CHAPTER ONE

INTRODUCTION

PURPOSE AND SCOPE

The Federal-Aid Highway Bridge Replacement and Rehabilitation program (*1*) is, by far, the principal source of funds for replacement and rehabilitation of structurally deficient and functionally obsolete bridges, both on and off the federal-aid highway system. This program is intended to provide safe bridge structures for the traveling public, especially in regions where local governments may otherwise lack the funds to adequately address the safety of the bridges under their jurisdiction. The program has had broad political support since its inception in 1970 as the Special Bridge Replacement program (*2*), and its funding has been supplemented in 1982 (*3*), 1987 (*4*) and 1991 (*5*). Other public funding sources include construction programs administered directly by agencies of the federal government, such as the U.S. Forest Service (USFS) and the National Park Service (NPS) and non-federally assisted programs of local jurisdictions.

Historic bridges, that is, those that are listed or determined to be eligible for listing in the National Register of Historic Places *(4)*, often present both transportation and preservation challenges. This is because characteristics that may render them no longer suitable for currently anticipated traffic are the same characteristics that distinguish them as representations of important developments in engineering technology, or as essential components of the fabric of historic districts or routes. There are no absolute standards for deciding which bridges are historic, which of those that are judged to be historic should be preserved, or what manner of preservation is most appropriate for each. For federal-aid projects, those decisions are negotiated by the individual state highway agencies in cooperation with their State Historic Preservation Officer (SHPO) and the Federal Highway Administration (FHWA), typically within the framework of agreed upon criteria (*6*). Where regional, local, or other considerations are also relevant, other persons or agencies might be included in the decision process as well. All decisions of National Register eligibility are made within the general framework specified by the Keeper of the RHP, as set forth in 36 CFR Part 60.4 (*7*).

Preservation in this context has generally been taken to mean the physical retention of the structure at its original or an alternate location with particular attention to protecting those elements of design, materials, and workmanship that support the quality of historic importance. Thus, preservation may include continued use for vehicular purposes at the same or a less demanding site, or use for nonvehicular purposes such as pedestrian or bicycle crossings, architectural adaptations, and historical ruins or monuments. In the present context, elements of cultural resource management such as dismantling and storing for future use, salvage of structural or decorative elements for reuse, display or research; and documentation to Historic American Engineering Record (HAER) or other standards are not considered forms of preservation.

The purpose of this synthesis is to identify and describe the current practices and experience of state and some local transportation agencies in dealing with the preservation of historic bridges in their jurisdiction. It emphasizes policies, decision criteria (or models), and administrative practices used to determine which bridges to preserve and the specific preservation option to be employed with each. It also emphasizes the experience of highway agencies in administering these policies and practices, describes a number of successful examples and identifies some unresolved issues. The synthesis will be useful to those in the highway transportation and preservation communities who influence and execute decisions involving historic bridges.

The synthesis is intended to complement *NCHRP Synthesis 101: Historic Bridges—Criteria for Decision Making*, published in 1983 (*6*), drawing on that work by reference. The earlier document was written at a time (1982–1983) when highway and transportation agencies, as a group, had been involved with the "historic bridge issue" for less than a decade and were only in the earliest stages of developing strategies for arriving at decisions regarding those structures. Money designated for bridge replacement and rehabilitation was being made available to highway agencies in annually increasing amounts in response to heightened concern over safety, and the preservation community was becoming increasingly alarmed at the rate at which this new emphasis was destroying or irrevocably altering some of the best examples of the nation's rich bridge building heritage. As a result, historic bridge investigations were becoming an increasingly larger factor in the management of cultural resources and there was concern that failure to deal with this issue skillfully risked unnecessary and costly delays to needed bridge projects. *NCHRP Synthesis 101* reviewed the background of that issue and discussed progress in developing workable solutions that could be supported by proponents of these often competing interests. The present work gives an overview

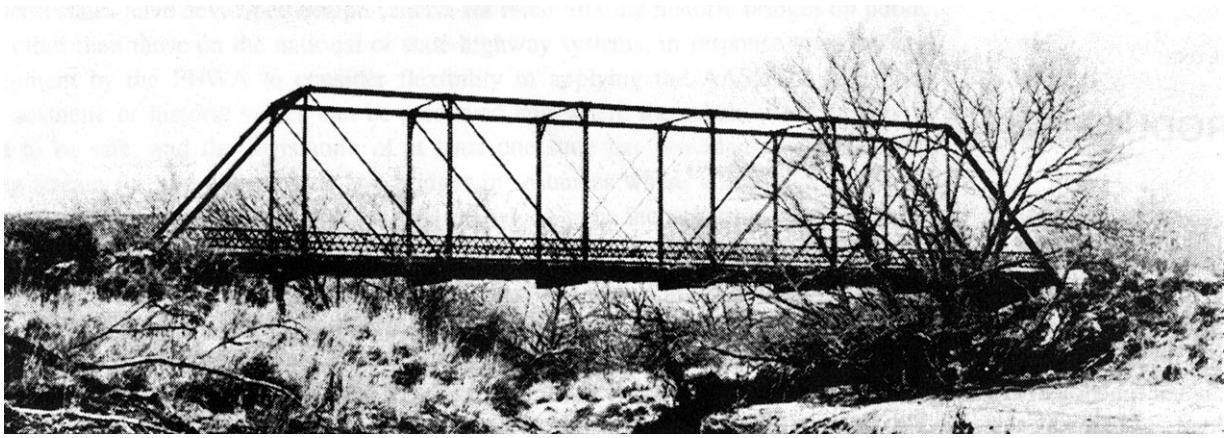

FIGURE 1 Rio Hondo Bridge at Picacho.

