

A Management Plan for Historic Bridges in Virginia: The 2017 Update

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| <p>16. Abstract:</p> <p><i>A Management Plan for Historic Bridges in Virginia</i>, published in 2001, identified the management and treatment needs for 55 historic bridges in Virginia (i.e., bridges that were individually eligible for or listed on the National Register of Historic Places) that were under some measure of state purview. The plan was undertaken to serve as a management tool for these historic bridges. The plan was acknowledged by the historic bridge preservation and bridge engineering communities as one of the most effective such plans in the United States. Included in the plan was a recommendation that it be reviewed and updated at least every 10 to 15 years.</p> <p>Updates to the plan at 5-year intervals now are required by a 2016 interagency programmatic agreement, which covers the management of cultural resources, including bridges, in Virginia. This agreement is the "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." Stipulation III of this agreement specifically treats the management of bridges.</p> <p>The current report constitutes the first update of the 2001 plan. It entailed the collection of information on the current status of the bridges in the 2001 plan, including any major changes with regard to each bridge since the publication of the 2001 plan. Such changes include changes in National Register status; ownership status; major maintenance; rehabilitation work; damage; deterioration; and in a few cases, dismantling or demolition of the structure. This update also identifies current management issues and includes expanded and updated maintenance and management recommendations for these historic structures. Both the 2001 plan and the current update were produced by the Virginia Transportation Research Council (VTRC), in concert with VDOT's central office 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).</p> <p>The study recommends the following: (1) VTRC and the HSTG should review and update the management plan every 5 years; (2) VDOT's Structure and Bridge Division should eliminate the option for inspectors to recommend bridge replacement for historic bridges in inspection reports; (3) VTRC and VDOT's Structure and Bridge Division should collaborate on an investigation of funding needs for historic bridge management and maintenance; (4) VTRC, VDOT's Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT's Environmental Division should collaborate to identify historic bridges that are candidates for adaptive use, including bicycle and pedestrian use; and (5) VTRC, VDOT's Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT's Environmental Division should collaborate to identify potential avenues to establish best practices for repair of historic masonry structures or masonry components of the bridges in the management plan.</p> | | | | | |
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FINAL REPORT
A MANAGEMENT PLAN FOR HISTORIC BRIDGES IN VIRGINIA:
THE 2017 UPDATE

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ABSTRACT

A Management Plan for Historic Bridges in Virginia, published in 2001, identified the management and treatment needs for 55 historic bridges in Virginia (i.e., bridges that were individually eligible for or listed on the National Register of Historic Places) that were under some measure of state purview. The plan was undertaken to serve as a management tool for these historic bridges. The plan was acknowledged by the historic bridge preservation and bridge engineering communities as one of the most effective such plans in the United States. Included in the plan was a recommendation that it be reviewed and updated at least every 10 to 15 years.

Updates to the plan at 5-year intervals now are required by a 2016 interagency programmatic agreement, which covers the management of cultural resources, including bridges, in Virginia. This agreement is the “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.” Stipulation III of this agreement specifically treats the management of bridges.

The current report constitutes the first update of the 2001 plan. It entailed the collection of information on the current status of the bridges in the 2001 plan, including any major changes with regard to each bridge since the publication of the 2001 plan. Such changes include changes in National Register status; ownership status; major maintenance; rehabilitation work; damage; deterioration; and in a few cases, dismantling or demolition of the structure. This update also identifies current management issues and includes expanded and updated maintenance and management recommendations for these historic structures. Both the 2001 plan and the current update were produced by the Virginia Transportation Research Council (VTRC), in concert with VDOT’s central office 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 study recommends the following: (1) VTRC and the HSTG should review and update the management plan every 5 years; (2) VDOT’s Structure and Bridge Division should eliminate the option for inspectors to recommend bridge replacement for historic bridges in inspection reports; (3) VTRC and VDOT’s Structure and Bridge Division should collaborate on an investigation of funding needs for historic bridge management and maintenance; (4) VTRC, VDOT’s Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT’s Environmental Division should collaborate to identify historic bridges that are candidates for adaptive use, including bicycle and pedestrian use; and (5) VTRC, VDOT’s Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT’s Environmental Division should collaborate to identify potential avenues to establish best practices for repair of historic masonry structures or masonry components of the bridges in the management plan.

FINAL REPORT

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INTRODUCTION

A Management Plan for Historic Bridges in Virginia, published in 2001 (Miller et al., 2001) (hereinafter “2001 Management Plan”), 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 [hereinafter “National Register”] and were under some measure of state purview. 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).

Updates to the plan at 5-year intervals now are 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” (“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.

The current report constitutes the main phase of the first update of the 2001 Management Plan (hereinafter “the 2017 update”). The scoping phase of the update (which included collecting information on National Register status changes, ownership changes, demolition/dismantling, and any repair or rehabilitation work done between 2000 and 2013 to bridges in the management plan (hereinafter “management plan bridges”) was completed in 2014 (Miller and Wallingford, 2014). The main phase of the 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 the present. Such changes included changes in National Register status; changes in ownership status; major maintenance;

rehabilitation work; damage; deterioration; and in a few cases, dismantling or demolition of the structure. This phase of the update also addresses current management issues, includes expanded and updated maintenance recommendations, and updates the recommendations regarding these historic structures provided in the 2001 Management Plan.

PURPOSE AND SCOPE

The purpose of this study was to update the original (2001) management plan for historic bridges in Virginia, as required by the 2016 interagency programmatic agreement (“Programmatic Agreement,” 2016). The scope of the study encompassed the 35 bridges included in the 2001 Management Plan that currently are under VDOT ownership and are being managed by VDOT. Bridges currently owned by railroads or municipalities were not included.

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).* VDOT’s Structure and Bridge Division and VDOT district structure and bridge offices were initially contacted via e-mail concerning this information. District structure and bridge engineers were queried as to the current status of the bridges in the 2001 plan 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 2001 plan; 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 to identify which recommendations had been followed.
2. *Collect information to identify the current conditions and the current and upcoming maintenance and management needs of the bridges.* Site visits to each management plan bridge under VDOT purview were undertaken. VDOT’s Structure and Bridge Division and each VDOT district structure and bridge office having historic bridges within its district were consulted regarding information on the relevant historic bridges. Discussions and meetings with the bridge offices typically were via an initial e-mail, with subsequent discussion via telephone conferences or personal interviews.
3. *Evaluate the information collected, 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

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 [formerly ISTEA, TEA-21, and now known as transportation alternatives funds] are no longer available to departments of transportation (DOTs). These sections from the 2001 report are not duplicated in this update.

The two appendices of the original (2001) management plan (Miller et al., 2001) were adapted for the 2017 update. These comprise the list of bridges included in this study with any changes from the bridges included in the original management plan (Appendix A) and the separate management plan recommendations for each bridge (Appendix B).

Original (2001) management plan sections for each bridge, including the recommendations, are included in this report for reference in Appendix B. The (2017) updated information and updated recommendations for each bridge follow the 2001 report section for that bridge.

The emphasis in the current 2017 update of the management plan is on management and maintenance needs, the recordation of work completed on each bridge after 2000, needed and planned work, and updated management recommendations for each bridge.

Changes in Management Plan Bridges and Current Management Plan Bridge Status

The bridges cited in this report were included in *A Management Plan for Historic Bridges in Virginia* (Miller et al., 2001), i.e., the original (2001) management plan, and in *A Management Plan for Historic Bridges in Virginia: Update/Scoping Phase* (Miller and Wallingford, 2014). The management plan bridges were not confined to one particular type of bridge construction: historic significance (i.e., individual eligibility for or listing on the National Register) was the unifying criterion for inclusion. A variety of bridge types were included in the plan: metal truss bridges, wooden covered bridges, masonry and concrete arch bridges, and non-arched concrete bridges.

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 that were owned by municipalities or railroads, carried vehicular traffic, and had state structure numbers but over which VDOT had limited (and in some cases 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 noted previously were transferred to VDOT in 2014. Between 2000 and the present, 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, after discussions with district and central office structure and bridge engineers and members of the HSTG, it was determined most feasible to place such structures into an "Inactive Status" category (hereinafter "on Inactive Status") as regards the management plan. No further updates to recommended treatments for the bridges on Inactive Status are anticipated as part of the management plan.

In addition to the 15 bridges now placed on Inactive Status, 5 bridges have been removed from the management plan because of demolition or dismantling. The remaining 35 bridges, all under VDOT ownership, constitute the current management plan bridges.

Updates and changes, including bridge work done between 2000 and 2013 to all of the original (2001) management plan bridges (bridges currently on Inactive Status included), and information on the demolished/dismantled bridges were recorded for base data / comparative data purposes in the scoping phase of this update: *A Management Plan for Historic Bridges in Virginia: Update/Scoping Phase* (Miller and Wallingford, 2014). Reference should be made to that report for this information. The above-noted transferred and demolished bridges, the current 15 bridges on Inactive Status, and the current 35 management plan bridges are specified in the following section.

It should be noted that only bridges included in the original (2001) management plan and currently under VDOT purview are covered in this update. VDOT bridges that subsequently

(i.e., post-2000) have been or will be determined historic will be brought into the management plan as future additions.

