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16. Abstract <p>Interest in the preservation of historic engineering structures has increased dramatically over the past decade. Because civil engineering structures primarily serve functions in the public domain, their preservation focuses attention on what appear to be diametrically opposed legislative mandates. Thus, today's bridge repair and replacement projects bring together two sets of professionals whose divergent approaches have seemingly been established by legislation whose ultimate aim is the public good.</p> <p>The identification and evaluation of structures and a commitment to conservation plans are necessary initial steps for the retention of historically significant bridges. The successful implementation of bridge conservation plans is vitally dependent upon acceptable guidelines and standards that accommodate the perspectives of both the preservation community and transportation agencies.</p> <p>This report presents principles, priorities, and guidelines for historic bridges that are consistent with current guidelines used in the conservation of historic buildings.</p>			
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TRIAL GUIDELINES FOR THE CONSERVATION
OF VIRGINIA'S HISTORIC BRIDGES

by

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With a Foreword by Howard J. Kittell
and
Contributions by Eric Delony and William Chamberlin

(The opinions, findings, and conclusions expressed in this
report are those of the author and not necessarily those of
the sponsoring agencies.)

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FOREWORD

Since the initiation of Virginia's survey of its potentially historic bridges in 1974, significant progress has been made nationwide in inventorying and establishing criteria by which to judge structures worthy of retention. Two states, Ohio and West Virginia, have published outlines of how historically significant bridges should be preserved. Under the direction of the Virginia Highway and Transportation Research Council, a conservation plan for the Commonwealth of Virginia is now being prepared.

The identification of structures and a commitment to conservation are necessary initial steps in the preservation of historic bridges. However, the successful implementation of conservation plans is vitally dependent upon acceptable guidelines and standards that direct the actions to be taken when historic bridges are part of transportation improvement projects. The need is for guidelines and standards that will accommodate both the goals of the preservation community and the requirements that transportation agencies must meet for safety, efficiency, and environmental quality.

When the Research Council undertook the development of a conservation plan for historic bridges it seemed the time had come to address this need for directly applicable guidelines and standards that would satisfy both the transportation and preservation interests. The propitiousness of this timing was evident in discussions of this need at meetings of the Transportation Research Board's Subcommittee A1F05(1) on Historic Preservation. As a national level, multidisciplinary body in which the interests of both fields converged, this subcommittee seemed to provide an appropriate forum for the consideration of a project for the development of the needed guidelines and standards.

In April 1985, a decision was made to organize a meeting of this subcommittee to consider the development of such guidelines and standards based upon those of the Secretary of the Interior, but tempered by transportation requirements. This group met on May 14-15 to discuss the undertaking and set forth a series of preliminary recommendations for Virginia. Based on these discussions, a consultant, Paula A. C. Spero, prepared a draft set of guidelines to be reviewed by the subcommittee prior to being submitted to the Research Council for its consideration. It was also hoped that this work might eventually form the basis for similar national-level standards.

The A1F05(1) membership was expanded somewhat by adding persons who had special interest or expertise in the areas under consideration. Grateful acknowledgement is made of the efforts of the following individuals, and their respective agencies, who participated in this important endeavor.

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- Earl T. Robb Virginia Department of Highways & Transportation
- Paula A. C. Spero Consultant
- C. L. Woodward Virginia Department of Highways and Transportation
- * Members of TRB Subcommittee A1F05(1)

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TRIAL GUIDELINES FOR THE CONSERVATION OF VIRGINIA'S HISTORIC BRIDGES

PREAMBLE

In the 1960s, the awareness of imminent dangers to the nation's cultural and historical resources led to the enactment of the National Historic Preservation Act; protective legislation for the national heritage. At the same time, the collapse of the Point Pleasant Bridge led to the enactment of Bridge Inspection and Replacement Programs, protective legislation for the public safety.*

Interest in the preservation of historic engineering structures has increased dramatically over the past decade. Because civil engineering structures primarily serve functions in the public domain, their preservation focuses attention on what appear to be diametrically opposed legislative mandates. Thus, today's bridge repair and replacement projects bring together two sets of professionals whose divergent approaches have seemingly been established by legislation whose ultimate aim is the public good.