of *NCHRP Synthesis 101* and summarizes current issues in historic bridge preservation (chapter 1), seeks to identify preservation trends and the reasons for those trends (chapter 2), focuses on the policies and practices that have evolved within highway agencies during the intervening decade and one-half since *NCHRP Synthesis 101* was published and highlights those that have been particularly effective (chapter 3). The present work also complements a current project sponsored by FHWA to synthesize existing information and practice regarding the technical aspects of evaluating, rehabilitating, and preserving historic bridges; and to recommend standards and guidelines appropriate for such work (*8*).

This synthesis draws on published and unpublished documents of state highway and transportation agencies, interviews with persons currently involved with historic bridge issues, and responses to a questionnaire mailed to the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. Local jurisdictions (counties and municipalities) identified by the respondents to the survey as having been unusually successful in managing their historic bridges were also contacted by telephone, as were representatives of the FHWA, NPS, and USFS. The survey questionnaire itself is included as Appendix A. Individual responses to all of the questions were tabulated and although not presented here, are drawn on at appropriate points in the text and the 38 responding agencies are listed in Appendix B.

BACKGROUND

Thirty-five miles west of Roswell, New Mexico, where U.S. 70 traverses the rural Hondo Valley at Picacho, a modest sign erected by that state's transportation agency describes a seven-panel, pin-connected, metal truss bridge that carries a recently abandoned segment of an unpaved county road over the Hondo River (*9*):

> RIO HONDO BRIDGE
>
> ORIGINALLY BUILT IN 1902 OVER THE PECOS RIVER, AND LATER MOVED TO THIS SITE, THIS PRATT TRUSS BRIDGE IS THE LONGEST AND OLDEST OF ITS KIND REMAINING IN NEW MEXICO

The Rio Hondo Bridge (Figure 1), barricaded and left standing on its original alignment, has been replaced by a modern structure of reinforced concrete on a parallel alignment, and now serves as a historical monument to the technology of an earlier time. That the structure survives at all is due, in the first instance, to the ease with which these early truss bridges could be disassembled and re-erected at alternate locations and, in the second, to the accommodation that has been forged between highway agencies and preservation interests. It is reasonable to speculate that had the Rio Hondo Bridge been replaced in the early 1980s, when *NCHRP Synthesis 101* was published, it would have been salvaged for its value in the scrap metals market, as would most bridges of its age and style in other parts of the country. In fact, in 1981, an FHWA survey reported only 13 states as having completed an inventory of any of their historic bridges (*10*) and 2 years later only five of those had identified candidates for RHP listing (*6*). New Mexico was then in the preliminary stages only of developing its own inventory (*6*).

NCHRP Synthesis 101

The issues addressed in *NCHRP Synthesis 101* in the early 1980s were relatively uncomplicated and dealt mainly with the need to increase awareness of the historic bridge "problem." They included:

- Promoting a clearer understanding within both the transportation and the preservation communities of the concerns of the other with regard to historic bridges;

- Clearly setting forth in one place the federal legislation and other actions that give legitimacy to both sets of those concerns; and
- Identifying the processes that were being developed within some highway agencies to assure that reasoned and consistent decisions would be made on historic bridges in a manner that did not needlessly delay projects.

An unstated assumption of the synthesis was that it was in the best interest of highway agencies to acknowledge that historic bridges would become an increasingly larger factor in cultural resource considerations and to begin developing strategies that could be used to address that issue in ways that cause as little interruption to needed bridge replacement and rehabilitation projects as possible.

The synthesis traced development of the then-current federal Highway Bridge Replacement and Rehabilitation Program (*3*) from the December 1967 collapse of the Point Pleasant Bridge over the Ohio River (*11*), as well as national preservation policy from its inception in the Historic Sites and Buildings Act of 1953 (*12*), and emphasized the conflicting values embodied in those legislative streams as they relate to historic bridges. Particular attention was given to the provisions of Section 4(f) of the U.S. Department of Transportation Act of 1966 (*13*) and Section 106 of the National Historic Preservation Act of 1966 (*14*) and their subsequent amendments. It reviewed the rationale, methods, and status of historic bridge inventories as well as methodologies then being used to rank individual bridges for National Register eligibility. It also discussed technical, legal, and financial constraints on the preservation of historic bridges, and it presented a hierarchy of preservation alternatives for affected bridges.

The synthesis also included a generalized decision model for treating historic bridges. The model, Figure 2, was less an original construct than a logical outgrowth of patterns that were already emerging in various highway and transportation agencies around the country, notable in Virginia (*6,15–17*), North Carolina (*6*) and Frederick County, Maryland (*6,18,19*). The findings suggested that such decisions evolve from at least four sets of considerations: preservation warrants, preservation feasibility, preservation alternatives, and preservation policy.