Overall Status Updates for Management Plan Bridges

Management Plan Active Status: Bridges Included in the Management Plan

In several meetings during March 2017, the HSTG met to review the 35 bridges currently in the management plan. In accordance with Stipulation III of the 2016 interagency programmatic agreement (“Programmatic Agreement,” 2016), the HSTG reaffirmed the earlier recommendations of National Register eligibility for all management plan bridges that were not already listed on the National Register. In addition, the HSTG reviewed and updated the treatment recommendations for all management plan bridges not currently in Section 106 review.

Brief descriptions of each of the 35 management plan bridges organized by district, including the type of construction and age, are provided in Appendix A. Appendix B provides the details concerning changes to the 35 management plan bridges and recommendations. Changes to a bridge since the original (2001) management plan are briefly described, and how these changes relate to / accord with the recommendations made in the 2001 Management Plan (Miller et al., 2001) regarding the bridge is noted. If no changes were made to a bridge (generally, if no bridge work has been recorded since 2000), this information is also noted.

Of the 35 bridges remaining under VDOT purview and in the management plan, 26 have undergone some degree of repair or rehabilitation since 2000, and 2 had undergone partial rehabilitation just prior to 2000. Nearly all work was in accordance with the recommendations for each bridge in the 2001 Management Plan. Of the management plan bridges not currently under Section 106 review, 7 are either currently undergoing, or shortly will undergo, evaluation for, or planning for, major rehabilitations.

The 2 management plan bridges noted previously as formerly owned by a railroad, and transferred to VDOT ownership in 2014, are Nelson County Structure No. 6052 and Prince William County Structure No. 6023. The Prince William County structure is currently under Section 106 review.

Three management plan bridges, the ca. 1823 Falling Creek Bridge in Chesterfield County, Allegheny County Structure No. 9008 (formerly No. 6064), and Page County Structure No. 9001 (formerly 1990), have been closed to all public access since the publication of the original (2001) management plan and are preserved as landscape features. Of the 4 management plan bridges currently under Section 106 review, i.e., Charlotte County Structure No. 6902, Culpeper County Structure No. 6906, Loudoun County Structure No. 6051, and Prince William County Structure No. 6023, 3 are currently closed to public access (1 of these has been dismantled for testing and evaluation for repair) and 1 is open for limited vehicular traffic at a 3-ton posting.

For 6 VDOT bridges that were previously considered eligible for the National Register, formal National Register forms were completed and the bridges were placed on the National Register at various times between 2005 and 2014, in the interval between the 2001 Management Plan and the 2017 update. (The National Register forms were undertaken, variously, by VDOT cultural resources personnel, Virginia Department of Historic Resources staff, and local organizations; this work was not a specific part of the 2001 Management Plan.) These structures are Appomattox County Structure No. 1002, Charlotte County Structure No. 6902, Highland County Structure No. 6034, Page County Structure No. 9001 (formerly No. 1990), Loudoun County Structure No. 1025, and Loudoun County Structure No. 6088. One structure, Alleghany County Structure No. 9007 (Humpback Bridge), which was previously listed on the National Register, was designated a National Historic Landmark. Addenda were added to several other existing National Register forms for VDOT bridges. In addition, Bland County Structure No. 9000 (now transferred to Bland County and now on Inactive Status) was placed on the National Register. *[Note: In addition to Bland County Structure No. 9000 being transferred to Bland County, Rockingham County Structure No. 6154, a rare Thatcher truss that was already listed on the National Register, was transferred to the Town of Broadway after rehabilitation.]*

For reference, the following are the 35 current management plan bridges, listed by VDOT district (the VDOT district number appears in parentheses after the name of the district):

Bristol District (1)

- Bland County Structure No. 1021
- Wythe County Structure No. 6016
- Wythe County [No Number] (Southwest Turnpike Company Bridge)

Salem District (2)

- Bedford County Structure No. 6087
- Botetourt County Structure No. 6100
- Botetourt County Structure No. 6386

Lynchburg District (3)

- Appomattox County Structure No. 1002
- Charlotte County Structure No. 6902 (Clarkton bridge) *[Note: This bridge is currently under Section 106 review.]*
- Nelson County Structure No. 6052 (Oak Ridge truss bridge) (this truss was transferred to VDOT by the Norfolk Southern Railway in 2014)
- Nelson County Structure No. 6070

Richmond District (4)

- Brunswick County Structure No. 6104
- Chesterfield County [No Number] (Falling Creek bridge)
- Dinwiddie County Structure No. 1005
- Henrico County Structure No. 1001

Culpeper District (7)

- Culpeper County Structure No. 6906 (Waterloo bridge) [*Note: This bridge is currently under Section 106 review.*]

Staunton District (8)

- Alleghany County Structure No. 9008 (formerly No. 6064)
- Alleghany County Structure No. 9007 (Humpback Bridge)
- Augusta County Structure No. 6027
- Augusta County Structure No. 6113
- Augusta County Structure No. 6147
- Augusta County Structure No. 6149
- 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
- Page County Structure No. 9001 (formerly No. 1990)
- Rockbridge County Structure No. 1012
- Rockbridge County Structure No. 6145
- Shenandoah County Structure No. 6078 (Meems Bottom covered bridge)

Northern Virginia District (9)

- Arlington County Structure No. 5020
- Loudoun County Structure No. 1025
- Loudoun County Structure No. 6051 (Catoctin Creek bridge; Featherbed Lane bridge) [*Note: This bridge is currently under Section 106 review.*]
- Loudoun County Structure No. 6088
- Prince William County Structure No. 6023 (Nokesville bridge) (this truss was transferred to VDOT by the Norfolk Southern Railway in 2014) [*Note: This bridge is currently under Section 106 review.*]

Management Plan Bridges in Section 106 Review

Four of the 35 management plan bridges (including 1 of the bridges transferred from railroad ownership) are currently in Section 106 review and for this reason were not reviewed by

the HSTG for updated recommendations for the current 2017 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, 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 State Historic Preservation Office, 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. Accordingly, in the case of the 4 management plan bridges currently under Section 106 review, the HSTG defers to these individuals and groups who are specifically involved by statute and is not making updated recommendations for these particular bridges during this iteration of the management plan.

Status Changes (post-2001) for Former Management Plan Bridges: Bridges Removed From the Management Plan Because of Demolition or Dismantling

Four of the bridges that have been removed from the management plan because of demolition or dismantling were under VDOT ownership, and one was owned by the City of Danville. Three of these bridges (two under VDOT ownership, and the Danville bridge) have been demolished. Of the two remaining VDOT bridges, one is in the process of demolition and one has been dismantled and stored (pending anticipated transfer of ownership). All of these actions accord with the recommendations in the 2001 plan.

For reference, the following are the bridges removed from the management plan because of demolition or dismantling (the VDOT district number appears in parentheses after the name of the district):

Bristol District (1)

- Grayson County Structure No. 1007 (demolished 2011)

Lynchburg District (3)

- City of Danville Structure No. 8006; owned by the city (demolished 2009-2010)

Staunton District (8)

- (former Augusta County Structure No. 6081) (dismantled and components stored pending anticipated transfer of ownership)
- Augusta County Structure No. 6729 (demolition in process)

- Page County Structure No. 1004 (demolished 2008-2009)

Status Changes (post-2001) for Former Management Plan Bridges: Management Plan Inactive Status

The 15 bridges listed here have been placed on Inactive Status because of limited (or virtually no) VDOT purview as a result of municipal or other ownership. As noted previously, the original (2001) management plan included historic bridges with state structure numbers but limited VDOT purview. The bridges placed on Inactive Status include 2 bridges recently transferred from VDOT to local (county or municipal) ownership.

For reference, the following are the bridges on Inactive Status, listed by VDOT district (the VDOT district number appears in parentheses after the name of the district):

Bristol District (1)

- Bland County Structure No. 9000 (Phoenix truss) (this bridge was transferred to Bland County by VDOT)
- City of Bristol Structure No. 1804 (this bridge is owned by the Norfolk Southern Railway)
- Town of Marion Structure No. 8003 (this bridge is owned by the Town of Marion; however, it should be noted that the town has requested SGR [State of Good Repair] funds from VDOT; the district structure and bridge engineer is aware of historic materials / preservation issues that should be considered relative to repair/rehabilitation of this structure)

Salem District (2)

- City of Bedford Structure No. 1800 (this bridge is owned by the Norfolk Southern Railway; it is inspected by the city)
- City of Roanoke Structure No. 1815 (this bridge is owned by the city)
- City of Roanoke Structure No. 1826 (this bridge is owned by the city)
- City of Roanoke Structure No. 8003 (this bridge is owned by the city)

Lynchburg District (3)

- City of Danville Structure No. 1811 (this bridge is owned by the city)
- City of Lynchburg Structure No. 1849 (this bridge is owned by the city)
- City of Lynchburg Structure No. 8044 (this bridge is owned by the city)

Richmond District (4)

- City of Petersburg Structure No. 8081 (this bridge is owned by the city)
- City of Richmond Structure Nos. 1849 and 1857 (these bridges are owned by the city)

Staunton District (8)

- Rockingham County Structure No. 6154 (Thacher truss) (this bridge has been transferred to the Town of Broadway by VDOT)
- City of Covington Structure No. 8002 (Hawthorne St. Phoenix bridge) (this bridge has been transferred to the City of Covington by the CSX Railroad)

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:

- General funding issues
- General issues regarding metal and metal truss bridges (including potential life span)
- Eyebars deterioration
- Coatings issues for metal truss bridges: painting, metallizing, and galvanizing
- Dismantling of pin-connected truss bridges for painting or rehabilitation
- Threats to bridges posed by modern vehicles
- Truss bridge capacity and overloading potential
- Reduction or elimination of vehicular traffic on certain historic bridges and identification of potential adaptive use
- Potential special consideration for inspection recommendations for historic bridges in Virginia
- Miscellaneous masonry issues
- 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 that often require the use of specialized methods and materials. In addition, previously available transportation enhancement funds (formerly ISTEA, TEA-21, and now known as transportation alternatives funds) are no longer available to DOTs. The HSTG endorses the idea of an investigation to identify 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 Life Span)

A significant issue that was noted during this study is the accelerated deterioration of many of the older metal truss bridges in the management plan. Bridges that were in relatively good or fair condition at the time of the original (2001) management plan have shown marked, and in some cases rapid, deterioration in the last 15 years. This is especially apparent with regard to wrought iron bridges, although it has been noted on older steel bridges as well. Of the six wrought iron through truss bridges currently in the management plan, all have exhibited a marked increase in deterioration since the publication of the original (2001) management plan.