A coherent approach to the treatment of historic bridges requires (1) identification of the resources to be preserved or protected, (2) a comprehensive plan for dealing with the resources identified, and (3) a methodology for the application of appropriate treatments, including standards and guidelines. Significant progress has been made nationwide in the identification of historic bridges, with many states having surveyed their bridges and established criteria by which to evaluate them. Two states, Ohio and West Virginia, have published conservation plans to be administered cooperatively by their departments of transportation and historic preservation offices.

The identification and evaluation of structures and a commitment to conservation plans are necessary initial steps for the retention of historically significant bridges. The successful implementation of bridge conservation plans is vitally dependent upon acceptable guidelines and standards that accommodate the perspectives of both the preservation community and transportation agencies. At present, the standards referred to in bridge rehabilitation projects are

1. Standard Specifications for Highway Bridges, adopted by the American Association of State Highway and Transportation Officials (AASHTO), and

* The historical development of this legislation and its offshoots has been well described in several recently published documents, and its inclusion here is not necessary.

2. The Secretary of the Interior's "Standards for Rehabilitation" and "Guidelines for Rehabilitating Historic Buildings."

The first is a detailed manual on bridge design; the second is a set of ten standards and expanded guidelines for the evaluation of proposed rehabilitations. The former must be quantitative and detailed to be useful for safe design practice, while the latter must be qualitative and broad enough to be applicable to a wide variety of buildings.

While on the surface one may say that the Secretary of the Interior's "Standards" and "Guidelines" can be applied to bridge rehabilitation, there is a genuine need to clarify issues in a way that can be mutually apprehended by both preservationists and bridge engineers. A brief comparison of the two groups' definitions of "rehabilitation" should suffice to illustrate this point.

1. The Secretary of the Interior's "Standards" define rehabilitation as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values."
2. In the regulations implementing the Highway Bridge Replacement and Rehabilitation Programs, rehabilitation is defined as "the major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects."

The bridge engineer's definition is usually interpreted to mean compliance with AASHTO standards, where safety defects include structural capacity and such geometric considerations as the clearance, deck width, and alignment of the approach roadway. Solutions to correct these defects are complex because bridges are "pure" structures designed to carry maximum loads with minimal materials. Unlike the case for most buildings, the structural framework of most bridges is exposed and unsheathed. Therefore, working on the structural system without affecting the appearance of the structure is extremely difficult.

Structural inadequacies can be corrected by rehabilitation alternatives which include strengthening the critical members, adding supplemental members, reducing the dead load, modifying the structural system, and repairing or replacing damaged members. The most obvious structural deficiency is inadequate load-carrying capacity for the superstructure. Other, often hidden deficiencies include mechanical problems with joints, bearings or other details, and substructure deterioration or instability. Engineering concerns are compounded by problems of functional obsolescence which include inadequate geometrics (vertical clearance, deck width, and

approach alignments), inadequate safety barriers, and inadequate hydraulic capacity.

It is extremely difficult to force an old bridge, designed for the loads, speeds, and vehicles of decades past, into the design mold for a new bridge. This problem has been acknowledged by the Federal Highway Administration (FHWA) and the ability to grant exceptions to AASHTO standards for historic bridges has been addressed by officials of that agency in the past few years. A report issued by the FHWA in October 1984, "Mitigation Options Related to Historic and Archeological Properties," states:

The standards are unlikely to be changed or modified now or in the near future. However, the frequency of granting exceptions is likely to increase as those standards are being questioned more routinely. Division Administrators are authorized to grant exceptions on a case-by-case basis if they believe the exception is justified.