1. *Preservation Warrants*—Assessments of National Register eligibility. For a cultural resource as numerous and diverse as bridges, this is best done after surveying the properties within the jurisdiction and then ranking their relative importance against national criteria as well as criteria specific to that jurisdiction.
2. *Preservation Feasibility*—The practical feasibility of preserving each bridge eligible for the RHP. This can be done by assessing the importance of a variety of technical, legal, and financial considerations that may constrain one or more of the desirable preservation alternatives.
3. *Preservation Alternatives*—Viable preservation alternatives identified after consideration of input

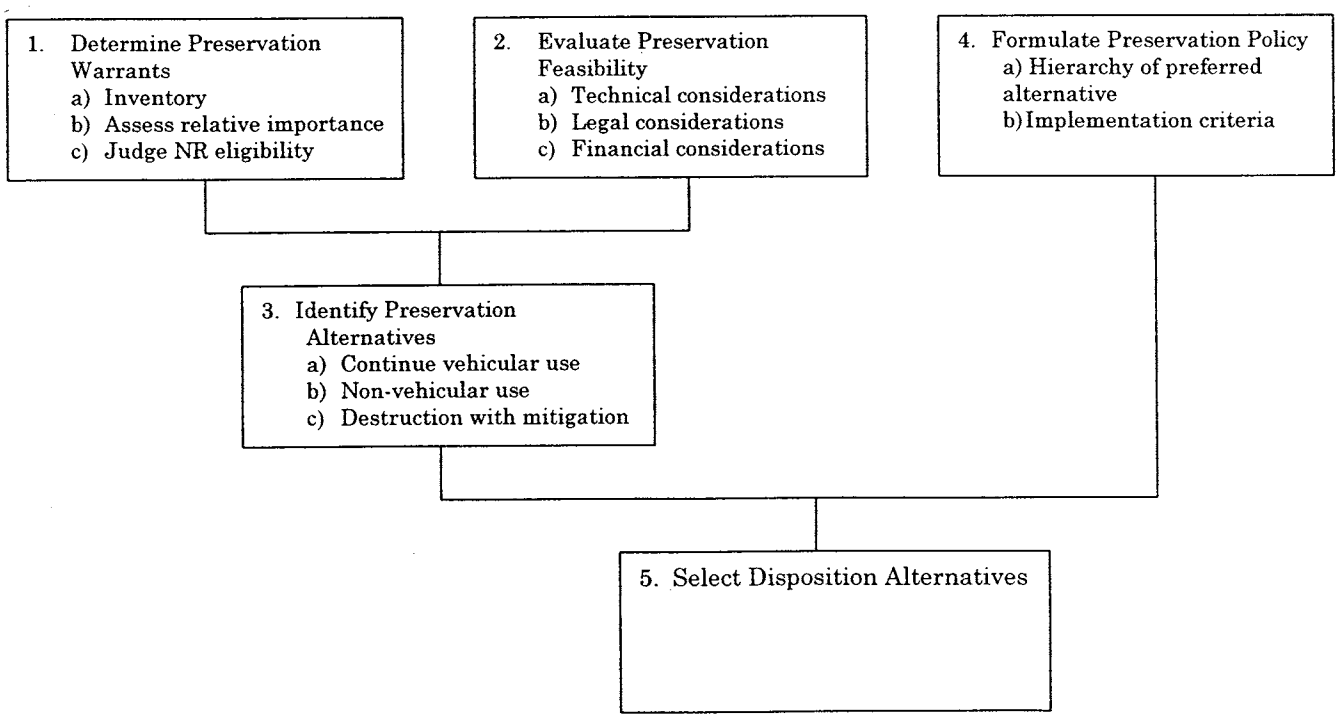

FIGURE 2 A model for decisions regarding historic bridges.

from 1 and 2, above. These may include alternatives that permit the bridge to continue in service for vehicular purposes at the same or at an alternate site, that remove it from vehicular service but permit continued use either as a bridge or in some adaptive mode, or that incorporate some form of mitigation such as recordation, if the bridge is destroyed.

4) *Preservation Policy*—An ordering of generic preservation alternatives from most to least desirable, together with a statement of the conditions that need to be met in order for each alternative to be implemented. This will provide a checklist against which to weigh specific alternatives identified for each bridge to assure that the best use possible is made of each of the historic structures.

The issues addressed by *NCHRP Synthesis 101* have for the most part been resolved. Highway and transportation agencies are now well aware of the status given to historic bridges by the preservation community and the statutory legitimacy of that recognition. The staffs of many of these agencies, particularly at the state level, now include cultural resource specialists trained in architectural and/or industrial history and many have taken commendable initiatives to develop and interpret the history of surface transportation within their own jurisdiction as a context for evaluating the importance of their historic bridges. This process has been aided by the emergence of consulting firms and joint venture efforts that have fielded teams of engineers and historians working together with the agencies to assess not only the technological and historical importance of the bridges but preservation feasibility and alternatives, as well.