The metal truss bridges included in the 2017 update of the management plan are constructed of either wrought iron or steel members. In general, metal truss bridges built pre-1890 can be assumed to be constructed of wrought iron. Metal truss bridges built post-1890 are likely to be constructed of steel. However, metal truss bridges built ca. 1890, and possibly into the mid-1890s, may contain both metals (wrought iron and 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, will 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 only ca. 1890 to the present. Virginia does not have metal truss bridge structures that are more than approximately 140 years old for wrought iron or more than approximately 125 years old for steel. Given the accelerated deterioration of many of these bridges in the period between the original (2001) management plan and the 2017 update, it appears likely that some of these structures may be approaching the end of their material life, at least as regards carrying modern traffic. The general stresses of aging metal, metal fatigue (from well over a century of traffic use), finite material life, and overweight loads are likely all factors in this deterioration, which in some cases has continued to occur despite repairs, painting, and other mitigation 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:

1. *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).
2. *Laminated die forged eyebars*. These eyebars were originally fabricated by piling and welding (i.e., putting several thicknesses of metal together and then heating and forging them together in a die). 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 eyebars were found on the Goshen bridge (Rockbridge County Structure No. 6145), a management plan bridge, when it was rehabilitated in 2001-2002 and were replaced (McKeel et al., 2006).

Delamination issues have been observed with wrought iron die forged eyebars on the Nokesville bridge (Prince William County Structure No. 6023), a management plan bridge. Another management plan bridge, the Oak Ridge bridge (Nelson County Structure No. 6052), which was constructed in the same year, is also made of wrought iron and had the same manufacturer (Keystone Bridge Company); this bridge should be examined for similar issues.

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 coating applications: painting, metallizing, and galvanizing.

Painting

As regards metal truss bridges, both wrought iron and steel truss bridges can be painted with non-lead-based paints. Wrought iron also sometimes will form a protective patina; this was a factor with at least one VDOT wrought iron historic bridge, Botetourt County Structure No. 6386, although the patina is not as stable as it was in 2001 and the wrought iron is now showing areas of deterioration.

Metallizing and Galvanizing

It cannot be emphasized too strongly that wrought iron is not compatible with metallizing or galvanizing, and no wrought iron bridge should be given these treatments. However, metallizing or galvanizing is generally feasible for steel as long as the metal is properly prepared and the coating 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; in some cases, such as the delaminating eyebars, the deteriorated elements were replaced with appropriate new elements. The lead paint was 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 as being in “good” condition.

In contrast, the coating applied through metallizing to the National Register–listed Loudoun County Structure No. 6051, the ca. 1889 Catoctin Creek truss bridge (also known as the Featherbed Lane bridge and the John G. Lewis Memorial bridge), yielded 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 metallizing. The structure was not disassembled. At the time that the project was planned, the construction date was uncertain: dates of ca. 1900 and 1925 had been reported for the bridge, which 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 was being replaced by steel in bridges. 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 for this bridge.

As part of the Section 106 review for Loudoun County Structure No. 6051, the Northern Virginia District Structure and Bridge Engineer Gary A. Runco presented a useful overview of the issues regarding metallizing 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 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.

A query to all nine VDOT district structure and bridge offices revealed that no VDOT bridges other than Rockbridge County Structure No. 6145 and Loudoun County Structure No. 6051 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 holding up well.

Dismantling Pin-Connected Truss Bridges for Painting or Rehabilitation

Comparative results of rehabilitation projects that have been done without the truss bridge being taken apart versus the truss bridge being at least partially dismantled have been instructive. In several VDOT projects, the Staunton District Structure and Bridge Office has 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.

The rehabilitation of the Goshen truss (Rockbridge County Structure No. 6145), which involved taking the bridge apart and then repairing, galvanizing, and reassembling the truss, was an involved and expensive project (McKeel et al., 2006). However, the result was an historic truss that a decade and a half after its rehabilitation remains in good condition and is serviceable for the lightly traveled road that it carries. A procedure used during the Goshen truss 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 truss 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 lighter than modern loads. Many early truss bridges, for example, were originally designed or load tested to capacities in the range of 5 to 9 tons. Records indicate that early load testing was generally done either (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, agricultural machinery, and construction equipment, are increasing in size and weight. This is especially true of vital emergency vehicles such as fire and rescue vehicles: a single modern ambulance or a smaller fire truck can easily exceed 9 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 the driver of a concrete truck weighing 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).

Reduction or Elimination of Vehicular Traffic on Certain Historic Bridges and Identification of Potential Adaptive Use

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. Therefore, particularly in the cases of the more fragile and deteriorating metal truss bridges, it appears likely that the removal of vehicular traffic from these structures, in addition to regular inspection, maintenance, and more extensive rehabilitation work where warranted, will substantially increase the likelihood that these historic structures will survive into future decades.

Over-height and over-weight 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).

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 will be 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. Although other types of historic bridges can also benefit from the reduction or elimination of vehicular traffic, VDOT's historic truss bridges have the most pressing need for such action at present. Pedestrian use, bicycle use, or the moving of the structure to a park or trail environment is the most probable adaptive use for many of these truss bridges at present.

Potential Special Consideration for Inspection Recommendations for Historic Bridges in Virginia

A number of management plan bridges that reflect early construction standards and practices are recommended for replacement in inspection reports. The HSTG strongly supports a directive, to be used for historic bridges, that no recommendation for replacement should be made in an inspection report. Consideration of replacement for a bridge, particularly an historic bridge, should be made by the district structure and bridge engineer, after careful study and consideration of the options for the bridge.

Miscellaneous Masonry Issues

A number of management plan bridges have issues with stone masonry. The use of stone masonry in VDOT's historic bridges ranges through the following:

- simple stone veneer (on Rockbridge County Structure No. 1012, built in 1940)
- stone piers and abutments on early (generally pre-ca. 1910) metal truss bridges and covered bridges
- impressive 19th century stone masonry arch structures such as Augusta County Structure No. 6997 (the Valley Railroad bridge), Nelson County Structure No. 6070 (a former James River and Kanawha Canal viaduct), and Loudoun County Structure No. 1025 (the Little River Turnpike bridge).

Several issues related to stone masonry were identified in the course of this study.

Masonry Stabilization

- Two effective common and time-tested methods 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 were 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 and were instrumental in minimizing damage to Virginia's only National Historic Landmark bridge in the record flooding of June 2016.

- Also effective is a proprietary process (grouted anchors), which consists of the insertion of mesh bags into a deteriorating stone masonry bridge by drilling followed by the pumping of grout into the bags. This expands the mesh bags to stabilize the bridge and restore it to functionality. The small stone cylinders removed in the drilling are then replaced in the drill holes. This process was used in 2001 on Loudoun County Structure No. 1025 (the Little River Turnpike bridge) and has worked well.
- The stone arch Hibbs [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, and then rebuilding the stonework.

Compatible Mortar

Ensuring compatible mortar for repointing, stonework repair, and construction pointing is important. In particular, for older structures a “soft” mortar with a substantial lime content (typically used before the early 20th century) is 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.

Historic Masonry Study

The HSTG endorses the idea of a study to establish procedures and best practices for masonry repairs and identification of historically compatible mortar specifications in order to facilitate the repair and/or rehabilitation of historic masonry structures, which often require specialized methods.

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

An issue that will require further monitoring and discussion in the future is the effect the replacement of a large percentage of elements or materials has on the bridge’s historic significance. Extensive replacement of materials can negatively affect a structure’s historic status. When deterioration necessitates that a large amount of the structure be replaced (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 will become more of a factor of concern as more rehabilitation work is done on historic bridges (particularly metal truss bridges) with extensive deterioration.

CONCLUSIONS

Based on the information gathered during this study, the current status of and changes made to the 35 bridges in the current management plan and listed in the 2001 management plan

(Miller et al., 2001), as well as general observations made in the course of this study, are as follows.

