particular district. The current status included any significant changes in condition, any significant work (repairs or rehabilitation) done on these structures since the completion of the 2017 update, changes in ownership, and any changes with regard to listing on the National Register. The information on bridge status received from the VDOT structure and bridge offices was compared with the recommendations for the bridges in the 2001 plan, the 2017 update, and the 2018 addendum to identify which recommendations had been followed.

2. *Collect information to identify the current conditions and on current and upcoming maintenance and management needs of the bridges.* Each VDOT district structure and bridge office having historic bridges within its district, as well as VDOT's Structure and Bridge Division, was consulted regarding information on the relevant historic bridges. Discussions and meetings with the bridge offices typically were conducted via an initial email, with subsequent discussions via phone conference or personal interviews. Site visits to Management Plan bridges under VDOT purview were undertaken as needed.

3. *Evaluate the data and update and finalize recommendations*. This was done in concert with the HSTG, with additional consultation with the district structure and bridge offices and VDOT's Structure and Bridge Division as needed. The information gathered during this task formed the basis of the majority of this report.

## RESULTS AND DISCUSSION

### Overview of the Original 2001 Management Plan and the 2017 Update

The original 2001 Management Plan (Miller et al., 2001), contained sections on the following topics:

- Identification of Issues.
- Collection of background information.
- Engineering elements (design standards, funding, Right-of-Way issues).
- Historic preservation issues (dispute resolution; the *Secretary of the Interior's Standards*).
- Documentation and evaluation elements (background of data gathering, explanation of rating system and significance levels).
- Development of the relational database and the decision matrix (used to compare the various issues and options for each bridge).
- Evaluation of the data and the resulting Management Plan.

These sections essentially are still valid (one exception is the funding section, especially in that transportation enhancement funds are no longer available to Departments of Transportation). These sections from the 2001 report effectively constitute background information for the later updated plans and were not duplicated in the subsequent updates (the

2017 update and the current 2024 update). The two appendices from the original plan remain as part of subsequent plan updates. Appendix A listed the bridges included in the plan, as well as bridges that had previously been identified as historically significant, but at the time of the completion of the original Management Plan had been programmed, demolished, dismantled, or replaced. Appendix B contained the management information and recommendations for each bridge that was currently on the Management Plan. The specific references and citations in the original Management Plan and the subsequent updates can be found in those reports.

The 2001 Management Plan included recommendations that the plan be reviewed and updated at least every 10 to 15 years. The first update of the 2001 Management Plan was undertaken during the 2010s in two phases: an initial scoping phase and a subsequent main phase. The scoping phase, which included the collection of information on updates and changes, including bridge work done between 2000 and 2013, and the current conditions of these bridges, was completed in 2014 (Miller and Wallingford, 2014). The main phase of this first update was completed in 2017 (Miller, 2018). The main phase of the 2017 update entailed collecting information on the current status of the Management Plan bridges, including any major changes in the period between the publication of the 2001 Management Plan and 2017. The main phase of the update also addressed current management issues, particularly providing expanded and updated maintenance recommendations.

As noted in the Introduction, the original 2001 Management Plan included 55 historically significant bridges that had state structure numbers and were in the state inventory. Sixteen of these were historically significant bridges which were owned by municipalities or railroads, carried vehicular traffic, and had state structure numbers, but over which VDOT had limited (and in some case virtually no) purview. In the cases of two of the railroad bridges, VDOT inspected the structures and made recommendations for repairs, but had no additional control over the bridges. In the majority of cases, VDOT's control over these municipal or railroad bridges was limited to the responsibility for scheduling required inspections if the owner failed to inspect the structure within a specified period after the inspection due date.

The two railroad bridges previously noted were transferred to VDOT in 2014. Between 2000 and 2017, two historic bridges were transferred by VDOT—one to a county and one to a municipality. One historic city bridge was demolished by its municipality in 2009–2010. Given the extremely limited association of VDOT with the remaining 15 bridges under municipal ownership, after discussions with district and central office structure and bridge engineers, and members of the HSTG, it was determined most feasible to place these structures into an "Inactive Status" category in regard to the Management Plan. No further updates to recommended treatments for the Inactive Status bridges are anticipated as part of the Management Plan.

In addition to the 15 bridges placed on the Inactive Status list, five bridges were removed from the Management Plan because of demolition or dismantling prior to 2017. These demolition/dismantling actions were in accordance with recommended treatments in the 2001 Management Plan. The remaining 35 bridges, all under VDOT ownership or purview, constituted the 2017 Management Plan bridges. The 2017 update included an updated Appendix A and Appendix B from the 2001 Management Plan. Listings of the Inactive Status bridges and

other structures that have been removed from the plan can be found in Appendix A of this report as well as Appendix A of the 2017 update.

The emphasis in the 2017 update of the Management Plan was on management and maintenance needs, on the recordation of work completed on each bridge after the previous update, on planned work, and on updated management recommendations for each bridge. The 2017 update included an updated Appendix A from the 2001 Management Plan, including listings of active bridges in the plan, the Inactive Status bridges, and bridges that had been removed from the plan because of being dismantled or demolished. A substantially updated Appendix B was also included, in order to facilitate comparison and tracking of information and recommendations for each bridge. Appendix B in the 2017 update contained, for each bridge:

- Original 2001 Management Plan sections for the bridge, including the recommendations.
- 2017 updated information and updated recommendations for the bridge.
- An image of the bridge.

## Changes in Management Plan Bridges and 2024 Management Plan Bridge Status

Three additional bridges were added to the Management Plan in the 2018 addendum. These structures are included in the 2024 update. In addition, between 2018 and 2024, five bridges were removed from the plan—three because of demolition and two because of removal from state ownership and moving to new locations.

The 2024 update constitutes the latest update of the 2001 Management Plan. This update includes information from the 2017 update and the 2018 addendum and includes the 33 Management Plan bridges now under VDOT ownership or purview. The 2024 update includes information on the current status of the Management Plan bridges, including any major changes occurring between 2017 and 2024. Such changes included changes in National Register status, changes in ownership status, major completed and proposed maintenance and rehabilitation work, damage, deterioration, and in a few cases, dismantling, moving, or demolition of the structure. This update also addresses current management issues, and includes expanded and updated maintenance recommendations, plus updates the recommendations regarding these historic structures provided in the 2001 and 2017 Management Plans.

The two appendices (A and B) from the original (2001) Management Plan and the 2017 update have been adapted as needed for the present (2024) update. Appendix A contains the list of bridges included in this study, noting any changes from the bridges included in the previous Management Plans. Separate lists of bridges under environmental review, bridges that have been removed from the Management Plan, and the Inactive Status bridges are included for reference. Appendix B contains the separate Management Plan recommendations for each bridge currently in the plan. Similar to the format used in the 2017 update, for ease of reference and information comparison and tracking, Appendix B contains the following information for each bridge currently on the Management Plan, in the following order:

- Original 2001 Management Plan sections for the bridge, including the recommendations.
- 2017 updated information and updated recommendations for the bridge.

- 2024 updated information and updated recommendations for the bridge.
- An image of the bridge.

As was the case with the 2017 update, the emphasis in the 2024 update of the Management Plan is on management and maintenance needs, on the recordation of work completed on each bridge after the previous update, on needed and planned work, and on updated management recommendations for each bridge.

All of the bridges cited in this report were among the bridges included in the original 2001 *A Management Plan for Historic Bridges in Virginia* (Miller et al., 2001) and the 2017 update (Miller, 2018), with the addition of the three bridges (Chesterfield County Structure No. 1900, Montgomery County Structure No. 9003, and Rockingham County Structure No. 6166) that were added in the 2018 addendum. The 2018 addendum did not involve a published VTRC report, but rather an HSTG review and recommendation that was accepted by the State Historic Preservation Office [Virginia Department of Historic Resources, hereinafter "VDHR"].

The Management Plan bridges were not confined to one particular type of bridge construction, rather historic significance (i.e., individual eligibility for, or listing on, the National Register) was the unifying criterion for inclusion. A variety of bridge types are included in the current plan: metal truss bridges, wooden covered bridges, masonry and concrete arch bridges, non-arched concrete bridges, an aluminum triangular box beam bridge, and an early steel beam semi-integral bridge.

## Overall Status Updates for the Management Plan Bridges

### Management Plan Active Status: Bridges Included on the Management Plan

The HSTG met in September 2024 to review and update the treatment recommendations for all Management Plan bridges not currently in environmental review. Brief descriptions of each of the 33 current Management Plan bridges organized by district, including the type of construction and age, are included in Appendix A. Appendix A also contains listings of the previous Management Plan bridges (i.e., noted for reference). Appendix B provides the details concerning changes to the 33 Management Plan bridges and recommendations. Changes to a bridge since the original 2001 Management Plan and the 2017 update are briefly described, and how these changes relate to/are in accordance with the recommendations made in the 2001 Management Plan and 2017 update (Miller, 2018; Miller et al., 2001) regarding the bridge are noted. If no changes were made to a bridge (generally, if no bridge work has been recorded since 2017), this information is also noted.

Of the 33 bridges remaining under VDOT purview and on the Management Plan, 6 have undergone some degree of repair or rehabilitation since 2017. This work was in accordance with the recommendations for each bridge in the 2001 Management Plan (or in the case of the bridge added in 2018, the 2018 addendum). Five of these rehabilitations involve through trusses: Botetourt County Structure No. 6100; Botetourt County Structure No. 6386; Culpeper County Structure No. 6906, Loudoun County Structure No. 6051; Prince William County Structure No. 6023. In addition, Montgomery County Structure No. 9003, a pony truss bridge added to the

Management Plan in 2018, had been rehabilitated in 2017; additional work was done in 2020 to remove utility lines and conduit from the bridge.

Major rehabilitations for 3 additional Management Plan truss bridges are scheduled to begin shortly: Two of these rehabilitations are through truss bridges: Brunswick County Structure No. 6104 and Wythe County Structure 6016, and one is a deck truss bridge: Bedford County Structure 6087. As with the other recently rehabilitated trusses, planning and the proposed work is in accordance with the original (2001) recommendations for each bridge.

For reference, the following are the 33 current Management Plan bridges, listed by VDOT district. The VDOT district number appears in parentheses after the name of the district; common and/or official names, as applicable, are given in parentheses after the bridge structure number. One bridge currently in Section 106 review is noted. More detailed information on these structures can be found in Appendix A and Appendix B of this report.

Bristol District (1)

- Bland County Structure No. 1021
- Wythe County Structure No. 6016
- Wythe County [no structure number] (Southwestern Turnpike Company Bridge)

Salem District (2)

- Bedford County Structure No. 6087 (Elk Creek Deck Truss)
- Botetourt County Structure No. 6100 (McKalaster Truss; McAllister Truss)
- Botetourt County Structure No. 6386 (Phoenix Truss Bridge)
- Montgomery County Structure No. 9003 (Bowstring Truss Bridge)

Lynchburg District (3)

- Appomattox County Structure No. 1002
- Nelson County Structure No. 6070 (James River and Kanawha Canal Owens Creek Viaduct)

Richmond District (4)

- Brunswick County Structure No. 6104 (Gholson's Bridge)
- Chesterfield County Structure No. 1900 (Campbell's Bridge; Aluminum Bridge)
- Chesterfield County [no structure number] (Falling Creek Bridge)
- Dinwiddie County Structure No. 1005
- Henrico County Structure No. 1001

Culpeper District (7)

- Culpeper County Structure No. 6906 (Waterloo Bridge).

Staunton District (8)

- Alleghany County Structure No. 9007 (Humpback Bridge)
- Augusta County Structure No. 6113
- Augusta County Structure No. 6149 (Knightly Bridge) [Currently under Section 106 review.]
- Augusta County Structure No. 6165
- Augusta County Structure No. 6553
- Augusta County Structure No. 6997 (Valley Railroad Bridge)
- Frederick County Structure No. 6903

- Highland County Structure No. 6034 (Lane Truss Bridge)
- Page County Structure No. 9001 (formerly No. 1990)
- Rockbridge County Structure No. 1012
- Rockbridge County Structure No. 6145 (Goshen Bridge)
- Rockingham County Structure No. 6166
- Shenandoah County Structure No. 6078 (Meems Bottom Covered Bridge)

Northern Virginia District (9)

- Arlington County Structure No. 5020
- Loudoun County Structure No. 1025 (Aldie Bridge; Little River Turnpike Bridge)
- Loudoun County Structure No. 6051 (Catoctin Creek Bridge; Featherbed Lane Bridge; John G. Lewis Memorial Bridge)
- Loudoun County Structure No. 6088 (Hibbs Bridge)
- Prince William County Structure No. 6023 (Nokesville Bridge)

*Management Plan Bridges in Active Project Planning or Rehabilitation*

As in prior iterations of the Management Plan, bridges in active project planning or rehabilitation are not extensively considered and are not subject to intensive review or recommendation by the HSTG during a current update. Such bridges were noted to the HSTG, but did not undergo detailed discussion. The three bridges for which major rehabilitation projects are scheduled to begin shortly are noted in the previous section.

*Management Plan Bridges in Section 106 Review*

As with bridges in active project planning or rehabilitation, bridges under Section 106 review are not subject to intensive review and recommendation by the HSTG during a current update. One of the 33 Management Plan bridges is currently in Section 106 review, and for this reason, was not reviewed by the HSTG for updated recommendations during the current 2024 update of the Management Plan. Section 106 of the Historic Preservation Act of 1966 (as amended) affects projects with one or more federal components (funding, licensing, or permits), requiring agencies to take into account the effects of their undertakings on historic properties in consultation with the State Historic Preservation Office, the Advisory Council on Historic Preservation, and other stakeholders and consulting parties. In the case of bridges, these discussions usually result in a treatment plan for the structure. Generally, in Virginia, these discussions involve the VDOT district structure and bridge and cultural resources staff, stakeholders (local and otherwise), and the various preservation offices required by statute (the VDHR and the Advisory Council on Historic Preservation). Legislation defines the Section 106 procedures, including dispute resolution (36 CFR, Part 800). These discussions are often lengthy and involve the preferences of local stakeholders and the expertise of the appropriate Structure and Bridge personnel. State-level review involves similar requirements, without the federal components. Accordingly, in the case of the Management Plan bridge currently under such review, the HSTG defers to these individuals and groups who are specifically involved by statute, and are not making updated recommendations for these particular bridges during this iteration of the Management Plan.

## Status Changes (post-2017) for Former Management Plan Bridges: Bridges Removed from the Management Plan Because of Demolition, Dismantling, or Moving

Five bridges have been removed from the Management Plan between 2017 and 2024 because of demolition, dismantling, or moving (after being removed from state ownership). These bridges are:

- Charlotte County Structure No. 6902 (Clarkton Bridge), removed in 2018
- Augusta County Structure No. 6027, moved to a new site in 2024
- Augusta County Structure No. 6147, moved to a new site in 2024
- Nelson County Structure No. 6052 (Oak Ridge Truss Bridge), in the process of demolition in 2024
- Alleghany County Structure No. 9008 (McKinney's Hollow Bridge), in the process of demolition in 2024

In addition, the remaining (center) span of Augusta County Structure No. 6729 was removed in 2024. This three-span through truss bridge was removed from the Management Plan in 2017 as demolition was beginning. The end spans were demolished shortly afterward. However, the center span was left in place, with no public access, until utility lines could be relocated. This center span was removed from state ownership and was moved to a new site in 2024.

## Major Issues Identified Regarding Historic Bridge Management, Planning, and Maintenance in Virginia

During this study, a number of significant issues were identified regarding the management and maintenance of historic bridges in Virginia. Many of these issues relate to, or expand on, issues identified and noted in the 2017 update. These issues are:

- General funding issues
- General issues regarding metal and metal truss bridges (including potential lifespan)
- Eyebar deterioration
- Coatings issues for metal truss bridges: painting, metalizing, and galvanizing
- Dismantling pin-connected truss bridges for painting or rehabilitation
- Threats to bridges posed by modern vehicles
- Truss bridge capacity and overloading potential
- Reducing or eliminating vehicular traffic on certain historic bridges
- Identification of potential adaptive / alternative use
- Bridges with stone masonry elements / historic masonry study
- Masonry stabilization
- Compatible mortar
- Percentage-of-replacement issues: the potential effect of the replacement of a large percentage of elements or materials on the bridge's historic significance

These issues are discussed in the following sections.

## General Funding Issues

Currently, there is no statewide funding dedicated specifically for the maintenance, repair, and/or rehabilitation of historic bridges, structures which often require specialized methods and materials. In addition, previously available transportation enhancement funds are no longer available to Departments of Transportation. While Virginia's State of Good Repair bridge program was developed primarily to act as the statewide capital improvement and replacement program for bridges, it can also be used to improve historic bridges in certain circumstances. Districts may pursue the use of State of Good Repair funds for historic bridges, but they must consider these expenditures within the context of the needs of their overall bridge inventories and available funding. The HSTG previously has endorsed the idea of identifying the current and projected funding needs for the management and maintenance of historic bridges in Virginia. Identifying current and future funding needs will permit effective long-term planning and budgeting for the preservation of these structures.

## General Issues Regarding Metal and Metal Truss Bridges (Including Potential Lifespan)

A continuing—and increasingly significant—issue that was noted during the past two decades is the accelerated deterioration of many of the older metal truss bridges on the Management Plan. Bridges that were in relatively good or fair condition at the time of the original plan in 2001 have shown marked, and in some cases, rapid deterioration in the last 20 years. This deterioration is especially apparent on wrought iron bridges, although it has been noted on older steel bridges as well. Of the eight wrought iron truss bridges on the current Management Plan, all have exhibited at least some increase—and in some cases a marked increase—in deterioration since the publication of the original Management Plan.

The metal truss bridges included in the 2024 update of the Management Plan are constructed of either wrought iron or steel members. In general, metal truss bridges built before 1890 should be assumed to be constructed of wrought iron. Metal truss bridges built ca. 1890, and into the mid-1890s, may contain both wrought iron and steel elements. Metal truss bridges built after the late 1890s are likely to be constructed of steel.

In addition, prior to the early 20th century, metal trusses were commonly pin-connected. This technology is typically fracture-critical and non-redundant (i.e., when a member fails, the bridge, or a major part of it, could collapse).

An essential question regarding historic metal truss bridges is as follows: What is the potential life span of (1) wrought iron bridges and (2) steel truss bridges? Wrought iron on extant bridges in Virginia has a history from ca. 1870 to the present. Steel on extant bridges in Virginia has a history from ca. 1890 to the present. Virginia does not have metal truss bridge structures that are more than approximately 155 years old for wrought iron or more than approximately 135 years old for steel. Given the accelerated deterioration witnessed in many of these bridges in the period between the original 2001 Management Plan and the 2017 update, and from the 2017 update to the time of the 2024 update, it appears likely that some of these structures may be approaching the end of their material lives, at least as regards carrying the demands of modern

traffic. The general stresses of aging metal, metal fatigue (from well over a century of traffic use), finite corrosion resistance, and loads greater than anticipated during design are likely all factors in this deterioration, which in some cases has continued to occur despite repairs, painting, and other maintenance procedures. The impacts from the corrosive effects of winter brine and salt treatments must also be considered.

**Eyebar Deterioration**

Two types of eyebars can be problematic elements in older pin-connected metal truss bridges, including historic structures:

- Loop welded (also known as forge welded, loop forged, or loop bars). These eyebars were fabricated from bar stock (square, rectangular, or round in section) by heating the end of the bar, bending it around a pin, and forging the tip into a notch on the straight shank of the bar. Such bars frequently fail along the forge line (McKeel and Miller, 2011).

- Laminated die forged eyebars. These eyebars were originally fabricated by piling and welding (i.e., putting several thicknesses of metal together, then heating and forging them together in a die). This technology is also known as "false die forged eyebars." Delamination is a common failure in such eyebars, and by the early 20th century, the piling and welding process was being advised against for fabricating steel eyebars. Early steel laminated die forged bars were found on the Goshen Bridge (Rockbridge County Structure No. 6145), a Management Plan bridge, when it was rehabilitated in 2001–2002, and these bars were replaced (McKeel et al., 2006). Delamination issues were observed in wrought iron piled and welded die forged eyebars on the Nokesville Bridge (Prince William County Structure No. 6023), a Management Plan bridge. During Section 106 review, stakeholders insisted on the bridge being repaired and returned to vehicular service. The rehabilitation to allow this bridge to safely carry vehicular traffic eventually required the repaired truss to be set on a modern beam bridge that carries the weight of both the historic bridge and vehicular traffic. A former Management Plan bridge, the Oak Ridge Bridge (Nelson County Structure No. 6052), was constructed in the same year as the Nokesville Bridge. The Oak Ridge Bridge also was made of wrought iron and had the same manufacturer (the Keystone Bridge Company), and it appeared to use the same eyebar technology. After extensive study and Section 106 review, it was determined that it was not feasible to strengthen this bridge to safely carry modern vehicular traffic (in particular, even with strengthening, the weight of some of the county emergency vehicles would exceed the capacity of the rehabilitated bridge, and there was no reasonable detour for emergency traffic). The bridge has been documented and it is now in the process of demolition and replacement; the eyebars will be examined to provide more documentation of the construction practices.

**Coatings Issues for Metal Truss Bridges: Painting, Metallizing and Galvanizing**

The application of various coatings to historic metal truss bridges was being anticipated at the time of the original 2001 Management Plan. The original coatings, primarily lead-based

paint, are usually hazardous and are no longer permitted. Successful outcomes of coating applications depend heavily on the types of metal and coatings involved. For older metal bridges, there are three commonly used types of coatings: painting, metallizing, and galvanizing.

*Painting*

As regards metal truss bridges: both wrought iron truss bridges and steel truss bridges can be painted with non-lead-based paints. Wrought iron also sometimes will form a protective patina. At the time of the 2001 Management Plan, this was a factor with at least one VDOT wrought iron historic bridge, Botetourt County Structure No. 6386. However, by the 2010s, this patina noticeably was not as stable as it was in 2001, and the wrought iron was showing areas of deterioration. This bridge and several other wrought iron bridges on the current Management Plan (notably Botetourt County Structure No. 6100 and Montgomery County No. 9003) recently have been painted as part of rehabilitation projects, and are performing well.

*Metallizing and Galvanizing*

It cannot be too strongly emphasized that wrought iron is **not** compatible with metallizing or galvanizing, and no wrought iron bridge should be given these treatments. However, metallizing or galvanizing are generally feasible for steel as long as the metal is properly prepared and the coating is properly applied.

During the rehabilitation of the 1890 National Register-listed Goshen truss bridge (Rockbridge County Structure No. 6145), the structure was disassembled, and deteriorated elements were repaired and in some cases—such as the delaminating eyebars—replaced with appropriate new elements. The lead paint was completely removed. The structure, which was constructed of an early type of steel, was galvanized. The outcome has generally been good: the truss was rated in "poor" condition prior to the rehabilitation, and is now rated in "good" condition. It also should be noted that in addition to the disassembly and repair, an additional factor contributing to the bridge's "good" condition over the past 20-plus years is likely its location on a low-volume, dead-end road. The current average daily traffic count is 104, and threats from overweight vehicles are minimal.

In contrast, the metallizing applied to the National Register-listed Loudoun County Structure No. 6051, the 1890 Catoctin Creek truss bridge (also known as the Featherbed Lane bridge and the John G. Lewis Memorial bridge), produced a much different outcome. After a multi-year planning project, the bridge underwent an extensive rehabilitation in 2003. This included repairs to the superstructure, removal of the lead paint, and metallization. The structure was not disassembled. At the time that the project was planned, the construction date was uncertain. A date of 1889 (for its original erection on a nearby site) had been estimated, but dates of ca. 1900 and 1925 also had been reported for this bridge. It was believed to be a steel structure (for which metallizing would be an appropriate treatment). Unfortunately, the bridge was, at least primarily, a late wrought iron structure (possibly with some steel elements), built at the time that wrought iron construction was being replaced by steel in bridges. The completion date of the bridge was subsequently documented as 1890. By 2013, random cracks, likely related to the

metallizing, were found during inspection. The posting was reduced to 3 tons, and as part of the treatment planning for the truss, Section 106 review was undertaken on this bridge.

As part of the Section 106 review for Loudoun County Structure No. 6051, then-VDOT Northern Virginia District Structure and Bridge Engineer Gary A. Runco presented a useful overview of the issues regarding metalizing and galvanizing wrought iron and steel bridges (Gary A. Runco, personal communication, January 24, 2017). In a PowerPoint presentation given to stakeholders and other interested parties, he noted the following:

> **"Process of Metallizing:** Metallizing is basically a method of galvanizing. It refers to the thermal spraying of zinc (or aluminum alloys) as a coating directly onto steel surfaces. The coatings are created by using a heat source (either flame or electric arc) to melt the metal which is supplied as a wire. An airstream sprays the molten metal onto the steel surface. Once the molten metal strikes the steel it solidifies quickly to become a coating. Metallizing is applied on a prepared/cleaned surface. Surface preparation is typically done by abrasive blasting. Chemical etching sometimes has been used for surface preparation."
> "The chemical make-up and manufacture of wrought iron is different from that of steel. Wrought iron will typically contain less than 0.1% carbon while [early] steels will range from 0.3 to 0.6% carbon. The manufacturing processes of that day were inconsistent which made the control of the levels of carbon and other impurities difficult. The result is that the chemical makeup of the finished product can be inconsistent. That could mean that the chemical makeup of individual members of a truss could be different and therefore produce varying visual and bonding effects when applying coatings. According to industry, the current galvanization process is set up for modern day structural steels. Structural members are blast cleaned, put through an acid bath, rinsed a number of times, pre-flux agent applied and dipped in molten zinc. Because of the inconsistencies in the chemical makeup and manufacturing process of wrought iron, galvanizing is unpredictable."

Besides Rockbridge County Structure No. 6145 and Loudoun County Structure No. 6051, a query to all nine VDOT district structure and bridge offices at the time of the 2017 Management Plan update revealed that no other historic VDOT bridges have been galvanized or metallized to date. However, in VDOT's Hampton Roads District, a few locations at the Jamestown-Scotland Ferry have metallized components on the (steel) aprons. The metallizing was done in the mid-1990s, and the district reports that these components are performing well.

After another multi-year environmental review and planning process in the late 2010s and early 2020s, Loudoun County Structure No. 6051 underwent another rehabilitation. The bridge was closed in 2021 and was reopened in 2023. Rehabilitation to allow this bridge to safely carry vehicular traffic required the repaired truss to be set on a modern beam bridge that carries the vehicular traffic, with added support from a new pier.

### Dismantling Pin-Connected Truss Bridges for Painting or Rehabilitation

Comparative results of rehabilitation projects that have been done without taking a truss bridge apart versus partial dismantling of the truss have been instructive. As noted in the 2017 update of the Management Plan, the Staunton District Structure and Bridge office tried to avoid dismantling in order to minimize stress on the members of several truss bridges (Augusta County Structure No. 6027, Augusta County Structure No. 6147, and Augusta County Structure No. 6149). However, they discovered after a few years that corrosion was continuing. Not taking the

structure apart prevented fully accessing, inspecting, and addressing joints and other areas that contained substantial pack rust and other deterioration. Taking a truss apart as part of rehabilitation allows better inspection and cleaning of truss members, and repair of damaged members, but the dismantling of a truss bridge can also increase stress on older structures. It is also much more expensive. Ultimately, the work done on these Augusta County structures, coupled with modern vehicle demands, was not enough to prevent continued deterioration. Despite additional repairs, all of these structures eventually had to be permanently closed to vehicular traffic. In 2024, Augusta County Structure No. 6027 and Augusta County Structure No. 6147 were removed from state ownership (and from the Management Plan). They have been moved from their original sites to new locations. Augusta County Structure No. 6149 is in Section 106 review at the time that this report is being completed.

The rehabilitation of the Goshen truss (Rockbridge County Structure No. 6145), which involved taking the bridge apart, then repairing, galvanizing, and reassembling the truss, was an involved and expensive project (McKeel et al., 2006). However, the result was an historic truss which, well over two decades after its rehabilitation, remains in good condition and is serviceable for the lightly traveled road that it carries. A procedure used during the Goshen project to facilitate the removal of the pins was helpful in minimizing stress to the bridge members during disassembly. Truss pins in early trusses are often heavily corroded, with substantial section loss; removal of such pins in order to disassemble the truss can be difficult (McKeel et al., 2006). In the Goshen project, a torch was used to pierce the centers of the pins in order to collapse/shrink the diameter of the pins. This allowed the pins to be removed with less stress to the truss members. A retired shipyard worker who was watching the disassembly of the bridge observed the contractor struggling with removing the pins and suggested this approach (McKeel et al., 2006; Park W. Thompson, personal communication, September 15, 2015).

**Threats to Bridges Posed by Modern Vehicles**

Modern vehicles pose an existential threat to historic bridges. Despite the presence of clearly visible signs limiting vehicle height, width and weight, drivers occasionally either ignore or fail to note these limits, imperiling the structures and their own lives. By continuing to permit 21st-century trucks on 19th- and early 20th-century structures, the small but very real possibility of losing the structures entirely is allowed.

**Truss Bridge Capacity and Overloading Potential**

The majority of VDOT's historic bridges date from the pre-automobile and early automotive eras, and were designed to carry loads that were much lower than modern demands. Many early truss bridges, for example, were originally designed or load tested to capacities in the 5 to 9 tons range. Records indicate that early load testing was generally done (1) in the later 19th century, by driving a heavily loaded wagon or a herd of cattle over the bridge, or (2) in the early 20th century, by testing the bridge with a road roller or truck(s) of known weight (generally in the range of 12 to 15 tons). As early truss bridges age, their capacity may decrease, hence the posted limits on many of these structures, and the ongoing examination of various strategies to strengthen these structures.

Overloading is a constant, serious threat to older bridges, particularly metal truss bridges. Modern vehicles, both personal and commercial vehicles, as well as agricultural machinery and construction equipment, are increasing in size and weight. This is especially true of vital emergency vehicles such as rescue and fire equipment: a single modern ambulance or a smaller fire truck can easily exceed 10 tons in weight, exclusive of crew. The failure of the truss bridge carrying Route 713 over Big Walker Creek in Giles County in 2008 provides a vivid and local example of this risk: this truss failed when a concrete truck in excess of 26 tons drove onto a truss bridge that was clearly posted for 8 tons (Adam D. Matteo, personal communication, April 26, 2017). As was noted previously, rehabilitation and strengthening of the 1882 Oak Ridge Bridge (Nelson County Structure No. 6052) was not feasible because of the increased weight of modern emergency vehicles that a bridge at this crossing would have to carry.

**Reduction or Elimination of Vehicular Traffic on Certain Historic Bridges**

In the cases of metal truss bridges that have been closed to vehicular traffic and turned to adaptive uses (such as pedestrian and bicycle use), the observed deterioration has been dramatically reduced or slowed. Conversely, in a number of cases where modern traffic has been allowed to continue on historic metal truss bridges, deterioration has continued, or even accelerated. Therefore, particularly in the cases of the more fragile and deteriorating metal truss bridges, it appears likely that limiting or removing vehicular traffic from these structures—in addition to regular inspection, maintenance, and, where warranted, more extensive rehabilitation work—will substantially increase the likelihood that these historic structures will survive into future decades.

Over-height and overweight vehicles pose an additional risk wherever historic bridges carry vehicular traffic. Many of these aging structures have vertical and horizontal clearances that are well below today's standards. This concern is compounded by the fact that many, if not most, of these structures are fracture-critical, meaning that the loss of any primary member would result in the failure of the structure, heightening the concern about non-traditional loads. The 2013 Skagit River Bridge collapse (I-5 in Mount Vernon, Washington), which was caused by an impact from an over-height vehicle, provides a very real reminder of this vulnerability (Adam D. Matteo, personal communication, April 26, 2017).

Several recent cases among Virginia's Management Plan bridges illustrate the risks from over-height and overweight vehicles. In 2021, Brunswick County Structure No. 6104 (Gholson's bridge, an 1884 wrought iron through truss) had its portal frame bracing ripped loose by a vehicle impact. The bridge has been closed since then, as a planned rehabilitation project had to be expanded because of the additional damage. Shenandoah County Structure No. 6078 (Meems Bottom Bridge), an 1894 wooden truss covered bridge, has been repeatedly struck and damaged by over-height and overweight vehicles, particularly in its portal areas, and has been closed on a number of occasions to assess and repair the damage. Nor are concrete structures particularly immune to impacts from vehicles: as an example, in 2013 an over-height vehicle struck and badly damaged the portals of Dinwiddie County Structure No. 1005, a 1926 concrete through arch. All of these structures required extensive repairs because of the vehicle impacts.