Since the publication of *NCHRP Synthesis 101*, most states have completed an inventory of at least some of their historic bridges. A number have updated their original inventory to reflect a more recent inventory "cut-off" date or to include bridge types or jurisdictions not included in their original inventory, such as bridges on local systems (*20–23*). Others, including Delaware, Georgia, Indiana, Massachusetts, Michigan, New York, Ohio, Pennsylvania, Tennessee, Washington, Wisconsin, and Virginia are in the process of updating or extending their original inventory. Montana (*24*), New Jersey (*25*), and Washington (*26*) are three states whose agencies have included or are including railroad bridges, even though most of these structures are privately owned and their inventory does not qualify for federal funding. Largely as a result of these efforts, bridges listed or eligible for listing in the National Register have increased from about 650 in 1980 (*6*) to more than 8,000 as of this writing (extrapolated from Question 3 of the study questionnaire). While this dramatic increase was undoubtedly accelerated by a provision of the Surface Transportation and Uniform Relocation Assistance Act of 1987 that required states to inventory their historic highway bridges, most state highway agencies now enthusiastically acknowledge the value of these inventories to the planning process. Seventy-five percent of those responding to Question 6 of the study questionnaire indicated that such inventories have proven to be an extremely useful planning tool (Table 1).

TABLE 1

STATES SATISFACTION WITH HISTORIC BRIDGE INVENTORIES

		Percent
5	Extremely useful	75.0
4		13.9
3	Moderately useful	8.3
2		0.0
1	Not at all useful	2.8
Total		100.0

Based on questionnaire responses from 36 states.

Current Issues

About 90 percent of the issues cited by respondents to the study questionnaire, when asked to identify the "three most important issues with regard to managing historic bridges" (Question 20), can be grouped under one of six general headings: *financial, public awareness and interest, alternative uses, safety and liability, historic integrity and historic significance*. These issues are not new. However, the specific focus within each category has changed over time as the sensitivity to historic bridges at all levels of government has increased, as new technical and financial resources have been brought to bear, and as knowledge and experience in dealing with this particular cultural resource has become more widespread. The experiences of highway agencies that have had noteworthy success in dealing with these issues are presented in chapter 3.

Financial

Financial issues continue to be a major constraint on the preservation of historic bridges. Even when preservation is seen as a desirable outcome by all parties and the technical and legal problems can be overcome, the issue often comes down to whether or not some agency or organization is willing or able to spend the money required to restore and maintain the structure, either with or without vehicular traffic. If the bridge must be moved to an alternate location, the cost of dismantling, transporting, and re-erecting it on a new foundation prepared for the purpose represents a substantial expenditure that may exceed the cost of a new structure. However, most of the interests that seek preservation are usually modestly funded and most highway agencies do not have the authority to maintain properties that are no longer part of or support the highway system (*6*).

Recent federal legislation (*4*) has helped but not solved the problem. Reasonable costs of preserving or protecting historic integrity are now eligible for reimbursement under rehabilitation projects as long as the load capacity and safety features of the rehabilitated bridge are adequate for the structure's intended use. Also, the law provides that preservation costs, up to the estimated cost of demolition are now eligible when the bridge is proposed for demolition or removal from vehicular service within the system. An important deterrent to the use of federal funds for this purpose is that such activities do not generate new monies but must compete with other replacement and rehabilitation needs of the state's highway system. However, even when federal funds are used for such purposes, there is reluctance on behalf of local jurisdictions and private recipients to assume additional preservation costs beyond those estimated for demolition as well as the costs of continued maintenance, neither of which qualifies for additional federal funds. Preservationists argue that these additional costs can be significant because the cost of actual preservation can exceed the estimated cost of demolition. Also, once funded, the bridge is henceforth disqualified under present law for other sources of federal monies (*4*), though pending federal legislation may alter that situation.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) set aside $2.64 billion over the 6-year life of the act for the states to fund "transportation enhancement activities." Applicants for enhancement funds need not use the monies for specific transportation projects but may use them for projects in areas served by a road or facility receiving federal funding, including several categories under which historic bridges qualify. Notwithstanding such assistance, many local jurisdictions and preservation organizations that are otherwise logical trustees of historic properties still lack the funds to match their share of the cost or to maintain the structure once it is preserved. A case in point is the rural town of Hadley, New York, a community of modest tax base located in an economically depressed region of the southeastern Adirondack Mountains. Hadley's town council hired a consultant to prepare its application for an enhancement grant to rehabilitate and convert to a pedestrian crossing an abandoned bridge (*27*). The truss bridge dated from 1885 and was one of the most unusual and esthetically pleasing structures surviving anywhere from the last quarter of the 19th century (Figure 3) (*28*). The application was successful but, by the time the $349,000 grant was awarded, the community's finances were so tenuous that a newly elected town council was unwilling to fund the $67,800 local share and to obligate itself for the continuing cost of the structure's maintenance (*Thomas Mason, Supervisor, Town of Hadley, NY, personal communication*).