- Of the 55 bridges in the 2001 Management Plan, 35 bridges are currently on Active Status. These 35 bridges represent the extant historic structures now under VDOT purview. Of the original 55 bridges in the 2001 Management Plan, 5 have been demolished or dismantled (in accord with the recommended treatment in the 2001 plan) and 15 have been placed on Inactive Status because of little or no VDOT purview.
- The HSTG's original (2001) and updated (2017) management recommendations for each historic bridge in the current management plan, in addition to background information on each structure, are included in this report as Appendix B.
- Of the 35 bridges remaining under VDOT purview and in the current management plan, 26 have undergone some degree of repair or rehabilitation since 2000 and 2 had undergone partial rehabilitation just prior to 2000. Seven are either currently undergoing or shortly will undergo evaluation or planning for major rehabilitations. Three management plan bridges have been closed to public access (preserved as landscape features) since 2000. Four management plan bridges are currently (2017) under Section 106 review.
- Results have generally been good for the majority of the management plan bridges: the structures that have received repairs or rehabilitations are for the most part stable. For some bridges, the condition rating has improved.
- For 6 VDOT bridges that were previously considered eligible for the National Register, formal National Register forms have been completed and the bridges placed on the National Register. Addenda were made to several other existing National Register forms for VDOT bridges. An additional former VDOT bridge (now transferred to a municipality) also was placed on the National Register.
- In accordance with Stipulation III of the 2016 interagency programmatic agreement ("Programmatic Agreement," 2016), the HSTG reaffirmed the earlier recommendations of National Register eligibility for all management plan bridges that were not already listed on the National Register. VDOT ratified this finding through a new interagency eligibility agreement with the Virginia State Historic Preservation Office dated September 20, 2017 ("Memorandum of Agreement," 2017).
- Wrought iron truss bridges, and a number of the early steel bridges, have exhibited noticeable deterioration in the approximately 15 years since the publication of the original (2001) management plan.
- Metal truss bridges built pre-1890 should be assumed to be constructed of wrought iron. Metal truss bridges built post-1890 should be assumed to be constructed of

steel. However, it should be noted that metal truss bridges built ca. 1890 (and possibly into the mid-1890s) may contain both wrought iron and steel elements.

- 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.
- 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.

RECOMMENDATIONS

1. *VTRC and the HSTG, as required by Stipulation III of the 2016 interagency programmatic agreement (“Programmatic Agreement,” 2016, should review and update the Management Plan for Historic Bridges in Virginia every 5 years. Each update should (1) note any rehabilitations, major repairs, or changes to the structure made since the last update; (2) note the current condition and needs as provided in the bridge inspection reports; and (3) recommend any necessary changes to the management plan.*
2. *VDOT’s Structure and Bridge Division should eliminate the option for inspectors to recommend bridge replacement for historic bridges in an inspection report. Consideration of replacement should be made by the district structure and bridge engineer after careful study and consideration of the options for the bridge.*
3. *VTRC and VDOT’s Structure and Bridge Division should collaborate on the investigation of funding needs for historic bridge management and maintenance. Projected funding needs should be reviewed and determined based on (1) a review of the historic bridge inventory and (2) estimates of current and projected needs from district structure and bridge offices.*
4. *VTRC, VDOT’s Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT’s Environmental Division should collaborate to identify historic bridges that are candidates for adaptive use, including bicycle and pedestrian use. If a candidate structure is identified, this should be discussed with VDOT’s Transportation and Mobility Planning Division.*
5. *VTRC, VDOT’s Structure and Bridge Division, the appropriate district structure and bridge offices, and VDOT’s Environmental Division should collaborate to identify potential avenues to establish best practices for repair of historic masonry structures or masonry components.*

This would include identifying specifications for soft mortar mixtures to ensure compatibility with original mortars and avoid damage to historic stone masonry. Repair and/or rehabilitation of historic masonry structures requires appropriate and specialized methods.

BENEFITS AND IMPLEMENTATION

Benefits

The information collected during this study was used to produce the 2017 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. Thus, the completion of the 2017 update of the management plan provides initial fulfillment of the relevant section of Stipulation III of the 2016 agreement and assures VDOT’s regulatory compliance.

Aside from the regulatory requirement, there are a number of general benefits that have been and will be derived from the original and updated Management Plan for Historic Bridges in Virginia. 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, enables VDOT routinely to avoid or minimize project delays, because the information is already in hand.

In addition, the stringent standards supported by VTRC, VDOT, and the HSTG regarding recommendations for historic significance of bridges in Virginia have resulted in a relatively small group (compared to some other states) of historic bridges. This is particularly true for bridges under VDOT ownership, as seen in the management plan. This has translated into Virginia having several dozen historic bridges to maintain and fund, rather than the hundreds of historic bridges seen in some other states. This has allowed VDOT to make good progress on 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 March 2017 on all of the management plan bridges currently under VDOT purview. This material (both on individual bridges and for comparative purposes) is thus 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 with regard to these historic bridges.

As regards specific benefits of implementing the recommendations of this study:

The benefits of implementing Recommendation 1 are compliance with the requirements in Stipulation III of the 2016 interagency programmatic agreement and the facilitation of continuity and long-term tracking of the data on these historic structures given in the original version and updates of the management plan.

The benefit of implementing Recommendation 2 is assurance that consideration of replacement is made by the district structure and bridge engineer, who has extensive familiarity with the bridge and has had the opportunity for due consideration of the options for the bridge.

The benefit of implementing Recommendation 3 is the proactive identification of projected funding needs for maintenance and management of historic bridges, in order to permit effective long-term planning and budgeting for the preservation of these structures.

The benefit of implementing Recommendation 4 is the identification of historic bridges that have the potential for adaptive use, including bicycle and pedestrian use. This will 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 traffic on these bridges will both extend the life of the bridges and still make them available for public use.

The benefit of implementing Recommendation 5 is the identification of 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.

Implementation

Recommendation 1, regarding periodic updates to the Management Plan for Historic Bridges in Virginia, will be implemented by VTRC and the HSTG every 5 years, in compliance with Stipulation III of the 2016 interagency programmatic agreement. The next update will begin no later than the second quarter of FY22.

Recommendation 2, regarding eliminating the option for inspectors to recommend bridge replacement for historic bridges in an inspection report, is in the process of being implemented by VDOT's Structure and Bridge Division. It is anticipated that implementation will be complete by the end of FY18.

Recommendation 3, regarding investigation of funding needs for historic bridge management and maintenance, will be implemented by VDOT's Structure and Bridge Division in collaboration with VTRC. The first meeting will be held in the second quarter of FY18.

Recommendation 4, regarding identification of historic bridges that are candidates for adaptive use, will be implemented by VDOT's Structure and Bridge Division in collaboration with VTRC. Identification of these structures is part of a VTRC study that will be initiated in FY18. A list of candidate structures will be identified by the end of FY19.

Recommendation 5, regarding identification of potential avenues to establish best practices for repair of historic masonry structures or masonry components, will be implemented by VDOT's Structure and Bridge Division in collaboration with VTRC, the appropriate district

structure and bridge offices, and VDOT's Environmental Division. Identification of these best practices is the subject of a VTRC study that will be initiated in FY18. Action steps to implement this recommendation will be discussed no later than the end of FY19.

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The updated information and discussions regarding the management plan bridges were provided by the staff of those VDOT district structure and bridge offices with historic bridges under their purview: Gary T. Lester (Bristol District); Teresa A. Gothard and Braden C. Chapman (Culpeper District); Frank J. Lukanich III and Pettis J. Bond (Lynchburg District); Gary A. Runco, Nicholas J. Roper, and Vicente Valeza, Jr. (Northern Virginia District); Jeffrey C. Hill, Gary A. Martin, and Thomas F. Lester (Richmond District); Dean W. Hackett (Salem District); and Rex L. Pearce, Park W. Thompson, Marc K. Stecker, and Robert W. Saufley, Jr. (Staunton District). Without their cooperation, knowledge, and assistance, the collection of this information would have been much more time-consuming and difficult. The members of the interdisciplinary HSTG provided their usual valuable input and assistance with this study and the updated recommendations for the management plan bridges. At VTRC, Zachary W. Barlow, formerly of the VDOT Engineering Scholar Program, and research intern Raleigh A. Matteo provided important field assistance and data support. Appreciation is also given to the study's technical review panel, G. Michael Fitch, Bernard L. Kassner, and Amy A. O'Leary of VTRC and Adam D. Matteo of VDOT's Structure and Bridge Division, and to State Structure and Bridge Engineer Kendal R. Walus for their detailed review and comments.

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APPENDIX A

NATIONAL REGISTER-ELIGIBLE BRIDGES IN THE 2001 MANAGEMENT PLAN INCLUDED IN AND OMITTED FROM THE 2017 UPDATE

The following categories of bridges are listed in this appendix:

1. Bridges Included in the Current Management Plan
2. Bridges Under VDOT Purview But Not Reviewed in the Current Management Plan Because of Current Section 106 Review
3. Bridges Included in the Original Management Plan and Subsequently Dismantled or Demolished (Removed from the Management Plan)
4. Bridges Included in the Original Management Plan But Now on Inactive Status (Because of Non-VDOT Ownership)

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, Rt. 98 crossing Crab Orchard Creek.