The AASHTO's most recently issued Policy on Geometric Design of Highways and Streets (1984) includes historical significance as a factor for granting exceptions on local roads and streets:

Existing substandard structures should be improved, but because of their high replacement cost, reasonably adequate bridges and culverts that meet tolerable criteria may be retained. Some of the nontechnical factors that should be considered are the esthetic value and the historical significance attached to famous structures, covered bridges, and stone arches.

It is important to recognize throughout the rehabilitative process the need to emphasize public safety. Thus, exceptions are granted on a case-by-case basis, and they specifically state that such exceptions are not to be construed as precedent-setting actions. "Tolerable criteria" have sometimes been interpreted to include engineering studies that support the capacity of a bridge to carry the anticipated loads and traffic safely, and an accident frequency that is not abnormally high.

Nontechnical factors which should be considered when determining the treatment of historic bridges include the degree of local public interest in the bridge; the importance of the bridge as a representative of the period, type of design, or example remaining in the state; the cost-effectiveness of rehabilitation; and the extent and magnitude of variances from AASHTO standards.

The needs of each bridge and its site must be considered in light of the needs of the overall highway network. In cases where a substandard historic bridge meets tolerable criteria, exceptions may be encouraged by

local transportation officials when guidelines for the appropriate treatment of historic bridges are readily available.

This document suggests such guidelines. Its purpose and use are emphasized in the section that follows.

PURPOSE AND USE OF THIS DOCUMENT

The principles, priorities, and guidelines for rehabilitating historic bridges comprised by this document are intended as a preliminary guide for evaluating rehabilitation options and determining appropriate treatments of historic bridges. These guidelines should be considered along with other requirements such as safety, cost-effectiveness, and other factors normally considered in executive bridge rehabilitation projects. The term "historic bridges" is defined as those bridges listed on or determined to be eligible for the National Register of Historic Places by the application of criteria developed for that purpose. (See Virginia Highway and Transportation Research Council publications "Criteria for the Preservation and Adaptive Use of Highway Structures," by Howard Newlon, Jr. for metal trusses, and "Criteria for Preservation and Adaptive Use of Historic Highway Structures," by Paula A. C. Spero for concrete and masonry arches.)

The PRINCIPLES, patterned after the U.S. Department of Interior's "Standards for Rehabilitation," are intentionally general so as to be applicable to all bridges. They are not rigid rules which evaluate all bridges alike. While there is a system of options and alternatives which may apply to most bridges, each historic bridge should be evaluated on its own merits with respect to its historic, character-defining elements. A hierarchy of important elements for each bridge should be established and referred to as rehabilitation plans proceed. Thus, creative solutions might be found in the process of designing necessary upgradings.

The GUIDELINES consist of a general section that addresses Structural Upgrading, Geometric Modification, Materials Repair and Maintenance, and Removal to a Less Demanding Site. Following the General Guidelines are Additional Guidelines which may be necessary when considering Nonvehicular Uses, Replacement, or Bridges Located in Historic Districts.

Additionally, the concepts contained in this document are intended for use in the treatment of all historic bridges, and should not be restricted solely to bridge rehabilitation and replacement projects. The PRINCIPLES and GUIDELINES are applicable to any historic bridge project, including upgrading for safety or other purposes and bridge maintenance.

It is hoped that the document will serve as a framework for an expanded version of guidelines that may be compiled as the body of information from successful bridge rehabilitation projects develops.

Additions Suggested at APT Workshop
Austin, Texas
September 30, 1986

PRINCIPLES FOR REHABILITATING HISTORIC BRIDGES

The decision to retain a bridge in service must be based on legislative mandates and considerations such as economy, safety, and the existing and future transportation needs of the overall highway network. The historical importance of the structure at the national, state, and local levels must be fully considered to assure a reasonable, balanced decision. As suggested in the AASHTO's most recent policy, where the bridge meets tolerable criteria exceptions to current accepted engineering standards should be sought.