Public Awareness and Interest

While the options for treating historic bridges continue to be contested, some vigorously, there now exists a broad base of awareness and acceptance, at least at the federal and state levels, that bridges can be legitimate subjects of preservation interest and there is a general willingness to

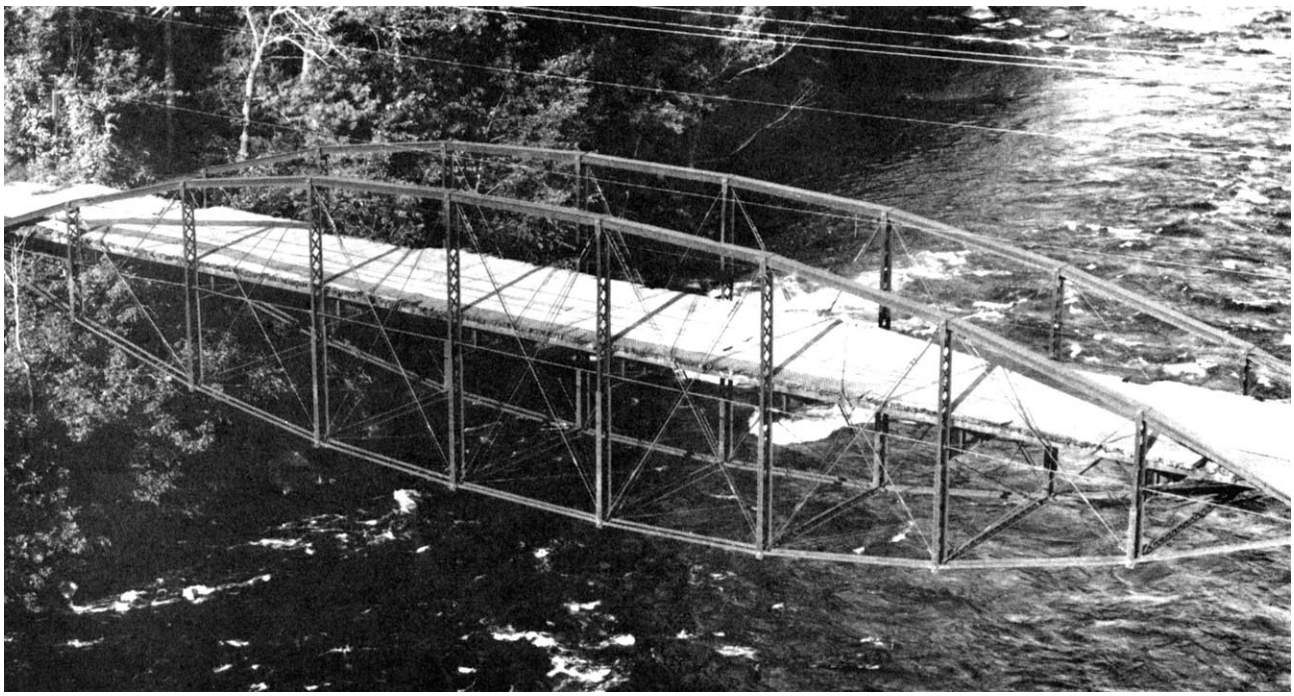

FIGURE 3 Old Corinth Road Bridge over the East Branch of the Sacandaga River, Hadley, New York *(photo credit: Jet Lowe)*.

make good faith efforts to seek resolutions that satisfy preservation values. In contrast, questionnaire respondents indicated that there is a perception, at least among state agencies, that local jurisdictions and their constituents, as a group, are less sensitive to the importance of historic bridges, less familiar with regulations that apply to them, less knowledgeable with regard to the options for their use and interpretation, and less willing to commit scarce resources to their preservation than at the state and federal levels. Of course, there are notable exceptions, such as the often-cited example of Frederick County, Maryland (*6,18,19*). According to *Preserving Historic Bridges* (*29*), a recent publication of the National Trust for Historic Preservation (NTHP), the most important element in the successful, long-term preservation of historic bridges is strong local support. The NTHP argues further that, "Public understanding of the importance (of bridges) . . . as well as a familiarity with federal programs to encourage (their) preservation, is key to their successful rehabilitation and reuse . . ." (*29*).

TABLE 2

STATES' SUCCESS IN MOVING HISTORIC BRIDGES TO ALTERNATIVE IN-STATE TRANSPORTATION LOCATIONS

		Percent
5	Extremely successful	10.8
4		2.7
3	Moderately successful	37.8
2		27.0
1	Not at all succcessful	21.6
Total		99.9

Based on questionnaire responses from 37 states

TABLE 3

STATES' SUCCESS IN MARKETING HISTORIC BRIDGES THROUGH ADVERTISING

		Percent
5	Extremely successful	5.9
4		8.8
3	Moderately successful	23.5
2		44.1
1	Not at all successful	17.6
Total		99.9

Based on questionnaire responses from 34 states

Alternative Uses

Closely related to issues of public awareness and interest are those that address the difficulty of finding alternative uses, either vehicular or non-vehicular, for historic bridges that are removed from their original location. The subject is discussed at greater length in chapter 3, but suffice it to say here that most states have not been overly successful in moving historic bridges to alternate transportation locations within their states. Only 13.5 percent of study questionnaire respondents indicated more than moderate success in such efforts; and 48.6 percent, less than moderate success (Table 2). Also, it does not appear that the anticipated benefit of publicly advertising the availability of such bridges, as now required by the 1987 Act, has materialized (Table 3). Some believe that this situation can be improved if local political jurisdictions and historical groups become better acquainted than they now are with the value and potential use of historic bridges. Others suggest that the highway agencies themselves need to become more aggressive in identifying innovative uses for their historic bridges (Question 17).