Other Management Plan bridges have had even greater damage from modern traffic, particularly overweight vehicles. It should be noted that the original Management Plan recommendation made by the HSTG for the Clarkton Bridge (Charlotte County Structure No. 6902, a multi-span through truss built in 1901), stated that "Repeated gross abuse of the posted 3-ton weight limit by overweight vehicles (including logging trucks) has been a major factor in the deterioration of this structure." An attempt to adapt the already badly deteriorated bridge as a pedestrian structure ultimately was not successful, and the bridge was demolished in 2018. In additional examples, despite repeated closures and repairs, the demands of modern traffic, including overweight vehicles, were a factor in the deterioration, recent permanent closing, and subsequent removals of two of the Management Plan truss bridges in Augusta County (Augusta County Structure No. 6027, a pony truss built in 1898, and Augusta County No. 6147, a through truss built between 1903 and 1904).

For these reasons, (1) the reduction or elimination of vehicular traffic on fragile/deteriorating historic bridges, particularly metal truss bridges, and (2) the identification of potential adaptive uses, are of benefit in preserving VDOT's historic bridges. There is strong support for this concept from VDOT's Structure and Bridge Division and district structure and bridge offices, as well as the HSTG.

The concept of taking vehicular traffic off deteriorated historic bridges previously has been cited in the 2017 update of the Management Plan. It is also included in the VDOT *Structure and Bridge* Manual. Chapter 32 of the Manual (Maintenance and Repair—Repair/Pres., Rehab. or Repl.: Decision Process Requirements and Recommendations [File No. 32.02-2]—Chapter 32, Section 2-02) contains the following guidance for historic bridges:

> Many historic structures were designed to sustain loads significantly lower than those associated with modern trucks, so these bridges are highly susceptible to damage or collapse from vehicles that exceed weight, height, or width limits. Given their sensitivity to modern trucks, the first preference for historic structures should be to remove truck traffic, and, if possible, all vehicle traffic. This action will provide the highest probability that the bridge will be preserved into the future. The following options should be considered for historic bridges:
>
> - Close the structure if a convenient bypass structure already exists.
> - Build a bypass structure.
> - Close the historic bridge to all but pedestrian and bike traffic if the structure can sustain these loads.
> - Consider preserving all or a portion of the structure in a public space such as a park or highway rest area. Where appropriate, structures may be disassembled and partially or fully re-assembled at a different site.
> - If closure to truck traffic is not a viable option, then consider positive means to limit the risk that the bridge will be subjected to over-height or overweight trucks. These might include height detection and weigh-in-motion devices placed along the approach roadways.

In its September 2024 meeting to review and update the treatment recommendations for Management Plan bridges, the HSTG strongly supported the concept of a reduction in traffic volume and a reduction in capacity (i.e., posting for a lower weight than the bridge's capacity) for older historic bridges. Although other types of historic bridges can benefit from vehicular traffic reduction or elimination as well, VDOT's historic truss bridges have the most pressing need for such procedures at present. Pedestrian use, bicycle use, or moving the structure to a park

or trail environment are currently the most probable adaptive uses for many of these truss bridges.

**Identification of Potential Adaptive/Alternative Use**

The 2017 update to the Management Plan recommended identifying the historic bridges that had the potential for adaptive/alternative use, including bicycle and pedestrian use. It was noted that this would be "especially important in cases where the reduction or elimination of vehicular traffic on fragile / deteriorating historic bridges, particularly metal truss bridges, is necessary to preserve VDOT's historic bridges. Reduction or elimination of [vehicular] traffic on these bridges will both extend the life of the bridges and still make them available for public use."

Prior to the initiation of the 2024 update, those bridges with potential for adaptive/alternative uses were identified in discussions with the appropriate district bridge engineers and their staff. This potential for each bridge is noted in entries in Appendix B of this report. These entries note if there is the potential for adaptive / alternative use (such as converting the bridge to bicycle or pedestrian use, bypassing, detours / alternative routes that could lessen traffic on the bridge, or moving the structure) that could lessen or eliminate the stress of vehicular traffic on the bridge. Due to their construction type, certain types of bridges, such as stone masonry and concrete bridges, have little potential for moving. Truss bridges have more potential for moving, particularly the smaller or medium-size trusses.

**Bridges with Stone Masonry Elements/Historic Masonry Study**

The 2017 update noted a number of stone masonry issues relative to VDOT's historic bridges, recognized that repair and/or rehabilitation of historic masonry structures require appropriate and specialized methods, and noted the need for a separate study to identify potential avenues to establish best practices for repair of historic masonry structures or masonry components. This would include identifying mortar mixes to ensure compatibility with original mortars and avoid damage to historic stone masonry. It was noted that this study would aid in "identifying specific masonry repair procedures and best practices, in order to have a consistent statewide set of information, standards, and practices for appropriate masonry repair in historic bridges and related structures. This will avoid inappropriate, variable, or unsuccessful repairs to historic masonry, as has been seen in some past instances."

This study was undertaken through VTRC and was published in 2023 (Miller, 2023). The 19 extant bridges on the current Management Plan that have stone masonry elements were identified, and historical background information, builders and/or designers, and in some cases, original specifications (if these could be located) were included (Miller, 2023). An overview of this information is noted under the sections on the specific bridges noted in Appendix B.

Three major types of stone masonry elements in Virginia's historic bridges were identified: stone masonry abutments/piers, stone masonry arch bridges, and stone masonry veneer over concrete rigid frame. All three types of bridges are represented on the Management Plan, and are listed in the following, with the types of stone masonry work noted for reference.

In the following listing, bridges are arranged by VDOT construction district, with numbers in parentheses, and are then arranged alphabetically by county within the construction district.

Bristol District (1)

- Wythe County (Southwestern Turnpike Company Bridge; no number): stone masonry arch bridge, ca. 1850.

Salem District (2)

- Bedford County Structure No. 6087: stone masonry abutments, ca. 1850, supporting a metal truss bridge, 1915.
- Botetourt County Structure No. 6100: stone masonry abutment and pier (lower portion of present abutment and pier, possibly late 19th century, with concrete tops and caps and concrete abutment added ca. 1902, supporting a metal truss bridge, 1886, moved to site 1902.
- Botetourt County Structure No. 6386: stone masonry abutments and pier, possibly late 19th century, with concrete caps added ca. 1903, supporting a metal truss bridge, 1887, and later approach span, moved to site 1903.

Lynchburg District (3)

- Nelson County Structure No. 6070: stone masonry arch bridge, 1835.

Richmond District (4)

- Brunswick County Structure No. 6104: stone masonry abutments and pier, supporting a metal truss bridge, 1884.
- Chesterfield County Structure No. 1900: (Aluminum triangular multi-girder bridge [Fairchild design]), 1960–1961, with remnant stone masonry abutment from an earlier wooden truss or metal truss bridge on the site.
- Chesterfield County (Falling Creek Bridge; no number): stone masonry arch bridge), ca. 1823.

Culpeper District (7)

- Culpeper County Structure No. 6906: stone masonry abutment and piers (some portions are pre-1878, the rest of the work is 1878), supporting a metal truss bridge, 1878.

Staunton District (8)

- Alleghany County Structure No. 9007 (Humpback Bridge): stone masonry abutments, supporting a wooden truss covered bridge, 1857.
- Augusta County (Valley Railroad Bridge) Structure No. 6997: stone masonry arch, 1874.
- Highland County Structure No. 6034: stone masonry abutments, supporting a metal truss bridge, 1896.
- Rockbridge County Structure No. 1012: concrete rigid frame bridge with stone veneer, 1940.
- Rockbridge County Structure No. 6145 (Goshen Bridge): stone masonry abutments and pier, supporting a metal truss bridge, 1890.
- Rockingham County Structure No. 6166: stone masonry abutments, supporting a semi-integral steel beam bridge, 1937.

- Shenandoah County Structure No. 6078 (Meems Bottom Bridge): stone masonry abutments, supporting a wooden truss covered bridge, 1894 (auxiliary concrete piers and steel beams added, 1985).

Northern Virginia District (9)

- Arlington County Structure No. 5020: concrete rigid frame bridge, with stone veneer, 1945.
- Loudoun County Structure No. 1025 (Aldie Bridge): stone masonry arch bridge, ca. 1810–1824.
- Loudoun County Structure No. 6088 (Hibbs Bridge): stone masonry arch bridge), ca. 1829.

[Note: Three former Management Plan bridges (Alleghany County Structure No. 9008, Augusta County Structure No. 6027, and Augusta County Structure No. 6147), all of which had stone masonry abutments supporting a metal truss bridge, also were included on the masonry study, but were subsequently removed from the Management Plan.]

**Masonry Stabilization**

The historic masonry study identified several practices related to stone masonry on bridges, and applicable/in use on Management Plan bridges:

*Concrete Aprons and Concrete Backwalls*

Two common and time-tested methods that have proved effective to stabilize stone masonry on bridges are (1) concrete aprons poured at the base of arches (this was used successfully on Nelson County Structure No. 6070 to stabilize the arches and raise the condition rating); and (2) concrete backwalls placed at each end of the bridge. Such backwalls, placed at the interface of the bridge portals and the stone-walled approaches of Humpback Bridge (Alleghany County Structure No. 9007) during the 2013 rehabilitation of that structure, were instrumental in minimizing damage to Virginia's only National Historic Landmark bridge in the record flooding of June 2016.

*Tie Rods/Tie Bars*

Tie rods or tie bars are also an effective and time-tested method. Although not in place on current Management Plan bridges with stone masonry, the now-ruinous bridge at Falling Creek in Chesterfield County had tie bars and tie rods in place prior to the 2004 storm damage. Probably these elements were put in place during the ca. 1922 repairs from previous storm damage. This technology has potential for stabilizing other historic stone bridges in Virginia. In addition to the bridge at Falling Creek, the early 19th-century Goose Creek stone arch bridge in Loudoun County, which formerly carried Route 50 and is now a non-VDOT historic site, had a number of tie rods and tie bars in place by the mid-20th century. Because the tie bars consist of reused I-beams, it is probable that these features date from the early 20th century.

*Grouted Anchors*

Also effective is a proprietary process (grouted anchors), which consists of mesh bags inserted into a deteriorating stone masonry bridge by drilling; grout is then pumped into, and expands, these mesh bags to stabilize the bridge and restore it to functionality. The small stone cylinders removed in the drilling are then replaced in the drillholes. This process was used in 2001 on Loudoun County Structure No. 1025 (the Little River Turnpike bridge) and has worked well.

*Partial Disassembly, Repair, and Replacement of Fill*

The stone arch Hibbs, or Snickersville Turnpike, Bridge (Loudoun County Structure No. 6088) was rehabilitated in 2007 by the more traditional method of disassembling the spandrel walls, inserting reinforced concrete elements, then rebuilding the stonework.

**Determination and Use of Compatible Mortar**

The 2017 update also noted the need to identify compatible mortar for repointing, stonework repair, and construction pointing. At the time of the 2017 update (and the original Management Plan), it was widely believed that for older structures, a "soft" mortar with a substantial lime content (typically used before the early 20th century) was necessary to match the properties of the original mortar and avoid damage to stonework from freeze-thaw damage and differing coefficients of expansion that might be factors with harder modern Portland cement mortars.

However, the masonry study indicated a more complex situation. The study identified a number of specifications, early contracts, and construction information for several of the Management Plan bridges, as well as similar, contemporary bridges. These various pieces of information brought out the fact that the compatible mortar issue is more complicated than previously believed. The original contracts for several of the Management Plan bridges, as well as other bridges that are no longer extant, note that a variety of mortars (some with lime content, others with a substantial natural cement content) were used on bridges in 19th-century practice. In particular, various different kinds of mortar commonly were used on the same bridge, depending on whether the specific area was above or below the usual water level. By the 20th century, the use of Portland cement had superseded lime and natural cement mortars, and Portland cement was used on both the 20th-century stone veneer bridges on the Management Plan as well as stone masonry abutments built by the U.S. Forest Service in the late 1930s (Rockingham County Structure 6166). In general, absent an original specification document or contract, a mortar analysis is the safest course to identify the original mortar formula.

**Percentage-of-Replacement Issues: The Potential Effect of the Replacement of a Large Percentage of Elements or Materials on the Bridge's Historic Significance**

As was noted in the 2017 update, and remains valid at the time of the current 2024 update, an issue that will require further monitoring and discussion in the future is: what effect the replacement of a large percentage of elements or materials has on the bridge's historic

significance. Extensive replacement of materials can negatively impact a structure's historic status. When deterioration necessitates a large amount of replacement of the structure, even in-kind replacement, for rehabilitation of an historic bridge, at some point the bridge may cease to be historic because of loss of its historic fabric and, by extension, its historic integrity. This factor will become more of a concern as more rehabilitations are done on bridges, particularly metal truss bridges, with extensive deterioration.

## Summary of Findings

Key findings obtained during this study are:

- Thirty-three bridges are in active status on the current update of the Management Plan. The 33 bridges now in active status on the Management Plan represent the extant bridges now under VDOT purview that are individually eligible for or individually listed on the National Register. Of the original 55 bridges in the 2001 Management Plan, 15 bridges have been moved to the Inactive Status category because of little or no VDOT purview. Ten bridges have been demolished, dismantled, or moved and are no longer in state ownership (these treatments were in accordance with recommended treatment in the 2001 Management Plan). Three bridges were added to the plan in 2018.

- The HSTG's original (2001) and updated (2017, 2024) management recommendations for each historic bridge on the current Management Plan, along with background information on each structure, are included in this report as Appendix B. The post-2001 information reflects the 2017 Management Plan update, the 2018 addendum, and the 2024 Management Plan update.

- Of the 33 bridges remaining under VDOT purview and on the current Management Plan, six underwent some degree of repair or rehabilitation since 2017. Major rehabilitations for three additional Management Plan bridges are scheduled to begin shortly.

- Currently, one Management Plan bridge is in Section 106 review.

- More than one third of the Management Plan bridges have undergone major repairs or rehabilitations in the past decades, and more bridge repairs are planned for the next several years. Results have generally been good for most of the Management Plan bridges that have received repairs or rehabilitations. These structures are for the most part stable, and for some bridges, the condition rating has improved. Particularly for older metal truss bridges and covered bridges, the reduction or elimination of vehicular traffic and capacity has been an important part of successful rehabilitations.

- Of the 33 National Register-eligible or National Register-listed bridges currently on the Management Plan, 15 bridges have had National Register nomination forms completed and are listed on the National Register. Addenda were made to several other existing National Register forms for VDOT bridges. National Register nomination forms are currently in progress for two more Management Plan bridges.

- Wrought iron truss bridges, and a number of the early steel bridges, have exhibited noticeable deterioration in the approximately two and a half decades since the publication of the original 2001 Management Plan.

- The metal truss bridges included in the 2024 update of the Management Plan are constructed of either wrought iron or steel members. In general, metal truss bridges built pre-1890 should be assumed to be constructed of wrought iron. Metal truss bridges built ca. 1890, and into the mid-1890s, may contain both wrought iron and steel elements. Metal truss bridges built after the late 1890s are likely to be constructed of steel.

- Maintenance of metal truss bridges, particularly planning for coating applications, requires accurate identification of the type of metal(s) used on the bridge. Wrought iron bridges require painting rather than galvanizing or metallizing. Steel can be galvanized, metallized, or painted.

- Painting pin-connected metal truss bridges without disassembling the structure can limit stress on the bridge members; however, this process will likely not eliminate corrosion within the joints; rather, corrosion will be left within the joints and will remain active and cause additional deterioration.

- Currently, 19 bridges on the Management Plan have some form of stone masonry (piers, abutments, masonry arch, or stone veneer. Repair and/or rehabilitation of historic masonry structures require appropriate and specialized methods.

- In the case of deteriorating historic bridges, particularly metal truss bridges, reduction or elimination of vehicular traffic will reduce stress on these structures and will prolong their existence considerably.

- At present, approximately eight of the bridges (i.e., approximately 25%) on the Management Plan have adaptive/alternative use established. Various other bridges on the plan have potential for such use.

## CONCLUSIONS

- *The scope of VDOT's Bridge Management Plan has evolved over the past quarter century*. Whereas the 2001 Management Plan had 55 bridges, this number has been reduced to 33 bridges with this update. The primary reason is that bridges have been moved to the Inactive Status category, although a smaller number of bridges have been demolished, dismantled, or moved, with three new bridges being added to this Plan.

- *Roughly one bridge per year has been rehabilitated since the last update of the Management Plan*. For the period 2017–2024, six bridges underwent some degree of repair or rehabilitation.

- *Slightly less than half of VDOT's historic bridges have had their National Register forms completed.* Of the 33 bridges, 15 have had these forms completed such that the bridges are listed on the National Register. These forms are in progress for two additional bridges.

- *About one quarter of the bridges have alternative use established*. Eight of the 33 bridges fall into this category, which is recognized as a way to prolong their existence as it reduces, or eliminates entirely, stress-inducing vehicular traffic. Roughly eight additional bridges have the potential to be added to this category.

## RECOMMENDATION

1. *VTRC, in consultation with the appropriate district structure and bridge offices, should complete the National Register nominations that are now in progress for two of the National Register-eligible bridges added to the Management Plan in 2018, as well as undertaking the National Register nomination form for at least one additional National Register-eligible bridge from the Management Plan.*

## IMPLEMENTATION AND BENEFITS

Researchers and the technical review panel (listed in the Acknowledgments) for the project collaborate to craft a plan to implement the study recommendations and to determine the benefits of doing so. This process is to ensure that the implementation plan is developed and approved with the participation and support of those involved with VDOT operations. The implementation plan and the accompanying benefits are provided here.

### Implementation

Recommendation 1, regarding the completion of National Register nominations for at least three more bridges on the Management Plan, is in the process of VTRC implementation. It is anticipated that the two nomination forms currently in progress will be finalized by the first quarter of fiscal year 2026. The nomination form for the additional bridge is anticipated to be completed by the end of fiscal year 2026.

### Benefits

#### General Benefits of the Management Plan

The information collected during this study was used to produce the 2024 update of the *Management Plan for Historic Bridges in Virginia*, as was recommended by the original (2001) study and as is required by the 2016 interagency Programmatic Agreement ("Programmatic Agreement," 2016) regarding certain transportation undertakings in Virginia. The initial update of the Management Plan was completed in 2017 (Miller, 2018). Thus, the completion of the 2024

update of the Management Plan provides current fulfillment of the relevant section of Stipulation III of the 2016 agreement and assures VDOT's regulatory compliance.

Aside from the regulatory requirement, numerous general benefits have been and will be derived from the original and updated *Management Plan for Historic Bridges in Virginia*. Both the original plan, the 2017 update, and the 2024 update were produced using in-house expertise—contributing to VDOT's continued development of historic bridge expertise among its staff. This in-house expertise allows VDOT to complete detailed Management Plans at considerable savings compared with typical costs for outside consultant firms. These Management Plans contain readily accessible information for addressing questions on these bridges raised by the public and advocacy groups, as well as VDOT personnel. Proactive identification of historic bridges and assessments and recommendations for their management routinely avoids or minimizes delays of VDOT projects because the information is already in hand.

The stringent standards VTRC, VDOT, and the HSTG support regarding recommendations for the historic significance of bridges in Virginia have resulted in a relatively small group compared with some other states of historic bridges. The use of these standards means Virginia has several dozen historic bridges to maintain and fund, rather than hundreds of historic bridges seen in some other states, which has allowed VDOT to make good progress documenting, repairing, and rehabilitating a substantial number of Virginia's historic bridges with limited funding.

In addition, this report provides current information and updated and comparative recommendations as of September 2024 on all the Management Plan bridges currently under VDOT purview. Thus, this material, both on individual bridges and for comparative purposes, is easily accessible to VDOT's Structure and Bridge Division and district structure and bridge personnel and to environmental and cultural resources personnel regarding management issues on these historic bridges.

**Specific Benefits for Each Recommendation**

The benefits of implementing Recommendation 1 are to finalize additional National Register listings for additional Management Plan bridges. These National Register listings provide extensive individual structure and historical information on each bridge and lend additional emphasis to the historical significance of these structures. This initiative is fully supported by VDHR and is the culmination of a cooperative effort between VTRC and VDHR for the past three decades.

**Monetized Benefits of a Concise Historic Bridge Management Program**

Although not all benefits can be monetized, it is possible to estimate the benefits associated with maintaining an accurate inventory of truly historic bridges in terms of the reduction in costs associated with VDOT planning for rehabilitation or review processes of a historic bridge, compared with a non-historic bridge. Generally, a bridge that is categorized as "historic" may require either or both of two sets of additional costs compared with bridges that

are not categorized as “historic.” These additional costs include extra VDOT staff time associated with review processes such as those involving VDHR and other agencies, and the extra costs of consulting services. The latter tends to occur for bridges that might be taken out of service. The magnitude of these additional costs varies greatly by bridge because they are influenced by several factors such as bridge condition, bridge type, materials used, public interest, location, and degree of stakeholder involvement.

That said, the rough order-of-magnitude costs provided by VDOT staff are useful for quantifying the benefits of maintaining a strong but concise bridge management program. For rehabilitation of historic bridges where removal is not likely to be considered, roughly 100 additional hours of staff time may be required compared with non-historic bridges (Hackett, 2024). For historic bridges where the analysis is more complex, such as situations where removal is being considered, costs might include 300 hours of staff time plus an additional $11,000 in consultant costs (Randy Lichtenberger, personal communication, October 3, 2024). Staffing costs also vary depending on an individual’s level of experience, but one midrange estimate of a loaded hourly cost is $100 per hour (Holma, 2024). These data suggest additional costs for a historic bridge could range between $10,000 (e.g., $100 per hour x 100 hours) and $41,000 (e.g., $100 per hour x 300 hours + $11,000). Based on the data in this report, one can expect, out of Virginia’s approximately 30 historic bridges, roughly 1.0 bridges per year being rehabilitated, at a cost that is between $10,000 and $41,000 per year. Such costs are necessary for bridges that are truly historic.

However, other states have a much more expansive list of historic bridges than Virginia. For example, a 2024 programmatic agreement (Maryland State Highway Administration, 2024) identified 160 bridges owned by the Maryland State Highway Administration as historic—defined as “listed in or eligible for listing [on] the National Register of Historic Places”—and an earlier review based on 2001 data (Maryland State Highway Administration, n.d.) found 415 historic bridges, including state, county, and city bridges. To roughly estimate the partial value of maintaining a well-defined bridge management program, one may estimate the increase in cost that would result if Virginia went from 30 historic bridges to a higher number, such as 150 historic bridges—more in line with but still smaller than that of other states. Assuming the rehabilitation rate was the same, then a more than five-fold increase in historic bridges should increase these costs by a factor of five—that is, between $50,000 and $205,000 per year.

In sum, a concise historic bridge management program may save the Commonwealth between $40,000 and $164,000 annually (Table 1). These benefits are likely an underestimate because they do not include costs for other agencies or some of the benefits described previously. Because numbers such as “$164,000” could convey a false sense of precision, it may be more apt to summarize this subset of monetized benefits, which reflect only VDOT costs associated with additional planning for historic bridge rehabilitation, as between $40,000 and $160,000 annually.

**Table 1. Additional Rehabilitation for States with Small and Large Bridge Management Programs**

| Data Element | Virginia | Another State |
|---|---|---|
| Number of Historic Bridges | 30 | 150 |
| Number of Historic Bridges Rehabilitated per Year | 1.0 | 5 |
| Additional Cost per Bridge due to Bridge Being Historic | $10,000–$41,000 | $10,000–$41,000 |
| Additional Cost per Year Attributed to Historic Bridges | $10,000–$41,500 | $50,000–$205,500 |
| Difference in Rehabilitation Costs | $40,000–$164,000 | |

## ACKNOWLEDGMENTS

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## APPENDIX A: NATIONAL REGISTER-ELIGIBLE BRIDGES IN THE 2001, 2017, AND 2024 MANAGEMENT PLANS INCLUDED IN AND OMITTED FROM THE 2024 UPDATE

The following categories of bridges are listed in this appendix:

- Bridges included in the current Management Plan.
- Bridges under VDOT purview but not reviewed in the current Management Plan because of current Section 106 or State Environmental Review.
- Bridges included on the original Management Plan and subsequently dismantled, demolished, or moved (removed from the Management Plan).
- Bridges included on the original Management Plan but now on Inactive Status (because of non-VDOT ownership) at the time of the 2017 Management Plan update.

The specific references and citations in the original Management Plan and the subsequent updates can be found in those reports.

### BRIDGES INCLUDED IN THE CURRENT MANAGEMENT PLAN

#### Bristol District (1)

**Bland County (10)**

**Bland County No. 1021:** (Concrete arch bridge); Spandrel braced arch with decorative elements, 1929, Route 98 crossing Crab Orchard Creek.

**Wythe County (98)**

**Wythe County No. 6016:** (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1880s, Route 619 crossing Cripple Creek.

**Wythe County [no number] (Southwestern Turnpike Company Bridge):** (Masonry arch bridge); 1850, off Route 11, crossing Reed Creek. This bridge accesses a former staging/storage area; it is not known to have a structure number. (NOT UNDER TRAFFIC.)

#### Salem District (2)

**Bedford County (9)**

**Bedford County No. 6087:** (Metal truss bridge); Pratt deck truss, 1915, Route 666 crossing Elk Creek. The 1915 date is for the present steel truss only; the large and impressive stone abutments, the oldest and most significant part of the bridge, date to ca. 1850 and originally supported a wooden trestle of the Virginia and Tennessee Railroad.

**Botetourt County (11)**

**Botetourt County No. 6100:** (Metal truss bridge); Warren (with Verticals) deck truss (with Phoenix columns used for compression members), 1886 (re-erected 1902), Route 817 crossing Craig Creek.

**Botetourt County No. 6386:** (Metal truss bridge); Pratt through truss (with Phoenix columns), with Warren deck truss approach, 1887, Route 685 crossing Craig Creek.

**Montgomery County (60)**

**Montgomery County No. 9003**: (Metal truss bridge); King patent tubular "Bowstring" truss, ca. 1878. This structure was moved to the Ironto Rest Area in Montgomery County in the late 1970s and has carried pedestrian traffic in the rest area since 1977. (NOT UNDER TRAFFIC.)

## Lynchburg District (3)

**Appomattox County (6)**

**Appomattox County No. 1002:** (Non-arched concrete bridge); T-beam, 1930 with 1971 widening, with decorative cast concrete rails; Route 24 crossing the Appomattox River.

**Nelson County (62)**

**Nelson County No. 6070:** (Masonry arch bridge); ca. 1835, Route 606 crossing Owens Creek.

## Richmond District (4)

**Brunswick County (12)**

**Brunswick County No. 6104:** (Metal truss bridge); Pratt through truss, 1884, Route 715 crossing Meherrin River.

**Chesterfield County (20)**

**Chesterfield County [no number] (Falling Creek Bridge):** (Masonry arch bridge); ca. 1823, at Falling Creek Wayside, off Route 1, crossing Falling Creek. From the 1930s until August 2004, this bridge served as a pedestrian bridge at the Falling Creek Wayside. Because of damage during Tropical Storm Gaston on August 30-31, 2004, the bridge is currently closed to all traffic/public access; the remaining structure has been stabilized. (NOT UNDER TRAFFIC.)

**Chesterfield County No. 1900:** (Aluminum multigirder [triangular] bridge [Fairchild design]; 1960-1961, Route 36 crossing the Appomattox River.

**Dinwiddie County (26)**

**Dinwiddie County No. 1005:** (Concrete arch bridge); Concrete through arch, 1926, Route 1 crossing Stony Creek. Significant damage from an October 2, 2013 vehicle impact was repaired.

**Henrico County (43)**

**Henrico County No. 1001:** (Non-arched concrete bridge); Continuous rigid frame, with decorative cast concrete rails and fascia, 1938, Route 1 crossing Upham Brook.

## Culpeper District (7)

**Culpeper County (23)**

**Culpeper County No. 6906:** (Metal truss bridge); Pratt through truss, 1878, Route 613 crossing Rappahannock River.

## Staunton District (8)

**Alleghany County (3)**

**Alleghany County No. 9007 (Humpback Bridge)** [This structure had no number assigned at the time of the original plan; it subsequently was numbered as 9007]: (Covered wooden bridge); Trussed arch ("humpbacked") covered bridge, 1857. This is now a pedestrian bridge, in the wayside off Route 60 west of Covington, crossing Dunlap Creek. It was listed as a National Historic Landmark (the highest level of landmark status) in 2012. It was rehabilitated in 2013; it was impacted by major flooding in 2016; flood damage to the approaches in the record 2016 flooding has been repaired. (NOT UNDER TRAFFIC.)

**Augusta County (7)**

**Augusta County No. 6113:** (Non-arched concrete bridge); Girder-and-floor beam, 1909, Route 722 crossing Whiskey Creek.

**Augusta County No. 6165:** (Concrete arch bridge); Spandrel braced arch, 1932, Route 835 crossing Jennings Branch.

**Augusta County No. 6553:** (Non-arched concrete bridge); Deck girder, 1925, Route 1205 crossing South River.

**Augusta County (Valley Railroad Bridge)** This structure had no number assigned at the time of the original plan; it subsequently was numbered as No. 6997: (Masonry arch bridge); 1874, crossing Folly Mills Creek just west of I- 81, south of Staunton. The structure is a landscape feature within the I-81 right of way and is closed to all traffic/public access. (NOT UNDER TRAFFIC.)

**Frederick County (39)**

**Frederick County No. 6903:** (Concrete arch bridge); Concrete closed spandrel arch bridge, 1917, Route 672 crossing Opequon Creek.

**Highland County (45)**

**Highland County No. 6034:** (Metal truss bridge); Lane Patent pony truss, 1896, Route 645 crossing Crab Run. This structure is closed to vehicular traffic and is a pedestrian and bicycle bridge. (NOT UNDER TRAFFIC.)

**Page County (69)**

**Page County No. 9001 (formerly No. 1990):** (Metal truss bridge); Pratt deck arch truss, 1938, Route 340 crossing Overall Creek. A new bridge was constructed to replace the existing bridge, bypassing the original bridge in 2008; the original bridge then was renumbered (from No. 1990 to No. 9001). The deck of the original bridge then was removed to expose the metal arch truss; the structure is now preserved as a landscape feature and an historical exhibit, and is also utilized for paint system evaluation; it is closed to all traffic/public access. (NOT UNDER TRAFFIC.)

**Rockbridge County (81)**

**Rockbridge County No. 1012:** (Concrete arch bridge); Rigid frame with stone veneer, 1940, Route 39 crossing Laurel Run.

**Rockbridge County No. 6145:** (Metal truss bridge); Pratt through truss, 1890, Route 746 crossing Calfpasture River.

**Rockingham County (82)**

**Rockingham County No. 6166**: (Steel beam semi-integral bridge), 1937, Route 924 crossing Mines Run.

**Shenandoah County (85)**

**Shenandoah County No. 6078:** (Covered wooden bridge); Burr arch truss, 1894, Route 720 crossing North Fork of Shenandoah River.

**Northern Virginia District (9)**

**Arlington County (0)**

**Arlington County No. 5020:** (Non-arched concrete bridge); Rigid frame, with decorative stone veneer, 1945, Memorial Avenue crossing Route 110, adjoining Arlington National Cemetery.

**Loudoun County (53)**

**Loudoun County No. 1025:** (Masonry arch bridge); ca. 1810–1824, Route 50 crossing Little River.

**Loudoun County No. 6088:** (Masonry arch bridge); ca. 1829, Route 734 crossing Beaverdam Creek.

**Loudoun County No. 6051:** (Metal truss bridge); Pratt through truss, date now documented to 1890, Route 673 crossing North Fork Catoctin Creek.

**Prince William County (76)**

**Prince William County No. 6023:** (Metal truss bridge); Pratt through truss, 1882, Route 646 crossing Norfolk Southern Railway. It was transferred to VDOT by the Norfolk Southern Railway in 2014.

## BRIDGE UNDER VDOT PURVIEW BUT NOT REVIEWED IN THE CURRENT MANAGEMENT PLAN BECAUSE OF CURRENT SECTION 106 REVIEW

### Staunton District (8)

**Augusta County (7)**

**Augusta County No. 6149:** (Metal truss bridge); Camelback through truss, 1915, Route 778 crossing Middle River.

## BRIDGES INCLUDED ON THE ORIGINAL MANAGEMENT PLAN AND SUBSEQUENTLY DISMANTLED, DEMOLISHED, OR MOVED (AND REMOVED FROM THE MANAGEMENT PLAN)

### Bristol District (1)

**Grayson County (38)**

**Grayson County No. 1007**: (Metal truss bridge); Polygonal top chord Warren, 1927, Route 94 crossing New River. It was demolished in 2011.

### Lynchburg District (3)

**Charlotte County (19)**

**Charlotte County No. 6902:** (Metal truss bridge); Camelback through truss, 1901, Route 620 crossing Staunton River. It was demolished in 2018.