Regardless of which alternative is chosen for rehabilitation of the historic bridge, the treatment should be carried out with careful consideration of the following principles:

1. Every reasonable effort should be made to continue the historic bridge in some form of useful transportation service. Primary consideration should be given to rehabilitation of the bridge on site. Only when this option has been fully exhausted should other alternatives be explored.
2. The original character-defining qualities or elements of a bridge, its site, and its environment should be respected. The removal, concealment, or alteration of any historic material or distinctive engineering or architectural features should be avoided when possible.
3. All bridges should be recognized as products of their own time. Proposed alterations that have no historical basis and which seek to create a false historical appearance should be discouraged.
4. Changes which have taken place in the course of time may be evidence of the history and development of a bridge, its site, and its environment. These changes may have acquired significance in their own right, and this significance should be recognized, be carefully evaluated, and respected.
5. Distinctive engineering and stylistic features or examples of skilled craftsmanship which characterize a bridge should be treated with sensitivity.

6. Deteriorated structural members and architectural details should be retained rather than replaced, and repaired whenever possible. In the event replacement is necessary, the new material should match the material being replaced in design, color, texture, and other visual qualities.
7. The surface cleaning and treatments of bridges should be done with processes that will not damage the historic materials.
8. Every reasonable effort should be made to protect and preserve significant archeological and other cultural and environmental resources by or adjacent to any bridge.
9. Contemporary designs for new bridges located in historic districts, should not be discouraged. Contemporary designs for proposed alterations and additions to historic bridges, should not be discouraged. These designs should be compatible with the size, scale, visual quality, and character of the historic district, or of the bridge and its environment, and any alterations and additions should not destroy or conceal significant structural, architectural, or historical materials.
10. Wherever possible, additions or alterations to bridges should be made in such a manner that their subsequent removal would not impair the essential form and integrity of the bridge.

PRIORITIES FOR TREATMENT OF HISTORIC BRIDGES

The specifics of each historic bridge and its environment will determine whether rehabilitation options for the continued use of the bridge are feasible. In planning the proposed treatment of a historic bridge, the following priorities should be explored.

I. Continued Use for Vehicular Purposes

The preferred use for a historic bridge shall be continued service for vehicular purposes.

This alternative will probably require consideration of one or more of the following:

- A. Structural upgrading
- B. Geometric modification
- C. Alignment adjustments and/or restriction to one-way traffic
- D. Materials repair and maintenance
- E. Removal to a less demanding site

II. Continued Use for Nonvehicular Purposes

If it is not feasible to continue a historic bridge in service for vehicular purposes, priority shall be given to continued use for nonvehicular purposes, at an existing site or at a new site. Preference shall be given to transportation-related uses of the historic bridge.

This alternative may require examination of some of the issues addressed by Priority I, above.

Nonvehicular uses of a historic bridge may include

- A. alternative transportation functions, like pedestrian and bicycling uses;
- B. architectural adaptation for residential, commercial, or educational space; or
- C. use as a historical ruin or public monument.

III. Replacement with Mitigation

When alternatives for continued use of a historic bridge for vehicular or nonvehicular uses have been considered and determined infeasible, and the historic bridge must be removed from its site, replacement with mitigation is the remaining alternative.

Mitigation options may include

- A. recordation and documentation of the historic bridge and its site,
- B. match marking, dismantling, and storage for future use, or
- C. salvage of specific elements for display, research, or reuse.

IV. Special Considerations for Bridges Located in Historic Districts

Bridges located within the boundaries of designated historic districts may contribute to, or detract from, the overall character of the historic district.

Treatment of an existing historic bridge, a replacement bridge, or a new bridge within a historic district should take into consideration the character of the historic district.

Considerations for a historic bridge located within a historic district may include

- A. continued use for vehicular purposes, Priority I above,
- B. continued use for nonvehicular purposes, Priority II above, or
- C. replacement with mitigation, Priority III above.

An additional consideration for new or replacement bridges should be compatibility of their design with the character of the historic district in which they are located.