Safety and Liability

The driving force behind the Highway Bridge Replacement and Rehabilitation Program has been concern for the public's safety. The older a bridge is the more likely that it has been weakened by one or more time-related mechanisms of alteration such as corrosion or freeze-thaw damage, the less likely it is to have been designed for modern traffic loads, and the less likely that its width, overhead clearance, approach alignments and/or hydraulic clearance are consistent with current design standards. Such deficiencies are categorized by bridge engineers as either structural or functional (*30, 31*). A structural deficiency is one that affects the capacity of the bridge to carry the desired traffic without collapsing or without undue deflection or vibration. A functional deficiency is one that affects the capacity of the bridge to allow efficient and safe movement of the intended traffic and to maintain adequate clearance beneath the bridge. While deficiencies in these two categories generally arise from different sets of conditions and require different approaches to remediation, both do impact safety. Further, a structural deficiency may have functional implications and a functional deficiency, structural implications.

With concern heightened by several recent catastrophic bridge failures, bridge engineers take safety issues extremely seriously and tend to act cautiously when faced with replacement and rehabilitation decisions. They are concerned that the desire to maintain historic integrity of on-system bridges can be incompatible with maintaining safe crossings and that, when structures are removed from the system, regular inspection and maintenance can no longer be assured. One team of legal investigators has suggested that the focus of federal legislation on historic preservation places the importance of the continued existence of old bridges above safe travel for the public (*32*). Preservationists, on the other hand, respond that highway engineers sometimes use safety and liability concerns as an excuse for their failure to seek creative solutions that do not endanger the public.

Historic Integrity

Closely related to safety and liability is the question of historic integrity, that is, how to rehabilitate a historic bridge so that it can be kept in service with the assurance of safety, but without significantly altering those elements that are important to its historic character. The regulations implementing the Highway Bridge Replacement and Rehabilitation Program define rehabilitation as, "The major work required to restore the structural integrity of a bridge as well as work necessary to correct major safety defects" (*1*). In order for HBBRP funds to be applied to a bridge, its sufficiency rating, a numerical measure (from 0 to 100) of the structure's sufficiency to remain in service at its present location (*30,31*), must be less than a value of 80 and the rehabilitation must remove the bridge from the eligibility list (*1*). Highway engineers have typically interpreted this to mean that rehabilitation requires the structure to be brought up to the current AASHTO guidelines. These guidelines, which deal primarily with design of new structures, set conditions on load capacity, deck geometry, overhead and waterway clearance, and approach roadway alignment that often cannot be met without seriously altering historic integrity.

Yet, the HBRRP now allows bridge engineers flexibility in applying those conditions to the rehabilitation of historic bridges where safety can be assured (*5*). However, in the absence of a national consensus document or guidance manual that better integrates safety practices with historic preservation needs, engineers continue to be concerned with exposing the traveling public to what may be an increased risk of injury or, secondarily, themselves or their agency to an increased liability risk. The issue is complicated by reports that FHWA division administrators have been inconsistent in their approval of exceptions to the AASHTO guidelines.

Historic Significance

In spite of the major efforts of the last 25 years to inventory historic bridges and to identify NR-eligible properties, questionnaire respondents indicated frustration over what they see as the arbitrary nature of many of these designations. Because the NR criteria themselves are so broad and because bridges exist in such great numbers and diversity, decisions of eligibility have been left to the discretion of the interested parties in the individual states working within their particular contextual framework, and often in the absence of complete information. Even though significant progress had been made in negotiating the criteria for such decisions with SHPOs, and in managing the designation process itself, such decisions are sometimes "second guessed" because original inventory "cut-off" dates were thought to be too conservative, because new information becomes available, or because local interest in preservation materializes only after the prospect of replacement or closure becomes known.

Federal and State Legislative Requirements

The current federal program that provides most of the funding for highway bridge replacement and rehabilitation and that has had, by far, the greatest impact on historic bridges, is the result of a stream of legislation that began with the Federal-Aid Highway Act of 1968 (*33*). That act established the National Bridge Inspection Program (*34,35*), the first of a series of legislative initiatives in response to the heightened concern for bridge safety that was precipitated by the 1966 collapse of the Point Pleasant bridge (*11*). The bridge inspection program was followed closely by the Special Bridge Replacement Program, established by the Federal-Aid Highway Act of 1970 to inspect and classify all federal-aid bridges, to rank them numerically for their sufficiency for remaining in service at their present locations, and to set priorities for their replacement (*30,31*). That act also authorized $250 million for demolition and replacement of substandard and unsafe bridges, funding that was renewed in increasing amounts in the Federal-Aid Highway Acts of 1973 and 1976.