Wythe County (98)

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

Wythe County N/A (Southwest Turnpike Company Bridge): (Masonry arch bridge); 1850, off Rt. 11, crossing Reed Creek. *[Note: This bridge accesses a 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 *[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.]*, Rt. 666 crossing Elk Creek.

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), Rt. 817 crossing Craig Creek.

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

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; Rt. 24 crossing the Appomattox River.

Nelson County (62)

Nelson County No. 6052: (Metal truss bridge); Pratt through truss, 1882, Rt. 653 crossing the Norfolk Southern Railway. It has been transferred to VDOT by the Norfolk Southern Railway.

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

Richmond District (4)

Brunswick County (12)

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

Chesterfield County (20)

Chesterfield County [NO NUMBER] (Falling Creek Bridge): (Masonry arch bridge); ca. 1823, at Falling Creek Wayside, off Rt. 1, crossing Falling Creek. *[Note: 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).

Dinwiddie County (26)

Dinwiddie County No. 1005: (Concrete arch bridge); Concrete through arch, 1926, Rt. 1 crossing Stony Creek. *[Note: Significant damage from a vehicle impact on October 2, 2013, has been repaired.]*

Henrico County (43)

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

Staunton District (8)

Alleghany County (3)

Alleghany County No. 9008 (formerly No. 6064): (Metal truss bridge); Pratt through truss, 1896, Rt. 633 crossing Cowpasture River. *[Note: A new bridge was constructed to replace the existing bridge, bypassing the original bridge, in 2013; the original bridge then was renumbered (from No. 6064 to No. 9008.)]* This bridge is now a landscape feature, closed to all traffic / public access. (NOT UNDER TRAFFIC).

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. *[Note: This is now a pedestrian bridge, in the wayside off Rt. 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 affected 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. 6027: (Metal truss bridge); Pratt pony truss, 1898, Rt. 907 crossing Christian's Creek.

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

Augusta County No. 6147: (Metal truss bridge); Pratt through truss, 1909, Rt. 775 crossing Middle River.

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

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

Augusta County No. 6553: (Non-arched concrete bridge); Deck girder, 1925, Rt. 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. *[Note: 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, Rt. 672 crossing Opequon Creek.

Highland County (45)

Highland County No. 6034: (Metal truss bridge); Lane Patent pony truss, 1896, Rt. 645 crossing Crab Run. *[Note: 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, Rt. 340 crossing Overall Creek. *[Note: 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, Rt. 39 crossing Laurel Run.

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

Shenandoah County (85)

Shenandoah County No. 6078: (Covered wooden bridge); Burr arch truss, 1894, Rt. 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 Ave. crossing Rt. 110, adjoining Arlington National Cemetery.

Loudoun County (53)

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

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

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

Lynchburg District (3)

Charlotte County (19)

Charlotte County No. 6902: (Metal truss bridge); Camelback through truss, 1901, Rt. 620 crossing Staunton River.

Culpeper District (7)

Culpeper County (23)

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

Northern Virginia District (9)

Loudoun County (53)

Loudoun County No. 6051: (Metal truss bridge); Pratt through truss, date uncertain (probably ca. 1889), Rt. 673 crossing N. Fork Catoctin Creek.

Prince William County (76)

Prince William County No. 6023: (Metal truss bridge); Pratt through truss, 1882, Rt. 646 crossing the Norfolk Southern Railway. It has been transferred to VDOT by the Norfolk Southern Railway.

**BRIDGES INCLUDED IN THE ORIGINAL MANAGEMENT PLAN
AND SUBSEQUENTLY DISMANTLED OR DEMOLISHED (REMOVED FROM
THE MANAGEMENT PLAN)**

Bristol District (1)

Grayson County (38)

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

Lynchburg District (3)

City of Danville (108)

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

Staunton District (8)

Augusta County (7)

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

Augusta County No. 6729: (Metal truss bridge); Pratt through truss, 1907, Rt. 769 crossing Middle River. It is in the process of demolition.

Page County (69)

Page County No. 1004: (Metal truss bridge); Pratt deck arch truss, 1936, Rt. 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 IN THE ORIGINAL MANAGEMENT PLAN BUT NOW
ON INACTIVE STATUS (BECAUSE OF NON-VDOT OWNERSHIP)**

Bristol District (1)

Bland County (10)

Bland County No. 9000: (Metal truss bridge); Pratt through truss (with Phoenix columns), ca. 1890, located on discontinued Rt. 61 crossing Wolf Creek. *[Note: This is now a pedestrian*

bridge. Since the original management plan, it has been transferred to, and is 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 St. 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, E. Chilhowie St. 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, Rt. 116 crossing 3rd St. and the 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, Rt. 11 crossing Roanoke River and the 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 St. crossing the 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, Rt. 43 crossing the Norfolk Southern Railway. It is owned by the 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, Rt. 29 / Main St. 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, 1908, Bedford Ave. crossing the Norfolk Southern Railway. It is owned by the city.

City of Lynchburg No. 8044: (Masonry arch bridge); 1839, 9th St. 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 Rd. and the CSX Railroad crossing Defense Rd. 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, Rt. 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, Rt. 1421 crossing Linville Creek. *[Note: 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 of Broadway.]*

City of Covington (107)

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

APPENDIX B

MANAGEMENT RECOMMENDATIONS FOR VIRGINIA'S HISTORIC BRIDGES UNDER VDOT'S PURVIEW (INCLUDING THE SECTION FROM THE 2001 PLAN AND THE 2017 UPDATE FOR EACH BRIDGE)

Introduction

This appendix provides the original (2001) management plan section for each bridge, including the recommendations, along with the 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 a section providing the 2017 updated information and updated recommendations for that bridge.

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 posted limits, if any, on the weight of vehicles crossing the bridge.

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 a 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 sections for the 2017 update:

Evaluation Update: This gives an updated overview of National Register recommendations and determinations 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.

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

[Note: As noted previously, the 2001 sections and recommendations for each bridge appear first followed by the 2017 updated material for that bridge.]

Bridges are listed by type, in the following order:

- Non-Arched Concrete Bridges
- Metal Truss Bridges
- Masonry Arch / Concrete Arch Bridges
- Covered Bridges
- Management Plan Bridges 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

Description: Appomattox County Structure No. 1002 is a single-span T-beam structure [104], built in 1930 with a 1971 widening, carrying Rt. 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 Rt. 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 with decorative cast concrete rails, 1930 with 1971 widening, Rt. 24 crossing Appomattox River (Figure B1).

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.

Current 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.

Current 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 to 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 Rt. 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, Rt. 1 crossing Upham Brook (Figure B2).

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 a latex overlay).
- The parallel bridge is in poor condition; when it 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.



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 Rt. 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, Rt. 722 crossing Whiskey Creek (Figures B3 and B4).

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 and 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.



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 Rt. 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 Rt. 11) in 1925, seven years after the Valley Pike was acquired by the Commonwealth. Therefore, fee simple ownership is presumed. Rt. 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, Rt. 1205 crossing South River (Figure B5).

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.



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 Rt. 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 Ave. crossing Rt. 110, adjoining Arlington National Cemetery (Figure B6).

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 for this bridge (i.e., through proper drainage and a membrane or other methods). It is uncertain at this time if these issues 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.



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 Rt. 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, Rt. 619 crossing Cripple Creek (Figures B7 and B8).

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 floor beams needs to be addressed.

Current 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.



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 Rt. 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.*], Rt. 666 crossing Elk Creek (Figure B9).

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 rehabilitation recommendations (Bedford County Structure No. 6087 is in a pool with approx. 30 other bridges).
- If necessary, the district structure and bridge office reports that it “will do everything we can” to use 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.



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 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 Rt. 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 Rt. 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), Rt. 817 crossing Craig Creek (Figure B10).

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 2001 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.



Figure B10. Botetourt County Structure No. 6100

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 Rt. 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 Rt. 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, Rt. 685 crossing Craig Creek (Figures B11 and B12).

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 the rehabilitation project 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.



Figure B11. Botetourt County Structure No. 6386



Figure B12. Botetourt County Structure No. 6386: Showing Details of Phoenix Columns and of Iron Decorative Elements

METAL TRUSS

Lynchburg District (3)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Nelson County (62)

VDOT Structure No. 6052

VDHR Inventory No. 062-0085

Name: Oak Ridge Railroad Overpass

Location: Route 653, crossing Norfolk Southern Railway

National Register Status: Listed

Description: Nelson County Structure No. 6052 is a single-span Pratt through truss with a steel beam approach span, built in 1882 by the Keystone Bridge Company, carrying Rt. 653 crossing the Norfolk Southern Railway. This structure was apparently moved to its present site in the early 20th century. The bridge is approximately 138 feet long overall, with the truss span being approximately 100 feet long. This bridge is significant as an example of a late 19th century metal Pratt through truss.

Evaluation: Nelson County Structure No. 6052 was listed on the Virginia Landmarks Register in 1977 and the National Register of Historic Places in 1978.

Documentation: Nelson County Structure No. 6052 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-107).

Condition: The current inspection report indicates that this structure is in poor condition. The majority of its timbers are decayed. The roller bearings are frozen and non-functioning. Rivets are missing. There is spalled concrete with severely rusted steel and cracks in the concrete piers. Additionally, the breast walls are delaminated and the truss members are moderately corroded. The structure needs painting (painting has been recommended in every inspection report since 1974).