GUIDELINES FOR THE REHABILITATION AND TREATMENT OF HISTORIC BRIDGES

For the purpose of establishing a methodology for bridge rehabilitation, General Guidelines appropriate for the treatment of all historic bridges are proposed in the following categories:

- I. Structural Upgrading
- II. Geometric Modification
- III. Materials Repair and Maintenance
- IV. Removal to a Less Demanding Site

Additional Guidelines follow the General Guidelines. The Additional Guidelines are applicable to the needs of Priority II, "Continued Use for Nonvehicular Purposes," Priority III, "Replacement with Mitigation," and Priority IV, "Special Consideration for Bridges Located in Historic Districts."

General Guidelines

I. Structural Upgrading

- A. Identify the structural system and its individual character-defining features.
 - 1. The structural system should be evaluated using nondestructive testing techniques, where possible.
 - 2. Passive solutions which adjust the live load by restricting vehicles should be explored. Examples include load posting, signaling, and channelling.
 - 3. The structural system should be respected, and its visual characteristics should be retained if modifications are necessary.
 - a. If possible, the original load-carrying system should be retained.
 - b. If possible, the dead load should be reduced by providing a lighter deck system.
 - c. If the load-carrying system must be altered, the character-defining visual qualities of the original structural system should be retained. Modified systems which can be visually minimized include the introduction of structure continuity and king post-truss beam reinforcement.

- d. If visual modifications are necessary, they should be kept as unobtrusive as possible.
 - d.1. Modifications may include changing the configuration of isolated members or the addition of helping structures.
 - d.2. Where needed, supplemental members should be added under the deck of the structure, if possible.
- 4. Visually intrusive structural modifications should be kept as inconspicuous as possible, and should affect only secondary views, if possible. Consideration should be given to whether there is a primary view.
 - a. Bridges which carry highways are seen by roadway travelers from afar, in elevation, and while traveling on the bridge deck. Modifications should be made with this in mind.
 - b. Where circumstances are such that the primary view is from below the bridge, e.g. canal bridges no longer in vehicular service, modifications should be made accordingly.
- 5. Modifications should be so designed that there is the least possible loss of historic material, and so that the character-defining features are not obscured, damaged, or destroyed.
- 6. Structural modifications, or helping structures, should be clearly differentiated from the historic bridge. The design should be compatible in terms of mass, materials, scale, and detail.
- 7. Traffic railings, or safety barriers, should be designed to meet requisite load requirements, and at the same time should be designed and installed so that character-defining features of the bridge are not obscured or damaged.
- 8. Deteriorated structural elements should be replaced in kind or with a material which duplicates the visual appearance of the original element.

II. Geometric Modifications

- A. Evaluate the geometric constraints of the bridge in the context of the overall highway network. Determine realistic needs for

geometric parameters in light of connecting highways, projected traffic volumes, accident history, and the proposed nature of future traffic needs.

- B. Explore passive (off-bridge) solutions.
1. Adjust alignment of the approaches, restrict the bridge to one-way traffic, or both.
 - a. Create holding lanes for traffic at the approaches to a one-lane bridge with appropriate provisions for safety.
 - b. Leave the historic bridge in place for one-lane traffic and move a visually compatible historic bridge to an adjacent site to carry the second lane.
 - c. Leave the historic bridge in place for one-lane traffic and construct a visually compatible new bridge on an adjacent site to carry the second lane.
 2. The flow of approaching traffic should be adjusted by restricting vehicles, restricting speed, or installing signs and traffic signals.
 3. Provide sidewalks external to the bridge for pedestrian safety.
 4. The bridge should be widened by cantilevering a new deck from either side of the existing structure, where structurally feasible and aesthetically and historically appropriate.
- C. Alter the geometric configuration of the bridge to remedy geometric deficiencies.
1. To increase the vertical clearance on through bridges, the depth of the portal frames and sway frames should be reduced with minimum possible destruction of historic fabric.
 2. To increase the vertical clearance on grade-separation structures, the superstructure should be raised or the roadway lowered.
 3. To increase the roadway width, some types of structures can be modified (e.g., multigirder, some concrete and stone bridges). Modifications should be designed to be

III. Materials Repair and Maintenance

- A. Identify features that are important in defining the overall historic character of the bridge.