It was during the mid-1970s that the preservation community became fully alerted to the potential threat of these programs to historic bridges, due in large measure to the efforts of the newly organized Historic American Engineering Record (*38–41*). The Surface Transportation Assistance Act of 1978 increased that threat by extending the program to include bridges off the federal-aid system (where many of the important early bridges were to be found) and at a greatly increased level of funding. It did offer modest relief by permitting rehabilitation rather than complete replacement, provided the sufficiency rating could be raised to a specified minimum value. This new initiative, called the Highway Bridge Replacement and Rehabilitation Program, was refunded in the Surface Transportation Assistance Act of 1982. However, it was not until the Surface Transportation and Uniform Relocation Assistance Act of 1987 that historic bridges were specifically identified for any special consideration in the federal program. By that act, the Congress decided it to be:

> . . . in the national interest to encourage the rehabilitation, reuse and preservation of bridges significant in American history, architecture, engineering and culture. Historic bridges are important links to our past, serve as safe and vital transportation routes in the present, and can represent significant resources for the future (*4*).

It also lent major support to preservation interests by charging the Secretary of Transportation to: " . . . encourage the inventory, retention, rehabilitation, adaptive

use, and future study of historic bridges" and " . . . require each state to complete an inventory of all bridges on and off the Federal-aid system to determine their historic significance." The Act also required any state proposing to demolish a historic bridge as part of a federally funded replacement project to first make the bridge available for donation to a public or responsible private entity, provided the recipient would agree to maintain the bridge and its historic elements and assume all legal and financial responsibilities. It also, for the first time, permitted reasonable costs for preserving or protecting historical integrity to be eligible for reimbursement as long as load capacity and safety features of the rehabilitated bridge could be judged adequate for the structure's intended use; and it allowed preservation costs, up to the estimated cost of demolition, to be eligible when the bridge was proposed for demolition or removed from active service within the system.

Further, support for preservation of historic bridges was included in the Intermodal Surface Transportation Efficiency Act of 1991 (*5*), which provided more flexible standards for rehabilitation projects, including bridges, by encouraging approval in cases where AASHTO guidelines may not be met but where the rehabilitated facility was judged to be safe. It also strengthened planning requirements to assure consideration of historic preservation earlier in project planning and established a program of "transportation enhancements" by setting aside a pool of money for projects in one of 10 specific categories typically considered beyond the usual mandate of highway agencies, several of which include bridges:

1) Facilities for pedestrians and bicycles;
2) Acquisition of scenic easements or historic sites;
3) Scenic or historic highway programs;
4) Landscaping and other scenic beautification;
5) Historic preservation;
6) Rehabilitation and operation of historic transportation buildings, structures, or facilities;
7) Preservation of abandoned railway corridors for pedestrian and bicycle trails;
8) Control and removal of outdoor advertising;
9) Archeological planning and research; and
10) Mitigation of water pollution from highway runoff.

The most recent federal legislation to affect historic bridges was passed in the summer of 1998. The Transportation Equity Act for the 21st Century (TEA-21) (*42*) adds three new "stand alone" enhancement categories:

11) Provision of Safety and Educational Activities for Pedestrians and Bicyclists;
12) Establishment of Transportation Museums; and
13) Mitigate or Reduce Vehicle Caused Wildlife Mortality While Maintaining Habitat Connectivity.

It also modifies Category 3 by adding the phrase, " . . . including the addition of tourist and welcome center facilities" (that are linked to scenic or historic sites). The extent to which any of these provisions will affect historic bridges depends on interpretation by the FHWA. The act also included a substantial increase in funding for the Enhancement Program, $630 million for the 6-year life of the act and a new program for historic covered timber bridges. Funding in the amount of $10 million for each of the fiscal years 1999 through 2003 will be available to the states on a project-by-project basis and may be used for repair, rehabilitation, relocation, or protection of eligible structures. The act also directs the Secretary of Transportation to: 1) research and disseminate information on the history of historic covered bridges and the techniques of their construction; and 2) research methods for protecting historic covered bridges from rot, fire, natural disasters and traffic loads.

Even though historic bridges were not identified for specific consideration within the federal bridge program until the 1987 act, they have been afforded the same protection as all historic and cultural resources since the mid-1960s. Federal legislation protecting historic bridges, as well as attendant policies and regulations, have been reviewed by a number of writers (*6,29,32,43-46*), the most recent and most thorough being that of Eilers and Vedder (*32*).

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 USC par. 470 et seq. [1992] requires federal agencies to take into account the effect of their proposed undertakings on properties listed or eligible for listing in the National Register before the expenditure of federal funds or the issuance of any licenses. While very few bridges have been designated as National Historic Landmarks, Section 106 does afford such properties additional protection in that agencies whose actions may directly and adversely affect them must make every effort to minimize that harm (*29*). The federal agency must also allow the Advisory Council on Historic Preservation, a 19-member body established by the NHPA to advise the President and Congress on matters relating to historic preservation, a reasonable opportunity to comment on the effects of these undertakings on the historic properties. In practice, agreements to mitigate potential damage to historic properties are negotiated at the state (or other jurisdictional) level and submitted to the Council for Advisory comment.