Posted Restrictions: The structure is posted at 12 tons.

ADT: 56.

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 Norfolk Southern Railway owns and maintains this structure, and VDOT inspects this structure and makes recommendations for repairs, 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. The recommended management option for this structure is to repair and maintain for vehicular use, with subsequent preventive maintenance. However, it should be noted that the task group and VDOT have no procedural control over this structure.

2017 UPDATE FOR:

Nelson County Structure No. 6052: (Metal truss bridge); Pratt through truss, 1882, Rt. 653 crossing the Norfolk Southern Railway (Figure B13).

Repairs and Maintenance Undertaken Post-2001:

- In 2000, posting signs were installed at both ends of the bridge. In 2002 and 2003, crews cut vegetation from around the ends of the structure. In 2007, the bridge underwent a series of modifications and repairs. The railing was tightened, and several timber floor members were replaced. In addition, new object markers and weight limit and advanced warning signs were erected. In 2008, one-lane bridge signs were erected on both approaches.
- This work was in accordance with the Recommended Treatment in the 2001 Management Plan.
- The ownership of this bridge was transferred to VDOT by the Norfolk Southern Railway in 2014.
- Deck timbers were repaired in 2015.

Current Inspection, Condition and Maintenance Information:

- The rating is 4-4-4.
- This rating places the bridge on the SGR [State of Good Repair] list.
- ADT: The current ADT is 60 [the ADT in the 2001 report was 56].
- The current ADT is low (60), although this may increase during special events at the adjacent Oak Ridge estate. The possibility of overweight vehicles trying to use this bridge is a concern.
- The structure is posted at 12 tons.
- Deterioration and problematic construction methods (i.e., piled eyebars, which are delaminating) were found during recent work on the similar Nokesville bridge in Prince William County. The Oak Ridge truss is the same age (built 1882) is also a wrought iron through-Pratt truss bridge, appears to be of similar construction, and was built by the same company (Keystone Bridge Company). It thus may have many of the same issues.
- The district structure and bridge office is engaged in an assessment of this bridge.

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 assessment of this structure.



Figure B13. Nelson County Structure No. 6052

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 Rt. 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, Rt. 715 crossing Meherrin River (Figure B14).

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.



Figure B14. Brunswick County Structure No. 6104

METAL TRUSS

Staunton District (8)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Alleghany County (3)

VDOT Structure No. 6064 [Note: Subsequently renumbered as 9008]

VDHR Inventory No. 003-0020

Name: McKinney's Hollow Bridge

Location: Route 633, crossing Cowpasture River

National Register Status: Eligible

Description: Alleghany County Structure No. 6064 is a three-span Pratt through truss, carrying Rt. 633 crossing Cowpasture River, built in 1896 by the Nelson and Buchanan Company. The structure is approximately 318 feet long overall; each truss is approximately 104 feet long. It retains its original masonry piers. The structure is significant as an example of an early multi-span metal through truss.

Evaluation: Alleghany County Structure No. 6064 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: Alleghany County Structure No. 6064 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-104)

Condition: The current inspection report indicates that this structure is in poor condition. The roller bearing devices are clogged and frozen, and there is section loss of steel in the stringers. In addition, there is mortar and rock missing at the abutments and piers. No scour problems are evident. Additionally, there is spalling on the bridge seat with overall heavy vegetation. Although the structure is posted at 9 tons, local residents report that logging trucks and other overweight vehicles use the bridge.

Posted Restrictions: The structure is posted at 9 tons.

ADT: 839.

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 the structure's large size and remote location, discontinuing or abandoning this structure is not recommended, and adaptive use or transferring ownership on or off-site is not considered feasible by the task group. Adaptive use would be difficult: because of the single-lane width of the bridge, it is not suitable for mixed vehicular and bicycle use and there does not appear to be demand for hiking trails at that crossing. The Staunton District Structure and Bridge Office is working on an upgrading/reinforcing/rehabilitation plan for this bridge. High current use creates a problem, and the bridge is a shortcut for heavy loads. Upgrading/reinforcing/rehabilitation would extend the life of the bridge; one possibility would be to take out the floor beams and stringers and replace with a load-carrying structure that would be hidden within the truss. Recommended management options for this structure, in order of preference, are:

1. Document and demolish.
2. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed.
3. An upgrade through an auxiliary structure is feasible and could be considered as a third option. The width of the bridge limits the amount of possible upgrade; such an upgrade would not be to DOT standards and would not solve the width problem.

2017 UPDATE FOR:

Alleghany County Structure No. 9008 (formerly No. 6064): (Metal truss bridge); Pratt through truss, 1896, Rt. 633 crossing Cowpasture River. *[Note: A new bridge was constructed to replace the existing bridge, bypassing the original bridge, in 2013; the original bridge then was renumbered from No. 6064 to No. 9008 (Figure B15).]*

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 2011, a hole in the approach pavement was patched by a maintenance crew. A replacement structure (assigned No. 6064) was completed in the first part of 2013. As part of the cultural resources review relative to the replacement project, in an August 20, 2009, agreement between VDOT and VDHR, VDOT agreed that the old bridge would be retained in place. The bridge was to be closed to traffic and inspected every 2 years, with any scour and debris buildup issues addressed.
- The old bridge was renumbered as Alleghany County Structure No. 9008, and there is no public access allowed onto the structure. This treatment essentially preserves the bridge as a landscape feature.
- Because of the size of the structure, adaptive use was not considered a feasible option by the task group in the 2001 Management Plan.

Current Inspection, Condition and Maintenance Information:

- The rating is 5-3-5. The structure is being inspected every 12 months because of the rating (i.e., 3) of the superstructure. (This superstructure rating has been unchanged since the 2006 inspection report.)
- As a result of the agreement for the construction of the new bridge, the old bridge is now a landscape feature, closed to vehicular traffic (with Jersey barriers). Scour and debris issues are being monitored, per the 2009 agreement.
- There is an extensive amount of cabling, section loss, encroachment of vegetation, etc., on this bridge. It is anticipated that there will be issues with the structure's condition in the future.

Current Historic Structures Task Group Observations and Recommendations: The current inspection report indicates that this structure is in poor condition. Currently, the 2009 agreement is being followed. The task group defers further recommendations at this time.



Figure B15. Alleghany County Structure No. 9008 (formerly No. 6064)

METAL TRUSS

Staunton District (8)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Augusta County (7)

VDOT Structure No. 6027

VDHR Inventory No. 007-0237

Name: Kerr's Crossing Bridge

Location: Route 907, crossing Christian's Creek

National Register Status: Eligible

Description: Augusta County Structure No. 6027 is a single-span pin-connected Pratt pony truss carrying Rt. 907 crossing Christian's Creek. The bridge is approximately 81 feet long. This structure was built in 1898 by the Brackett Bridge Company. It is significant as an example of a late 19th century metal pony truss.

Evaluation: Augusta County Structure No. 6027 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. 6027 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-101).

Condition: The current inspection report indicates that this structure is in fair condition. There is section loss and pitting to the steel. The wearing surface is rough, and several deck planks are loose and deteriorating. Longitudinal timbers placed to restrain exterior channels are deteriorating throughout with sections missing. The bridge is heavily rusted and needs to be cleaned and repainted.

Posted Restrictions: The structure is posted at 5 tons.

ADT: 56.

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 truss bridge, an upgrade to DOT standards is not feasible. Discontinuance and abandonment are not recommended by the task group. Beyond these factors, however, the small size, location, and condition of this bridge

permit a number of management options. This structure is located on a loop road, which can easily be closed off or bypassed if non-vehicular or other adaptive use is desired. Recommended management options for this structure, in order of preference, are:

1. Repair and maintain for vehicular use, with subsequent preventive maintenance as needed. Condition issues and repair requirements for this structure are not pressing; priority will be given to the more urgent rehabilitation needs of Augusta County Structure No. 6147 and No. 6149 (q. v.). Eventual repair recommendations are to replace deteriorated decking and other timbers and to repaint the structure.
2. Repair and maintain for adaptive use and transfer ownership on-site if a suitable recipient can be identified.
3. Transfer ownership off-site. The small size of this pony truss makes this and the following three options feasible.
4. Document and salvage for adaptive use off-site.
5. Document and retain for DOT use off-site.
6. Document and demolish (recommended only if the bridge can no longer carry traffic and other options are exhausted).

2017 UPDATE FOR:

Augusta County Structure No. 6027: (Metal truss bridge); Pratt pony truss, 1898, Rt. 907 crossing Christian's Creek (Figure B16).

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. In an effort to limit stress on the bridge's members, the bridge was not taken apart but rather was painted in place.
- Some repairs were made in 2006. In 2012, the vertical member (U2L2) upstream was replaced and vegetation around both abutments was removed.
- This work was in accordance with Recommendation 1 in the 2001 Management Plan.

Current Inspection, Condition and Maintenance Information:

- The rating is 7-4-4.
- ADT: The current ADT is 79 [the ADT in the 2001 report was 56].
- The structure is posted at 5 tons.
- The bridge is on a lightly traveled loop road.
- The district structure and bridge engineer is monitoring this bridge. If it becomes necessary to close this structure, it may be a candidate for a wayside or other preservation in place. Detours are minimal.