**City of Danville (108)**

**City of Danville No. 8006**: (Concrete arch bridge); Open spandrel concrete arch with decorative molded balusters on railing, 1928, Worsham Street crossing Dan River. It was owned by the city; it was demolished in 2009-2010.

**Nelson County (62)**

**Nelson County No. 6052:** (Metal truss bridge); Pratt through truss, 1882, Route 653 crossing Norfolk Southern Railway. It was transferred to VDOT by the Norfolk Southern Railway in 2014. It was in process of demolition as of the writing of this report in late 2024.

### Staunton District (8)

**Augusta County (7)**

**(Former Augusta County No. 6081):** (Metal truss bridge); Pratt pony leg ["bedstead"] truss, 1914, Route 683 crossing Little Calfpasture River. It has been dismantled and the components stored pending anticipated transfer of ownership.

**Augusta County No. 6729:** (Metal truss bridge); Pratt through truss, 1907, Route 769 crossing Middle River. The bridge was removed from the Management Plan in 2017 as demolition was beginning; the end spans were demolished in the late 2010s; however, the center span was left standing, with no public access, until utility lines could be relocated. The center span was removed from state ownership and moved in 2024.

**Augusta County No. 6027:** (Metal truss bridge); Pratt pony truss, 1898, Route 907 crossing Christian's Creek. The bridge was removed from state ownership and moved in 2024.

**Augusta County No. 6147:** (Metal truss bridge); Pratt through truss, 1909, Route 775 crossing Middle River. The bridge was removed from state ownership and moved in 2024.

**Page County (69)**

**Page County No. 1004** (Metal truss bridge); Pratt deck arch truss, 1936, Route 340 crossing Jeremiah's Run. A new bridge was constructed to replace the existing bridge, bypassing the original bridge, in 2008, after which the old bridge was demolished.

## BRIDGES INCLUDED ON THE ORIGINAL MANAGEMENT PLAN BUT PUT ON INACTIVE STATUS (BECAUSE OF NON-VDOT OWNERSHIP) AT THE TIME OF THE 2017 MANAGEMENT PLAN UPDATE

### Bristol District (1)

**Bland County (10)**

**Bland County No. 9000:** (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1890, located on discontinued Route 61 crossing Wolf Creek. This is now a pedestrian bridge. Since the original Management Plan, it has been transferred to, and owned by, Bland County.

**City of Bristol (102)**

**City of Bristol No. 1804:** (Non-arched concrete bridge); Continuous frame, with decorative cast concrete rails and light posts; 1918, Mary Street crossing the Norfolk Southern Railway. It is owned by the Norfolk Southern Railway.

**Town of Marion (119)**

**Town of Marion No. 8003:** (Metal truss bridge); Pratt through truss, 1885, East Chilhowie Street crossing Middle Fork Holston River. It is owned by the town.

## Salem District (2)

**City of Roanoke (128)**

**City of Roanoke No. 1815:** (Concrete arch bridge); Open spandrel concrete rib arch with ramp and decorative elements, 1927, Route 116 crossing 3rd Street and Norfolk Southern Railway. It is owned by the city.

**City of Roanoke No. 1826:** (Concrete arch bridge); Open spandrel concrete rib arch with decorative elements, 1926, Route 11 crossing Roanoke River and Norfolk Southern Railway. It is owned by the city.

**City of Roanoke No. 8003**: (Concrete arch bridge); Closed spandrel concrete arch with decorative elements, 1926, Jefferson Street crossing Norfolk Southern Railway. It is owned by the city.

**City of Bedford (141)**

**City of Bedford No. 1800**: (Concrete arch bridge); Closed spandrel concrete arch, with decorative elements, 1906, Route 43 crossing Norfolk Southern Railway. It is owned by Norfolk Southern Railway.

## Lynchburg District (3)

**City of Danville (108)**

**City of Danville No. 1811:** (Concrete arch bridge); Open spandrel concrete arch with decorative molded balusters on railing, 1927, Route 29/Main Street crossing Dan River. It is owned by the city.

**City of Lynchburg (118)**

**City of Lynchburg No. 1849:** (Non-arched concrete bridge); Coded as a slab (probably an encased I-beam), 1908, Bedford Avenue crossing the Norfolk Southern Railway. It is owned by the city.

**City of Lynchburg No. 8044:** (Masonry arch bridge); 1839, 9th Street crossing old James River and Kanawha Canal. It is owned by the city.

## Richmond District (4)

### City of Petersburg (123)

**City of Petersburg No. 8018:** (Concrete arch bridge); Concrete rigid frame, with brick veneer, 1936, Halifax Road and CSX Railroad crossing Defense Road. It is owned by the city.

### City of Richmond (127)

**City of Richmond Nos. 1849/1857:** (Concrete arch bridge); Concrete closed spandrel arch with decorative elements, 1911-1913, Route 360 crossing north and south divisions of the James River at Mayo's Island. It is owned by the city.

## Staunton District (8)

### Rockingham County (82)

**Rockingham County No. 6154:** (Metal truss bridge); Thacher through truss, 1898, Route 1421 crossing Linville Creek. This bridge underwent a major rehabilitation, completed in 2013, and was repurposed as a pedestrian and bicycle bridge. It subsequently was transferred to the town of Broadway by VDOT and is owned by the town.

### City of Covington (107)

**City of Covington No. 8002:** (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1885/ca. 1900, Hawthorne Street crossing CSX Railroad. It was rehabilitated in 2006 and transferred to the city of Covington by the railroad, and is owned by the city.

# APPENDIX B: MANAGEMENT RECOMMENDATIONS FOR VIRGINIA'S HISTORIC BRIDGES UNDER VDOT'S PURVIEW (INCLUDING THE SECTIONS FROM THE 2001 PLAN, THE 2017 UPDATE, 2018 ADDENDUM, AND THE 2024 UPDATE FOR EACH BRIDGE)

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## Introduction

This appendix provides the original (2001) Management Plan section for each bridge, including the recommendations, along with updated information and updated recommendations for each bridge. For each bridge, the section from the original (2001) Management Plan for the bridge appears first and is followed by the 2017 and 2024 update material for that bridge. For each of the three bridges added to the plan in 2018, the 2018 section, including the recommendations, is followed by the 2024 update.

### Original 2001 Sections

The following categories are used in the original (2001) sections:

*Description:* This is the physical description of the bridge.

*Evaluation*: This gives an overview of National Register recommendations and determinations regarding the bridge.

*Documentation*: This cites previous historical survey and other recordation documents on the bridge.

*Condition*: This cites the physical condition of the bridge (information from inspection reports and district structure and bridge offices).

*Posted Restrictions:* This records the posted limits, if any, on the weight of vehicles crossing the bridge.

*Average Daily Traffic (ADT)*: This number is the average daily traffic count for the bridge.

*Right-of-Way Ownership:* This records the owner of the roadway carried by the bridge. In the absence of other evidence, the approaches to bridges on primary routes are presumed to be held in fee simple. The approaches to bridges on secondary roads are presumed to be on prescriptive easement (usually a right of way of 30 feet, which was the statutory width for county roads constructed prior to the creation of the state secondary system in 1932). Known exceptions (i.e., in cases where the road postdates 1932, where a right of way has been purchased as part of a project, or where title searches have revealed a different ownership situation) are noted for each bridge.

*Recommended Treatment:* This records the treatment option(s) recommended by the Historic Structures Task Group for the bridge.

**2017 Update Sections**

The following categories are used in the section for the 2017 update:

*Evaluation Update*: This gives an updated overview of the National Register recommendations, determinations, and status regarding the bridge made after 2001.

*Repairs and Maintenance Undertaken Post 2001*: This records the repairs and maintenance after 2001 for each bridge.

*Current Inspection, Condition and Maintenance Information*: This records the results of the latest inspection, condition ratings, and current maintenance information for each bridge.

*Current Historic Structures Task Group Observations and Recommendations*: This records the treatment option(s) recommended by the Historic Structures Task Group for the bridge for the 2017 update.

**2024 Update Sections**

The following categories are used in the section for the 2024 update:

*Evaluation Update*: This gives an updated overview of the National Register recommendations, determinations, and status regarding the bridge made after 2017 (2018 for bridges added in the 2018 addendum).

*Potential for Adaptive/Alternative Use*: This notes if there is the potential for adaptive/alternative use (such as converting the bridge to bicycle or pedestrian use, bypassing, detours, or moving the structure) that could lessen or eliminate the stress of vehicular traffic on the bridge.

*Presence of Stone Masonry*: This notes stone masonry elements or construction that may require specialized planning or maintenance, and any known plans, specifications, or other documentation that have been identified.

*Repairs and Maintenance Undertaken Post 2017*: This records the repairs and maintenance after 2017 for each bridge.

*Current Inspection, Condition and Maintenance Information*: This records the results of the latest inspection, condition ratings, and current maintenance information for each bridge.

*Current Historic Structures Task Group Observations and Recommendations*: This records the treatment option(s) recommended by the Historic Structures Task Group for the bridge for the 2024 update.

**Additional Terms**

Additional terms used are defined as follows:

*H & HA*: Hydrologic and Hydraulic Analysis. The hydrologic portion is the act of estimating a quantity of water at a given point, using watershed characteristics and historic rainfall data. The hydraulic portion is the performance/reaction of the structure, channel, or bridge when under flood at one or more specified return frequencies.

*Overlays*: Concrete overlays include such materials as latex, silica fume, or a thin-bonded polymer.

*Rating*: Ratings are according to National Bridge Inspection Standards (NBIS). The rating is a three-digit code number determined from the periodic bridge inspections. The first digit relates to the deck (the riding surface), the second to the superstructure (the supports immediately beneath the driving surface and everything above), and the third to the substructure (the foundation and supporting posts and piers). The code key is as follows:

- N: Not applicable
- 9: Excellent condition
- 8: Very good condition
- 7: Good condition
- 6: Satisfactory condition
- 5: Fair condition
- 4: Poor condition
- 3: Serious condition
- 2: Critical condition
- 1: Imminent failure condition
- 0: Failed condition

*SHPO*: Virginia State Historic Preservation Officer.

*VDHR*: Virginia Department of Historic Resources.

## Listings

As stated previously, the 2001 sections and recommendations for each bridge appear first, followed by the 2017 and 2024 update material for that bridge. For the three bridges added to the plan in 2018, the 2018 material is followed by the 2024 update. The specific references and citations in the original Management Plan and the subsequent updates can be found in those reports.

Bridges are listed by type, in the following order:

- Non-Arched Concrete Bridges
- Metal Truss Bridges
- Masonry Arch/Concrete Arch bridges
- Covered Bridges

- Aluminum Triangular Box Beam Bridge
- Steel Beam Semi-Integral Bridge
- Management Plan Bridge Currently in Section 106 Review

**NON-ARCHED CONCRETE**

**Lynchburg District (3)**

**Original [2001] Management Plan Information for:**

**Appomattox County (6)**
*VDOT Structure No. 1002*
*VDHR Inventory No. 006-0048*
*Location: Route 24, crossing Appomattox River*
*National Register Status: Eligible*

*[Note: This structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2005.]*

*Description:* Appomattox County Structure No. 1002 is a single-span T-beam structure [104], built in 1930 with a 1971 widening, carrying Route 24 crossing the Appomattox River. The structure is approximately 33 feet long. A commemorative bridge built in the vicinity of the Civil War surrender site at Appomattox Court House, this structure has unique cast concrete rails incorporating Union and Confederate motifs, with end posts topped with obelisks. (The bridge antedates the national park by 5 years and appears to have been intended as part of a memorial wayside or picnic area.) The rails were moved and reused, and the end posts and obelisks were replicated when the bridge was widened in 1971.

*Evaluation*: Appomattox County Structure No. 1002 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in November 1995, a determination confirmed by the Virginia State Historic Preservation Officer (SHPO) and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Appomattox County Structure No. 1002 was included in the non-arched concrete bridge survey prepared by VTRC (Miller, McGeehan, and Clark, 1996).

*Condition*: The current inspection report indicates that this structure is in fair condition. There is some spalling and moisture seepage in the bottom deck. Cracks are present in the breast wall and in the T-beams. There is a small amount of spalling on the railposts. There is scour in the channel and under the footing. Additionally, there is scaling of the breast wall and delamination in the endwall. The wearing surface is delaminated. Vegetation is encroaching on the bridge.

*Posted Restrictions:* None.

*ADT*: 4,423.

*Right-of-Way Ownership:* This structure carries a primary route. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its concrete construction, location, and unique decorative design, moving the structure to another location or abandoning it is not an option. Demolition is not recommended. The structure has already been widened; an upgrade to DOT standards is not necessary. The recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to remove the asphalt overlay, evaluate and repair the deck, install a new concrete overlay, clean drains, remove vegetation, repair spalled and delaminated areas, and address the scour problem. H & HA is recommended.
2. Transfer of ownership is not considered a feasible option at present; however, were Route 24 to be realigned, and in the event of interest in acquiring the bridge on the part of the National Park Service, this could be considered as a second option.

**2017 Update for:**

**Appomattox County Structure No. 1002:** (Non-arched concrete bridge); T-beam, 1930 with 1971 widening, with decorative cast concrete rails, Route 24 crossing Appomattox River. *Evaluation Update*: The structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2005.

*Repairs and Maintenance Undertaken Post-2001:*

- Minor repairs were undertaken in 2002, when the railing of the bridge was repaired. In 2003, the bridge underwent a number of major repairs. A concrete apron was poured in front of both abutments. A number of spalled and delaminated areas on the substructure were repaired. Further, embankment erosion was mitigated and repaired. The wearing surface was milled from the deck, and both approaches were milled and paved. The deck surface was repaired, and the deck received a latex-modified concrete overlay. Minor additional repairs and maintenance were performed later. In 2005, plant mixture was placed on the deck. In 2007, plant mixture was placed on the deck and approaches. In 2011, the vegetation surrounding the bridge was trimmed.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.

*2017 Inspection, Condition, and Maintenance Information:*

- The rating is: 7-6-7.
- ADT: The current ADT is 3,400 [the ADT in the 2001 report was 4,423].
- There are a few areas of delaminated/spalled concrete.
- Vegetation surrounding the bridge needs to be monitored and kept trimmed back from the bridge.

*2017 Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that the bridge is in satisfactory condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group

reiterates the recommendations of repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. This work should specifically continue to keep vegetation from encroaching on the bridge and repair areas of delaminated/spalled concrete.

**2024 Update for:**

**Appomattox County Structure No. 1002:** (Non-arched concrete bridge); T-beam, 1930 with 1971 widening, with decorative cast concrete rails, Route 24 crossing Appomattox River (Figure B1).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present. As noted in Recommendation 2 in the 2001 Management Plan, were Route 24 to be realigned, and in the event of interest in acquiring the bridge on the part of the National Park Service, transfer of ownership could be considered an option.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- Debris was removed from the deck in 2023.
- No bridge work since 2017 has been recorded.
- The vegetation surrounding the bridge has been monitored and trimmed back as needed.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-6-6 [the rating in the 2017 report was 7-6-7].
- ADT: The current ADT is 4,598 [the ADT in the 2017 report was 3,400].
- There are a few areas of delaminated/spalled concrete and hairline cracking.
- Vegetation surrounding the bridge needs to be monitored and kept trimmed back from the bridge.
- The district structure and bridge office notes that issues regarding the bridge appear to be fairly consistent with the previous plan update (i.e., monitor/repair cracks, spalls and delamination; monitor/trim vegetation, monitor footings).

*2024 Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that the bridge is in satisfactory condition. Previous and anticipated repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. This work should specifically continue to keep vegetation from encroaching on the bridge and repair areas of delaminated/spalled concrete.

**Figure B1. Appomattox County Structure No. 1002**

**NON-ARCHED CONCRETE**

**Richmond District (4)**

**Original [2001] Management Plan Information for:**

**Henrico County (43)**
*VDOT Structure No. 1001*
*VDHR Inventory No. 043-0710*
*Location: Route 1 crossing Upham Brook*
*National Register Status: Eligible*

*Description:* Henrico County Structure No. 1001 is a three-span continuous concrete rigid-frame bridge [207], with decorative cast concrete rails and fascia, built in 1938, carrying Route 1 crossing Upham Brook. This structure is approximately 85 feet long overall; each span is approximately 28 feet long. This is one of three pre-1950 continuous rigid frame bridges surviving in Virginia and is the only one of these not crossing a railroad. The Gothic-style decorative motifs, extending not only to the rails but also to the fascia, are unique in Virginia.

*Evaluation*: Henrico County Structure No. 1001 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in November 1995, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Henrico County Structure No. 1001 was included in the non-arched concrete bridge survey prepared by VTRC (Miller, McGeehan, and Clark, 1996).

*Condition*: The current inspection report indicates that this structure is in fair condition. There are random hairline cracks with some efflorescence and areas of discolored concrete on the underside of the deck. In addition, the structure exhibits a small amount of spalling. There are popouts and abrasion on the abutments, and an impact crack on one endpost. The drains are blocked. Vegetation is encroaching on the bridge. One wingwall appears to be under stress.

*Posted Restrictions*: None.

*ADT*: 11,830.

*Right-of-Way Ownership:* This structure carries a primary route. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location, abandoning it, adaptive use, or transferring ownership is not an option. Demolition is not recommended. A structural upgrade to DOT standards is not necessary. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to cut back and remove vegetation from around the structure and open and extend the drains

below the level of the beams. Evaluate the deck waterproofing system; if it is deficient, upgrade with a concrete overlay. Repair spalled areas as needed, and monitor the wingwall. H & HA is recommended.

**2017 Update for:**

**Henrico County Structure No. 1001:** (Non-arched concrete bridge); Continuous rigid frame, with decorative cast concrete rails and fascia, 1938, Route 1 crossing Upham Brook.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2001, the utility along the upstream side was rewrapped and approximately 43 square feet of asphalt patching was placed along the wearing surface.
- This work was in partial accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-6
- ADT: The current ADT is 11,355 [the ADT in the 2001 report was 11,830].
- There are no scheduled repairs at present.
- Inspection indicates some issues with the deck. There has been a major increase in deck patching. The district structure and bridge office will look at bridge preservation technologies and will evaluate the best methods to deal with the deck condition (such as latex overlay).
- The parallel bridge is in poor condition; when this is replaced the district plans to use a design that is sympathetic to, and evokes the design of, the 1938 bridge.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Henrico County Structure No. 1001:** (Non-arched concrete bridge); Continuous rigid frame, with decorative cast concrete rails and fascia, 1938, Route 1 crossing Upham Brook (Figure B2).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- No major bridge work has been recorded.
- Some preventive maintenance has been done, including cutting back / removing vegetation encroaching on the bridge.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-6 [the rating in the 2017 report was 6-6-6].
- ADT: The current ADT is 9,549 [the ADT in the 2017 report was 11,355].
- There are no scheduled repairs at present.
- Inspection indicates some area of cracking, delamination, and spalling.
- The parallel bridge is in poor condition; when this is replaced the district plans to use a design that is sympathetic to, and evokes the design of, the 1938 bridge.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in satisfactory condition. Previous repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B2. Henrico County Structure No. 1001**

**NON-ARCHED CONCRETE**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Augusta County (07)**
*VDOT Structure No. 6113*
*VDHR Inventory No. 007-1304*
*Location: Route 722 crossing Whiskey Creek*
*National Register Status: Eligible*

*Description:* Augusta County Structure No. 6113 is a single-span girder-and-floor beam [103] structure, built in 1909, carrying Route 722 crossing Whiskey Creek. The bridge is approximately 44 feet long. This bridge is the oldest girder-and-floor beam bridge in the state and is the first concrete bridge in Virginia built with state aid funds.

*Evaluation*: Augusta County Structure No. 6113 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in November 1995, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Augusta County Structure No. 6113 was included in the non-arched concrete bridge survey prepared by VTRC (Miller, McGeehan, and Clark, 1996).

*Condition*: The current inspection report indicates that this structure is in poor condition. Both its exterior girders have deep spalling on the bottom sides that diminish on the vertical sides. The deck bottom and diaphragms are delaminated, with up to 3 inches of deep spalling and exposed rebar in scattered areas. The drains are blocked, and there are areas of vegetation on the bridge. There have been previous scour problems; riprap has been placed on the banks.

*Posted Restrictions:* The structure is posted at 12 tons.

*ADT:* 103

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Because of its through-girder concrete construction, moving the structure to another location or upgrading it to DOT standards is not an option. If traffic demands increase, the surrounding topography provides a logical route to bypass this structure; it could then be maintained for adaptive use or ownership transferred to a willing landowner. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to repair spalled and delaminated areas, clear the drains, monitor scour, and keep the bridge clear of vegetation. Additional recommendations are to remove the asphalt overlay; evaluate and repair the deck; and, if needed, install a new concrete overlay.
2. Repair and maintain for adaptive use.
3. Transfer ownership if a willing recipient can be identified.

**2017 Update for:**

**Augusta County Structure No. 6113:** (Non-arched concrete bridge); Girder-and-floor beam, 1909, Route 722 crossing Whiskey Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2009, minor bridge repairs were done. Crews gunnited the girders and the deck bottom.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-5.
- ADT: The current ADT is 133 [the ADT in the 2001 report was 103].
- The structure is posted at 12 tons.
- Some of the gunite from the 2009 repairs has cracked; there are some areas of spalling and exposed rebar.
- Some deck drains are metal, some are plastic; the metal drains have medium to heavy rust.
- Gunite and drain issues need to be addressed.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Augusta County Structure No. 6113:** (Non-arched concrete bridge); Girder-and-floor beam, 1909, Route 722 crossing Whiskey Creek (Figures B3 and B4).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: There is a nearby alternative route / detour if the structure needs to have vehicular traffic reduced or eliminated. The through-girder construction precludes widening the structure.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- No major repairs have been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-5 [the rating in the 2017 report was 6-6-5].
- ADT: The current ADT is 49 [the ADT in the 2017 report was 133].
- The structure is posted at 12 tons.
- There are some areas of spalling and cracking.
- Some deck drains are covered with fill material.
- The district structure and bridge office reports that all current issues can be addressed through general maintenance at this time. Recommended maintenance includes unclogging and repairing the drains as needed and repairing areas of spalling and cracking.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B3. Augusta County Structure No. 6113, End View**

**Figure B4. Another View of Augusta County Structure No. 6113, Showing the Typical Heavy Parapets of an Early Through-Girder Concrete Bridge**

**NON-ARCHED CONCRETE**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Augusta County (07)**
*VDOT Structure No. 6553*
*VDHR Inventory No. 007-1319*
*Location: Route 1205 crossing South River*
*National Register Status: Eligible*

*Description:* Augusta County Structure No. 6553 is a single-span deck girder structure [102], built in 1925, carrying Route 1205 crossing South River. The bridge is approximately 38 feet long. This is an excellent and well-preserved example of deck girder technology. The structure was built from standard plans.

*Evaluation*: Augusta County Structure No. 6553 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in November 1995, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Augusta County Structure No. 6553 was included in the non-arched concrete bridge survey prepared by VTRC (Miller, McGeehan, and Clark, 1996).

*Condition*: The current inspection report indicates that this structure is in fair condition. There are relatively minor areas of delaminated, deteriorated, and spalled concrete throughout the structure. The drains are clogged with debris. There is vegetation and silt accumulation on and around the bridge. There are no known previous scour or hydrologic problems.

*Posted Restrictions:* None.

*ADT:* 893.

*Right-of-Way Ownership:* This structure was built on the route of the old Valley Pike (subsequently Route 11) in 1925, 7 years after the Valley Pike was acquired by the Commonwealth. Therefore, fee simple ownership is presumed. Route 11 was not moved to its present location until the 1930s.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location, abandoning it, or transferring ownership is not an option. An upgrade to DOT standards is not feasible. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to repair spalled and delaminated areas, open and extend the drains, and remove the accumulated silt and vegetation. Additional recommendations

are to remove the asphalt overlay, evaluate and repair the deck, and install a new concrete overlay if needed.

**2017 Update for:**

**Augusta County Structure No. 6553:** (Non-arched concrete bridge); Deck girder, 1925, Route 1205 crossing South River.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2010, crews repaired potholes in the deck top upstream.
- This work was in partial accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-6.
- ADT: The current ADT is 1,175 [the ADT in the 2001 report was 893].
- There are some areas of concrete deterioration, including delamination to the deck bottom, and some spalling on the upstream girder.
- The upstream drains are clogged.
- Vegetation is encroaching on the bridge.
- The district structure and bridge office reports that all current issues can be addressed through general maintenance at this time. Recommended maintenance includes: remove vegetation, unclog the drains, repair areas of delamination and spalling.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Augusta County Structure No. 6553:** (Non-arched concrete bridge); Deck girder, 1925, Route 1205 crossing South River (Figure B5).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Several nearby alternative routes exist if the structure needs to have vehicular traffic reduced or eliminated.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- No major repairs have been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-6 [the rating in the 2017 report was 5-5-6].
- ADT: The current ADT is 1278 [the ADT in the 2017 report was 1175].
- There are some (slight) areas of concrete deterioration and exposed rebar, including delamination to the deck bottom, and some spalling on the upstream girder.
- The upstream drains are clogged.
- Vegetation is encroaching on the bridge.
- The district structure and bridge office reports that all current issues can be addressed through general maintenance at this time. The bridge is slated for needed repairs and maintenance. This includes: remove vegetation, unclog the drains, patch delaminated/deteriorated areas as needed (particularly on the outside deck edge).

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

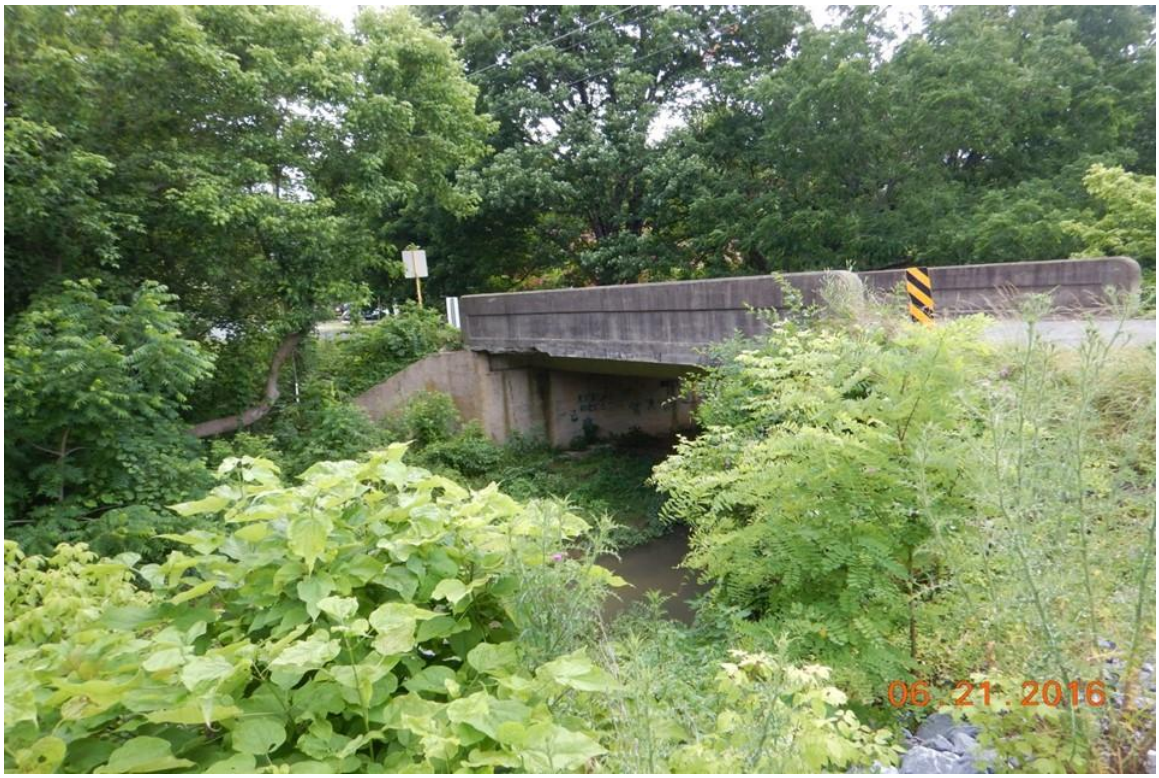


**Figure B5. Augusta County Structure No. 6553**

**NON-ARCHED CONCRETE**

**Northern Virginia District (9)**

**Original [2001] Management Plan Information for:**

**Arlington County (0)**
*VDOT Structure No. 5020*
*VDHR Inventory No. 000-2270*
*Location: Memorial Avenue, crossing Route 110*
*National Register Status: Eligible*

*Description:* Arlington County Structure No. 5020 is a two-span rigid frame structure [107] with decorative stone veneer. Built in 1945, it carries Memorial Avenue crossing Route 110, adjoining Arlington National Cemetery. In place of conventional concrete railings, the structure has sidewalks; broad, grassed verges; and a hedge concealing a simple pipe railing. The structure is approximately 60 feet long. This significance of this bridge derives from a combination of its rigid frame technology, decorative stonework, and relation to the landscape design of Arlington cemetery.

*Evaluation*: Arlington County Structure No. 5020 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in November 1995, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997. The structure also adjoins Arlington National Cemetery.

*Documentation*: Arlington County Structure No. 5020 was included in the non-arched concrete bridge survey prepared by VTRC (Miller, McGeehan, and Clark, 1996).

*Condition*: The current inspection report indicates that this structure is in good condition, with no apparent condition problems.

*Posted Restrictions*: None.

*ADT*: 39,090.

*Right-of-Way Ownership*: This structure carries a primary route. Fee simple ownership is presumed.

*Recommended Treatment*: Arlington County Structure No. 5020 has no apparent condition problems and requires no immediate action. Because of its concrete construction and location, moving the structure to another location, abandoning it, or transferring ownership is not an option. Because of landscaping elements, an upgrade to DOT standards is not feasible. Management recommendations consist of normal preventive maintenance and repairing and maintaining for vehicular use at such time that this becomes necessary.

**2017 Update for:**

**Arlington County Structure No. 5020:** (Non-arched concrete bridge); Rigid frame, with decorative stone veneer, 1945, Memorial Avenue, crossing Route 110, adjoining Arlington National Cemetery.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-6.
- ADT: The current ADT is 10,972 [the ADT in the 2001 report was 39,090].
- There are no scheduled repairs at present.
- There are areas of spalling, delamination, efflorescence, and cracking on the frame and abutments.
- There is vegetation along the mortar joints and spandrel walls; this vegetation should be removed.
- The current inspection indicates some water penetration issues with the deck; this will cause problems in the long term.
- The district structure and bridge office will consider ways to address the deck issues on this bridge (i.e., through proper drainage and a membrane; or other methods). It is uncertain at this time if this will be addressed through normal maintenance or whether a more extensive project is needed.
- Ideally, a project involving this bridge would be added (within the next year or two) to the rehabilitation of the Arlington Memorial bridge. However, it is uncertain if this is feasible.
- *Right-of-Way Ownership issues*: Previously, fee simple ownership was presumed since this structure carries a primary route. However, the roads on either side and underneath are federal property (National Park Service). The inspection report indicates state agency maintenance and ownership responsibility. This suggests that the bridge is governed by an agreement between VDOT and the National Park Service, possibly an aerial easement. Additional research is needed to document the precise terms of this responsibility. The district structure and bridge office is researching this.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. The task group reiterates the recommendations of repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Arlington County Structure No. 5020:** (Non-arched concrete bridge); Rigid frame, with decorative stone veneer, 1945, Memorial Avenue, crossing Route 110, adjoining Arlington National Cemetery (Figure B6).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: Yes. This is a concrete rigid frame bridge with decorative stone veneer. It carries Memorial Avenue adjoining Arlington Cemetery. The decorative stone veneer is compatible with other stonework on structures in the vicinity, particularly on the George Washington Memorial Parkway with which this structure is associated. The original plans and specifications exist; the bridge was completed in 1945 from plans dated 1941: it was designed as "Bridge No. 1 / Heavy Duty Road Underpass at Memorial Avenue" by the Federal Works Agency, Public Roads Administration, as part of the War Department Building Road Network. (The War Department Building now is more commonly known as the Pentagon.) The bridge was a late project of noted architect and industrial designer Paul Philippe Cret, who is noted as "consulting architect" on the plans (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No bridge work since 2017 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is N-6-6 [the rating in the 2017 report was 6-6-6].
- ADT: The current ADT is 13,000 [the ADT in the 2017 report was 10,972].
- There are areas of water infiltration, some spalling, delamination, some efflorescence, and cracking on the frame and abutments. There are some cracks in the stone veneer.
- There is vegetation along the mortar joints and spandrel walls; this vegetation should be removed.
- The district structure and bridge office is starting to identify and plan needed repairs for this bridge as an upcoming project.
- *Right-of-Way Ownership issues*: In the original Management Plan, fee simple ownership was presumed. However, VDOT owns Route 110 and inspects the bridge, while Memorial Avenue is under the purview of the George Washington Memorial Parkway. The road ownership situation suggests that the bridge is governed by an agreement between VDOT and the National Park Service; additional research still is being conducted to document the precise terms of the responsibility.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. The task group reiterates the recommendations of repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B6. Arlington County Structure No. 5020**

**METAL TRUSS**

**Bristol District (1)**

**Original [2001] Management Plan Information for:**

**Wythe County (98)**
*VDOT Structure No. 6016*
*VDHR Inventory No. 098-5017*
*Location: Route 619, crossing Cripple Creek*
*National Register Status: Eligible*

*Description:* Wythe County Structure No. 6016 is a single-span Pratt through truss (with Phoenix columns) with a steel beam approach span, probably built in the 1880s, carrying Route 619 crossing Cripple Creek. The structure is approximately 143 feet long overall; the truss is approximately 125 feet long. This is a well-preserved example of a truss using the patented Phoenix column. Although no builder is documented, the presence of Phoenix columns suggests that the bridge was probably built (or fabricated) by the Phoenix Bridge Company. The bridge has a concrete abutment (A) and pier at the approach span and one end of the truss, and a masonry abutment (B) at the other end of the truss, indicating that this bridge was moved to the site in the early 20th century. A plaque from this bridge (now in the district structure and bridge office), reading "Built by Atlantic Bridge Co., Charlotte, N.C. 1920" may refer to the re-erection of the bridge, as the structure's stylistic and decorative elements appear to date from the last quarter of the 19th century.