Historic materials should be repaired, if possible. If replacement of a feature is necessary, it should be replaced in kind or with a compatible substitute material.

1. Masonry: superstructure and substructure
 - a. Drainage and vegetation
 - a.1. Provide proper deck drainage systems which do not damage or promote deterioration of the superstructure or substructure
 - a.2. Remove vegetation growing on bridge superstructure or substructure.
 - b. Cleaning
 - b.1. Clean masonry only when necessary to halt deterioration or to remove heavy soiling.
 - b.2. Clean masonry with the gentlest method possible.
 - b.3. Use cleaning method on test patches to determine long-range detrimental effect of cleaning.
 - c. Repointing
 - c.1. Remove deteriorated mortar by carefully hand-raking the joints to avoid damaging the masonry.
 - c.2. Duplicate old mortar in strength, composition, color, and texture.
 - c.3. Duplicate old mortar joints in width and joint profile.
 - d. Repair of deteriorated sections
 - d.1. Replace extensively deteriorated or missing features in kind or with a compatible substitute material.
 - d.2. Replace masonry sections that are not repairable, in kind, using the same materials or compatible substitute materials. Dismantle deteriorated sections by hand, and with care.
 - d.3. Do not apply nonhistoric coatings, such as stucco, gunite, and sealants, to masonry surfaces as a substitute for repointing and masonry repairs.

2. Metals

- a. Cleaning
 - a.1. Identify metal prior to cleaning and test for gentlest possible cleaning method.
 - a.2. Use the gentlest possible cleaning methods for cast iron, wrought iron, and steel (structural metals found on historic bridges) to remove paint buildup and corrosion. If hand scraping and wire brushing prove ineffective, low pressure dry grit blasting may be used as long as it does not abrade or damage the surface. Test patches should be cleaned to determine damage.
- b. Repaint with colors that are appropriate for the historic bridge.
- c. Replace deteriorated or missing decorative elements in kind or with a compatible substitute material.

3. Wood

- a. Repair historic wood features by patching or reinforcing, using recognized preservation techniques.
- b. Replace in kind historic wood features which need to be replaced. If replacement in kind is not possible, substitute materials that are compatible in texture and form, and that convey the same visual appearance as the original.

IV. Removal to a Less Demanding Site

- A. If possible, seek a less demanding site on the existing transportation system.
- B. If possible, find a new owner for the historic bridge among public agencies such as state parks and recreation departments, or county or municipal parks departments, or state tourism agencies.
- C. If a new owner cannot be located in the public sector, an owner in quasi-public or nonprofit groups should be sought.
- D. If no recipient can be found in public or quasi-public groups, an owner in the private sector may be sought.

- E. Ensure that the recipient of the bridge is prepared to maintain it, and rehabilitate it if necessary. A preservation covenant or restriction may be necessary to ensure this.
- F. When possible, undertake the selection and preparation of a relocation site in the proximity of the original site.
- G. Prior to removal, make a complete and comprehensive inventory of all bridge parts. The parts should be carefully numbered and referenced to the inventory for identification.
- H. If possible, remove the bridge without disassembling.
- I. If disassembly is necessary, disassemble the bridge in such a manner as to allow for its reassembly.
- J. Reassemble the bridge to duplicate its original configuration.
- K. Do any required cleaning or repair of the bridge in conformance with previously stated guidelines as appropriate.

Additional Guidelines

I. Continued Use for Nonvehicular Purposes

If it is not feasible to continue a historic bridge in service for vehicular purposes, priority should be given to an adaptive use either at the same site or at a compatible new site.