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 reiterates the

recommendations of (continued) repair and maintain for vehicular use, with subsequent preventive maintenance as needed (Recommendation 1), in the 2001 Management Plan, with Recommendation 2 (repair and maintain for adaptive use and transfer ownership on-site if a suitable recipient can be identified) as a possible second option.



Figure B16. Augusta County Structure No. 6027

METAL TRUSS

Staunton District (8)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Augusta County (7)

VDOT Structure No. 6147

VDHR Inventory No. 007-1077

Name: Carpenter's Ford Bridge

Location: Route 775, crossing Middle River

National Register Status: Eligible

Description: Augusta County Structure No. 6147 is a single-span pin-connected Pratt through truss carrying Rt. 775 crossing Middle River. The structure is approximately 142 feet long. The structure was built in 1903-1904 by the Brackett Bridge Company. This bridge is significant as an example of an early 20th century metal Pratt through truss.

Evaluation: Augusta County Structure No. 6147 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. 6147 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-99).

Condition: The current inspection report indicates that this structure is in fair-to-poor condition. In general, the substructure exhibits cracking, spalling, and deterioration. Additionally, the stringers are rusty with steel pitting over the seats. There is some section loss. The bridge's wearing surface is coming off, and there are scattered loose deck planks. The east abutment is constructed of masonry capped with concrete; the masonry pointing is failing. Trees are overhanging the bridge. The structure needs painting. Riprap has recently been applied to the stream banks.

Posted Restrictions: The structure is posted at 8 tons.

ADT: 59.

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. 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. Immediate repair recommendations are to cut back the overhanging trees. Planned work is to replace the deck, stringers, and floor beams and to repaint the structure. This work has a projected advertisement date of early 2001. It is intended that these repairs will raise the capacity of the structure to 14 to 15 tons. The task group also recommends that the masonry be repointed within the next several years.
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. 6147: (Metal truss bridge); Pratt through truss, 1909, Rt. 775 crossing Middle River (Figure B17).

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 2002. In an effort to limit stress on the bridge's members, the bridge was not taken apart but rather was painted in place. This has not eliminated corrosion within the joints.
- In 2012, crews tightened a loose rail at the Abutment B end post. The bridge is currently under repair.
- Additional repairs were done in 2013 and 2014.
- This work was in partial accordance with Recommendation 1 in the 2001 Management Plan.

Current Inspection, Condition and Maintenance Information:

- The rating is 8-4-5.
- ADT: The current ADT is 105 [the ADT in the 2001 report was 59].
- The structure is posted at 3 tons.
- There is 100% section loss in various areas. There is heavy cabling on the structure.
- The district structure and bridge engineer will be evaluating the bridge shortly. It may be necessary to close this structure. There is a 5-mile detour.

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

defers further recommendations pending the results of the district structure and bridge office's evaluation of this structure. However, the task group notes that (1) the crossing should be evaluated for its potential for non-vehicular use or (2) if necessary, the old abutments could be evaluated for the potential to support a new truss.



Figure B17. Augusta County Structure No. 6147

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 Rt. 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, Rt. 778 crossing Middle River (Figure B18).

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 rather 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.



Figure B18. Augusta County Structure No. 6149

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

Description: Highland County Structure No. 6034 is a single-span Lane Patent pony truss, carrying Rt. 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 Rt. 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, Rt. 645 crossing Crab Run (Figure B19). *[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 Rt. 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 rare: only four are known to be extant. If the county is willing to coordinate with VDOT for a transportation enhancement grant. VDOT could assist the county with the submittal and administration of such a grant.



Figure B19. 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

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 Rt. 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 Rt. 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 Rt. 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 Rt. 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 Rt. 340. The claims of historic significance for Rt. 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, Rt. 340 crossing Overall Creek (Figure B20).

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 an 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 construction of the new bridge. The original agreement, among VDOT, the Federal Highway Administration, and the VDHR, was finalized in 2004 and was amended in 2010. Under the agreement, 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 an 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 was removed to expose the metal arch truss; the approaches have been removed. The structure is now preserved as a landscape feature and an 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 terms of 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.



Figure B20. 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 Rt. 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, Rt. 746 crossing Calfpasture River (Figure B21).

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.



Figure B21. Rockbridge County Structure No. 6145

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 Rt. 98 crossing Crab Orchard Creek. The structure is approximately 43 feet long. This bridge, which was built as a WWI 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, Rt. 98 crossing Crab Orchard Creek (Figure B22).

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.
- The district office plans to clean rebar, place some anodes, and 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.



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 Rt. 11 in this region). It carries the former turnpike (former Rt. 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 Rt. 11; subsequently, Rt. 11 in the vicinity of Reed Creek was realigned. The section of former Rt. 11 around the old Southwestern Turnpike Bridge became part of the secondary system and was renumbered to Rt. 662. Most of Rt. 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 N/A (Southwest Turnpike Company Bridge): (Masonry arch bridge); 1850, off Rt. 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: 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; the 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 indicates 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.



Figure B23. Southwest 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 Rt. 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 Rt. 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, Rt. 606 crossing Owens Creek (Figure B24).

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 they were not used—aprons were poured instead.
- The 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 5-5-6.
- ADT: The current ADT is 51 [the ADT in the 2001 report was 52].
- The bridge contains approx. 10 feet of fill.
- More repointing and repair of settlement cracks and voids under the 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.



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 Rt. 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 Rt. 1, crossing Falling Creek (Figure B25).

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 Rt. 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 100 years (in the 1910s and in 2004). The 2004 (pre-Gaston) appearance of the parapet differed from that of the earlier parapet. It is possible that there also were earlier episodes of flood damage 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.



Figure B25. Falling Creek Bridge, Chesterfield County

MASONRY ARCH / CONCRETE ARCH

Richmond 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 Rt. 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 Rt. 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 Rt. 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 Rt. 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, Rt. 1 crossing Stony Creek (Figures B26 and B27).

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.



Figure B26. Dinwiddie County Structure No. 1005



Figure B27. Another View of Dinwiddie County Structure No. 1005, Showing the Repaired 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 Rt. 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 Rt. 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 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 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 Rt. 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, Rt. 835 crossing Jennings Branch (Figure B28).

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 rebar, and efflorescence on the underside of the bridge and some spalled areas on the abutments.
- There is minor damage to the rail posts.
- The spalling, cracking, exposed rebar, and efflorescence on the underside of the bridge should be monitored/repared 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 Rt. 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 (2001) 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).

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 to increase drainage, and to relieve the weight of saturated soil, on this structure. In addition, 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 recommendations under *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.



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 Rt. 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, Rt. 672 crossing Opequon Creek (Figure B30).

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].
- 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 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 bridge project 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.



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 Rt. 39 crossing Laurel Run. The bridge is approximately 31 feet long. This bridge was designed as part of the improvements to Rt. 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, Rt. 39 crossing Laurel Run (Figure B31).

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 approx. 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.



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]

Description: Loudoun County Structure No. 1025 is a two-span masonry arch bridge carrying Rt. 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 Rt. 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 Rt. 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 Rt. 50 bypass of Aldie, with the present section of Rt. 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 Rt. 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, Rt. 50 crossing Little River (Figure B32).

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 wingwall and buttress required reconstruction because of severe deterioration of the mortar between the stones. Portions of the wingwall and buttress were reconstructed. Engineers used a proprietary (Cintec) grouted anchor 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 (Cintec) grouted anchor 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:
 - a. 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.

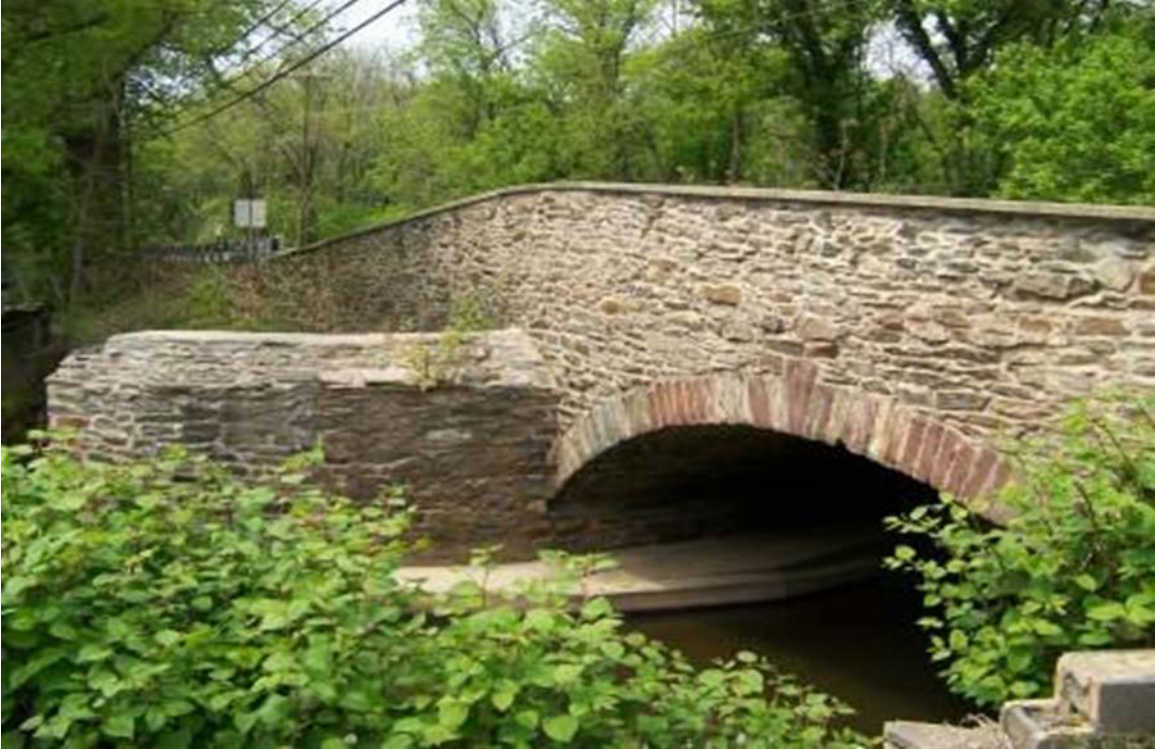


Figure B32. Loudoun County Structure No. 1025

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

Description: Loudoun County Structure No. 6088 is a two-span masonry arch bridge carrying Rt. 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, Rt. 734 crossing Beaverdam Creek (Figure B33).