*Evaluation:* Wythe County Structure No. 6016 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation:* Wythe County Structure No. 6016 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997).

*Condition*: The current inspection report indicates that this structure is in fair condition. It was painted in 1986, and the paint is in good condition. The structure was recently rehabilitated using maintenance funds; this work corrected some minor condition problems such as light-to-medium rust on the floor beams and truss members; there was no measurable section loss. A new deck and new galvanized stringers were added. The roller seats need cleaning; abutments, floor beam flanges, etc., need washing. Vegetation is encroaching on the pier and abutments. Plans are underway to address the scaling, cracking, and debris on the concrete abutments and cracking and deterioration of the masonry abutment.

*Posted Restrictions:* The structure is posted at 15 tons.

*ADT:* 181.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* The rural location and size of this structure argue against it being a candidate for adaptive reuse or ownership transfer, either on or off-site. This structure, recently rehabilitated, is functioning well on its lightly traveled secondary road. The task group recommends that the only feasible option for this structure is that the remaining repairs be completed (abutment repairs have been discussed and approved by VDHR) and that the structure have subsequent preventive maintenance as necessary for it to remain in place and under vehicular use. Particular maintenance needs are removal of vegetation and cleaning of the roller seats, abutments, and floor beam flanges. The weepholes at the base of the Phoenix columns should periodically be cleaned out. The new galvanized stringers should be painted after an appropriate weathering period.

**2017 Update for:**

**Wythe County Structure No. 6016:** (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1880s, Route 619 crossing Cripple Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.
- The structure was rehabilitated shortly before the completion of the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-4-5; the structure will be assessed by the district structure and bridge office. The condition of the superstructure dropped to a 4 in the most recent inspection report.
- *ADT*: The current ADT is 162 [the ADT in the 2001 report was 181]
- The coating of the structure will be assessed by the district structure and bridge office; recoating will probably be needed.
- The condition of the floorbeams needs to be addressed.

*2017 Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in poor condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Wythe County Structure No. 6016:** (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1880s, Route 619 crossing Cripple Creek (Figures B7 and B8).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: As noted below, the district structure and bridge engineer explored the possibility of taking the bridge off vehicular use and moving it to a pedestrian trail, but was unsuccessful in finding a partnering organization. During environmental review, local stakeholders would not support moving the bridge or alternative (non-vehicular uses) for the structure.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- In the late 2010s, the district structure and bridge engineer assessed the condition of the structure (because of the condition of the superstructure having dropped to a 4). The office explored the possibility of taking this structure off vehicular use, moving this structure, and re-erecting it on a pedestrian trail. However, no suitable partnering organizations could be identified.
- During the environmental review local stakeholders would not support moving the bridge or alternative (non-vehicular) uses.
- Accordingly, planning for a rehabilitation of this structure has been underway for the past several years.

*Current Inspection, Condition and Maintenance Information:*

- The structure is closed to traffic [the rating in the 2017 report was 6-4-5].
- Rehabilitation planning, including environmental and cultural resource review, has been completed. The planned rehabilitation work is in accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Historic Structures Task Group Observations and Recommendations:* This structure was not considered for task group recommendations in the current Management Plan update because of the current rehabilitation project. However, the task group supports the planned rehabilitation of this bridge.


**Figure B7. Wythe County Structure No. 6016**


**Figure B8. Another View of Wythe County Structure No. 6016, Showing Decorative Elements on the Portal; See Botetourt County Structure No. 6386 for a Similar, but More Highly Ornamented, Bridge.**

**METAL TRUSS**

**Salem District (2)**

**Original [2001] Management Plan Information for:**

**Bedford County (9)**
*VDOT Structure No. 6087*
*VDHR Inventory No. 009-5281*
*Name: Elk Creek Deck Truss*
*Location: Route 666, crossing Elk Creek*
*National Register Status: Eligible*

*Description:* Bedford County Structure No. 6087 is a single-span Pratt deck truss built in 1915 by the Camden Iron Works. The bridge carries Route 666 crossing Elk Creek. The structure is approximately 107 feet long. The 1915 date applies to the present steel truss only; the stone abutments date to ca. 1850 and originally supported a wooden trestle of the Virginia and Tennessee Railroad.

*Evaluation*: Bedford County Structure No. 6087 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Bedford County Structure No. 6087 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997).

*Condition*: The current inspection report indicates that this structure is in fair condition. The truss members and rivets exhibit areas of corrosion, pack rust, and section loss.Much of the paint topcoat is gone. Large trees have fallen in the creek, and there is a large accumulation of debris on the bearing seats. There are sections of broken and deteriorated decking boards. There is vegetation on and near the structure.

*Posted Restrictions:* The structure is posted at 8 tons.

*ADT:* 90.

*Right-of-Way Ownership:* The approaches to Bedford County Structure No. 6087 are constructed on the old Virginia and Tennessee Railroad right of way. Because of the structure's early construction date (1915 for the highway bridge, indicating that the road was part of the Bedford County road system prior to 1932), and its location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Given the limitations of the truss, an upgrade to DOT standards is not recommended. Discontinuance, abandonment, or adaptive use on-site is not recommended. Abandoning the structure would place the responsibility for the structure in the hands of a (probably unwilling) landowner; the structure would likely not receive any maintenance and would be allowed to deteriorate or be demolished. Transferring ownership (on or off-site), or retaining for later off-site DOT use, is not considered a feasible option by the task group: the size and configuration of the truss structure (deck truss, with most of the structure hidden from those who are crossing the bridge) makes such structures less visually interesting than most trusses and renders these options unlikely and problematic. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use on-site, with subsequent preventive maintenance as needed. With repairs, the structure can stay in service as long as the traffic demand does not increase. The condition problems of this structure need to be addressed, particularly the deterioration of the gusset plates. The abutments should be cleaned off; debris should be cleaned from the bridge (via pressure washing). Much of the paint topcoat is gone, and the primer is lead-based. The primer should be tested; if it is in good condition, the structure would benefit from a topcoat, and this would extend the life of the truss; spot painting and zone painting could also be considered. A deck membrane and overlay should be considered. Vegetation should be removed from on and near the structure.
2. Document and salvage for adaptive use (in this case, *document and salvage* means reusing the abutments for a new structure).
3. Document and demolish.

**2017 Update for:**

**Bedford County Structure No. 6087:** (Metal truss bridge); Pratt deck truss, 1915 *[Note: This date is for the present steel truss only; the stone abutments date to ca. 1850 and originally supported a wooden trestle of the Virginia and Tennessee Railroad]*, Route 666 crossing Elk Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2000, the bridge underwent major rehabilitation of the deck in which the timber floor was replaced with new 4 inch by 10 inch timbers and 5 inch by 6 inch wheel guards. The following year, 2001, eroded areas around Abutment B were repaired by a repair crew. In 2007, a VDOT bridge repair crew tightened loose deck timbers.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-4-7.
- ADT: The current ADT is 159 [the ADT in the 2001 report was 90].

- The structure is posted at 13 tons.
- There has been some additional development in the area since 2000, but proposed large scale housing developments did not materialize after the economic downturn of 2008. Development pressures and urban sprawl in the area have eased.
- The bridge is in a work plan and is being evaluated. Consultants are under contract to do the rehab recommendations (Bedford County Structure No. 6087 is in a pool with approximately 30 other bridges).
- If necessary, the district structure and bridge office reports that it "will do everything we can" to utilize the substructure—possibly inserting a new deck truss on the 1850s abutments. This work would be in accordance with Recommendation 2 in the 2001 Management Plan.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in poor condition. Previous repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group defers further recommendations pending the results of the consultant's evaluation.

**2024 Update for:**

**Bedford County Structure No. 6087:** (Metal truss bridge); Pratt deck truss, 1915 *[Note: This date is for the present steel truss only; the stone abutments date to ca. 1850 and originally supported a wooden trestle of the Virginia and Tennessee Railroad]*, Route 666 crossing Elk Creek (Figure B9).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: The ca. 1850 stone abutments could support a new deck truss if needed in the future; however, a rehabilitation of the 1915 truss and performing (minor) needed repointing to the abutments is the most cost-effective treatment option at present.

*Presence of Stone Masonry*: Yes. The bridge has its original ca. 1850 stone masonry abutments (built for the Virginia and Tennessee Railroad, and the oldest and most significant part of the present bridge). The present concrete caps were probably added when the present deck truss was constructed in 1915. The builder/contractor for the original bridge is not known. No original plans or specifications for the ca. 1850 work or the 1915 deck truss construction have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*
- The results of the evaluation of the structure noted in the 2017 update indicated that it is feasible to rehabilitate the structure.

*Current Inspection, Condition and Maintenance Information:*
- The rating is 4-4-7 [the rating in the 2017 report was 5-4-7].
- ADT: The current ADT is 130 [the ADT in the 2017 report was 159].
- The structure is posted at 13 tons.

- The consultant's evaluation of the structure, as noted in the 2017 update, was completed. The results indicated that it is feasible to rehabilitate the structure. The deck truss will be fully rehabilitated, and the stone masonry abutments will require only minor repointing. Rehabilitation planning, including environmental and cultural resource review, has been completed. This project is scheduled for advertisement in late 2024.
- This work would be in accordance with Recommendation 1 in the 2001 Management Plan.

*Current Historic Structures Task Group Observations and Recommendations:* This structure was not considered for task group recommendations in the current Management Plan update because of the current rehabilitation project. However, the task group supports the planned rehabilitation of this bridge.

**Figure B9. Bedford County Structure No. 6087**

**METAL TRUSS**

**Salem District (2)**

**Original [2001] Management Plan Information for:**

**Botetourt County (11)**
*VDOT Structure No. 6100*
*VDHR Inventory No. 011-0404*
*Name: McKalaster [McAllister] Truss*
*Location: Route 817, crossing Craig Creek*
*National Register Status: Eligible*

*Description:* Botetourt County Structure No. 6100 is a two-span Warren (with Verticals) deck truss, with Phoenix columns used for compression members. This structure was built in 1886 (moved to its present site in 1902), and carries Route 817 crossing Craig Creek. This structure is approximately 253 feet long overall; each truss is approximately 123 feet long. The structure was moved from elsewhere and re-erected on its present site in 1902 to serve the Craig Valley branch of the Chesapeake and Ohio Railroad. The old railroad right of way was abandoned in the late 1950s and was purchased by the Virginia Department of Highways in 1961. The bridge now carries Route 817, which occupies the old railroad route. This former railroad bridge is Virginia's only example of a deck truss using the patented Phoenix column; although no builder is documented, the presence of Phoenix columns suggests that it was probably built by the Phoenix Bridge Company.

*Evaluation*: Botetourt County Structure No. 6100 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Botetourt County Structure No. 6100 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997).

*Condition*: The current inspection report indicates that this structure is in good condition. In the course of natural weathering, the wrought-iron Phoenix columns and Phoenix-fabricated components have formed their own weatherproof surface treatment, making painting unnecessary. However, some pitting can be observed, and other truss members exhibit surface corrosion, pitting, and pack rust. The floors have some surface checks and splits. There is vegetation on the abutments, pier, and truss members, and trees are growing up under the bridge. Scour is a problem, although the abutment and piers are not yet undermined.

*Posted Restrictions:* The structure is posted at 15 tons.

*ADT:* 55.

*Right-of-Way Ownership:* The approaches to Botetourt County Structure No. 6100 are constructed on the former railroad right of way purchased in 1961 (i.e., held in fee simple).

*Recommended Treatment:* The low traffic (ADT of 55) and scenic rural surroundings, plus the potential to link this route to a Virginia Byway, make Botetourt County Structure No. 6100 a strong candidate for rails-to-trails adaptive use, and there have been some preliminary discussions regarding this option. National Scenic Byways funds (a 20/80 match) can be used to develop such a project. The task group agrees that preservation in-place for pedestrian/bicycle use appears to be a feasible treatment option. Treatment measures, therefore, may not necessarily need to accommodate long-term vehicular use (and therefore, a structural upgrade to DOT standards), and repairing and maintaining the structure for continued (long-term) vehicular use may not be necessary. Because of the potential for eventual adaptive use, moving the structure or demolition is not considered a feasible option. Recommended management options for the bridge, in order of preference, are:

1. Preventive maintenance (particularly in the form of removing trees and vegetation from the abutments, pier, and truss members and addressing the scour problem) while structure continues under vehicular use. The weepholes at the base of the Phoenix columns need periodic cleaning out; these, and the seats, should be pressure washed. Where there is deterioration of the truss members, spot painting and applying penetrating sealer in areas of zone rust would be beneficial. A deck membrane and overlay should be considered.
2. At such time that plans for adaptive use are finalized, the structure should be closed to vehicular traffic. Ownership should be transferred to the association that owns the trail, and this successor owner should then repair and maintain the structure for this adaptive use on-site.

*[Note: Information received from the district at the time this report went to press indicates that no determinations are imminent regarding the conversion of this bridge to a walking trail component. The use of the bridge for access (vehicular and possibly pedestrian) would have to continue as long as the route was part of the secondary system. There may be requests in the future to extend Rts. 817 and 818. There are two other major structures built by the railroad that could be involved if a trail or road were extended in this area. If it is not feasible to close the bridge to vehicular traffic, there is the issue of how the road traffic and trail users would be handled on this narrow bridge. There is the potential that accommodations would have to be addressed for both vehicles and trail users: this could include improvements to the existing bridges, if possible, or other structures being built. There has been no determination made on who would be the owner of the trail facility or who would maintain it if a proposal was pursued. Currently, the right of way is owned and maintained by VDOT. If the district determines that the development of the trail is not feasible, treatment measures that will accommodate long-term vehicular use should be considered, including a possible structural upgrade to DOT standards and repairing and maintaining the structure as needed for continued long-term vehicular use.]*

**2017 Update for:**

**Botetourt County Structure No. 6100:** (Metal truss bridge); Warren (with verticals) deck truss (with Phoenix columns used for compression members), 1886 (re-erected 1902), Route 817 crossing Craig Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2005, two repairs were performed. First, the approach pavement for the bridge was repaired. Second, 12 of the decaying floor timbers were replaced with new timbers. In 2007, the deteriorating timber flooring was replaced with 5 inch by 10 inch timbers. In addition, the curbs were replaced with 4 inch by 6 inch timbers.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.
- The potential Rails-to-Trails project noted in the original Management Plan did not have extensive local support, and such a project appears no longer to be viable.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-5-5.
- ADT: The current ADT is 47 [the ADT in the 2001 report was 55].
- The structure is posted at 15 tons.
- There is no active plan for rehabilitation or replacement.
- Maintenance and preventive maintenance are being done.
- The bridge is not structurally deficient.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs/maintenance are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Botetourt County Structure No. 6100:** (Metal truss bridge); Warren (with verticals) deck truss (with Phoenix columns used for compression members), 1886 (re-erected 1902), Route 817 crossing Craig Creek (Figures B10 and B11).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Yes. This bridge has a low ADT and will be part of the in-progress Rails-to-Trails Craig Botetourt Scenic Trail project. As noted below, this bridge will

remain under vehicular traffic as part of this 26-mile trail which includes approximately 9 miles of low-volume secondary roads.

*Presence of Stone Masonry*: Yes. Stone masonry is present on the lower portions of the abutments and pier. The builder/contractor for the stone masonry elements of this bridge is not known. No original plans or specifications have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- In 2020 the bridge underwent repairs and repainting and some floor beam replacement. This work was in partial accordance with Recommendation 1 in the 2001 Management Plan. The project narrative received from the district structure and bridge office is as follows:
  - Salem District – Botetourt County
  - Project No.: 0817-011-805, B678
  - (UPC 114300)
  - Project Location – Rte. 817 over Craig Creek
  - (Route 817/Old Rail Road 0.60 mi INT. Route 704 – Botetourt County)
  - Structure No.: – 6100 (03534)
  - The rehabilitation of the McAllister truss involved replacing two (2) structural steel floor beams by state forces in 2020. The truss (two simple steel deck truss spans 253' long.) was cleaned and recoated in 2020.
  - The project was constructed entirely inside the existing right of way and the contractor utilized a temporary lightweight scaffolding attached underneath the bridge for construction access.
  - There was no impact to the Craig Creek.
  - The bridge had periodic scheduled road closures during construction.
  - The bridge is a one lane structure (12.17 feet curb to curb) and is currently posted for 13 tons.
  - The truss was painted brown 595-20059.
  - Contractor: (K.V.K. Contracting, Inc.)
  - Construction: July 2020 – December 2020
  - Construction Cost: $132,044.68
  - Order No.:C11
  - Plan No. N/A

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-5-5 [the rating in the 2017 report was 7-5-5].
- ADT: The current ADT is 43 [the ADT in the 2017 report was 47].
- The structure is posted at 8 tons.
- The potential Rails-to-Trails project noted in the original Management Plan now has local support, and is moving forward. It is planned to have this bridge remain under vehicular traffic as part of this 26-mile Craig Botetourt Scenic Trail, which includes approximately 9 miles of low-volume secondary roads as well as sections of the old railroad right-of-way.
- Maintenance and preventive maintenance are being done.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs / maintenance are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates Recommendation 1, of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B10. Botetourt County Structure No. 6100**

**Figure B11. Botetourt County Structure No. 6100, Showing Phoenix Column Compression Members**

**METAL TRUSS**

**Salem District (2)**

**Original [2001] Management Plan Information for:**

**Botetourt County (11)**
*VDOT Structure No. 6386*
*VDHR Inventory No. 011-0095*
*Name: Phoenix Truss Bridge*
*Location: Route 685, crossing Craig Creek*
*National Register Status: Listed*

*Description:* Botetourt County Structure No. 6386 is a single-span Pratt through truss (with Phoenix columns), with a Warren deck truss approach span and two small steel beam approach spans, carrying Route 685 crossing Craig Creek. The through truss span was built in 1887 by the Phoenix Bridge Company. The structure is approximately 267 feet long overall; the through truss is approximately 150 feet long; the deck truss approach span is approximately 74 feet long. The through truss and deck truss spans were moved from elsewhere and re-erected on the present site in 1903 to serve the Craig Valley branch of the Chesapeake and Ohio Railroad. The old railroad right of way was abandoned in the late 1950s and was purchased by the Virginia Department of Highways in 1961. This bridge now carries Route 685, which occupies the old railroad route. The bridge is constructed of wrought iron, and the various decorative iron elements on this structure mark it as the most elaborate of Virginia's Phoenix bridges.

*Evaluation:* Botetourt County Structure No. 6386 was placed on the Virginia Historic Landmarks Register and the National Register of Historic Places in 1975.

*Documentation:* Botetourt County Structure No. 6386 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-105).

*Condition*: This structure underwent rehabilitation in 1999, and the current inspection report indicates that the bridge is in fair condition. In the course of the recent rehabilitation, the deck and stringers were replaced. Replacement stainless-steel shims were used. There are still some broken washers on some lower chord pin connections. Several of the wrought iron decorative elements are cracked or broken. In the course of natural weathering, this wrought iron structure formed its own weatherproof surface treatment, making painting unnecessary. There is loose mortar in some of the abutment and pier masonry. Vegetation is encroaching on the piers and abutments of the bridge.

*Posted Restrictions:* None.

*ADT:* 240.

*Right-of-Way Ownership:* The approaches to Botetourt County Structure No. 6386 are constructed on former railroad right of way purchased in 1961 (i.e., held in fee simple).

*Recommended Treatment:* This structure is on a relatively lightly traveled (the ADT was 240 in 1998) dead-end road. Because of the recent rehabilitation of the structure, additional major repairs for vehicular use are not necessary at present. Upgrading the through truss to DOT standards is not feasible. Discontinuing, abandoning, moving, demolishing, or transferring ownership of the structure is not a recommended option. As noted above, painting the structure is not necessary. Recommended management options for the bridge, in order of preference, are:

1. Preventive maintenance (for continued vehicular use). Particular attention should be paid to periodic cleaning out of the weepholes at the base of the Phoenix columns. Elastomeric shims should be considered for future replacement shims. Vegetation should be removed from around the bridge. A deck membrane and overlay should be considered for future application. The broken washers on the lower chord pin connections should be repaired. The deteriorated mortar in the piers and abutments should be repointed with a suitable (part-lime) mortar mix. The new galvanized stringers should be painted after an appropriate weathering period.
2. Repair and maintain for adaptive use on-site should this eventuality arise (no apparent adaptive use for this structure and no alternative route for the road have yet been identified). However, if the bridge is no longer able to carry vehicular traffic, the adaptive-use option should be thoroughly explored, as this is preferable to any other option.

**2017 Update for:**

**Botetourt County Structure No. 6386:** (Metal truss bridge); Pratt through truss (with Phoenix columns), with Warren deck truss approach, 1887, Route 685 crossing Craig Creek.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2001, modifications were made to the bridge in which the upstream railing post at L3 (adjacent to the inside low chord) was torch notched to allow the lower chord to move unrestricted. In 2002, a 1-inch wearing surface and rubber deck sealer were applied. In 2008, the wearing surface and rubber sealer (60 square feet) were repaired.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-4-5.
- ADT: The current ADT is 276 [the ADT in the 2001 report was 240].
- The structure is posted at 23 tons.
- There has been deterioration of portions of this structure since 2000 (as has been seen in other wrought iron structures); this deterioration includes section loss and areas of pack rust in the Phoenix columns.
- Consultants are in the process of evaluating the truss for rehabilitation needs; this is a specific project solely for this truss; the truss is not part of a pool being evaluated.

- The rehabilitation project is already set up (UPC 110614).
- The full recommendation report from the consultants has not yet been received. The general estimate for rehabilitation costs is $2.7 million. It is anticipated that members with section loss will be replaced and the structure will be painted. The district is committed to undertaking this project and finding the necessary funds. Approximately $150,000 has been spent on Preliminary Engineering. The district anticipates starting in the next 18 months.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in poor condition. Previous repairs are in accordance with Recommendation 1 in the 2001 Management Plan. A rehabilitation of this structure is planned. The task group concurs with this plan.

**2024 Update for:**

**Botetourt County Structure No. 6386:** (Metal truss bridge); Pratt through truss (with Phoenix columns), with Warren deck truss approach, 1887, Route 685 crossing Craig Creek (Figures B12 and B13).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Yes. This bridge has a relatively low ADT and will be part of the in-progress Rails-to-Trails Craig Botetourt Scenic Trail project. It is located on a dead-end road. As noted below, this bridge will remain under vehicular traffic as part of this 26-mile trail which includes approximately 9 miles of low-volume secondary roads.

*Presence of Stone Masonry*: Yes. *Presence of Stone Masonry*: Yes. The abutments and pier are stone masonry, with concrete caps. The builder/contractor for the stone masonry elements of this bridge is not known. Plans for the truss (or an extremely similar truss bridge) exist, but no original plans or specifications for the masonry portions, have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- In 2019-2020, the structure underwent a rehabilitation. This work was in partial accordance with Recommendation 1 in the 2001 Management Plan. The project narrative received from the district structure and bridge office is as follows:
  - Salem District – Botetourt County
  - Project No.: 0685-011-805, B678
  - (UPC 110614)
  - Project Location – Rte. 685 over Craig Creek
  - (Route 685/Ballpark Road 0.02 MI. w. INT. Rte. 615 – Botetourt County)
  - Structure No.: – 6386 (03496)
  - The rehabilitation of the historic Phoenix truss involved structural steel repairs to the floor beams both flanges and webs, structural steel replacements to stringers, lateral cross bracing, replacement of steel fasteners (900 rivets) with high strength bolts, cleaning and painting the existing truss, concrete mortar repair and waterproofing of the abutments and piers bearing seats, removal and replacement of the timber deck

and curb; placing a waterproofing membrane over the new timber deck and resurfacing with 2 inches asphalt.
    - The project was constructed entirely inside the existing right of way and the contractor utilized a temporary lightweight scaffolding attached underneath the bridge for construction access.
    - There was no impact to the Craig Creek.
    - The bridge had periodic scheduled overnight road closures during construction.
    - The bridge is a one lane structure (11.5 feet curb to curb) and is currently posted for 25 tons.
    - The truss was painted black 595-27038.
    - Contractor: (D. A. Brown, Inc.)
    - Construction: February 2019 – November 2020
    - Construction Cost: $2,548,345
    - Order No.:A24
    - Plan No. 116-14A

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-6-7 [the rating in the 2017 report was 7-4-5].
- ADT: The current ADT is 260 [the ADT in the 2017 report was 276].
- The structure is posted at 25 tons.
- The potential Rails-to-Trails project noted in the original Management Plan now has local support, and is moving forward. It is planned to have this bridge remain under vehicular traffic as part of this 26-mile Craig Botetourt Scenic Trail, which includes approximately 9 miles of low-volume secondary roads as well as sections of the old railroad right-of-way.
- Maintenance and preventive maintenance are being done.

*Current Historic Structures Task Group Observations and Recommendations:* The structure has been rehabilitated. This work is in accordance with Recommendation 1 in the 2001 Management Plan. The current inspection report indicates that this structure is in satisfactory condition. The task group reiterates Recommendation 1, of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B12. Botetourt County Structure No. 6386: Closeup of Portal (Before Painting) Showing Details of Phoenix Columns and Iron Decorative Elements**


**Figure B13. Botetourt County Structure No. 6386 (After Painting)**

**METAL TRUSS**

**Salem District (2)**

**Original [2018] Management Plan Information for:**

**Montgomery County (60)**
*VDOT Structure No. 9003*
*VDHR Inventory No. 060-5066*
*Location: Ironto Rest Area, I-81, Montgomery County*
*National Register Status: Listed*
*[Note: This structure was added to the Management Plan as part of the 2018 addendum.]*

*Description:* Montgomery County Structure No. 9003 is a single-span King patent tubular "Bowstring" truss, built ca. 1878. It was originally located in Bedford County over Stony Fork, north of Moneta; it subsequently was moved and erected east of the town of Bedford, carrying Route 637 over Roaring Run as Bedford County Structure No. 6046. It was moved to the Ironto Rest Area in Montgomery County in the late 1970s, and has carried pedestrian traffic across a drainage channel in the rest area since 1977. The structure is approximately 55 feet long. The original truss members are wrought iron. Some replacement flooring members, added over the years, were of steel.

*Evaluation*: Montgomery County Structure No. 9003 was placed on the Virginia Landmarks Register in 2008 and the National Register of Historic Places in 2013.

*Documentation*: Montgomery County Structure No. 9003 (prior to receiving its current structure number) was included in the initial metal truss bridge survey report prepared by VTRC (Deibler/Spero, 1975-1980). It was not included in the 1997 truss bridge survey update (Miller and Clark, 1997) because it had been moved to the rest area and no structure number was furnished. Prior to its move, the bridge was recorded via Historic American Engineering Record [HAER] measured drawings (HAER No. VA-7). The bridge also was documented in the National Register nomination form used for both the Virginia Landmarks Register, 2008, and the National Register of Historic Places, 2013.

*Condition*: This structure underwent extensive rehabilitation and repair in 2017; there are no current repair needs. The project narrative received from the district structure and bridge office is as follows:

- Salem District – Montgomery County
- Project No.: BR02-060-823, B601
- UPC – 106879
- Virginia Structure No. – 9003
- Federal Structure ID – 29220
- Project Location – I-81 NBL Ironto Rest Area over Drainage Channel

**Scope of Work:**

The intent of this project was to rehabilitate and repair the historic "Bowstring" pedestrian truss. Work done under the contract included:

- Removal and replacement of the timber deck and railing
- Replacement of deteriorated steel stringers
- Repair of deteriorated lateral strut collars and threaded rods on the vertical lattice members
- Cleaning and painting the structural steel and iron, including the truss, floor beams and stringers. The structure was painted black (595-27038) which, based on our best information, was the original color of the structure.
- Placement of concrete slab slope protection under the bridge
- Addition of new utility conduits
- Placement of new concrete approach walkway
- Installation of interpretive signage with information about the historic structure

The pedestrian bridge was closed during construction.
Contract Information:

- Contractor – L. A. S. Trucking
- Construction Start – May 2017
- Construction Completion – September 2017
- Construction Cost – $232,560

*[Note: The bridge was inspected on September 14, 2017, near the completion of the rehabilitation work. The current rating is 9-5-7.]*

*Posted Restrictions:* None. The structure does not carry vehicular traffic; it is a pedestrian bridge in an interstate rest area.

*Right-of-Way Ownership:* This structure now is located, and carries pedestrian traffic, over a drainage channel within the Ironto Rest Area for I-81; as part of the rest area, it is located within the right-of-way for I-81.

*Recommended Treatment:* The structure has served as a pedestrian bridge within the Ironto Rest Area since 1977. The task group concurs with its current adaptive use. Because of its location and current use, repairing and maintaining for vehicular use, transferring ownership, moving the structure to another location, discontinuing it, or abandoning it are not options. A structural upgrade to DOT standards is neither feasible nor necessary. Dismantling or demolition is not recommended. The structure underwent rehabilitation in 2017 and there are no current repair needs. The recommended management option for this structure consists of normal preventive maintenance and repairing and maintaining the structure for continued adaptive (i.e., pedestrian) use as needed.

**2024 Update for:**

**Montgomery Structure No. 9003:** (Metal truss bridge); King patent tubular "Bowstring" truss, ca. 1878; I-81 NBL Ironto Rest Area over drainage channel (Figure B14).

*Evaluation Update*: Unchanged from 2018 (Listed).

*Potential for Adaptive/Alternative Use*: Established. The bridge has served as a pedestrian bridge within the rest area since being moved to the site in 1977.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2018:*

- In 2020, the remaining utility lines and conduit on the bridge were removed from the structure and relocated.
- This work was in accordance with the Recommended Treatment in the 2018 addendum to the Management Plan.

*Current Inspection, Condition and Maintenance Information*

- The rating is 8-6-7 [the rating near the completion of rehabilitation work in 2017 was 9-5-7]
- The structure remains as a pedestrian bridge.
- Interpretive signage with information about the historic structure is in place near the bridge.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in satisfactory condition. Previous repairs and the recent rehabilitation are in accordance with the Recommended Treatment in the 2018 addendum to the Management Plan. The task group reiterates the Recommended Treatment of (continued) repair and maintain for continued adaptive/alternative use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B14. Montgomery County Structure No. 9003**

**METAL TRUSS**

**Richmond District (4)**

**Original [2001] Management Plan Information For:**

**Brunswick County (12)**
*VDOT Structure No. 6104*
*VDHR Inventory No. 012-0080*
*Name: Gholson's Bridge*
*Location: Route 715, crossing Meherrin River*
*National Register Status: Listed*

*Description:* Brunswick County Structure No. 6104 is a two-span Pratt through truss, built in 1884 by the Wrought Iron Bridge Company, carrying Route 715 crossing Meherrin River. This structure has an overall length of approximately 192 feet; the south truss span is approximately 100 feet long; the north truss span is 86 feet long. The structure is significant as Virginia's oldest surviving multi-span metal truss bridge.

*Evaluation*: Brunswick County Structure No. 6104 was listed on the Virginia Landmarks Register in 1977 and on the National Register of Historic Places in 1978.

*Documentation*: Brunswick County Structure No. 6104 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-111).