Section 4(f) of the U.S. Department of Transportation Act (DOTA) of 1966, as amended (49 USC par.1653(f) and par.18(a) of the Federal-Aid Highway Act of 1968, 23 USC par.138) (hereinafter referred to jointly as Section 4(f)), provides that the Secretary of Transportation shall not approve any program or project that requires the use of any land from a historic site of national, state, or local

significance unless there is no feasible and prudent alternative to the use of such land and all possible efforts are made to minimize harm to the historic site. By allowing conditional approval of projects designed to preserve historic value even though they may not meet AASHTO standards, Section 109q of ISTEA, the 1991 Transportation Act, encourages a more flexible interpretation of what is "feasible and prudent" (*29*).

While Section 106 of the NHPA, Section 4(f) of the DOTA and the bridge programs collectively, exert the greatest legislative influence on transportation projects that include historic bridges, other federal laws impose requirements as well. Principal among these is the National Environmental Policy Act (42 USC par.4321-70d, 1994) (NEPA). NEPA is best known for its requirement of an Environmental Impact Statement (EIS) as a full-disclosure document on proposed federal actions that will significantly affect environmental quality, including important historical and cultural resources. Such resources need not be National Register-listed or eligible in order to trigger the requirement for an impact statement, however, in the practice of state highway agencies, they usually are (*29*). The EIS must describe the impact of the proposed action, potential adverse effects, and possible alternative actions; and the agency must inform the public of the findings of the review and demonstrate that the impact was considered (*29,32*). However, the requirements of NEPA are procedural and do not impose an obligation on agencies to implement the most environmentally favorable alternatives (*32*). Even outside of the context of preparing an EIS, NEPA requires that every federal agency's policies, regulations, and public laws be interpreted and administered to the fullest extent possible in accordance with NEPA's substantive goals, including historic preservation (*29*).

In addition to federal legislation, many states have passed omnibus environmental quality and/or historical preservation acts that impose requirements on public works projects that impact historic properties or archeological resources. Without specifically identifying them, such acts are generally taken to include bridges, particularly those that have been determined eligible for listing with the National Register or that are listed in the state's own register of historic places. Bridges have also been protected as contributing components of scenic or historic highways identified at the state level. Oregon, for instance, has been particularly aggressive in this regard, establishing in 1983 a historic and scenic highway program (*47*) that provided limited protection for 11 of Oregon's historic bridges and 26 other structures included in the Historic Columbia River Highway District (*48*) nominated that same year for the National Register. The Oregon program is discussed in greater detail in chapter 3. More recently, some states have restricted the flexibility of their own agencies when disposing of or altering properties under their jurisdiction that have historical value, and these of course include bridges. An example of the latter is California which, in 1980, amended its Public Resources Code to require all state-owned structures over 50 years of age to be inventoried and their eligibility for NRHP or state landmark listing to be determined. It also invoked protections against arbitrary demolition or rehabilitation similar in substance to those of Section 4(f) of DOTA. The California legislation defines a structure as any immovable man-made work used to shelter or promote a form of human activity (*49*). Tennessee has sought similar protection for its state-owned historic properties but through a different, and possibly less enforceable, approach. In 1988, its legislature required that all state agencies elicit comment from the state's historical commission prior to demolishing, altering or transferring any property that is or may be of historical, architectural, or cultural significance. Tennessee's building commission must consider but is not bound by the historical commission's comments (*50*).

The above examples notwithstanding, very few states have passed laws that target bridges specifically. One exception is New Hampshire, which, as early as 1963, enacted legislation requiring a public hearing by the state's Historical Commission whenever one of its remaining covered bridges was being considered for demolition. Apparently responding to the capacity of these picturesque structures to attract tourists and to the fact that state financial aid was already available for their rehabilitation, New Hampshire declared the retention of its remaining wooden covered bridges to be public policy (*51*). In 1985, the state legislature of Maine found it to be in that state's best interest to maintain and, where necessary, improve its historically important bridges. In so doing, it identified 11 such bridges by name (*52*), a list that was expanded to 13 in 1987 (*53*). In 1986, the Indiana legislature authorized the dedication of $500 per bridge per year from its motor vehicle highway account for maintenance of each of its approximately 92 publicly owned, covered timber bridges, the monies to be paid directly to the counties in which the bridges were located (*54*); and, in 1991, Oregon legislated a maintenance and rehabilitation program under the auspices of a covered bridge advisory committee with a biennial allocation of $220,000 to be shared on a 50/50 matching basis with city and county jurisdictions that owned the bridges (*55*).

The most comprehensive and fully elaborated legislative initiative yet to deal at the state level with historic bridges is that enacted by Vermont in 1993 (*56*). Vermont, in effect, has given its historic bridge preservation policy the status of law, including: a hierarchy of preferred methods of protection for all historic bridges, funding mechanisms, and the assignment of administrative responsibility between the state's agencies of transportation and historic

preservation. Perhaps more than any other state, Vermont's economy is dependent on the attraction to tourists of its rural character, and that character is perceived to be related as much to the visual impact of its roadscapes as it is to the viability of its small farms and communities. Accordingly, in 1996 Vermont took additional legislative action to provide funding from non-federal sources for improvements to its secondary highways in order, among other reasons, to allow more flexibility in the design of treatments for its roads and its historic bridges (*57*). This important program is also discussed in greater detail in chapter 3.