Evaluation Update: The structure was placed on the Virginia Landmarks Register in 2010 and on 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:
 - a. 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.



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 Rt. 60 was realigned and a new bridge constructed. In 1953-4, 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 (2001) management plan; it subsequently was numbered as 9007.]: (Covered wooden bridge); Trussed arch (“humpbacked”) covered bridge, 1857 (Figure B34). [Note: This is a pedestrian bridge, in the wayside off Rt. 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 affected 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 an 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 more than 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.)



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 Rt. 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 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, 1894, Rt. 720 crossing North Fork of Shenandoah River (Figure B35).

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 it was struck by a tractor-trailer whose driver was following directions from a GPS unit and attempted to cross the bridge. The driver disregarded the posted weight, width, and height limit signs and signs warning that a 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 and a passenger vehicle.
- “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 wingwalls. 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 the 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.



Figure B35. Shenandoah County Structure No. 6078

MANAGEMENT PLAN BRIDGES UNDER SECTION 106 REVIEW

The following four structures were not considered for task group recommendations in the current management plan update because of ongoing Section 106 review.

Metal Truss

Lynchburg District (3)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Charlotte County (19)

VDOT Structure No. 6902

VDHR Inventory No. 019-0086

Name: Clarkton Bridge; Bruce's Bridge

Location: Route 620, crossing Staunton River

National Register Status: Eligible

Description: Charlotte County Structure No. 6902 is a two-span Camelback through truss with 12 steel-beam approach spans, built in 1901 by the Virginia Bridge and Iron Company. King post floor beam reinforcements to the truss sections were added in 1940. The structure carried Rt. 620 crossing Staunton River, but it is now (year 2000) closed because of unsafe bridge conditions. The bridge is 673 feet long overall; each truss span is 152 feet long. This bridge is significant as an example of an early multi-span metal Camelback through truss.

Evaluation: Charlotte County Structure No. 6902 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: Charlotte County Structure No. 6902 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-108).

Condition: Charlotte County Structure No. 6902 was closed in 1998. The bridge was previously closed in 1990 and again in 1996 because of conditions found during regular safety inspections; approximately \$90,000 was spent on repairs to this bridge in the period from the 1990 closing until the 1998 closing. The structure was closed in 1998 because of extensive undermining of Column 1 at Pier 13. A subsequent detailed inspection of the structure revealed additional structural deficiencies. The structure exhibits wear and deterioration throughout. The superstructure is sagging in certain spans, and several end posts are bowed in the trusses. Additionally, the pins throughout exhibit corrosion with critical section loss; failure of a single pin may cause the entire structure to collapse suddenly. There are numerous additional major and minor structural deficiencies, including areas of extensive corrosion and pack rust in various truss members, a deteriorated floor system and deck, and section loss in other truss members. In addition, the bridge needs to be repainted. The scale of any rehabilitation effort would be substantially greater for continued vehicular use than it would be for non-vehicular purposes.

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.

Posted Restrictions: The structure was posted at 3 tons prior to its closing.

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 structure is unsafe and has remained closed since 1998. VDOT has previously considered demolishing this structure and barricading the roadway or replacing the structure with a new bridge. There is low demand for this crossing (the ADT in 1997 was 70). Replacement of the structure will take approximately \$1.6 million. A major outlay of funds would be necessary merely to reopen this structure to traffic at a 3-ton posting. Rehabilitation to reopen the bridge at a 3-ton posting (\$1.2 million) would cost approximately 75% of the cost of a new bridge and would probably allow 1 to 2 more years of life before additional major maintenance would have to be done. With the size, structural problems, aging, and deterioration of the structure, the bridge is far beyond any routine preventive maintenance, and a flood and scour hazard remains as well. If this structure were rehabilitated and reopened to vehicular traffic, abuse by overweight vehicles would almost certainly resume.

In 1999, a local citizen's group applied for and received a TEA-21 grant to cover minimal repairs to reopen the bridge to traffic (the federal allocation for this enhancement project is \$160,000). This application was made without the knowledge of the Lynchburg District Structure and Bridge Office or the VDOT Central Office Structure and Bridge Office. The task group cannot support the enhancement project as currently proposed and recommends that the bridge remain closed to traffic, especially given the deteriorated condition and isolated location of the bridge. Spending a sizable amount of money to reopen a bridge that (1) will require extensive additional work in the near future, and (2) will almost certainly be subject to continued abuse from overweight vehicles is not a wise use of public funds. Use of enhancement money to stabilize the bridge for some sort of adaptive use (such as an eyecatcher or part of a walking trail) might be feasible provided that the county or a separate group was willing to assume ownership and liability for the bridge. Such transfer of ownership and its conditions, of course, would have to be acceptable to VDOT.

Recommended management options for this structure, in order of preference, are:

1. Transfer ownership, if a suitable, willing recipient can be identified.
2. Document and demolish the structure.
3. Repair and maintain for adaptive use, if an appropriate adaptive use can be identified.

2017 UPDATE FOR:

Charlotte County Structure No. 6902: (Metal truss bridge); Camelback through truss, 1901, Rt. 620 crossing Staunton River (Figures B36 and B37).

Evaluation Update: The structure was placed on the Virginia Landmarks Register in 2006 and on the National Register of Historic Places in 2007.

Repairs and Maintenance Undertaken Post-2001:

- In 2005, the structure was repaired and rehabilitated as a pedestrian bridge in accordance with VDOT's Road and Bridge Standards. In 2009, the warning (load restriction) signs were revised at both approaches. In 2010, the bridge underwent a number of repairs and modifications, including work on the Lally columns that support the bridge. Column 1 at Pier 12 had a crack repaired (fourth segment from bottom on Span 13 side). Column 2 at Pier 13 had a crack repaired (fifth segment from bottom on Span 14 side); in addition, an angle was added to the segment over the rivet heads. Column 1 at Pier 13 had a crack repaired (fourth segment from bottom on Span 14 side). The top chord splice plates were replaced with 12 inch by 6 inch by ¼ inch plates at three locations: Span 13 Left, U1U2 near U2; Span 13 Left, U6U7 near U2; and Span 14 Left, U1U2 near U2. Steel bands (2½ inch by ¼ inch) were added to columns as follows: Column 1 at Pier 12, two bands at second segment from bottom; Column 1 at Pier 12, two bands at fourth segment from bottom; and Column 1 at Pier 13, three bands at third segment from bottom. A retrofit hole was drilled in Column 2 at Pier 12 in second segment from bottom to arrest the crack. Warning signs were replaced at both approaches.
- This work was in accordance with Recommendation 3 in the 2001 Management Plan.

Current Inspection, Condition and Maintenance Information:

- The 2015 inspection disclosed additional deterioration in the steel, and the Lally columns are failing.
- The bridge was determined unsafe even for inspection access. The district structure and bridge office has closed the bridge completely.
- 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.



Figure B36. Charlotte County Structure No. 6902



Figure B37. Charlotte County Structure No. 6902, Showing Lally Columns

Metal Truss

Culpeper District (7)

ORIGINAL [2001] MANAGEMENT PLAN INFORMATION FOR:

Culpeper County (23)

VDOT Structure No. 6906

VDHR 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 Rt. 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, Rt. 613 crossing Rappahannock River (Figure B38).

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, in addition to 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 an 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 million).
- 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.



Figure B38. Culpeper County Structure No. 6906

Metal Truss

Northern Virginia 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 Rt. 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 Rt. 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 ISTEPA 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, date uncertain (probably ca. 1889), Rt. 673 crossing N. Fork Catoctin Creek (Figure B39).

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 metallizing; 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 metallizing 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 Northern Virginia District 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 management plan update because of ongoing Section 106 review.



Figure B39. Loudoun County Structure No. 6051

Metal Truss

Northern Virginia 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 Rt. 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, Rt. 646 crossing the Norfolk Southern Railway (Figure B40).

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 eyebars, which are delaminating) were found during preliminary rehabilitation work on this bridge. The rehabilitation plan for the structure is now being reassessed, and the structure 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, 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.



Figure B40. Prince William County Structure No. 6023 (Shown Prior to Disassembly)