*Condition*: The current inspection report indicates that this structure is in fair condition. Over the years, light erosion has occurred around abutment A, and there is dirt on the bridge seats and the bottom flanges of the stringers. Impact damage to the truss's decorative portals has been repaired, and the replacement elements have been fabricated to match the originals. Extra counters were previously installed to strengthen the bridge. Vegetation is encroaching on the bridge. The masonry piers and abutments have been poorly repointed in the past.

*Posted Restrictions:* The structure is posted at 11 tons.

*ADT:* 1,011.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Brunswick County Structure No. 6104 is a single-lane through truss bridge; an upgrade to DOT standards is not feasible. Particularly given the topography and road locations in the region, adaptive use, discontinuance, or abandonment is not considered a feasible

option. Transfer of ownership either on-site or off-site or demolition is not recommended. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to stabilize and monitor the eroded area, remove vegetation, and clean the bridge seats. A parallel structure could be constructed if the road has to be widened. When the bridge is next painted, attention should be given to various options (such as sandblasting vs. stripping, painting vs. metalizing or galvanizing). Future repointing of the masonry should be done with more careful attention to historical practice and with a lime-content (not pure Portland cement) mortar.

**2017 Update for:**

**Brunswick County Structure No. 6104:** (Metal truss bridge); Pratt through truss, 1884, Route 715 crossing Meherrin River.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2012, work was done to make repairs to the deck of the bridge, replacing four planks and installing new wearing surfaces.
- The posting was reduced to 3 tons.
- There has been additional deterioration of the structure since the 2012 work was done. The bridge is currently under investigation to determine future plans.
- The work done to the bridge in 2012 was in partial accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-5-7.
- ADT: The current ADT is 760 [the ADT in the 2001 report was 1,011].
- The county wants the bridge to remain in place but does not want a parallel span.
- Rehabilitation of the bridge is being planned; options for rehabilitation are still being examined.
- The structure is posted at 3 tons. Posting will be kept at 3 tons after rehabilitation.
- This is a wrought iron bridge. Given the age and structure of the bridge, vehicle use of the bridge should be limited.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. A rehabilitation of this structure is planned. The task group concurs with this plan.

**2024 Update for:**

**Brunswick County Structure No. 6104:** (Metal truss bridge); Pratt through truss, 1884, Route 715 crossing Meherrin River (Figure B15).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely. There has been no local support for alternative use (such as bypassing, moving, or a parallel span) from local governments or stakeholders.

*Presence of Stone Masonry*: Yes. The bridge has its original 1884 abutments and pier. Original bridge contracts and specifications, including mortar specifications, and pier and abutment information, exist. The contract for the masonry work was awarded to Stewart & Shirreffs, of Richmond, Virginia., who were also the agents for the Wrought Iron Bridge Co. of Canton, Ohio, the company that was awarded contract for the metal truss bridge (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- Rehabilitation of the bridge was being planned at the time of the previous update in 2017; options for rehabilitation were still being examined at that time.
- In September 2021, shortly before the planned rehabilitation was to begin, the bridge was struck by an overweight vehicle and was severely damaged. Among other damage sections of the portal frame were heavily impacted; portions of the bracing (including rivets) were ripped out. The bridge was immediately closed by the district structure and bridge engineer. The bridge had to be re-evaluated and the rehabilitation planning had to begin again because of the additional damage.

*Current Inspection, Condition and Maintenance Information:*

- The bridge has been closed since 2021 [the rating in the 2017 report was 8-5-7; this was prior to the extensive damage in September 2021].
- The bridge has been closed since 2021 [the ADT in the 2017 report was 760; this was prior to the extensive damage in September 2021].
- Rehabilitation planning, including environmental and cultural resource review, has been completed. The district anticipates that the project will be advertised in late 2024.
- This is a wrought iron bridge. Given the age and structure of the bridge, vehicle use of the bridge should be limited. Posting reportedly will be kept at 3 tons after rehabilitation.

*Current Historic Structures Task Group Observations and Recommendations:* This structure was not considered for task group recommendations in the current Management Plan update because of the current rehabilitation project. However, the task group supports the planned rehabilitation of this bridge.


**Figure B15. Brunswick County Structure No. 6104**

**METAL TRUSS**

**Culpeper District (7)**

**Original [2001] Management Plan Information for:**

**Culpeper County (23)**
*VDOT Structure No. 6906*
*VVDHR Inventory No. 023-0073*
*Name: Waterloo Bridge*
*Location: Route 613, crossing Rappahannock River*
*National Register Status: Eligible*

*Description:* Culpeper County Structure No. 6906 consists of a single-span Pratt through truss with 15 steel beam approach spans carrying Route 613 crossing the Rappahannock River. The truss was built in 1878 by the Pittsburgh Iron Company. and retains its masonry piers. The current steel beam approach spans (with concrete bents) were completed in 1919 and were built by the Virginia Bridge and Iron Company, replacing earlier deteriorated and flood-damaged wooden approach spans. The bridge is approximately 387 feet long overall; the truss span is 100 feet long. This structure is significant as Virginia's oldest surviving in-service metal truss bridge.

*Evaluation*: Culpeper County Structure No. 6906 was identified as eligible for listing in the National Register of Historic Places after the initial survey of Virginia's metal truss bridges in the 1970s. This assessment was reiterated by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Culpeper County Structure No. 6906 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-112).

*Condition*: The current inspection report indicates that this structure is in poor condition. The structure has numerous deficiencies. Various deck timbers are broken, decayed, or rotted through. Among these, 50% are loose and are missing deck bolts. The structure is so rusted that it has critical section loss through some beams. There are various loose counters and diagonals. There is spalling, delaminations, and exposed rebar on the concrete piers and abutments of the approach spans. The ADT is relatively high for a rural area (over 500). Although the structure is posted at 3 tons, overweight vehicle abuse of this bridge is frequent.

*Posted Restrictions:* The structure is posted at 3 tons.

*ADT:* 541.

Right-of-Way Ownership: Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the

secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* A sizable amount of development is zoned in the area, which suggests that the already high ADT and abuse of the bridge by overweight vehicles will increase. The immediate neighbors like the look and historicity of the bridge and would like it to remain on-site. However, questions of potential adaptive use are rendered problematic by the conflicting viewpoints among the area's population on the issue of public access to the Rappahannock River. Several "No Boaters" signs are posted on the properties adjacent to the bridge, and there is local opposition to the proposed Rappahannock Scenic River designation. The district structure and bridge office advises that despite the relatively high ADT, plans are to keep it under traffic until it can no longer be used and then probably close it and leave it in place. If the structure is not maintained, there is always the danger of it washing out or being left to collapse. There are no immediate plans to build a new bridge. The district structure and bridge office estimates that a decision on whether to close the bridge may have to be made in as little as 5 years. After making an independent assessment of the various issues concerning this structure, the task group notes that because this is a single-lane through truss, an upgrade to DOT standards is not feasible. Abandonment, transfer of ownership off-site, salvage, or other off-site options are also not considered feasible by the task group. Demolition is not a recommended option at present. The task group's recommended management options for this structure, in order of preference, are:

1. Preventive maintenance.
2. Discontinue.
3. Transfer ownership if a suitable recipient can be identified.
4. Repair and maintain for adaptive use.

**2017 Update for:**

**Culpeper County Structure No. 6906:** (Metal truss bridge); Pratt through truss, 1878, Route 613 crossing Rappahannock River.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No major rehabilitation was undertaken to this structure since 2001. Some repair work was completed between 2001 and 2009: several broken diagonals were replaced with cables; channel sections were retrofitted at beam ends where holes were present; damaged railing was repaired; and damaged deck timbers and stringers were replaced.
- In 2004, the bridge was repainted.
- In 2008, a driver struck the bridge, causing significant superstructure damage; repairs were made by a VDOT specialty crew experienced in maintaining and repairing vintage bridges. These repairs were completed in early 2009.

- The bridge remained posted at 3 tons. The bridge was also posted for no trucks and with a warning that only one vehicle at a time should be on the bridge.
- This work was in partial accordance with the Recommended Treatment in the 2001 Management Plan.
- There was additional deterioration of the structure since the 2009 repairs. By 2012 the bridge was under investigation to determine future plans.

*Current Inspection, Condition and Maintenance Information:*

- The 2013 inspection disclosed additional deterioration, indicating that capacity dropped below 3 tons. The bridge was closed by the district structure and bridge engineer.
- The bridge remains closed.
- Fauquier and Culpeper counties, plus local and regional preservation groups, want the bridge rehabilitated for vehicular traffic and reopened. They do not want the structure moved to a park or rehabilitated for adaptive use (the potential for adaptive use of this bridge at its present site is limited at present). Neither county had interest in pursuing a VDOT revenue sharing application for the rehabilitation project (each county estimated that they would have to contribute in excess of $1,000,000).
- Rehabilitation of the bridge is being planned, and options for rehabilitation are being examined, by VDOT.
- This is a wrought iron bridge. A sizable number of elements will have to be replaced in a rehabilitation.
- Section 106 review is being initiated with stakeholders.

*Current Historic Structures Task Group Observations and Recommendations*: This structure was not considered for task group recommendations in the current Management Plan update because of Section 106 review.

**2024 Update for:**

**Culpeper County Structure No. 6906:** (Metal truss bridge); Pratt through truss, 1878, Route 613 crossing Rappahannock River (Figure B16).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: There has been no local support for alternative use from local governments or stakeholders. They do not want the structure moved to a park or rehabilitated for adaptive use (the potential for adaptive use of this bridge at its present site is limited at present).

*Presence of Stone Masonry*: Yes. The bridge has stone masonry piers and an abutment; part of a wing wall and an abutment on the Fauquier County side of the river survive from an earlier bridge on the site; the rest of the work dates from the 1878 constriction of the bridge. The builder/contractor for the 1878 masonry portions of this bridge was a local stonemason, Bushrod Thompson. No original plans have been located but original (1878) bridge contracts and masonry specifications, including mortar specifications and pier and abutment information, survive (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- The structure was rehabilitated in 2020-2021.
- Under a $3.65 million construction contract, Corman Kokosing Construction of Annapolis, MD dismantled, repaired, and re-erected the through truss bridge. The truss members were blast cleaned and repaired or replaced as needed. A significant number of the truss elements required repair or replacement; new elements were designed to follow the appearance of the originals in order to preserve the character of the bridge. The stone masonry pier and abutments were repaired.
- This work was in partial accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-7 [the bridge was closed at the time of the 2017 report; no rating information exists for that period].
- ADT: The current ADT is 438 [the bridge was closed at the time of the 2017 report; no ADT information exists for that period].
- The bridge is posted at 12 tons.
- Issues with deck clips becoming loose have been addressed.
- The inspection report does not identify any major points of concern.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition**.** The recent rehabilitation was in accordance with the Recommended Treatment in the 2001 Management Plan (this structure was not considered for task group recommendations in the 2017 Management Plan update because of ongoing Section 106 review). The task group reiterates Recommendation 1, (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B16. Culpeper County Structure No. 6906**

**METAL TRUSS**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Highland County (45)**
*VDOT Structure No. 6034*
*VDHR Inventory No. 045-0032*
*Name: Lane Truss*
*Location: Route 645, crossing Crab Run*
*National Register Status: Eligible*

*[Note: This structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2009.]*

*Description:* Highland County Structure No. 6034 is a single-span Lane Patent pony truss, carrying Route 645 crossing Crab Run. The structure was built in 1896 by the West Virginia Bridge Works. It is approximately 37 feet long. This bridge is a rare surviving example of a patented Lane truss; it is the only bridge of this type remaining in Virginia.

*Evaluation*: Highland County Structure No. 6034 was determined eligible as part of a project; this assessment was reiterated by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Highland County Structure No. 6034 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997).

*Condition*: The current inspection report indicates that this structure is in fair-to-poor condition. Highland County Structure No. 6034 was closed to vehicular traffic in 1994, after which the structure was rehabilitated to serve as a foot and bicycle bridge (this use allows pedestrians and cyclists to avoid the primary traffic on Route 250). Preventive maintenance is undertaken on an as-needed basis. The bridge was cleaned, redecked, wire brushed, and painted at the time that it was closed to vehicular traffic. There are currently some areas of rust on the truss members. The abutments (masonry, faced with concrete) exhibit some areas of cracking and spalling and are periodically subject to slight, but repairable scour. A tree is growing against the upstream abutment. Some of the truss members are loose and require tightening.

*Posted Restrictions:* None. The structure has been closed to vehicular traffic and converted into a pedestrian and bicycle bridge.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the

secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* This structure now serves as a foot and bicycle bridge in the village of McDowell. The Historic Structures Task Group concurs with this bridge being closed to vehicular traffic and concurs with its current adaptive use. The recommended management option for this structure consists of normal preventive maintenance and repairing and maintaining for continued adaptive use when necessary. Immediate repair recommendations are to remove the tree growing against the abutment, address the scour problem, and repair or reinforce the deteriorated abutment. Loose truss members should be tightened.

**2017 Update for:**

**Highland County Structure No. 6034:** (Metal truss bridge); Lane Patent pony truss, 1896, Route 645 crossing Crab Run. *[Note: This structure has been closed to vehicular traffic since 1994; it is a pedestrian and bicycle bridge.]*

*Evaluation Update*: The structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2009.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-4-4.
- The structure, closed to vehicular traffic since 1994, remains as a pedestrian and bicycle bridge.
- There is interpretive signage near the bridge, part of the statewide Civil War Trails series. The signage notes not only the Civil War history of the area but also the history and importance of the Lane truss.
- There is severe rust and section loss on floor beams.
- Floor beam hanger rods are bent.
- Several stringers (2 and 3) are not bearing on Floor Beam 1.
- The rubble masonry abutments are covered with concrete, which is delaminating (up to 8 to 9 inches in some areas) and exhibiting active cracking and efflorescence.
- There is undermining and extensive voids in the footings of the abutments. There is particularly extensive undermining on the end of the bridge nearest Route 250.
- Vegetation encroaching on the structure should be removed.
- The truss elements of the bridge need repair and painting.
- The abutments will require repair soon.
- The district structure and bridge office intends to begin planning repairs shortly.
- Traffic on the bridge is currently limited to pedestrian and bicycle access by metal guard railing at each end. The district structure and bridge office plans to install a more attractive rail in the future.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair to poor condition. Planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of repair and maintain for continued adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. The task group strongly supports making repairs to this important structure in the near future. Surviving Lane trusses are extremely rare: only four are known to be extant. If the county is willing to coordinate with VDOT for a Transportation Enhancement grant, VDOT could write and administer such as grant.

**2024 Update for:**

**Highland County Structure No. 6034:** (Metal truss bridge); Lane Patent pony truss, 1896, Route 645 crossing Crab Run (Figure B17). *[Note: This structure has been closed to vehicular traffic since 1994; it is a pedestrian and bicycle bridge.]*

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Established. The bridge has served as a bicycle and pedestrian bridge since 1994.

*Presence of Stone Masonry*: Yes. The bridge has its original stone masonry abutments, overlaid with concrete. The builder/contractor for the masonry portions of this bridge is not known. No original plans or specifications for the masonry portions have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No bridge work since 2000 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-4-4 [the rating in the 2017 report was 7-4-4].
- The structure, closed to vehicular traffic since 1994, remains as a pedestrian and bicycle bridge.
- There is interpretive signage near the bridge, part of the statewide Civil War Trails series. The signage notes not only the Civil War history of the area, but also the history and importance of the Lane truss.
- There is section loss to floor beams.
- Floor beam hanger rods are bent.
- There appears to be some settlement of abutment A.
- The concrete covering the rubble masonry abutments is still delaminating and exhibiting active cracking and efflorescence. Per the inspection report, the concrete reinforcement bars include horseshoes.
- There is undermining and extensive voids in the footings of the abutments. There is particularly extensive undermining on the end of the bridge nearest Route 250. The inspection report recommends pouring a concrete jacket along the full length of abutment A to repair undermining and voids and stabilize the abutment.

- A tree growing against the upstream end of abutment A needs to be cut and removed; other vegetation encroaching on the structure should be removed.
- The truss elements of the bridge need cleaning, repair, and painting.
- The district structure and bridge office has discussed repair plans.
- Traffic on the bridge is still limited to pedestrian and bicycle access by metal guard railing at each end. The district structure and bridge office has discussed plans to install a more attractive rail in the future.
- A source of funding needs to be identified.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair to poor condition. Previously discussed repairs would be in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of repair and maintain for continued adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. The task group strongly supports making repairs to this important structure in the near future. Surviving Lane trusses are extremely rare: only four are known to be extant.

**Figure B17. Highland County Structure No. 6034**

**METAL TRUSS**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Page County (69)**
*VDOT Structure No. 1990 [Note: Subsequently renumbered as 9001]*
*VDHR Inventory No. 069-0238*
*Location: Route 340, Overall Creek*
*National Register Status: Eligible*

*[Note: The structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2008.]*

*Description:* Page County Structure No. 1990 is a single-span Pratt deck arch truss with four T-beam concrete approach spans, built in 1938 by the Virginia Department of Highways, carrying Route 340 crossing Overall Run. The bridge is approximately 245 feet long overall; the truss is approximately 123 feet long. This bridge is one of two metal arch truss bridges in Virginia.

*Evaluation*: Page County Structure No. 1990 was determined eligible for listing in the National Register of Historic Places as part of a project. This assessment was reiterated by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Page County Structure No. 1990 was included in the updated initial metal truss survey report prepared by VTRC (Miller and Clark, 1997).

*Condition*: The current inspection report indicates that this structure is in poor condition. The deck is delaminated and scaled with exposed rebar. Its concrete rail system and curbs are severely deteriorated and crumbling. There is spalling on the concrete beam-ends and pier caps, plus section loss on the stringers, floor beams, and braces in the truss span.

*Posted Restrictions:* The structure has a legal limit of 27 and 40 tons, respectively.

*ADT:* 3,337.

*Right-of-Way Ownership:* This structure carries a primary route and relates to a road improvement project undertaken during the late 1930s. Fee simple ownership is presumed.

*Recommended Treatment:* A project to upgrade this section of Route 340 is currently in design phase. This structure and the similar Page County Structure No. 1004 were originally slated for replacement. However, a local citizens' group, Scenic 340 Project, Inc., which supports keeping Route 340 a two-lane, rural road in its present configuration, has been waging an active, well-organized campaign against the expansion and the replacements of the deteriorated National Register-eligible bridges. Scenic 340 Project, Inc., has also made claims that Route 340 itself

(which reached most of its present configuration in the mid to late 1930s) is historically significant, apparently based on the presence of 18th, 19th, and early 20th century predecessor roads in the general corridor of present-day Route 340. The claims of historic significance for Route 340 are still under evaluation. The task group made an independent assessment of the issues regarding Page County Structure No. 1990; its general determinations are as follow: Because of the site-specific nature of this kind of truss, transferring ownership, adaptive use, or salvage and reuse of elements off-site is not feasible. There are significant topography and design issues with this location: there is insufficient room at this site to permit construction of a new road while leaving the old bridge in place. Adaptive use on-site, on-site transfer of ownership, discontinuance, or abandonment is not feasible. The deteriorated condition of this bridge is beyond preventive maintenance. Recommended management options for this structure, in order of preference, are:

1. Document and demolish.
2. Repair and maintain for vehicular use.
3. An upgrade to DOT standards is feasible and could be considered as a third option. This would involve replacing the present deck with a lightweight, possibly wider, deck.

**2017 Update for:**

**Page County Structure No. 9001 (formerly No. 1990):** (Metal truss bridge); Pratt deck arch truss, 1938, Route 340 crossing Overall Creek.

*Evaluation Update*: The structure was placed on the Virginia Landmarks Register and the National Register of Historic Places in 2008. A continuation sheet with additional documentation was added in 2013.

*Repairs and Maintenance Undertaken Post-2001:*

- Areas of deterioration were repaired by VDOT's on-call contractor in 2007. In 2008, a new bridge was constructed to replace the existing bridge, bypassing the original bridge. Minor strengthening work was done to reinforce the deteriorating areas. The deck was removed to expose the metal arch truss; the structure is now preserved as a landscape feature and historical exhibit and is closed to all public access. Interpretive signage covering various elements of local history and one of the concrete end posts with its date plate were erected near the old bridge. The old bridge was renumbered as Page County Structure No. 9001. The truss portion of the bridge was painted in 2013 (as part of the commitment required by the amended 2010 memorandum of agreement).
- Preservation of the structure was required under several memoranda of agreement related to the constriction of the new bridge. The original agreement, among VDOT, the Federal Highway Administration, and the Virginia Department of Historic Resources, was finalized in 2004 and was amended in 2010. For a period of 15 years, VDOT will inspect the truss and the supporting piers of the structure every 4 years and will perform the minimum repairs to keep the truss and piers stable.
- Because of the site-specific nature and deteriorated condition of the structure, adaptive use was not considered a feasible option by the Virginia Historic Structures Task Group

in the 2001 Management Plan. Conversion to a landscape feature and historical exhibit was not among the recommended options for the bridge in the 2001 Management Plan.
- A new bridge was constructed to replace the existing bridge, bypassing the original bridge in 2008; the original bridge then was renumbered (from No. 1990 to No. 9001).

*Current Inspection, Condition and Maintenance Information:*
- Per the original and amended memoranda of agreement, the deck of the original bridge then was removed to expose the metal arch truss; the approaches have been removed. The structure is now preserved as a landscape feature and historical exhibit, and is also utilized for paint system evaluation by the district structure and bridge office. It is closed to all traffic/public access.

*Current Historic Structures Task Group Observations and Recommendations:* Currently, the original and amended memoranda of agreement are being followed. Along with its use as a landscape feature and an historical exhibit, the bridge is serving an additional purpose in paint system evaluation. The task group supports the fulfillment of the memoranda of agreement and the continued use of the structure for paint system evaluation.

**2024 Update for:**

**Page County Structure No. 9001 (formerly No. 1990):** (Metal truss bridge); Pratt deck arch truss, 1938, Route 340 crossing Overall Creek (Figure B18).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Established. The bridge has served as an historical feature and landscape feature, and also as a medium for paint system evaluation, since 2008.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*
- Per the original agreement, among VDOT, the Federal Highway Administration, and the Virginia Department of Historic Resources, finalized in 2004 and amended in 2010: VDOT has been inspecting the truss and the supporting piers of the structure every 4 years and performing the minimum repairs to keep the truss and piers stable.
- In addition, the bridge is being used for paint system evaluation.

*Current Inspection, Condition and Maintenance Information:*
- The rating is N-3-4 (reflecting the fact that the deck has been removed); previous post-closure inspection data reflected the bridge's 2007 rating of 4-3-4.
- The structure is closed to all traffic/public access.
- Per the original and amended Memoranda of Agreement, the structure is still preserved in place as a landscape feature and historical exhibit, and is still utilized for paint system evaluation by the district structure and bridge office. It remains closed to all traffic/public access.

*Current Historic Structures Task Group Observations and Recommendations:* Currently, the original and amended memoranda of agreement are being followed. Along with its use as a landscape feature and an historical exhibit, the bridge is still serving an additional purpose in paint system evaluation. The task group continues to support the fulfillment of the memoranda of agreement and the continued use of the structure for paint system evaluation.

**Figure B18. Page County Structure No. 9001 (Formerly No. 1990)**

**METAL TRUSS**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Rockbridge County (81)**
*VDOT Structure No. 6145*
*VDHR Inventory No. 226-5001*
*Name: Goshen Bridge*
*Location: Route 746, crossing Calfpasture River*
*National Register Status: Listed*

*Description:* Rockbridge County Structure No. 6145 is a two-span Pratt through truss, built in 1890 by the Groton Bridge Co, carrying Route 746 crossing Calfpasture River. This structure is approximately 261 feet long overall; the trusses are approximately 139 and 121 feet long. Constructed for the planned industrial community of Goshen, this bridge has a number of points of significance: it is one of Virginia's earliest multi-span truss bridges; it is built on a skew; and it is an early multimodal bridge. As originally designed, the structure included a lane for vehicular traffic, a lane for streetcars, and a cantilevered sidewalk.

*Evaluation*: Rockbridge County Structure No. 6145 was placed on the Virginia Landmarks Register in 1977 and on the National Register of Historic Places in 1978.

*Documentation*: Rockbridge County Structure No. 6145 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-102).

*Condition*: The current inspection report indicates that this structure is in poor condition. There are numerous areas of corrosion and section loss to steel members. The piers are missing mortar and substructure stones in various locations. The roller bearing devices are frozen, and some are displaced. In addition, debris is present on the bridge seats, on the connections, and between the stringers. Only one lane is open to vehicular traffic; the other lane, which was originally planned as a streetcar lane, has not had decking for at least 50 years; there is attendant corrosion of the exposed members. A rehabilitation of the structure is planned.

*Posted Restrictions:* The structure is posted at 6 tons.

*ADT*: 55.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* A full rehabilitation of this structure has been in the planning stage by the Staunton District Structure and Bridge Office over the last several years. Planning is now complete. The stone piers will be repaired and repointed as needed, using compatible mortar. The truss will be disassembled, and the members repaired as needed and galvanized. The truss will then be reassembled and restored for two lanes of vehicular traffic. The task group concurs with this plan. Attempts to fund this rehabilitation substantively with enhancement grant monies were unsuccessful until the present (2000) grant cycle, when $25,000 was received in a TEA-21 grant ($250,000 was requested).

**2017 Update for:**

**Rockbridge County Structure No. 6145:** (Metal truss bridge); Pratt through truss, 1890, Route 746 crossing Calfpasture River.

*Repairs and Maintenance Undertaken Post-2001:*

- The bridge underwent extensive rehabilitation in 2001-2002. The planning phase for this project was underway at the time the 2001 Management Plan was issued, and the project was completed in mid-2002. The project included major work on the deteriorated superstructure and substructure and work on the deck. The bridge underwent reconstruction in which it was disassembled and reconstructed with major repairs being made. Lead paint was removed; the metal was galvanized to comply with modern standards; and deteriorated or outdated parts (particularly the eyebars and elements with a high percentage of section loss) were replaced. (For a detailed report on this rehabilitation, see McKeel et al., 2006.)
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-8.
- ADT: The current ADT is 132 [the ADT in the 2001 report was 55].
- The inspection report does not identify any major points of concern.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. The task group concurred with the planned 2001-2002 rehabilitation of this structure, as noted under Recommended Treatment in the 2001 Management Plan. The task group recommendation is to continue maintenance and repairs if needed for vehicular use, with subsequent preventive maintenance as needed.

**2024 Update for:**

**Rockbridge County Structure No. 6145:** (Metal truss bridge); Pratt through truss, 1890, Route 746 crossing Calfpasture River (Figure B19).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: The bridge serves a low volume, dead-end road. Threats from overweight vehicles are minimal.

*Presence of Stone Masonry*: Yes. The bridge has its original stone masonry piers and abutments. The builder/contractor for the masonry portions of this bridge is not known. No original plans or specifications for the masonry portions have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No major bridge work has been recorded since the 2001-2002 rehabilitation.
- Preventive maintenance has been done as needed.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-8 [the rating in the 2017 report was 7-7-8].
- ADT: The current ADT is 104 [the ADT in the 2017 report was 132].
- The inspection report does not identify any major points of concern.
- The district structure and bridge office reports that there are no major issues with this structure and that the bridge remains in good condition more than two decades after the completion of its rehabilitation.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. The task group recommendation is to continue maintenance and repairs if needed for vehicular use, with subsequent preventive maintenance as needed.

**Figure B19. Rockbridge County Structure No. 6145**

**METAL TRUSS**

**NOVA District (9)**

**Original [2001] Management Plan Information for:**

**Loudoun County (53)**
*VDOT Structure No. 6051*
*VDHR Inventory No. 053-0131*
*Name: Catoctin Creek Bridge*
*Location: Route 673, crossing North Fork of Catoctin Creek*
*National Register Status: Listed*

*Description:* Loudoun County Structure No. 6051 is a single-span Pratt through truss, date uncertain (probably ca. 1889), built by Variety Iron Works, carrying Route 673 crossing the North Fork of Catoctin Creek. This structure is approximately 159 feet long. It originally carried the Leesburg and Alexandria Turnpike (predecessor of Route 7) over Goose Creek some 3 miles east of Leesburg; it was moved to its present site in 1932. This bridge is significant as an example of an early metal Pratt through truss.

*Evaluation*: Loudoun County Structure No. 6051 was placed on the Virginia Landmarks Register and the National Register of Historic Places in 1974.

*Documentation*: Loudoun County Structure No. 6051 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-110).

*Condition*: The current inspection report indicates that this structure is in poor condition. The structure has numerous areas of deterioration and damage to steel members. There is severe rust on almost all truss members; some members have corrosion and section loss of up to 25%. The bearings are frozen with severe rust and section loss. A rehabilitation of the structure is planned.

*Posted Restrictions:* The structure is posted at 12 tons.

*ADT*: 280.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Because the structure is a one-lane through truss; a structural upgrade to DOT standards is not feasible. However, a full rehabilitation of this structure has been planned by the Northern Virginia District Structure and Bridge Office over the last several years. Planning is currently being completed. The truss will be disassembled, and the members repaired

or replaced as needed and then galvanized or metalized. The truss will then be reassembled and restored. Attempts to fund this rehabilitation with ISTEA and TEA-21 enhancement grant monies have been unsuccessful thus far. If necessary, rehabilitation will be pursued through maintenance funds. The task group made an independent assessment of the issues regarding this bridge and confirmed that the repair and maintenance for vehicular use, and subsequent preventive maintenance as needed, are the preferred treatment for this structure. In the event vehicular use is no longer possible, repairing and maintaining the structure for adaptive (non-vehicular) use is a less desirable, but still feasible, option.

**2017 Update for:**

**Loudoun County Structure No. 6051:** (Metal truss bridge); Pratt through truss, [originally noted as "date uncertain (probably ca. 1889)"; the date of the bridge has now been documented to 1890] Route 673 crossing North Fork Catoctin Creek.

*Repairs and Maintenance Undertaken Post-2001:*

- After a multi-year planning project, the bridge underwent an extensive rehabilitation in 2003. The rehabilitation was performed by DLB Inc. of Hillsville, Virginia, and cost $1,128,237. It included work on the superstructure including metallization; a timber deck replacement with an asphalt overlay; adjustments to the stringers; masonry repointing; modification of the surrounding drainage; and adjustment of the rails. Environmental protection and health and safety work (the aforementioned metallization occurred after the bridge was stripped of lead paint); jacking of the existing structure; and modification of the grading were also part of the rehabilitation.
- At the time, the bridge was believed to be a steel structure.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.
- The bridge subsequently exhibited widespread cracking. The NOVA Structure and Bridge office reported that the cracks are on various types of members (primary members, secondary members, connection plates, batten plates, etc. The cracks are on tension members, compression members and bending members. Thus, the cracking is random.)
- After the cracking was found, posting was dropped to 3 tons.

*Current Inspection, Condition and Maintenance Information:*

- The bridge is currently open for limited vehicular traffic with a 3 ton posting.
- The rating is 7-4-7.
- ADT: The current ADT is 57 [the ADT in the 2001 report was 280]
- Section 106 review is ongoing with stakeholders to determine treatment options.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in poor condition**.** The previous work was in accordance with the Recommended Treatment in the 2001 Management Plan. This structure was not considered for task group recommendations in the current [2017] Management Plan update because of ongoing Section 106 review.

**2024 Update for:**

**Loudoun County Structure No. 6051:** (Metal truss bridge); Pratt through truss, 1890 (date of erection now confirmed; see the following text), Route 673 crossing North Fork Catoctin Creek (Figure B20)

*Evaluation Update*: Unchanged from 2017 (Listed).

*Confirmation of Construction Completion Date:*

- The March 27, 1890 edition of the *Alexandria Gazette* included the item, "The bridge over Goose Creek, on the turnpike, four miles east of Leesburg, has been completed, and is now ready for the accommodation of the travelling public."

*Potential for Adaptive/Alternative Use*: There has been no local support for alternative use (such as bypassing or moving) from local governments or stakeholders. However, as noted below, the old truss is now essentially a self-supporting feature sitting on a modern beam bridge that actually carries the traffic load.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- After a multi-year review and planning project involving extensive public stakeholder input, the bridge underwent another extensive rehabilitation in 2021-2023. The rehabilitation was performed by Kokosing Construction Company, Inc., and cost $5.1 million. This included extensive work on the site, substructure, and superstructure. The bridge was closed to traffic in January 2021; the truss bridge was rigged and removed from its abutments and set near the site for rehabilitation the following April. The work included repairs to the 1890 truss as well as the construction of a new beam bridge and deck to carry the old truss and vehicular traffic, and the addition of a new pier as well as work on the abutments.
- The truss supports its own weight (i.e., it still acts as a truss) but the weight of traffic is carried by the beam bridge. Per the inspection report, it is considered a "stringer multi-beam girder." The original truss bridge is now known to be largely a wrought iron structure.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The bridge was reopened to vehicular traffic in December 2022 and final work was completed in February 2023.
- The rating is 7-7-9. Effectively, this rating relates to the beam structure; per the inspection report, the structure is now considered a "stringer multi-beam girder" [the rating of the truss in the 2017 report was 7-4-7].
- ADT: The current ADT is 60 [the ADT in the 2017 report was 57].