- A. Where feasible the bridge should be retained in a transportation or transportation-related function.
 - 1. While the most feasible transportation use may be to leave the bridge in place as a bicycle or pedestrian crossing, or to move it to a public park or recreation area for the same purpose, other uses and other locations should not be precluded, including ones that involve private ownership.
 - 2. Adaptive use in situ will be the only alternative for many bridges because of their nature or size. However, others are movable, particularly metal and timber trusses. In instances where the features in the immediate vicinity of the bridge have an associative value, preference should be given to adaptive use in situ. This is particularly important where the bridge is located within the boundaries of a historic district, or is clearly associated with contemporary transportation or industrial features.

3. In choosing among alternatives, greater consideration should be given to those factors that will enhance or protect the historic bridge than to the specific nature of the adaptive use or its location. Such factors include
 - a. provision for maintenance,
 - b. protection from vandalism,
 - c. accessibility to the public, and
 - d. opportunities for interpretation.
4. While an adaptive use may reflect a reduced level of loading, structural adequacy for the new use must still be determined, and rehabilitation undertaken when appropriate. In such instances, the General Guidelines found on pages 11 - 15 of this document should be applied.
5. The selection and preparation of an alternative site should be undertaken with sensitivity to the historical use and siting of the bridge.
 - a. A bridge that has distinctive features that link it with a particular use should be used in its historical context. For example, a bridge that has features that link it with canal usage or history would be best used in a canal park.
 - b. Bridges should not be placed where they are clearly too long or too short for the obstruction that they span, and skews generally should be avoided. New abutments should be of compatible design and clearly distinguishable from the historic bridge.
6. Consistent with safety considerations, the structure itself should be returned to its historic configuration by removing visually obtrusive, non-character-defining elements that may have been added to permit the bridge to serve its present function, but which are not required for the new function. These might include
 - a. elements added to enhance stiffness or load capacity,
or
 - b. secondary features, such as modern decks and guard-rails.

Elements which have been added to the bridge over the course of its history and which are determined to be character-defining should not be removed.

7. Missing nonstructural elements of the bridge, including decorative features, that are distinctive of the style, type, or period in which the bridge was built should be replaced if they can be replicated from similar elements that survive on the same or a similar bridge.
- B. If it is not feasible to retain the bridge in a transportation-related function, consideration should be given to non-transportation-related uses including public recreational uses, use as interpretive sites or museums, or architectural adaptations that could provide residential, commercial, or educational space.
1. In such instances, the adaptive use should not obscure or alter the essential elements of the structure that impart its identity and significance as a bridge.
 2. If the bridge is to remain or be moved within a historic district, careful consideration should be given to the compatibility of the proposed use with the architectural and historical character of the historic district.
 3. Items A.1., A.2, and A.7 above are equally applicable to architecturally adaptive uses.
- C. If an adaptive use cannot be found, consideration should be given to retaining the bridge either in place or at an alternative location as a historical ruin or monument.

II. Replacement With Mitigation

When all rehabilitation options for continued use of the historic bridge have been exhausted, the bridge usually must be replaced. If an alternative site has not been found for the historic bridge, either it will be stored for future use or it will be demolished. Historic bridges which are scheduled for demolition (or alteration which destroys historic integrity) are documented to mitigate the adverse effect of demolition (or alteration). Such documentation should be prepared for inclusion in the Historic American Engineering Record (HAER) collection in the Library of Congress. Additional mitigation options include storage and/or salvage of all or parts of a bridge.

A. Documentation

The primary criterion in documenting historic bridges is whether the bridge can reveal information critical to under-

standing and interpreting bridge design, fabrication, engineering, and technology. Documenting bridges can contribute to understanding the development of transportation systems in the United States. Moreover, documentation provides information on the lives and works of individuals and engineers who contributed to advancing bridge technology.