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition**.** The recent rehabilitation was in accordance with the Recommended Treatment in the 2001 Management Plan (this structure was not considered for task group recommendations in the 2017 Management Plan update because of ongoing Section 106 review). The task group recommendation is to continue maintenance and repairs if needed for vehicular use, with subsequent preventive maintenance as needed.

**Figure B20. Loudoun County Structure No. 6051**

**METAL TRUSS**

**NOVA District (9)**

**Original [2001] Management Plan Information for:**

**Prince William County (76)**
*VDOT Structure No. 6023*
*VDHR Inventory No. 076-0081*
*Name: Nokesville Bridge*
*Location: Route 646 crossing Norfolk Southern Railway*
*National Register Status: Listed*

*Description:* Prince William County Structure No. 6023 is a single-span Pratt through truss, built in 1882 by the Keystone Bridge Company, carrying Route 646 crossing Norfolk Southern Railway. This structure was apparently moved to its present site in the early 20th century. It is approximately 74 feet long. This bridge is significant as an example of a late 19th century metal Pratt through truss.

*Evaluation*: Prince William County Structure No. 6023 was placed on the Virginia Landmarks Register in 1977 and the National Register of Historic Places in 1978.

*Documentation*: Prince William County Structure No. 6023 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-109).

*Condition*: The current inspection report indicates that this structure is in poor condition. There are loose tension members on the truss, deck planks, and railing. There is severe rust with section loss or pitting on truss member and pins. In addition, severe rust is present on the steel stringers and bearing assemblies (which are rust packed and frozen). Much of the timber stringers, deck planks, mailers, bearing seats, and backwalls are decayed. Development is increasing in the area; the ADT (over 2,900) continues to rise; the bridge cannot continue to carry these vehicle demands.

*Posted Restrictions:* The structure is posted at 15 tons.

*ADT:* 2,974.

*Right-of-Way Ownership:* The Norfolk-Southern Railway owns and maintains and VDOT inspects this structure. Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Because the Norfolk-Southern Railway owns and maintains and VDOT only inspects this structure, recommendations for adaptive use (on or off-site),

transferring ownership, and demolition are not applicable. Because the structure is a one-lane through truss, a structural upgrade to DOT standards is not feasible. Given the condition of the bridge and the high (and increasing) ADT, repairing and maintaining the structure for continued vehicular use is not recommended by the task group. Rather, the old bridge should be maintained for vehicular use until a new bridge can be built; then, the approach right of ways should be abandoned or discontinued, leaving the old bridge in place for action by the Norfolk-Southern Railway, the owner of the bridge. The task group's recommended management options for this structure, in order of preference, are:

1. Abandon.
2. Discontinue.
3. Preventive maintenance as needed and feasible.

However, it should be noted that the task group and VDOT have no procedural control over this structure.

**2017 Update for:**

**Prince William County Structure No. 6023:** (Metal truss bridge); Pratt through truss, 1882, Route 646 crossing Norfolk-Southern Railway.

*Repairs and Maintenance Undertaken Post-2001:*

- No major bridge work between 2000 and 2013 has been recorded.
- There were two repairs to the flooring between 2007 and 2013.
- The structure was posted at 6 tons in 2013.

*Current Inspection, Condition and Maintenance Information:*

- A major rehabilitation, including the construction of a parallel span, was in the planning stage for several years.
- The bridge was transferred to VDOT by the Norfolk Southern Railway in 2014.
- The bridge previously had been through Section 106 review. The review, and plans for the rehabilitation of this structure as a one-way bridge, with plans for a parallel structure to handle traffic in the opposite direction, had been completed.
- Deterioration and problematic construction methods (i.e., particularly, piled eye-bars, which are delaminating) were found during preliminary rehabilitation work on this bridge. The rehabilitation plan for the structure is now being re-assessed, and it is back in Section 106 review. The Oak Ridge truss in Nelson County, another Management Plan bridge, is the same age (1882), is of similar construction, and was built by the same company (Keystone Bridge Company.), and thus may have many of the same issues.
- The bridge is currently disassembled, and the elements are being analyzed.
- Section 106 review is ongoing with stakeholders.

*Current Historic Structures Task Group Observations and Recommendations:* This structure was not considered for task group recommendations in the current Management Plan update because of ongoing Section 106 review.

**2024 Update for:**

**Prince William County Structure No. 6023:** (Metal truss bridge); Pratt through truss, 1882, Route 646 crossing Norfolk-Southern Railway (Figure B21).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: There has been no local support for alternative use (such as bypassing or moving) from local governments or stakeholders. However, as noted below, the old truss is now essentially a "cosmetic" feature sitting on a modern beam bridge, and it is the beam bridge that actually carries the traffic load (as well as the weight of the old truss).

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- The bridge underwent a reconstruction in 2018-2019. In the second Section 106 review, stakeholders continued to support retaining the old truss, which would serve one-way traffic with a parallel span serving traffic in the opposite direction.
- The old truss elements were repaired and reassembled, with a significant percentage of elements requiring replacement. To meet modern traffic demands, the old bridge was set on a modern beam bridge which both supports the old truss and carries modern traffic. Per the inspection report, the "Truss that is present is cosmetic and carries no load" and the structure is now considered a "stringer multi-beam girder." The original truss bridge is now known to be largely a wrought iron structure.
- The weight of both the truss and the traffic is carried by the beam bridge.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-7-7 [effectively, this rating relates to the beam structure; per the inspection report, the "Truss that is present is cosmetic and carries no load" and the structure is now considered a "stringer multi-beam girder."; the bridge had been closed and was disassembled at the time of the 2017 update].
- ADT: The current ADT is 2769 [the bridge had been closed and was disassembled at the time of the 2017 update].
- The inspection report does not identify any major points of concern.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure (including the old truss components) is in good condition**.** The recent rehabilitation was in accordance with the Recommended Treatment in the 2001 Management Plan (this structure was not considered for task group recommendations in the 2017 Management Plan update because of ongoing Section 106 review). The task group recommendation is to continue maintenance and repairs if needed for vehicular use, with subsequent preventive maintenance as needed.


**Figure B21. Prince William County Structure No. 6023 (After Reconstruction, with a New Parallel Span)**

**MASONRY ARCH/CONCRETE ARCH**

**Bristol District (1)**

**Original [2001] Management Plan Information for:**

**Bland County (10)**
*VDOT Structure No. 1021*
*VDHR Inventory No. 010-5005*
*Location: Route 98, crossing Crab Orchard Creek*
*National Register Status: Eligible*

*Description:* Bland County Structure No. 1021 is a single-span concrete spandrel braced arch with decorative elements, built in 1929 by the Luten Bridge Company, carrying Route 98 crossing Crab Orchard Creek. The structure is approximately 43 feet long. This bridge, which was built as a World War I memorial, is significant as one of the most elaborate and highly decorated of Virginia's concrete arch bridges, with bronze commemorative plaques and concrete decorative elements that include fluted street lamp columns and molded balustrade railings, produced by the Pettyjohn Art Concrete Company of Terre Haute, Indiana.

*Evaluation*: Bland County Structure No. 1021 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in February 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation*: Bland County Structure No. 1021 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition*: The current inspection report indicates that this structure is in poor condition. There is spalling (up to 2 inches deep) with exposed rebar showing section loss on the underside of the deck. Some of the arch members are cracked. The beams and breast wall show areas of scaling, as does the sidewalk. Additionally, the approach pavement is cracked and settled.

*Posted Restrictions:* The structure has a legal limit of 20 and 29 tons, respectively.

*ADT:* 299.

*Right-of-Way Ownership:* This structure carries a primary route. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location, abandoning it, or transferring ownership is not an option. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to remove the asphalt overlay, evaluate and repair the deck, install a new concrete overlay, extend the drains, repair spalled and delaminated areas, seal joints, and evaluate for possible cathodic protection on the arches.
2. An upgrade to DOT standards is feasible, and could be considered as a second option. Preservation, duplication, or adaptation of the decorative elements should be included in such a design.
3. Documentation and demolition and replacement with a new structure is a final option. If the bridge requires replacement, the memorial function should be preserved, and the plaques and concrete decorative elements should be preserved/duplicated if/as possible.

**2017 Update for:**

**Bland County Structure No. 1021:** (Concrete arch bridge); Spandrel braced arch with decorative elements, 1929, Route 98 crossing Crab Orchard Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- The structure was repaired and maintenance was performed in 2004. Work was done to replace the deck between the sidewalks.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-5-6.
- ADT: The current ADT is 234 [the ADT in the 2001 report was 299].
- The posting is good at this time (rating in 2004): shows 78 tons single, 96 tons semi.
- Some areas on the arches need patching.
- Minor spalling needs to be addressed.
- Previous cracks have been epoxied.
- District office plans to clean rebar, place some anodes, undertake additional patching
- Decorative elements are in acceptable condition.
- Railings have a small amount of scale (the railings have been waterproofed).

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Bland County Structure No. 1021:** (Concrete arch bridge); Spandrel braced arch with decorative elements, 1929, Route 98 crossing Crab Orchard Creek (Figure B22).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present. The bridge is on a primary route.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- No major bridge work since 2017 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-5-6 [the rating in the 2017 report was 6-5-6].
- ADT: The current ADT is 261 [the ADT in the 2017 report was 234].
- Some areas on the arch, and areas of minor spalling need patching.
- The district structure and bridge office reports no condition or repair updates.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B22. Bland County Structure No. 1021**

## MASONRY ARCH/CONCRETE ARCH

### Bristol District (1)

**Original [2001] Management Plan Information for:**

**Wythe County (98)**
*VDOT Structure No. [No Number]*
*VDHR Inventory No. 098-5024*
*Name: Southwestern Turnpike Bridge*
*Location: Off Route 11, crossing Reed Creek*
*National Register Status: Eligible*

*Description:* The Southwestern Turnpike Bridge is a single-span masonry arch built ca. 1850 to serve the Southwestern Turnpike Company (the predecessor of Route 11 in this region). It carries the former turnpike (former Route 11) crossing Reed Creek. This structure is approximately 36 feet long. It is one of the few remaining masonry turnpike bridges in Virginia. In 2001, the bridge was used by VDOT for access to materials storage and staging area for nearby construction projects.

*Evaluation*: The Southwestern Turnpike Company Bridge was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in June 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation*: The Southwestern Turnpike Company Bridge was included in the updated arch bridge survey report prepared by VTRC (Miller and Clark, 2000).

*Condition*: This structure appears to be in fair condition. However, the bridge has no structure number and is not on a formal inspection schedule. There are several trees growing out of the end walls, and there is general encroachment of vines and vegetation on the structure. The masonry of the arch shows some deterioration, notably some cracking and separation of the stones of the outside ring and the stones of the rest of the barrel, on the underside. The semicircular arch configuration is an extremely strong arch type, and this structure has carried considerable weights. Besides loaded materials (mostly gravel) trucks (many weighing 20 tons or more), a 40-ton crane recently used the structure to access a construction site.

*Posted Restrictions:* None. The structure is not on-system.

*Right-of-Way Ownership:* The Southwestern Turnpike was constructed on a 60-foot right of way. This route was later part of Route 11; subsequently, Route 11 in the vicinity of Reed Creek was realigned. The section of former Route 11 around the old Southwestern Turnpike Bridge became part of the secondary system and was renumbered to Route 662. Most of Route 662 was discontinued in 1964; however, the Bristol District Office advises that there is also fee right of

way from another project. The old turnpike bridge is now closed to public vehicular traffic, but it is still used by VDOT vehicles on an as-needed basis to access a nearby materials storage area

*Recommended Treatment:* A condition assessment in the near future would be helpful to identify current and potential problems and needs. A structure number should be assigned, and the structure should be placed on a regular inspection schedule. With the structure on the bridge inventory, VDOT can use federal transportation enhancement funds or state maintenance funds to work on a bridge asset, albeit out of active service. Because of its masonry construction and location, moving the structure to another location is not an option. Transfer of ownership or abandonment is not recommended, because of the bridge's continuing use by VDOT. However, the use of the bridge by heavy vehicles should be limited. The task group's recommended management option for this structure is to repair and maintain for adaptive use (i.e., the site access for which the bridge is currently used), with subsequent preventive maintenance as needed. Of primary importance is the condition assessment mentioned previously. In particular, the vegetation and trees should be removed from the structure; any needed repairs should be made; and the cracks under the bridge should be assessed, monitored, and repaired if needed. Any masonry repair or repointing of masonry joints should be done with a compatible (lime-content, not pure Portland cement) mortar mix. Because of the uncommon structural design of this bridge, an application for a transportation enhancement grant should be considered to aid in its rehabilitation.

**2017 Update for:**

**Wythe County [no number] (Southwestern Turnpike Company Bridge):** (Masonry arch bridge); 1850, off Route 11, crossing Reed Creek. *[Note: This bridge has previously been used to access a staging/storage area that was used for some construction projects; it does not have a structure number.]*

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.
- The staging/storage area (accessed via the bridge) has not been used in a number of years; Bristol District Structure and Bridge office reports that the bridge has not been used by vehicles for approximately 10 years, and the area is no longer used for staging.

*Current Inspection, Condition and Maintenance Information:*

- The bridge has not been assigned a bridge number and is not formally inspected. The condition of the bridge is being monitored by the Bristol District Structure and Bridge office.
- There are cracks and separations in the mortar on the underside of this masonry bridge. A comparison of the current size and condition of the cracks with older images indicate that the bridge is essentially stable. A few cracks have grown slightly (estimated at

approximately 1/4 inch to 3/8 inch) since 2000. The cracks are receiving ongoing monitoring by the district.
- Some small trees and other vegetation encroaching on the bridge are being removed.
- Insertion of grouted anchors to prevent further movement of the structure should be considered.
- If the bridge is no longer in use, transferring ownership to Wythe County, if there is interest in acquiring the bridge on the part of the county, could be considered as an option.
- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* The task group reiterates the recommendations of repair and maintain for adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Wythe County [no number] (Southwestern Turnpike Company Bridge):** (Masonry arch bridge); 1850, off Route 11, crossing Reed Creek (Figure B23). *[Note: This bridge has previously been used to access a staging/storage area that was used for some construction projects; it does not have a structure number.]*

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Essentially established. The bridge is no longer used to access the staging area. The bridge sees only very occasional light use by an adjoining property owner.

*Presence of Stone Masonry*: Yes. This is a stone masonry arch structure built for the Southwestern Turnpike. The builder/contractor for the masonry portions of this bridge is not known. No original plans or specifications for the masonry portions have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*
- No structural bridge work since 2017 has been recorded.
- Small trees and vegetation encroaching on the bridge have been removed as needed.
- The district structure and bridge office reports that the staging/storage area (formerly accessed via the bridge) is no longer used for staging.

*Current Inspection, Condition and Maintenance Information:*
- The bridge has not been assigned a bridge number and is not formally inspected. The condition of the bridge continues to be monitored by the Bristol District Structure and Bridge office.
- The cracks and separations in the mortar on the underside of this masonry bridge were noted in the 2017 update of the Management Plan. A comparison of the current size and

condition of the cracks with older images indicate that the bridge is essentially stable. The cracks are being monitored by the district structure and bridge office.

- The district structure and bridge office is also monitoring vegetation on the bridge. Small trees and other vegetation encroaching on the bridge are being removed as needed to prevent these from damaging the structure.
- The district structure and bridge office reports no condition or repair updates.

*Current Historic Structures Task Group Observations and Recommendations:* The task group reiterates the recommendations of repair and maintain for adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B23. Southwestern Turnpike Company Bridge, Wythe County**

**MASONRY ARCH/CONCRETE ARCH**

**Lynchburg District (3)**

**Original [2001] Management Plan Information for:**

**Nelson County (62)**
*VDOT Structure No. 6070*
*VDHR Inventory No. 062-5092*
*Name: James River and Kanawha Canal Owens Creek Viaduct*
*Location: Route 606, crossing Owens Creek*
*National Register Status: Eligible*

*Description:* Nelson County Structure No. 6070 is a two-span masonry arch carrying Route 606 crossing Owens Creek; it was originally built ca. 1835 as a viaduct for the James River and Kanawha Canal. The masonry portion of the structure is approximately 97 feet long overall. The James River and Kanawha Canal was acquired by the Richmond and Alleghany Railroad (which subsequently merged with the Chesapeake and Ohio Railroad in 1880, and the railroad track now occupies a portion of the old towpath; the filled bed of the canal is now occupied by Route 606. This structure is significant as a well-preserved element of the canal and features exceptionally fine masonry work.

*Evaluation*: Nelson County Structure No. 6070 was recommended as eligible for listing on the National Register of Historic Places by the Historic Structures Task Group in April 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia. *[Note: The James River and Kanawha Canal system was also previously designated a Virginia Engineering Landmark by the American Society of Civil Engineers.]*

*Documentation:* Nelson County Structure No. 6070 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition*: The current inspection report indicates that this structure is in fair condition. There are cracks with efflorescence, moisture, and seepage on the bottom sides of the arches. A hole on the road shoulder above the southwest arch communicates with a separation in the stones of the arch ring and allows debris to fall through into the creek. The concrete extension has spalling concrete with exposed steel on the bottom sides of its arches. Vegetation is growing on the structure. Debris in the channel is often lodged in the upstream side of the structure. Large sycamore trees growing on the original masonry structure have caused separations in some of the stonework. The trees were removed in June 2000.

*Posted Restrictions:* None.

*ADT:* 52.

*Right-of-Way Ownership:* Nelson County Structure No. 6070 and its immediate approaches are owned by the CSX Railroad. VDOT maintains the structure. Access to the approaches and to the structure is under a 30-foot easement deeded to the Virginia Department of Highways by the Chesapeake and Ohio Railroad (predecessor of CSX) in 1950.

*Recommended Treatment:* Because of its masonry construction, moving the structure to another location is not an option. Because the CSX Railroad owns and VDOT only maintains this structure, recommendations for adaptive use (on or off-site), transferring ownership, abandonment, and demolition are not applicable (nor, given the structure's high rating for historic significance, would demolition be recommended). A structural upgrade to DOT standards is not feasible. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to repair the loose and shifted masonry, and repoint the masonry joints with a compatible (lime-content, not pure Portland cement) mortar mix. The channel should be cleared and monitored to prevent debris buildup. A transportation enhancement grant application should be considered as a potential funding source for needed masonry restoration.

**2017 Update for:**

**Nelson County Structure No. 6070:** (Masonry arch bridge); ca. 1835, Route 606 crossing Owens Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2002, crews poured concrete aprons in both arches to repair the undermining. In 2005, vegetation was cut from around the structure. In 2007, vegetation was cut from around the inlet end and areas of embankment erosion were backfilled.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.
- Use of grouted anchors had been discussed for the stabilization but were not used for stabilization—aprons were poured instead
- Condition Ratings of the deck and superstructure were raised because there was no more movement after the aprons were poured.

*Current Inspection, Condition and Maintenance Information:*

- The rating is now 5-5-6.
- ADT: The current ADT is 51 [the ADT in the 2001 report was 52].
- The bridge contains approximately 10 feet of fill.
- Some more repointing and repair of settlement cracks and voids under footing are needed.

- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Nelson County Structure No. 6070:** (Masonry arch bridge); ca. 1835, Route 606 crossing Owens Creek (Figure B24).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present. The structure's immediate approaches are owned by the CSX Railroad. VDOT maintains the structure; access to the approaches and to the structure is under a 30-foot easement deeded to the Virginia Department of Highways by the Chesapeake and Ohio Railroad (predecessor of CSX) in 1950. However, this structure is located in a rural area and has a very low ADT.

*Presence of Stone Masonry:* Yes. This is a stone masonry arched viaduct, built for the James River and Kanawha Canal, and converted to highway use by the mid-20th century. The builder/contractor for the masonry portions of this bridge is not known. No original plans or specifications for the masonry portions have been located. The voussoir work on the arches is particularly well done (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No major work on the structure has been reported.

*Current Inspection, Condition and Maintenance Information:*

- The rating is now 5-5-6 [the rating in the 2017 report was 5-5-6].
- ADT: The current ADT is 44 [the ADT in the 2017 report was 51].
- The bridge contains approximately 10 feet of fill.
- The issues regarding the bridge appear to be fairly consistent with the previous plan update (i.e., more repairs and repointing of settlement cracks, stone masonry repairs, and repairs of voids under footings are needed).
- There are some areas of map cracking and moisture seepage on the bottom of the arches. Arch No. 1 has areas of cracked and missing mortar and fractured/missing stones; there is a void in the exterior wall.
- Some more repointing and repair of settlement cracks and voids under footings are needed. Loose and shifted masonry needs to be repaired and joints repointed with a compatible mortar mix. The upstream masonry arch wings need to be stabilized and repaired to prevent future settlement.

- The district structure and bridge engineer has applied for PROTECT funding for masonry repairs, noting that "Repairs to this valued historic resource will make the structure more resilient to flooding, extreme weather events, and other long term deterioration."

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan, and supports the proposed masonry repairs.

**Figure B24. Nelson County Structure No. 6070**

## MASONRY ARCH/CONCRETE ARCH

### Richmond District (4)

**Original [2001] Management Plan Information for:**

**Chesterfield County (20)**
*VDOT Structure No. [No Number]*
*VDHR Inventory No. 020-0135*
*Name: Falling Creek Bridge*
*Location: Falling Creek Wayside, off Route 1, crossing Falling Creek*
*National Register Status: Listed*

*Description:* The two-span masonry arch bridge at Falling Creek Wayside, off Route 1, crossing Falling Creek, was built ca. 1823 by the Manchester and Petersburg Turnpike Company. The structure is approximately 134 feet long overall. Traces of molten iron on some of the stones of the bridge suggest that stone may have been salvaged from the nearby site of the first iron furnace in the English colonies, destroyed in the Massacre of 1622. The bridge parapet has been raised previously, and this probably reflects the raising of the roadbed over the years. The structure was closed to vehicular traffic in the early 1930s, and one of the first waysides in Virginia was designed around the old bridge, which still serves as a footbridge and landscape feature at Falling Creek Wayside.

*Evaluation:* The Falling Creek Bridge was listed on the Virginia Landmarks Register and the National Register of Historic Places in 1995.

*Documentation:* The Falling Creek Bridge was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition:* The Falling Creek Bridge appears to be in generally good condition. The bridge has no structure number and is not on a formal inspection schedule. Ivy and other vegetation are growing on the structure. Mortar is loose or missing from some of the masonry joints. There is a bulge and loose stones on the southeast wall of the bridge: there is a depression in the roadway above, and water is apparently accumulating there and feeding down through the bridge fill. Heavy rains cause water to wash over the bridge, with attendant erosion. Much of this problem can be traced to a blocked drainage pipe at the parking lot above the bridge, and this is being repaired. There has been some slight masonry repair at the bottom of the northwest arch ring. There is missing mortar and some loose stones at the bottom of the northeast arch ring and the arch. A Portland cement mortar appears to have been used in previous repairs and repointing. A concrete scour apron has been placed around the center pier.

*Posted Restrictions:* None. The structure is closed to vehicular traffic.

*Right-of-Way Ownership:* The Falling Creek Bridge and its approaches are located in the Falling Creek wayside; right-of-way ownership for this structure is not applicable.

*Recommended Treatment:* Preservation in-place for pedestrian use has been successful. Treatment measures do not need to accommodate continued vehicular use. A condition assessment in the near future would be helpful to identify current and potential problems and needs. In order to fund maintenance work for this historic structure, it should be inventoried within HTRIS. A structure number should be assigned to this structure (which still carries pedestrian traffic as a footbridge), and the structure should be placed on a regular inspection schedule. VDOT then can use federal transportation enhancement funds or state maintenance funds to work on a bridge asset, albeit out-of-active service. Because of its masonry construction and location, moving the structure to another location or transferring ownership is not an option. Issues relating to vehicular use, upgrade to DOT standards, etc., are also not applicable. Because of the structure's situation as a central feature of the wayside, demolition is not a recommended option. The recommended management option for this structure is to repair and maintain for continued adaptive use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to address and monitor the drainage problems that cause water accumulation and washing around the bridge, to remove the vegetation from the bridge, and to repair and repoint the masonry as needed. A compatible (lime-content, not pure Portland cement) mortar should be used. VDHR should be consulted to ensure a compatible mortar formula.

**2017 Update for:**

**Chesterfield County [no number] (Falling Creek Bridge):** (Masonry arch bridge); ca. 1823, at Falling Creek Wayside, off Route 1, crossing Falling Creek.

*Evaluation Update*: The remaining structure of the bridge (after 2004 flood damage) is still considered by the VDHR as National Register-listed.

*Repairs and Maintenance Undertaken Post-2001:*

- From the 1930s until August 2004, this bridge served as a pedestrian bridge at the Falling Creek Wayside. Because of damage during Tropical Storm Gaston on August 30-31, 2004, the bridge is currently closed to all traffic/public access; the remaining structure has been stabilized.

*Current Inspection, Condition and Maintenance Information:*

- The flooding from Gaston caused severe damage to the superstructure. The water scoured out most of the parapets, the roadbed, and the approaches. Unreinforced concrete grouting subsequently was used to stabilize the exposed upper portions of the arches to prevent the structure from collapsing. Various stabilization and repair strategies still are being discussed and studied, and options are being explored. There are no funds at present for stabilization and repair work.
- It has been documented that VDOT does have purview over, and title to, the wayside area where the bridge site is located (the area between the northbound and southbound lanes of Route 1).
- There previously has been support from the county for the idea of "restoring" the bridge. However, such a reconstruction is not supported by the task group. The original hydraulic opening was inadequate. Flooding has caused substantial damage to the bridge at least twice in the past hundred years (in the 1910s and in 2004). The 2004 (pre-Gaston)

appearance of the parapet differed from the earlier parapet. It is possible that there also were earlier flood-damage episodes that are not documented.
- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* The task group recommends preserving the remains of the old bridge as a ruin, with further stabilization as needed. If a crossing over Falling Creek is needed within the wayside, a modern pedestrian footbridge could be erected. Possibly this could use the old bridge as partial support. Interpretive signage to relate the history of the 1823 bridge is an additional recommended option.

**2024 Update for:**

**Chesterfield County [no number] (Falling Creek Bridge):** (Masonry arch bridge); ca. 1823, at Falling Creek Wayside, off Route 1, crossing Falling Creek (Figure B25).

*Evaluation Update*: Unchanged from 2017 (The remaining structure of the bridge is still considered by the VDHR as National Register-listed.)

*Potential for Adaptive/Alternative Use*: Previously established (in the 1930s as a pedestrian bridge in a wayside) but now ruinous because of flood damage. Repair and options for future use are still being explored.

*Presence of Stone Masonry*: Yes. This is a stone masonry arch structure. Board of Public Works records for 1829 state that the builder/contractor for the original masonry portions of this bridge was William Carter, a Richmond builder who was also responsible for the other stonework on the first six miles of the turnpike ("Bridge at Falling Creek" National Register nomination 1995). No original plans or specifications for the masonry portions have been located. There previously have been several rebuildings necessitated by flood damage (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*
- From the 1930s until August 2004, this bridge served as a pedestrian bridge at the Falling Creek Wayside. Because of damage during Tropical Storm Gaston on August 30-31, 2004, the bridge is currently closed to all traffic/public access; the remaining structure has been stabilized. No additional work since 2017 has been recorded.

*Current Inspection, Condition and Maintenance Information:*
- As noted in the 2017 update, the flooding from Gaston caused severe damage to the superstructure and unreinforced concrete grouting subsequently was used to stabilize the exposed upper portions of the arches to prevent the structure from collapsing. The grouting is still in place. Various stabilization and repair strategies still are being discussed.
- It has been documented that VDOT does have purview over, and title to, the wayside area where the bridge site is located (the area between the northbound and southbound lanes of Route 1).

- There previously has been support from the county and historic preservation groups for the idea of restoring / reconstructing the bridge. However, such a restoration/reconstruction previously has not been supported by the task group. As noted above, the original (1823) hydraulic opening was inadequate. Flooding has caused substantial damage to the bridge at least twice in the past hundred years (in the 1910s and in 2004), and the 2004 (pre-Gaston) appearance of the parapet differed noticeably from the earlier parapet seen in ca. 1910s photographs. Previous damage repair resulted in rebuilding of the parapets, as well as insertion of tie rods and tie bars, insertion of reinforcing and parging over the deck, and other repairs. In addition, it is possible that there were earlier (i.e., prior to the early 20th century) flood-damage episodes (and repairs) that are not documented.
- A privately erected interpretive sign with some historical information on the turnpike and the bridge has been erected near the bridge by the Falling Creek Ironworks Foundation.

*Current Historic Structures Task Group Observations and Recommendations:* The task group reiterates its previous recommendation of preserving the remains of the old bridge as a ruin, with further stabilization as needed. If a crossing over Falling Creek is needed within the wayside, a modern pedestrian footbridge could be erected. Interpretive signage to relate the history of the 1823 bridge is an additional recommended option. For the current update, the task group reiterates non-support for a restoration/reconstruction of the bridge because of the inadequate hydraulic opening and the fact that the bridge has sustained major damage from previous flooding at least twice.

**Figure B25. Falling Creek Bridge, Chesterfield County**

**MASONRY ARCH/CONCRETE ARCH**

**Richmond District (District 4)**

**Original [2001] Management Plan Information for:**

**Dinwiddie County (26)**
*VDOT Structure No. 1005*
*VDHR Inventory No. 026-5002*
*Location: Route 1, crossing Stony Creek*
*National Register Status: Eligible*

*Description:* Dinwiddie County Structure No. 1005 is a single-span concrete through arch with two concrete T-beam approach spans, built in 1926, carrying Route 1 crossing Stony Creek. The structure is approximately 167 feet long overall; the through arch is 90 feet long. This concrete through arch, a design also known as a Marsh arch or rainbow arch, is the only remaining structure of this type in Virginia.

*Evaluation*: Dinwiddie County Structure No. 1005 was recommended as eligible for listing on the National Register of Historic Places by the Historic Structures Task Group in February 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation*: Dinwiddie County Structure No. 1005 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition*: The current inspection report indicates that this structure is in fair condition. The bridge is deteriorating, and there are various areas of efflorescence, chipping, spalling, and delamination, some of which are substantial. There are areas of exposed rebar. Portions of the rail have previously been replaced. The drains are blocked. The bridge rests on iron rockers, which show some areas of rusting and deterioration. There are areas of scour at the south pier.

*Posted Restrictions:* None.

*ADT:* 2,160.

*Right-of-Way Ownership:* This structure is located on a primary route. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its concrete construction and its location on a major primary route, moving the structure to another location, abandoning it, or transferring ownership is not an option. The through-arch technology permanently limits height and does not permit widening. Because of this technology, an upgrade to DOT standards is not feasible. The deteriorating concrete of the structure and the height restrictions occasioned by its technology

(particularly if there are future upgrade needs for Route 1) may eventually make it impossible for this bridge to stay under vehicular use. Long-term preservation of this structure will entail imaginative (and expensive) engineering solutions—probably either realigning Route 1 or moving the bridge slightly to remove it from the highway. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to repair spalled, cracked, and delaminated areas; seal the joints; keep the drains open; and address the scour problems.
2. Documenting and salvaging some elements of the bridge for adaptive use off-site could be considered as a second option. A new structure would be required.
3. Documentation and demolition and replacement with a new structure is a third option.
4. Repairing and maintaining the structure for adaptive use on-site, or nearly on-site, is a fourth option. Realigning Route 1 and bypassing the through arch is one (complicated and expensive) possibility. The entire arch (approximately 110 tons) could also be moved to the side of the right of way if money is no object, but such an expedient would also be extremely expensive (the 1999 estimate for moving the through arch was in excess of $500,000). In either case, a new structure would be required.

**2017 Update for:**

**Dinwiddie County Structure No. 1005:** (Concrete arch bridge); Concrete through arch, 1926, Route 1 crossing Stony Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work was recorded between 2000 and 2013.
- On October 2, 2013, the structure was struck by an over-height vehicle. Both portals sustained significant damage from broken concrete and bent main reinforcing steel. Damage was assessed, and the bridge was monitored while repairs to the portals were planned. Significant damage from the vehicle impact was repaired. The color of the concrete repairs is appropriate.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-5.
- ADT: The current ADT is 1,172 [the ADT in the 2001 report was 2,160].
- The bridge is now posted. The structure has a legal limit of 26 tons (single axle) and 38 tons (semi).
- The bridge has cast-in-place concrete floor beams. These are the controlling members for the posting. Removing the posting will require strengthening the floor beams.
- New Federal Highway Administration mandates to post for special hauling vehicles are being explored relative to this bridge.

- There currently are no scour issues.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Dinwiddie County Structure No. 1005:** (Concrete arch bridge); Concrete through arch, 1926, Route 1 crossing Stony Creek (Figures B26 and B27).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017*
- No major bridge work has been reported.

*Current Inspection, Condition and Maintenance Information:*
- The rating is 5-5-5 [the rating in the 2017 report was 5-5-5].
- ADT: The current ADT is 1,150 [the ADT in the 2017 report was 1,172.
- There are various areas of cracking, delamination, spalling, and section loss.
- Beams and floorbeams show some cracking and section loss.
- The bridge is posted. The structure has a legal limit of 26 and 38 tons, respectively. Depending on inspection, it may be necessary to downpost. Proportional postings are now in place.
- The bridge has cast-in-place concrete floor beams. These are the controlling members for the posting.
- Expansion joints are paved over and show leakage.
- Channel banks are sloughing and eroding. There is some drift in the channel upstream. There is some local scour around the piers.
- There is heavy vegetation on the downstream side.
- The district reports that there may be additional issues evident in the upcoming (September 2024) inspection.
- The bridge is on annual inspection.
- The district reports that clearance is legal but functionally obsolete (14’ is legal but 16’ 6” is the current standard).
- The district reports that the bridge could be strengthened; the preference is to repair the bridge (possibly with State of Good Repair funds).

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous repairs are in

accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B26. Dinwiddie County Structure No. 1005**


**Figure B27. Another View of Dinwiddie County Structure No. 1005, Showing the Portals**

**MASONRY ARCH/CONCRETE ARCH**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Augusta County (7)**
*VDOT Structure No. 6165*
*VDHR Inventory No. 007-5072*
*Location: Route 835, crossing Jennings Branch*
*National Register Status: Eligible*

*Description:* Augusta County Structure No. 6165 is a single-span spandrel braced arch with two short concrete slab approach spans, carrying Route 835 crossing Jennings Branch. The structure was built in 1932 by the Luten Bridge Company. It is approximately 84 feet long overall; the arch is 60 feet long. This is an excellent example of one of Daniel B. Luten's innovative designs.

*Evaluation*: Augusta County Structure No. 6165 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in February 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation*: Augusta County Structure No. 6165 was included in the updated arch bridge survey report prepared by VTRC (Miller and Clark, 2000).

*Condition*: The current inspection report indicates that this structure is in fair condition. There is scattered cracking, spalling, and discoloration on the pier caps. In addition, minor cracking appears on its arches and it shows discolorations and scale on the deck. The concrete is generally in good condition. The scour is unchanged since approximately 1985. The traffic count is steadily increasing because of development farther up Route 835 and the surrounding area.

*Posted Restrictions:* None.

*ADT:* 648.

*Right-of-Way Ownership:* The bridge was constructed in 1932, at the time of the creation of the state secondary system, raising the question of the ownership of the right-of-way. In response to this question, the Staunton District Right-of-Way Office reported that the approaches to Augusta County Structure No. 6165 are apparently constructed on prescriptive easement.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location or transferring ownership off-site is not an option. Discontinuing, abandoning, demolishing the structure, or transferring ownership on-site are not recommended. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to repair the cracked and spalled concrete, remove the asphalt overlay, evaluate and repair the deck, install a new concrete overlay, clear and extend the drains, and clean the channel to divert water from the south end of the bridge.
2. An upgrade to DOT standards is feasible and could be considered as a second option. As development and traffic continue to increase, there may be growing demands for an upgrade of this crossing. Houses and a church at the south end of the bridge limit the amount of possible realignment of Route 835, and there is not sufficient room for a parallel lane and bridge. If widening is needed, the best potential for widening the road would be to widen the existing bridge as well by constructing a third arch and moving or duplicating the existing rail; such plans should be developed in consultation with VDHR.

**2017 Update for:**

**Augusta County Structure No. 6165:** (Concrete arch bridge); Spandrel braced arch, 1932, Route 835 crossing Jennings Branch.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-6.
- ADT: The current ADT is 618 [the ADT in the 2001 report was 648].
- Drains have been opened.
- There is some minor spalling, cracking, exposed rebars, and efflorescence on the underside, and some spalled areas on the abutments.
- There is minor damage to the rail posts.
- The spalling, cracking, exposed rebars, and efflorescence on the underside should be monitored/repaired as needed.
- The damage to the rail posts should be repaired.
- The spalling on the abutments should be repaired.
- The district structure and bridge office reports that all current issues can be addressed through general maintenance at this time.
- In the 2001 Management Plan, it was noted that a large amount of increased development to the area around the bridge was anticipated. However, greatly increased development has not occurred. Currently, road improvement to Route 835 is not a major issue.
- The bridge could be widened in kind if necessary, thus preserving the general appearance of the historic structure. However, the railings would have to be replaced.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Augusta County Structure No. 6165:** (Concrete arch bridge); Spandrel braced arch, 1932, Route 835 crossing Jennings Branch (Figure B28).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- Drains have been opened.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-6 [the rating in the 2017 report was 5-5-6].
- ADT: The current ADT is 539 [the ADT in the 2017 report was 618].
- There is some minor spalling and cracking on the underside, and some spalled areas on the abutments.
- Several rail posts have sustained traffic damage and should be repaired.
- The spalling and cracking are being monitored.
- The district structure and bridge office reports that all current issues can be addressed through general maintenance at this time.
- In the 2001 Management Plan, it was noted that a large amount of increased development to the area around the bridge was anticipated. However, greatly increased development has not occurred. Currently, road improvement to Route 835 is not a major issue.
- The bridge could be widened in kind if necessary, thus preserving the general appearance of the historic structure. However, the railings would have to be replaced.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B28. Augusta County Structure No. 6165**

**MASONRY ARCH/CONCRETE ARCH**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Augusta County (7)**
*VDOT Structure No: [No Number] [Note: Subsequently numbered as No. 6997]*
*VDHR Inventory No. 007-0041*
*Name: Valley Railroad Bridge*
*Location: West of I-81, crossing Folly Mills Creek, south of Staunton*
*National Register Status: Listed*

*Description:* The Valley Railroad Bridge is a four-span masonry arch bridge crossing Folly Mills Creek just west of I- 81, south of Staunton. It is approximately 147 feet long. Built in 1874 to carry rail traffic on the Valley Railroad, this large multi-span masonry arch bridge is one of the largest and most visible 19th century masonry railroad bridge structures in Virginia. The railroad line was discontinued in 1942, and the bridge is now preserved as a landscape element adjacent to I-81.

*Evaluation*: The Valley Railroad Bridge was listed on the Virginia Landmarks Register and the National Register of Historic Places in 1974.

*Documentation*: The Valley Railroad Bridge was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition*: This structure appears to be in generally fair condition. The bridge has no structure number and is not on a formal inspection schedule. There are grass, weeds, vines, bushes, and small trees growing on the old roadway and various other areas of the bridge. The bases of two piers along the creek have concrete aprons added as a stabilization measure. There are some areas of seepage through the arch and corresponding loss of mortar; some repointing has been done with Portland cement.

*Posted Restrictions:* None. The structure does not carry traffic of any sort.

*Right-of-Way Ownership:* The Valley Railroad Bridge and its approaches carry no traffic of any kind; the structure is located within the right of way for I-81; right-of-way ownership for this structure is not applicable.

*Recommended Treatment:* Although unsuitable for use as a vehicular or pedestrian bridge because of its location in the I-81 right of way, the Valley Railroad Bridge is one of the most visible, and popular, historic bridges in Virginia. Because of its location, material, and appearance, it is a striking landscape feature, and it is seen and remarked upon by thousands of drivers every day. A condition assessment in the near future would be helpful to identify fully current and potential problems and needs. A structure number should be assigned, and the structure should be placed on a regular inspection schedule. Once the structure is inventoried

within HTRIS, VDOT can use state maintenance funds to work on a bridge asset, albeit out-of-active service. This attractive and highly visible historic bridge should be considered a candidate for a transportation enhancement grant. Because of its masonry construction and location, moving the structure to another location is not an option. Other usual options such as upgrade to DOT standards, transferring ownership, etc. are not applicable in the case of this structure, which will not carry either vehicular or foot traffic. The recommended management option for this structure is to repair and maintain for adaptive use (i.e., its continuing role as a landscape feature), with subsequent preventive maintenance as needed. Immediate maintenance recommendations are to remove the vegetation from the bridge. The grass on the roadbed is not a serious encroachment, but the vines, bushes and trees should be removed to prevent further damage to the structure. A structural assessment should be made of the cracks in the bridge, these should be repaired or monitored as necessary; an appropriate mortar mix (part-lime, not pure Portland cement) should be used for repointing. Monitoring and maintenance of the streambed should be continued. To minimize seepage through the structure, the roadway should be evaluated for the most effective sealing and drainage methods (possibly an impermeable clay liner and drainage pipe inserted into the roadway to promote runoff). Interpretive signage regarding the bridge should be placed at flanking rest areas. The feasibility of interesting an "Adopt-A-Highway" group in this bridge should be examined.

**2017 Update for:**

**Augusta County (Valley Railroad Bridge) Structure No. 6997**: This structure had no number assigned at the time of the original plan; it subsequently was numbered as No. 6997: (Masonry arch bridge); 1874, crossing Folly Mills Creek just west of I-81, south of Staunton.

*Repairs and Maintenance Undertaken Post-2001:*

- No bridge work since 2000 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The structure remains as a landscape feature within the I-81 right of way and remains closed to all traffic. There is no public access allowed onto the bridge.
- There still is a need for increased drainage, and to relieve the weight of saturated soil, on this structure. Additionally, the cracks in the masonry require repair or monitoring.
- Soil nailing has been done.
- The district structure and bridge office will explore drainage and masonry repair issues with regard to this structure.
- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* The task group reiterates the majority of the Recommended Treatment (excluding the recommendation to pursue a transportation enhancement grant) in the 2001 Management Plan. The task group defers further recommendations pending the results of the district structure and bridge office's assessment of drainage and masonry repair issues for this structure. However, the task group notes their strong support for maintaining this structure in good condition.

**2024 Update for:**

**Augusta County (Valley Railroad Bridge) Structure No. 6997**: This structure had no number assigned at the time of the original plan; it subsequently was numbered as No. 6997: (Masonry arch bridge); 1874, crossing Folly Mills Creek just west of I- 81, south of Staunton (Figure B29).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: Established. This structure is a landscape feature within the I-81 right-of-way.

*Presence of Stone Masonry*: Yes. This is a stone masonry arch structure. The bridge was constructed by the Mason Syndicate. No original plans or specifications for the masonry portions have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No bridge work since 2017 has been recorded.

*Current Inspection, Condition and Maintenance Information:*

- The structure remains as a landscape feature within the I-81 right of way and is closed to all traffic. There is no public access allowed onto the bridge.
- There still is a need for increased drainage, and to relieve the weight of saturated soil, on this structure. Additionally, the cracks in the masonry require repair or monitoring.
- The district structure and bridge office is exploring drainage and masonry repair issues on this structure.

*Current Historic Structures Task Group Observations and Recommendations:* The task group reiterates the majority of the Recommended Treatment (excluding the recommendation to pursue a transportation enhancement grant) in the 2001 Management Plan. The task group defers further recommendations pending the results of the district structure and bridge office's further assessment of drainage and masonry repair issues for this structure. However, the task group notes their strong support for maintaining this structure in good condition.

**Figure B29. Augusta County Structure No. 6997 (Valley Railroad Bridge)**

**MASONRY ARCH/CONCRETE ARCH**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Frederick County (34)**
*VDOT Structure No. 6903*
*VDHR Inventory No. 034-5022*
*Location: Route 672, crossing Opequon Creek*
*National Register Status: Eligible*

*Description:* Frederick County Structure No. 6903 is a two-span concrete closed spandrel arch, with each abutment forming a short approach span. The structure carries Route 672 crossing Opequon Creek. It was built for the Virginia State Highway Commission in 1917 by the Monongahela Valley Engineering Company. The structure is approximately 209 feet long overall; each span is approximately 82 feet long. This structure is significant for its use of the Thacher reinforcing system. A metal truss bridge was proposed for this site in 1915. However, after the patent on the Thacher bar reinforcing system was overturned in 1916, this concrete bridge was quickly designed and built instead using the Thacher system.

*Evaluation*: Frederick County Structure No. 6903 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in August 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation:* Frederick County Structure No. 6903 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition:* The current inspection report indicates that the overall condition of the bridge is fair. The superstructure is in generally good condition. However, there are areas of marked deterioration throughout the substructure. The piers and abutments exhibit areas of cracking, chipping, spalling (freeze thaw), and efflorescence. There are areas of efflorescence and deterioration at the joints of the formwork on the underside of the arch. There are trees growing close to the bridge. There is debris on the deck, and vegetation is growing on the deck and piers of bridge. There is a scour hole near one abutment. Debris lodges against the upstream piers. The drains, which are of unusual construction (the drains go through the piers and abutment), are partly blocked.

*Posted Restrictions:* None.

*ADT:* 582.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location, off-site adaptive use, or transferring ownership off-site is not an option. Demolition is not recommended. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to open the drains, repair the scour hole, cut the trees back to allow air circulation and allow the concrete to dry off, remove vegetation from the deck and piers of the bridge, and remove debris from the deck. The cracking, chipping, spalling (freeze thaw), and efflorescence on the piers and the efflorescence on the joints of the formwork on the underside of the arch need to be addressed in the near future, and adequate moisture protection needs to be provided. The curb line should be sealed to keep water out of the construction joints. Various sealing technologies should be evaluated for possible use on this bridge. Spalled and delaminated areas need to be repaired. *[Note: This bridge needs major repairs within the next 5 years. Given the scale of a full rehabilitation, the cost will approach that of a new bridge. Application for a transportation enhancement grant to assist with rehabilitation should be considered.]*
2. An upgrade to DOT standards is feasible and could be considered as a second option.
3. Repair and maintain for on-site adaptive use, with subsequent preventive maintenance as needed.
4. Transfer ownership on-site if a willing and suitable recipient can be identified.
5. Discontinue.
6. Abandon.

**2017 Update for:**

**Frederick County Structure No. 6903:** (Concrete arch bridge); Concrete closed spandrel arch bridge, 1917, Route 672 crossing Opequon Creek.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2012, crews removed dirt and debris that had built up along the curbs.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-5.
- ADT: The current ADT is 799 [the ADT in the 2001 report was 582; the ADT in 2005 was 1,030].
- The bridge requires major work. There are extensive areas of efflorescence, scale, spalling and exposed rebar. Portions of the exposed rebar have extensive section loss. The bridge needs to be closed temporarily, so that the fill can be removed and replaced (possibly with lightweight fill), and an impervious membrane system added.
- While the fill is removed, the condition of the exposed areas of the bridge needs to be examined.
- The drains, which are in an unusual location (within the piers and abutments), also need to be addressed.
- This will be a very sizable project: the district structure and bridge office indicates that this likely would be a Structure and Bridge Maintenance (604) Program effort. Since the 604 program is an annual fund and funds cannot be saved for several years, this will require a dedicated fund and prioritization for this particular bridge.
- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. Excluding the recommendation to pursue a transportation enhancement grant, the task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. The task group strongly recommends and supports the rehabilitation of this structure

**2024 Update for:**

**Frederick County Structure No. 6903:** (Concrete arch bridge); Concrete closed spandrel arch bridge, 1917, Route 672 crossing Opequon Creek (Figure B30).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: No.

*Repairs and Maintenance Undertaken Post-2017:*

- No major work on the structure has been reported.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-5-5 [the rating in the 2017 report was 5-5-5].
- ADT: The current ADT is 910 [the ADT in the 2017 report was 799].

- There are large trees growing adjacent to both the upstream and downstream sides of the structure, with some limbs overhanging the structure; some trees are undermined, and the embankment along the upstream channel is eroding. The large trees need to be cut back or removed, and the channel needs to be stabilized.
- This bridge requires major work. There are extensive areas of efflorescence, scale, spalling and exposed rebar. Portions of the exposed rebar have extensive section loss. The bridge needs to be closed, and the fill removed and replaced (possibly with lightweight fill), and an impervious membrane system added.
- While the fill is removed, the condition of the exposed areas of the bridge needs to be examined.
- The drains, which are in an unusual location (within the piers and abutments), also need to be addressed.
- This will be a sizable project.
- The district structure and bridge office is initiating a rehabilitation schedule.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. The task group strongly recommends and supports the rehabilitation of this structure.


**Figure B30. Frederick County Structure No. 6903**

**MASONRY ARCH/CONCRETE ARCH**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Rockbridge County (81)**
*VDOT Structure No. 1012*
*VDHR Inventory No. 081-5052*
*Location: Route 39, crossing Laurel Run*
*National Register Status: Eligible*

*Description:* Rockbridge County Structure No. 1012 is a single-span concrete rigid frame with stone veneer, built in 1940, carrying Route 39 crossing Laurel Run. The bridge is approximately 31 feet long. This bridge was designed as part of the improvements to Route 39 running through Goshen Pass. This design was part of the Virginia Department of Highway's overall landscaping for this project, which was carefully planned to complement scenic Goshen Pass. This project was the department's first large-scale integration of highway design and landscaping to avoid or minimize highway impact to an historic/scenic area.

*Evaluation:* Rockbridge County Structure No. 1012 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in June 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation:* Rockbridge County Structure No. 1012 was included in the updated arch bridge survey report prepared by VTRC (Miller and Clark, 2000).

*Condition:* The current inspection report indicates that the structure is in good condition. There are some loose stones and breaks in the stone coping. A small amount of water is draining through the west abutment. There is some washout around the retaining/wing wall area on the upstream side. A scour footing has been added on the west side of the bridge.

*Posted Restrictions:* None.

*ADT:* 689.

*Right-of-Way Ownership:* This structure carries a primary route and relates to a project undertaken in the 1930s and 1940s. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its concrete construction and location, moving the structure to another location, discontinuing it, abandoning it, adaptive use, or transferring ownership is not an option. A structural upgrade to DOT standards is not recommended. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance as needed. The immediate repair recommendations are

to stabilize the washout on the upstream retaining/wing wall; repoint the loose stones, and repair the broken coping. A scour footing should be added to the east side of the bridge. The asphalt should be excavated from on and around the bridge, and the structure should be evaluated to determine the best methods to stop water from draining through the west abutment and to repair and prevent washout and scour around the structure.

**2017 Update for:**

**Rockbridge County Structure No. 1012:** (Concrete arch bridge); Rigid frame with stone veneer, 1940, Route 39 crossing Laurel Run.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- There previously were some areas of slight erosion, particularly along the southwest side of the bridge. Erosion control stone has been placed to correct areas of erosion.
- This work was in partial accordance with the Recommended Treatment in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-7.
- ADT: The current ADT is 786 [the ADT in the 2001 report was 689].
- The current inspection report notes approximately 12 feet of cap missing from the masonry railing. There is some efflorescence visible through the bottom of the deck. Otherwise, no significant problems are identified.
- The missing cap should be repaired with appropriate stone and mortar. The efflorescence should be monitored.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Rockbridge County Structure No. 1012:** (Concrete arch bridge); Rigid frame with stone veneer, 1940, Route 39 crossing Laurel Run (Figure B31).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present. The geography of Goshen Pass does not allow for bypassing or other alternative routing of vehicles.

*Presence of Stone Masonry*: Yes. This is a concrete rigid frame structure with stone masonry rubble veneer and stone veneer wing walls. It was designed and built as part of the scenic improvements to Goshen Pass, the Virginia Department of Highway's first large scale integration of highway design and landscaping (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No major work on the structure has been reported.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-6 [the rating in the 2017 report was 7-7-7].
- ADT: The current ADT is 648 [the ADT in the 2017 report was 786].
- The current inspection report notes approximately 20 feet of cap missing from the masonry railing. There is some efflorescence visible through the bottom of the deck. Otherwise, no significant problems are identified.
- The missing cap should be repaired with appropriate stone and mortar. The efflorescence should be monitored.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B31. Rockbridge County Structure No. 1012**

**MASONRY ARCH/CONCRETE ARCH**

**Northern Virginia District (9)**

**Original [2001] Management Plan Information for:**

**Loudoun County (53)**
*VDOT Structure No. 1025*
*VDHR Inventory No. 053-0244*
*Name: Aldie Bridge (Little River Turnpike Bridge)*
*Location: Route 50, crossing Little River*
*National Register Status: Eligible*

*[Note: Listed as a contributing structure within a National Register Historic District]*

*[Note: This structure was placed on the Virginia Landmarks Register in 2007 and the National Register of Historic Places in 2014.]*

*Description*: Loudoun County Structure No. 1025 is a two-span masonry arch bridge carrying Route 50 crossing Little River. It was built ca. 1810–1824 by the Little River Turnpike Company. The structure is approximately 108.5 feet long overall. This structure is one of the few remaining masonry turnpike bridges in Virginia.

*Evaluation*: Loudoun County Structure No. 1025 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in June 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia. *[Note: This bridge is also a contributing structure within the Aldie Mill Historic District, which was listed on the Virginia Landmarks Register and the National Register of Historic Places in 1970.]*

*Documentation*: Loudoun County Structure No. 1025 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition*: The current inspection report indicates that this structure is in fair condition. Loudoun County Structure No. 1025 has suffered numerous occurrences of impact damage over the years because of vehicle impacts on the heavily traveled primary Route 50. In late 1998, 30 feet of the northeast parapet wall were destroyed by vehicle impact; after consultation with the task group and VDHR, the destroyed parapet section was rebuilt in kind using an historically compatible mortar. In 1999, outward movement of the spandrel walls caused a separation between the deck and spandrel walls. Water drains through the underside of the bridge. There are areas of missing mortar on the arch bottom, face, and parapets. Scour aprons have been placed on the pier and abutments.

*Posted Restrictions:* The structure has a legal limit of 27 and 40 tons, respectively.

*ADT:* 13,373.

*Right-of-Way Ownership:* This structure carries a primary route. Fee simple ownership is presumed. As originally built, the Little River Turnpike had a 50-foot right of way.

*Recommended Treatment:* Because of its masonry construction and location, moving the structure to another location, abandoning it, or transferring ownership is not an option. Because of the location of this structure and the proximity of other historic resources in the Aldie Mill Historic District, options are limited. There is, for example, insufficient space to realign Route 50 slightly at Little River so that the bridge structure could be bypassed, as this would affect numerous other buildings and sites. Adaptive use is, therefore, not feasible, nor is discontinuing or abandoning the bridge. An upgrade to DOT standards would necessitate alteration of the bridge's historic form and dimensions. Accordingly, in the task group's opinion, the most feasible management recommendation for this bridge is that it be repaired and maintained for vehicular use, with subsequent preventive maintenance. However, the ADT of approximately 13,000 vehicles, many of them trucks, poses a serious threat to the historic bridge; it is the task group's further recommendation that traffic load on this bridge should be reduced, preferably by a Route 50 bypass of Aldie, with the present section of Route 50 through Aldie becoming a village street. This would not only limit stress on the bridge itself, but would also reduce traffic vibration impact on other historic structures within the historic district.

*Note: Recent plans advanced by the 50 Corridor Coalition, a local citizens' group, which is attempting to preserve the scenic character of their region, call for using this bridge as a traffic calming device. These traffic calming plans, which may be found in A Traffic Calming Plan for Virginia's Rural Route 50 Corridor: Fauquier and Loudoun Counties, Including Aldie, Middleburg and Upperville, published for the Route 50 Corridor Coalition, Middleburg, Virginia, in 1996, also recommend "put the hump back in the stone bridge over Little River" (p. 44) (i.e., Loudoun County Structure No. 1025). However, there is no documentary or physical evidence that such a feature previously existed on this bridge: the likeliest explanation is that the belief in a previous "hump" is a misinterpretation of the previous raising of the approaches to the bridge. Raising the approaches would have lessened the effect of climbing from low approaches onto the bridge.*

*It is the opinion of the task group that this is a unique historic structure with some serious structural problems and stresses from heavy traffic. These problems must be addressed—and soon—if the structure is to survive. This is 180-year-old masonry bridge, not a "traffic calming device." The task group does not endorse the idea of bridges being used as traffic calming devices and evaluates structures solely on the basis of historical significance along with their use as infrastructure assets for conveyance of traffic over obstacles or obstructions.*

**2017 Update for:**

**Loudoun County Structure No. 1025:** (Masonry arch bridge); ca. 1810–1824, Route 50 crossing Little River.

*Evaluation Update*: The structure was placed on the Virginia Landmarks Register in 2007, and on the National Register of Historic Places in 2014.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2001, the bridge underwent extensive rehabilitation after an inspection in July 2000 showed that a portion of the bridge's wing wall and buttress required reconstruction because of severe deterioration of the mortar between the stones. Portions of the wing wall and buttress were reconstructed. Engineers used a proprietary grouted anchor (Cintec) system as a strengthening method to repair the bridge to functionality. Martins Construction Corp., of Falls Church, Virginia, completed the work at a cost of $1.1 million.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.
- The proprietary grouted anchor (Cintec) system, added in 2001, is working well.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-7
- *ADT*: The current ADT is 7,801 [the ADT in the 2001 report was 13,373]
- The bridge is not posted.
- There is some debris build-up and vegetation growth, a few potholes, and a few loose stones at the bridge.
- The district structure and bridge office reports that all current issues can be addressed through normal maintenance/preventive maintenance: remove vegetation, remove debris, fill potholes, and "normal masonry work" under the arch.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Loudoun County Structure No. 1025:** (Masonry arch bridge); ca. 1810–1824, Route 50 crossing Little River (Figure B32).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: There has been no local support (and considerable opposition) for alternative use from local governments or stakeholders.

*Presence of Stone Masonry*: Yes. This is a stone masonry arch bridge rehabilitated with grouted anchors. The original (1820s) builder/contractor is not known. No original plans have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- Vehicle impact and damage to the parapet was addressed.

*Current Inspection, Condition and Maintenance Information:*

- The rating is N-5-6 [the rating in the 2017 report was 6-6-7].
- ADT: The current ADT is 9,058 [the ADT in the 2017 report was 7,801].
- The district structure and bridge office reports a recent minor impact ("scrape") to the stone parapet that occasioned minor repairs, but caused no damage of significance. (Vehicle impacts to the parapet have been an ongoing problems issue with the bridge.)
- The district structure and bridge office reports that all current issues can be addressed through normal maintenance/preventive maintenance, including: remove vegetation and debris, fill potholes, and "normal masonry work" under the arch.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. Previous and planned repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B32. Loudoun County Structure No. 1025**

**MASONRY ARCH/CONCRETE ARCH**

**Northern Virginia District (District 9)**

**Original [2001] Management Plan Information for:**

**Loudoun County (53)**
VDOT Structure No. 6088
*VDHR Inventory No. 053-0243*
*Name: Hibbs Bridge*
*Location: Route 734, crossing Beaverdam Creek*
*National Register Status: Eligible*

*[Note: This structure was placed on the Virginia Landmarks Register in 2010 and the National Register of Historic Places in 2011.]*

*Description*: Loudoun County Structure No. 6088 is a two-span masonry arch bridge carrying Route 734 crossing Beaverdam Creek. It was built ca. 1829 by the Snickers Gap Turnpike Company. The structure is approximately 133 feet long overall. This structure is one of the few remaining masonry turnpike bridges in Virginia.

*Evaluation*: Loudoun County Structure No. 6088 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in June 1998. This determination was confirmed by the September 5, 2000, attachment to the October 23, 1997, agreement between the Virginia SHPO and VDOT's Commissioner regarding National Register eligibility of bridges in Virginia.

*Documentation*: Loudoun County Structure No. 6088 was included in the initial arch bridge survey report prepared by VTRC (Spero, 1984) and the more recent update (Miller and Clark, 2000).

*Condition:* The current inspection report indicates that this structure is in poor condition. The rubble masonry parapets have large gaps because of missing stones and deteriorating mortar. Scour aprons have been placed on the pier and abutments, and the undersides of the arches have been shotcreted. Water leaks from the asphalt surface through the deck and discharges on the underside of the arch. Because of this, the arch has developed scattered hairline cracks and efflorescence. Much of the lime-and-sand mortar around the masonry fill has leached, and probing reveals voids within the spandrel walls. There is extensive vegetation, including bushes and small trees, growing on and around the bridge. *Repeated gross abuse of the posted 6-ton weight limit by vehicles (including gravel trucks, heavy equipment trailers, building supply delivery vehicles, and horse vans) is a major factor in the deterioration of this structure.*

*Posted Restrictions:* The structure is posted at 6 tons.

*ADT:* 1,225.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement. The Snickers Gap Turnpike had a 45-foot right of way.
*Recommended Treatment:* During the 1990s, VDOT proposed a plan to take the structure off-system, bypass it, and construct a new bridge; the old bridge would then become part of a wayside. There was intense citizen opposition to this plan, coupled with citizens' and county supervisors' demands that the ca. 1829 bridge be kept under vehicular use. The county subsequently rejected a second VDOT proposal (designed by VDOT in close consultation with VDHR and the National Park Service's Williamsport Training Center and approved by VDHR) to rebuild the structure. This design included inserting a concrete arch to strengthen the structure and widening the structure, while rebuilding the spandrel walls, parapets, and other features to replicate the appearance of the historic masonry work. The masonry work would have been done by craftspersons from the Williamsport Training Center. After further discussion with VDOT, Loudoun County hired its own engineering consultant to recommend rehabilitation techniques for the bridge. This report is pending. The task group members made an independent assessment of the issues regarding this bridge; their general determinations are as follows: Because of its masonry construction, moving of the structure to another location, transferring of ownership off-site, or another off-site use is not an option. Transferring ownership on-site, abandoning the structure, or demolishing the structure is not recommended. The task group's recommended management options for this structure, in order of preference, are:

1. The preferable treatment for the structure from an historic preservation viewpoint is to repair and maintain it for adaptive (non-vehicular) use (such as a wayside, walking trail, or horse trail), with subsequent preventive maintenance as needed. A new vehicular bridge would likely be required. Immediate repair recommendations are to remove the vegetation and repair the areas of damaged masonry.
2. The second option is to repair and maintain the structure for vehicular use. This would continue to subject the structure to modern traffic, and almost certainly to continued abuse of the weight limit.
3. The third option is a structural upgrade to DOT standards, which would require at least partial rebuilding of the bridge and attendant loss of part of its historic dimensions, as well as loss of much of the evidence of its historic building practices. Widening, including reinforcement and extension of the arch ring, probable rebuilding of at least one spandrel wall, and rebuilding of the parapets would be required.
4. A fourth option is discontinuing the bridge and its approaches. This would place all responsibility for the repair and maintenance of the historic structure on the county. It is doubtful whether the county has the resources to assume ownership of and maintain this bridge.

*Note: In the task group's opinion, the original VDOT plan to bypass the old bridge would have been the correct treatment. However, it appears that this option has little local support. Therefore, the most realistic management recommendations for this bridge are that it be repaired and maintained for vehicular use, with subsequent preventive maintenance. The task group still recommends repairing and maintaining the bridge for adaptive use (i.e., for non-vehicular use) as an option.*

**2017 Update for:**

**Loudoun County Structure No. 6088:** (Masonry arch bridge); ca. 1829, Route 734 crossing Beaverdam Creek.

*Evaluation Update*: The structure was placed on the Virginia Landmarks Register in 2010 and the National Register of Historic Places in 2011.

*Repairs and Maintenance Undertaken Post-2001:*

- After prolonged discussions between VDOT and Loudoun County, the bridge underwent a major rehabilitation in 2007. This included extensive work on the superstructure and substructure. The spandrel walls were dismantled and rebuilt by hand by the use of stone masonry techniques compatible with 19th century practices. A reinforced concrete slab floating on gravel base material was added to distribute loads more evenly to the arch, thereby improving its strength and durability. An internal reinforced concrete saddle was added. Underdrains were installed to help collect drainage material and prevent it from saturating the base material, leaking, and causing freeze-thaw damage to the masonry walls. The objective of the project was to increase the durability and longevity of the bridge rather than to increase its capacity, which remained posted at 6 tons.
- The structure's posting at 6 tons is in accordance with the provisions of a 2001 memorandum of agreement between Loudoun County and VDOT. The bridge is owned by the Commonwealth of Virginia, but Loudoun County assumed responsibility for maintenance funding in a 2001 memorandum of agreement between Loudoun County and VDOT.
- This work was in accordance with Recommendation 2 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-7-7.
- ADT: The current ADT is 1,367 [the ADT in the 2001 report was 1,225].
- The bridge is posted for 6 tons; it is rated for 8 tons single, 11 tons semi.
- There is some debris build-up and a few potholes. The expansion joints, and a few cracks on the underside of the bridge, are in need of sealing.
- The district structure and bridge office reports that all current issues can be addressed through normal maintenance/preventive maintenance: remove debris, fill potholes, and seal the expansion joints and the cracks on the underside of the bridge.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Previous and planned repairs are in accordance with Recommendation 2 in the 2001 Management Plan. The task group reiterates the recommendations (Recommendation 2) of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**2024 Update for:**

**Loudoun County Structure No. 6088:** (Masonry arch bridge); ca. 1829, Route 734 crossing Beaverdam Creek (Figure B33).

*Evaluation Update*: Unchanged from 2017 (Listed).