The following guidelines are recommended for documentation of historic bridges

1. When a bridge has been determined to be eligible for the National Register of Historic Places and all alternatives for preservation are exhausted, the federal and state agencies involved should consult with the appropriate Regional Office of the National Park Service (Mid-Atlantic Regional Office for Virginia) to determine the documentation level required. Generally, the levels of documentation correspond to the level of significance of the bridge as follows:
 - a. Documentation Level I for bridges of national significance requires
 - a.1. measured drawings,
 - a.2. large-format contemporary photographs,
 - a.3. photocopies of selected existing drawings (when available),
 - a.4. historic photographs and illustrations, and
 - a.5. written data.
 - b. Documentation Level II for bridges of state significance requires
 - b.1. photocopies of selected existing drawings (when available),
 - b.2. historic photographs and illustrations,
 - b.3. large-format contemporary photographs, and
 - b.4. written data.
 - c. Documentation Level III for bridges of local significance requires

- c.1. dimensioned sketch plans and elevations showing bridge configuration,
 - c.2. large-format contemporary photographs, and
 - c.3. written data.
4. Individuals compiling documentation should be professionally qualified with demonstrable experience in bridge history and in documenting historic bridges.
 5. Documentation should focus on the existing bridge and should be an accurate record of existing conditions supplemented by information obtained from reliable secondary sources with documentary limitations clearly stated.
 6. Documentation should be prepared in such a manner as to permit the independent verification of information.
 7. Documentation should be prepared on materials that are readily reproducible, durable, and of standard sizes that meet accession and archival requirements of the Library of Congress.
 8. Documentation should be clearly and concisely presented.

B. Storage and/or Salvage

If storage and/or salvage are part of the mitigation required for the bridge, additional consideration is necessary after Documentation, above, has been completed.

1. The goal of salvaging parts or all of the historic bridge should be identified in order to determine appropriate treatment.
2. If future use of the bridge is anticipated, a comprehensive inventory of all bridge parts should be completed. The bridge parts should be carefully numbered and referenced to the inventory for identification.
3. If future use of the entire bridge is anticipated, the bridge should be dismantled with care in such a way as to allow reassembly. The bridge parts should be stored in a place where they will be protected from deterioration.

- 4. If only portions of the bridge will be salvaged, those portions should be removed with care and stored or delivered to the new owner.
- 5. Guidelines included in General Guidelines, IV. Removal to a Less Demanding Site, pages 15 - 16, may be applicable.

III. Special Considerations for Bridges Located in Historic Districts

Bridges located within the boundaries of designated historic districts may contribute to the overall character of the historic district. Special consideration of the effect on the historic district should be given to bridge projects located within such districts.

- A. In consultation with the State Historic Preservation Officer (SHPO), designated historic districts and their important characteristics should be identified.
 - 1. Identify features which are important in defining the overall historic character of the district.
 - 2. Identify character-defining features of the historic bridge and its relationship to the buildings, streetscapes, and landscapes in the historic district.
- B. The treatment to be given historic bridges should be established with reference to the Priority Levels presented on pages 9 and 10.
 - 1. If the bridge is a historic bridge and/or contributing structure within the designated historic district, rehabilitation options may include
 - Priority I. Continued Use for Vehicular Purposes, or
 - Priority II. Continued Use for Nonvehicular Purposes, both addressed on page 9.
 - 2. When the bridge cannot be upgraded adequately for continued vehicular use and the site precludes other uses, the historic bridge may need to be replaced. This alternative may require replacement with mitigation, including documentation, addressed above in Replacement With Mitigation, pages 18 - 21.
 - 3. In addition to the evaluation of appropriate treatments for the historic bridge, the design of the replacement

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bridge should include consideration of the new bridge's compatibility within the historic district.

- C. New bridges built in existing historic districts, whether replacement bridges or not, should be designed to be compatible with the character of the historic district in which they are located.
1. The design and construction of the new or replacement bridge should be compatible with the bridge site and the historic character of the district in terms of size, scale, design, materials, color, and texture.
 2. The design of the new or replacement bridge should preserve the historic relationship between the bridge, its site, and the buildings adjacent to it.
 3. The design of the new replacement bridge should retain the historic relationship between the overall bridge siting and streetscape and landscape features in the district.
 4. If the historic substructure is sound, the replacement bridge should incorporate it as part of the new bridge.