*Potential for Adaptive/Alternative Use*: There has been no local support (and considerable opposition) for alternative use from local governments or stakeholders.

*Presence of Stone Masonry*: Yes. This is a stone masonry arch bridge rehabilitated with a floating concrete slab and saddle. The original (ca. 1829) builder/contractor is not known. No original plans have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- The Abutment A side weight limit sign was replaced. As noted above, the objective of the 2007 project was to increase the durability and longevity of the bridge rather than to increase its capacity, which remains posted at 6 tons.
- A pothole was patched on the Abutment B approach.
- This work was in accordance with Recommendation 2 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-7-7 [the rating in the 2017 report was 8-7-7].
- *ADT*: The current ADT is 2,060; [the ADT in the 2017 report was 1,367]
- The bridge remains posted for 6 tons.
- It should be noted that a recent inspection report noted that several trucks that appeared to exceed the weight limit were observed traveling over the bridge during inspection.
- The district structure and bridge office reports that all current issues can be addressed through normal maintenance/preventive maintenance, including: remove debris, fill potholes, repair loose and missing stones and mortar in parapets and abutments, and seal the expansion joints and the cracks on the underside of the bridge.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Previous and planned repairs are in accordance with Recommendation 2 in the 2001 Management Plan. The task group reiterates the recommendations (Recommendation 2) of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.

**Figure B33. Loudoun County Structure No. 6088**

**COVERED**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Alleghany County (03)**
*VDOT Structure No. [No Number] [Note: Subsequently numbered as No. 9007]*
*VDHR Inventory No. 003-0002*
*Name: Humpback Bridge*
*Location: Off Route 60, crossing Dunlap Creek*
*National Register Status: Listed*

*Description:* Known as Humpback Bridge, this structure is a single-span trussed arch ("humpbacked") covered bridge built in 1857 to carry the James River and Kanawha Turnpike across Dunlap Creek west of Covington. The structure is approximately 120 feet long (including a 100-foot arch). The bridge carried traffic until 1929, when Route 60 was realigned and a new bridge constructed. In 1953–1954, it was restored to serve as a footbridge and the focal point of a wayside park that was designed around the old structure. It is the oldest surviving covered bridge in Virginia

*Evaluation*: Humpback Bridge was listed on the Virginia Landmarks Register in 1968 and on the National Register of Historic Places in 1969.

*Documentation*: Humpback Bridge was included on the field survey of covered bridges in Virginia prepared by VTRC in 1997. It was also recorded by the Historic American Engineering Record (HAER No. VA-3).

*Condition*: Humpback Bridge appears to be in generally good condition. As a courtesy to the wayside, the structure currently receives periodic maintenance by VDOT's Lexington Residency. However, the bridge has no structure number and is not on a formal inspection schedule

*Posted Restrictions:* None. The structure is closed to vehicular traffic.

*Right-of-Way Ownership:* The bridge is located in a wayside; right-of-way ownership is not applicable.

*Recommended Treatment:* Preservation in-place for pedestrian use has been successful. Treatment measures do not need to accommodate continued vehicular use. Similarly, an upgrade to DOT standards is neither feasible nor necessary. Discontinuance of the roadway and repair/maintenance for adaptive use have already been implemented. A condition assessment in the near future would be helpful to identify fully current and potential problems and needs. A structure number should be assigned, and the structure should be placed on a regular inspection schedule. Once the structure is inventoried within HTRIS, VDOT can use federal transportation enhancement funds or state maintenance funds to work on a bridge asset, albeit out-of-active service. Since it is not open to vehicular traffic, this bridge is not currently eligible for National

Historic Covered Bridge Preservation Program funds. However, this attractive and publicly accessible historic bridge should be considered a candidate for a transportation enhancement grant. Recommended management options for this structure, in order of preference, are:

1. Assign a structure number, and undertake a condition assessment to identify problems and needs. Undertake repairs and preventive maintenance as needed for continued adaptive use.
2. If a suitable, willing recipient can be identified, transfer of ownership could be considered as a second option.

**2017 Update for:**

**Alleghany County Structure No. 9007 (Humpback Bridge)** [This structure had no number assigned at the time of the original plan; it subsequently was numbered as 9007]: (Covered wooden bridge); Trussed arch ("humpbacked") covered bridge, 1857). *[Note: This is pedestrian bridge, in the wayside off Route 60 west of Covington, crossing Dunlap Creek. It was listed as a National Historic Landmark (the highest level of landmark status) in 2012.]*

*Evaluation Update*: The structure was included among a nationwide group of the most historically important covered bridges in a National Historic Landmark Context Study in 2012 and was listed as a National Historic Landmark in 2012.

*Repairs and Maintenance Undertaken Post-2001:*

- Planning for repairs to the structure was completed in 2012-2013, and repairs were undertaken in the summer of 2013. The work included replacement of the roof sheeting and shingles, stabilization or replacement in kind of deteriorated framework, replacement of deteriorated weatherboards, and repointing of the mortar on the stone masonry abutment and approach walls. Concrete backwalls were placed at each end of the bridge.
- With the loss of a similar (although less arched) covered bridge in Ohio in June 2013, the Humpback bridge is now the only remaining example of a trussed arch covered bridge in the United States.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.
- The bridge was impacted by record flooding on June 23, 2016. Water rose 3 feet within the bridge at its portals, and there were some tree impacts to the outside of the structure. There was erosion of the bank, and approximately 2 feet of the top of the approaches was carried away by floodwaters.
- The strengthening and stabilization occasioned by the 2013 rehabilitation likely saved the bridge structure from destruction. The primary damage from the flooding was erosion of the bank and approaches.
- Flood damage to the approaches from the record 2016 flooding was rapidly repaired through an expedited project, which involved cooperation between VDOT and the Federal Highway Administration. Repairs began on July 21, 2016, and were completed on August 16. The following project description was received from the Staunton District:

> Project Description: Repair rock masonry walls at both approaches to Humpback Bridge damaged from June 23, 2016 storm and flooding. Reclaim and reuse existing stones to reconstruct walls as closely as possible to the original condition. Any stones that are

missing will be replaced with native stones of similar size, color, and shape. Soft masonry mortar mix will be utilized between stones to secure them in place, and contained beneath and to the fill-side of the rocks to maintain a dry-stack appearance upon completion. Stabilize undermined concrete backwalls on both ends of bridge utilizing a reinforced concrete jacket. All debris will be removed from the structure. Both walkway approaches will be brought up to grade, sealed with a chip and seal surface treatment, and the wooden pedestrian railing will be replaced. Remove 2 feet diameter damaged and leaning ash tree on east upstream corner of bridge outside of the time of year restriction of 4/15-9/15. No trees to be removed during the time of year restriction. FHWA has ruled that the project is excepted from Section 4(f) provisions under 774.13(a).

Purpose And Need: Stabilize and repair historic bridge as quickly as possible to ensure no further damage occurs.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-4-4.
- The structure remains as a pedestrian bridge
- Graffiti is on ongoing problem on this bridge. The Lexington Residency office has been approached by the local Chamber of Commerce regarding installing security cameras on the bridge. The task group supports this if the cameras are not visually apparent.
- The recent flooding and damage to the bridge, and the rapid mobilization to repair the damage have shown that potential transfer of ownership, noted as Recommendation 2 in the 2001 Management Plan, is not a feasible option with this National Historic Landmark bridge. VDOT has the expertise and resources to mobilize and make repairs in the case of such damage (and thus prevent additional damage or loss of the structure). Such rapid response would likely be beyond the ability of a locality or a private organization.
- The current inspection report indicates that the bridge is in poor condition. *[Note: This rating, made after the latest repairs, results from a description of masonry and timber units that are accurate for National Bridge Inventory inspection of vehicular bridges. However, that description is not applicable to a more than 150-year-old heavy-timber frame wooden bridge such as Humpback Bridge that has been taken off the vehicular system and is carrying pedestrians.]* The district structure and bridge office reports that the "4" ratings have been in place for over a decade. These ratings relate particularly to checks and splits in some of the heavy frame members (a not uncommon occurrence with older heavy frame members), some cracks in substructure rocks, and some channel scour. No specific repair recommendations were attached to these observations.
- Transportation enhancement grants, noted as a potential funding source under Recommended Treatment in the 2001 Management Plan, are no longer available to DOTs.

*Current Historic Structures Task Group Observations and Recommendations:* Previous rehabilitation and repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations of (continued) repair and maintain for continued adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. The feasibility of stream restoration techniques should be explored: these would keep the channel from migrating in normal flow. (The channel is fairly stable at present.)

**2024 Update for:**

**Alleghany County Structure No. 9007 (Humpback Bridge)** [This structure had no number assigned at the time of the original plan; it subsequently was numbered as 9007]: (Covered wooden bridge); Trussed arch ("humpbacked") covered bridge, 1857 (Figure B34). *[Note: This is pedestrian bridge, in the wayside off Route 60 west of Covington, crossing Dunlap Creek. It was listed as a National Historic Landmark (the highest level of landmark status) in 2012.]*

*Evaluation Update*: Unchanged from 2017 (Listed [National Register] and a National Historic Landmark).

*Potential for Adaptive/Alternative Use*: Established. The bridge serves as a pedestrian bridge within the wayside.

*Presence of Stone Masonry*: Yes. The bridge has masonry stone abutments and approaches. It is uncertain if some of the stone masonry dates to one of the previous bridges at the site or whether the stone masonry elements were built new for the construction of the present bridge in 1857. The builder/contractor for the 1857 work has not been documented beyond doubt. No original (1857) plans or specifications have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- No major bridge work has been done. The structure underwent major repairs in 2013, and additional extensive repairs after flood damage in 2016.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 5-4-4 [the rating in the 2017 report was 5-4-4].
- The structure remains as a pedestrian bridge.
- As was noted in the 2017 update, the record flooding and damage to the bridge in 2016, and the rapid mobilization to repair the damage have shown that potential transfer of ownership, noted as Recommendation 2 in the 2001 Management Plan, is not a feasible option with this National Historic Landmark bridge. VDOT has the expertise and resources to mobilize and make repairs in the case of such damage (and thus prevent additional damage or loss of the structure). Such rapid response would likely be beyond the ability of a locality or a private organization.
- The current inspection report indicates that the bridge is in poor condition. *[Note: This rating results from a description of masonry and timber units that are accurate for National Bridge Inventory inspection of vehicular bridges. However, that description is not applicable to a more than 150-year-old heavy-timber frame wooden bridge such as Humpback Bridge that has been taken off the vehicular system and is carrying pedestrians.]* The district structure and bridge office reports that the "4" ratings have been in place for well over a decade. These ratings relate particularly to checks and splits in some of the heavy frame members (a not uncommon occurrence with older heavy frame members), some cracks in substructure rocks, and some channel scour. No specific repair recommendations were attached to these observations.
- The district structure and bridge office reports that the 2013 and 2016 repair work to the bridge is performing well.

- Vegetation encroaching on the bridge needs to be removed.
- The cracking and mortar loss on the stone masonry of abutments A and B needs to be monitored.
- The channel scour and embankment erosion at abutments A and B needs to be monitored.

*Current Historic Structures Task Group Observations and Recommendations:* Previous rehabilitation and repairs are in accordance with Recommendation 1 in the 2001 Management Plan. The task group reiterates the recommendations for (continued) repair and maintenance for continued adaptive use, with subsequent preventive maintenance as needed, in the 2001 Management Plan.


**Figure B34. Alleghany County Structure No. 9007 (Humpback Bridge)**

**COVERED**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Shenandoah County (85)**
*VDOT Structure No. 6078*
*VDHR Inventory No. 085-0103*
*Name: Meems Bottom Bridge*
*Location: Route 720 crossing North Fork of Shenandoah River*
*National Register Status: Listed*

*Description:* Shenandoah County Structure No. 6078 is a single-span Burr arch truss, built ca. 1893, carrying Route 720 crossing the North Fork of Shenandoah River. The structure is approximately 207 feet long. Known familiarly as the Meems Bottom Bridge, this is the only covered bridge that still carries vehicles on the public road system in Virginia. It sustained heavy damage when arsonists burned it in October 1976. After restoration, the bridge was reopened in September 1979. It was subsequently strengthened by the addition of steel I-beams and concrete piers.

*Evaluation*: Shenandoah County Structure No. 6078 was listed on the Virginia Landmarks Register and the National Register of Historic Places in 1975.

*Documentation*: Shenandoah County Structure No. 6078 was included on the field survey of covered bridges prepared by VTRC in 1997.

*Condition*: The current inspection report indicates that this structure is in good condition. After the 1976 fire, the truss of the Meems Bottom Bridge was restored using an innovative combination of in-kind replacement and epoxy consolidation. A state-of-the-art fire retardant and sealant was then applied to all four sides of the members. Over the years, some moisture and insect problems have developed because of the trapping of moisture inside the members. It was subsequently established that to prevent buildup and trapping of moisture within the wood, one face of members should not be treated. A supplementary steel beam/concrete pier supporting structure was later installed to strengthen the covered bridge.

*Posted Restrictions:* The structure is posted at 13 tons.

*ADT:* 527.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Repair and maintenance for vehicular use is considered to have already been implemented. Demolition is not recommended. Discontinuance or abandonment is

not a recommended option at present. Structural upgrade to DOT standards, salvage, and other off-site options are not considered feasible by the task group. In 2000, VDOT submitted a successful application to the National Historic Covered Bridge Preservation Program for funds to design and construct a fire-suppression system for this structure. Recommended management options for this structure, in order of preference, are:

1. Preventive maintenance as needed.
2. Repair and maintain for adaptive use.
3. If a suitable, willing recipient can be identified, transfer of ownership on-site could be considered as a future option. This would entail discontinuance or abandonment.

**2017 Update for:**

**Shenandoah County Structure No. 6078:** (Covered wooden bridge); Burr arch truss, built 1894, Route 720 crossing North Fork of Shenandoah River.

*Evaluation Update*: The bridge was long thought to have been built ca. 1893, but recent research supported a date of 1894. In 2008, a continuation page containing additional historical research (including correcting the date in the original 1975 National Register nomination to 1894) was added to the Virginia Landmarks Register and National Register forms.

*Repairs and Maintenance Undertaken Post-2001:*

- In 2011, electrical upgrades and maintenance repairs were done on the bridge.
- In 2012, vehicular damage to the Abutment A portal was repaired.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.
- The bridge has been struck several times in the last few years.
- The fire suppression system has been installed but the Edinburg Residency reports that there have been problems with the unit being knocked down.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-7-6.
- ADT: The current ADT is 444 [the ADT in the 2001 report was 527].
- The structure is still posted at 13 tons.
- In early March 2017, the bridge sustained damage to its west end when struck by a tractor-trailer that was following directions from a GPS unit and attempted to cross the bridge. The driver of the truck ignored the posted weight, width, and height limit signs, and signs warning that GPS should not be used to navigate over the bridge.
- The bridge was struck again by a tractor-trailer in late March 2017, under similar circumstances. There have been subsequent impacts from trucks, plus a car impact, as well.
- “No Trucks” signage is being installed on the approaches to the bridge.
- A feasible height restriction method must be determined for this bridge.
- The wooden bridge does not function as a truss: per the inspection reports, it was “modified to 4 Continuous Steel Rolled Girder Spans in 1985.”
- Inspection indicates that some repointing is needed on the stone masonry wing walls. Vegetation encroaching on the structure should be removed.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Overweight and over-height and/or over-width vehicles must be prevented from accessing this bridge. Posted weight and height/width limitation signs have been repeatedly disregarded by drivers. The district structure and bridge office reports that physical limitations such as height-limiting bars ("bang" or "headache" bars) were previously considered and rejected because of potential liability concerns. But this issue is being revisited given the repeated damage to this bridge. Through traffic on the road has been restricted. The task group supports assessing all warning and signage opportunities to ensure signage in all directions. Sensors with audible alarms to detect over-height vehicles are also potential treatment options. There are several locations approaching the bridge from either direction that would support sensors with audible alarms and turn-arounds for over-height vehicles. The task group reiterates the recommendation of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. As a second option, adaptive use (Recommendation 2 in the 2001 Management Plan) could be considered by the district structure and bridge office.

**2024 Update for:**

**Shenandoah County Structure No. 6078:** (Covered wooden bridge); Burr arch truss, built 1894, Route 720 crossing North Fork of Shenandoah River (Figure B35).

*Evaluation Update*: Unchanged from 2017 (Listed; date was corrected and continuation page added)

*Potential for Adaptive/Alternative Use*: There is potential for alternative use (closing the bridge to vehicular traffic and limiting it to bicycle and pedestrian use). However, this will require funding for acquisition of a new right of way, realigning Route 720, and construction a new crossing of the Shenandoah River.

*Presence of Stone Masonry*: Yes. The bridge has its original stone masonry abutments, supplemented with concrete piers added in the 1980s. The original builder/contractor was John W. Woods (for landowner F. H. Wisler). The stonemasons have not been specifically identified. No original plans have been located (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2017:*

- Despite warning signs, the bridge was struck by oversize vehicles (over-height, over-width, overweight, etc.) at various times since 2017.
- In 2018 signs and overhead clearance bars with suspended chains were installed to alert drivers of oversized vehicles that were approaching the bridge. Vehicles size was limited to 10 feet in height, 12 feet in width, and 13 tons weight. Despite warning devices, the bridge was struck 11 times between 2019 and late 2021.
- Repeated vehicular strikes caused the bridge to be closed to traffic for repairs in November 2021.
- After repairs, the bridge was reopened to traffic in July 2022.
- The bridge has been pressure washed and the exterior has been stained.

- Logs and limbs lodged against the pier were removed; vegetation at the rubble masonry wingwalls and abutment A was removed.
- The alarm system wires have been problematic but have been repaired (if the bridge is hit the alarm goes off; this is tied to a telephone line).
- The repair work was in accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 8-7-6 [the rating in the 2017 report was 8-7-6].
- ADT: The current ADT is 552 [the ADT in the 2017 report was 444].
- The structure is still posted at 13 tons. Signs and overhead clearance bars with suspended chains remain in place.
- The wooden bridge does not function as a truss: per the inspection reports, it was "modified to 4 Continuous Steel Rolled Girder Spans in 1985."
- Inspection indicates that some repointing is needed on the stone masonry wing walls. Vegetation encroaching on the structure should be monitored and removed as necessary.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in good condition. Overweight and over-height and/or over-width vehicles must be prevented from accessing this bridge. Posted weight and height/width limitation signs have been repeatedly disregarded by drivers in the past. The task group reiterates the recommendation of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2001 Management Plan. As a second option, adaptive use for non-vehicular use (Recommendation 2 in the 2001 Management Plan) could be considered by the district structure and bridge office. This would require funding, acquisition of a new right of way, and a new crossing for Route 720.


**Figure B35. Shenandoah County Structure No. 6078**

**ALUMINUM TRIANGULAR BOX BEAM**

**Richmond District (4)**

**Original [2018] Management Plan Information for:**

**Chesterfield County (20)**
*VDOT Structure No. 1900*
*VDHR Inventory No. 020-5806*
*Location: Route 36, crossing Appomattox River*
*National Register Status: Eligible*

*[Note: This structure was added to the Management Plan as part of the 2018 addendum.]*
*Description:* Chesterfield County Structure No. 1900 is a single-span aluminum multigirder (triangular) bridge (Fairchild design), built in 1960-1961, carrying Route 36 crossing the Appomattox River. The structure is 100 feet long. This structure is significant as the first aluminum bridge in Virginia, and the earliest of the four innovative Fairchild design aluminum bridges (i.e., bolted or riveted, stiffened triangular box beam/girder structures) that were constructed in the United States during the early 1960s. The Route 36 bridge is a bolted triangular box beam. The plan number is 152-24; it was designed by Hayes, Seay, Mattern and Mattern; fabricated by Reynolds Metals; and built by Sanford Construction Company. (The Sanford Construction Company, of Sanford, North Carolina, was acquired in the 1990s by Sanford Grading Company. Sanford Grading Company was founded in 1969. The company today operates as Sanford Contractors, Inc.)
The other Fairchild design examples (all riveted triangular box beams) were Sykesville, Maryland (Route 32 over Patapsco River, opened 1963, now closed) and Amityville, New York (a pair of bridges, Route 110 over Sunrise Highway, 1963).

*Evaluation*: Chesterfield County Structure No. 1900 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in March 2017, a determination confirmed by the interagency agreement between VDOT and the Virginia State Historic Preservation Officer (SHPO) dated September 20, 2017.

*Documentation*: As the only bridge of its type in Virginia, and one of only four aluminum triangular box beam bridges in the United States, Chesterfield County Structure No. 1900 has not been included in previous thematic bridge surveys prepared by VTRC. Rather, it has been researched and documented, separately from any thematic survey, as a unique structure in Virginia. A National Register nomination is being prepared.

*Condition*: The current rating is 7-6-6. The current inspection report indicates that on the railings, there is a crack in a rail post, a broken weld in the railing, and some missing anchor bolts. There is a crack in the wall between the railing and connector plate. The bearing seats need cleaning and repainting. There are cracks in the deck and back wall, and some spalls in the concrete. The deck joints need to be replaced and resealed.

*Posted Restrictions:* None.

*ADT*: 6385.

*Right-of-Way Ownership:* This structure carries a primary route. Fee simple ownership is presumed.

*Recommended Treatment:* Because of its location, transferring ownership, moving the structure to another location, or discontinuing it or abandoning it are not options. Adaptive use is not considered a feasible option at present. A structural upgrade to DOT standards is not necessary. Dismantling or demolition is not recommended. The current inspection report indicates that current repair needs are minor. The recommended management options for this structure are to repair and maintain for continued vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to: repair the railings and anchor bolts as needed, repair the crack in the wall between the railing and connector plate, clean and repaint the bearing seats, seal cracks in the deck and back wall, patch spalls in the concrete, add an epoxy grit overlay or silene sealant (penetrating sealant) to protect the concrete, and replace and reseal the joints.

**2024 Update for:**

**Chesterfield County Structure No. 1900:** Aluminum multigirder (triangular) bridge, built in 1960-1961, Route 36 crossing the Appomattox River (Figure B36).

*Evaluation Update*: The National Register nomination for this bridge is in progress.

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: Yes. There are a few courses of stone masonry at the base of the north abutment. This is the residue of the abutment from a previous (truss) bridge at the site.

*Repairs and Maintenance Undertaken Post-2018:*

- In 2019 preventive maintenance was performed.
- This work was in accordance with Recommendation 1 in the 2018 addendum.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-6-6 [the rating in 2018 was 7-6-6].
- ADT: The current ADT is 6072 [the ADT in 2018 was 6385].
- Routine maintenance is being performed, including cleaning bearings and sweeping the deck. Bearing replacement possibly may be considered in the future.
- Vegetation encroaching on the structure should be removed.
- The district does not note any major areas of concern. No major work is planned.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in satisfactory condition. The task group reiterates the Recommended Treatment of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2018 addendum.


**Figure B36. Chesterfield County Structure No. 1900**

**STEEL BEAM SEMI-INTEGRAL**

**Staunton District (8)**

**Original [2018] Management Plan Information for:**

**Rockingham County (82)**
*VDOT Structure No. 6166*
*VDHR Inventory No. [Pending]*
*Location: Route 924, crossing Mines Run*
*National Register Status: Eligible*

*[Note: This structure was added to the Management Plan as part of the 2018 addendum.]*

*Description:* Rockingham County Structure No. 6166 is a single-span steel beam semi-integral bridge, built in 1937, carrying Rt. 924 crossing Mines Run. The structure is approximately 51 feet 6 inches long. Built for the U.S. Forest Service, this is an extremely early example of a steel beam semi-integral bridge.

*Evaluation*: Rockingham County Structure No. 6166 was recommended as eligible for listing in the National Register of Historic Places by the Historic Structures Task Group in March 2017, a determination confirmed by the interagency agreement between VDOT and the Virginia State Historic Preservation Officer (SHPO) dated September 20, 2017.

*Documentation*: Rockingham County Structure No. 6166 was identified by the VDOT Staunton District Structure and Bridge office as an extremely early example of steel beam semi-integral construction. This type of bridge construction only became common in the 1980s (nearly 50 years after the construction of this bridge). Rockingham County Structure No. 6166 has not been included in previous thematic bridge surveys prepared by VTRC. Rather, this bridge has been researched and documented, separately from any thematic survey, as an extremely early example of this technology. A National Register nomination is being prepared. *[Note: This structure may have been built from an early or experimental federal design or standard plan for this bridge type, but this has not yet been documented.]*

*Condition*: The current rating is 6-6-6. This over-80-year-old structure is still performing well, and has been described by the VDOT Staunton District Structure and Bridge engineer as “a lesson in design longevity” (Rex L. Pearce, personal communication, December 1, 2017). The current inspection report indicates that there is some minor spalling and scaling on the concrete of the abutments, the beam ends and bearings need cleaning and the beam ends need painting, and the deck drains do not extend below the deck bottom.

*Posted Restrictions:* None.

*ADT*: 201.

*Right-of-Way Ownership:* A road in the location of present Route 924 appears on the 1885 atlas of Rockingham County. The 1932 county map marks the road as under "Forest Service Maintenance" and it is noted as Forest Road 5 on this map. The road was accepted into the state secondary system as Route 924 in 1951, with a right-of-way of 66 feet.

*Recommended Treatment:* Because of its location, and construction, transferring ownership on or off site, moving the structure to another location, or discontinuing it or abandoning it are not options. Adaptive use is not considered a feasible option at present. A structural upgrade to DOT standards is not necessary. Dismantling or demolition is not recommended. The current inspection report indicates that current repair needs are minor. The recommended management options for this structure are to repair and maintain for continued vehicular use, with subsequent preventive maintenance as needed. Immediate repair recommendations are to: make minor concrete repairs (repair spalled and scaled areas on the abutments), clean the beam ends and bearings, paint the beam ends, and extend the deck drains below the deck bottom.

**2024 Update for:**

**Rockingham County Structure No. 6166:** Steel beam semi-integral bridge, 1937, Route 924 crossing Mines Run (Figure B37).

*Evaluation Update*: The National Register nomination for this bridge is in progress.

*Potential for Adaptive/Alternative Use*: Alternative use is unlikely at present.

*Presence of Stone Masonry*: Yes. This bridge has stone masonry abutments and wing walls; it was constructed by the U.S. Forest Service. The builder/contractor for the masonry portions of this bridge is not known. No original plans or specifications for the masonry portions have been located. It is uncertain if the bridge elements are of solid stone masonry, but given the U.S. Forest Service practices of the time, solid stone masonry seems extremely likely. The stone masonry work on this bridge is consistent with the types of rubble stone masonry for bridge abutments and wing walls shown in the Forest Service's 1936 publication *Acceptable Bridge Plans* (Miller, 2023).

*Repairs and Maintenance Undertaken Post-2018:*

- Damaged object markers have been replaced.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 6-6-6 [the rating in 2018 was 6-6-6].
- ADT: The current ADT is 164 [the ADT in 2018 was 201].
- A few areas need spot painting; the beam ends need painting.
- Very minor repair is needed on one area of the stone masonry wing walls (one stone on abutment A, downstream, has fallen off and needs to be reset).
- There is slight delamination of the abutment A concrete cap and the vertical face (each) under beam 2 and 3.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in fair condition. The task group reiterates the recommendation of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed, in the 2018 addendum.

**Figure B37. Rockingham County Structure No. 6166**

## MANAGEMENT PLAN BRIDGE UNDER SECTION 106 REVIEW

(The following structure was not considered for Task Group recommendations in the current Management Plan update because of ongoing Section 106 review).

**METAL TRUSS**

**Staunton District (8)**

**Original [2001] Management Plan Information for:**

**Augusta County (7)**
*VDOT Structure No. 6149*
*VDHR Inventory No. 007-1055*
*Name: Knightly Bridge*
*Location: Route 778, crossing Middle River*
*National Register Status: Eligible*

*Description:* Augusta County Structure No. 6149 is a single-span pin-connected Camelback through truss, carrying Route 778 crossing Middle River. The structure is approximately 182 feet long. It was built in 1915 by the Champion Bridge Company. This bridge is significant as an example of an early 20th century metal Camelback through truss.

*Evaluation*: Augusta County Structure No. 6149 was identified as eligible for listing in the National Register of Historic Places after the initial survey of Virginia's metal truss bridges in the 1970s. This assessment was reiterated by the Historic Structures Task Group in August 1996, a determination confirmed by the Virginia SHPO and VDOT's Commissioner by agreement dated October 23, 1997.

*Documentation*: Augusta County Structure No. 6149 was included in the initial metal truss survey report prepared by VTRC (Deibler/Spero, 1975-1982) and the more recent update (Miller and Clark, 1997). It was also recorded to Historic American Engineering Record Standards (HAER No. VA-100).

*Condition*: The current inspection report indicates that this structure is in fair-to-poor condition. There is section loss and pitting to the steel. Isolated cracking, delamination, and deterioration are present on the substructure. The streambed is eroding in front of one of the abutments; riprap has recently been applied to the stream banks.

*Posted Restrictions:* The structure is posted at 6 tons.

*ADT*: 124.

*Right-of-Way Ownership:* Because of the structure's location on a portion of a secondary roadway that has undergone no substantial improvement projects since the creation of the secondary system in 1932, the approaches are presumed to be constructed on prescriptive easement.

*Recommended Treatment:* Because this is a single-lane through truss, an upgrade to DOT standards is not feasible. The alignment of this structure will make replacement difficult. In addition, due largely to the location and the size of the structure, adaptive use, discontinuance, abandonment, transferring ownership on or off-site, or other off-site options are not feasible. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Monitor the streambed and banks for erosion and scour. Planned work to be done is to replace the deck and stringers and to repaint the structure. This work is tentatively planned for implementation in late 2002 or 2003.
2. Documentation and demolition could be considered as a second option. In this case, the elaborate bridge plaque should be salvaged, for either preservation, display, or possible reuse on a replacement bridge.

**2017 Update for:**

**Augusta County Structure No. 6149:** (Metal truss bridge); Camelback through truss, 1915, Route 778 crossing Middle River.

*Evaluation Update*: The previous evaluation finding (of National Register eligibility) was reaffirmed by the Historic Structures Task Group in March 2017 in accordance with Stipulation III of the 2016 interagency Programmatic Agreement. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia SHPO dated September 20, 2017.

*Repairs and Maintenance Undertaken Post-2001:*

- The bridge was painted in 2005 with the Termarust system. In an effort to limit stress on the bridge's members, the bridge was not taken apart but was painted in place.
- In 2012, crews tightened a loose rail at the Abutment B end post.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- The rating is 7-4-6.
- ADT: The current ADT is 292 [the ADT in the 2001 report was 124]
- The structure is posted at 14 tons.
- The eyebars are corroding and there is deterioration around the pins.
- The district structure and bridge engineer will be evaluating the bridge shortly. The bridge has gone beyond regular maintenance and needs rehabilitation. There is a 6.8 mile detour.

*Current Historic Structures Task Group Observations and Recommendations:* The current inspection report indicates that this structure is in poor condition. Previous repairs are in accordance with the Recommended Treatment in the 2001 Management Plan. The task group defers further recommendations pending the results of the district structure and bridge office's

evaluation of this structure. However, the task group would support a rehabilitation of this structure.

**2024 Update for:**

**Augusta County Structure No. 6149:** (Metal truss bridge); Camelback through truss, 1915, Route 778 crossing Middle River (Figure B38).

*Evaluation Update*: Unchanged from 2017 (Eligible).

*Repairs and Maintenance Undertaken Post-2017:*

- The bridge was closed in October 2019 for emergency repairs because of significant deterioration. After repairs, it was reopened two months later, posted at 3 tons.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

*Current Inspection, Condition and Maintenance Information:*

- Following evaluation of the structure by the district structure and bridge office, the district structure and bridge engineer made the decision that further repairs and rehabilitation were not feasible, and the bridge was permanently closed to vehicular traffic in February 2024.
- The bridge is currently in Section 106 review.

*Current Historic Structures Task Group Observations and Recommendations:* This structure was not considered for task group recommendations in the current Management Plan update because of ongoing Section 106 review.

**Figure B38. Augusta County Structure No. 6149**