

September 2008

# HIGHWAY BRIDGE PROGRAM

## Clearer Goals and Performance Measures Needed for a More Focused and Sustainable Program





Highlights of [GAO-08-1043](#), a report to congressional committees

## Why GAO Did This Study

The August 1, 2007, collapse of a Minnesota bridge raised nationwide questions about bridge safety and the U.S. Department of Transportation's (DOT) ability to prioritize resources for bridges. The Highway Bridge Program (HBP), the primary source of federal funding for bridges, provided over \$4 billion to states in fiscal year 2007. This requested study examines (1) how the HBP addresses bridge conditions, (2) how states use HBP funds and select bridge projects for funding, (3) what data indicate about bridge conditions and the HBP's impact, and (4) the extent to which the HBP aligns with principles GAO developed, based on prior work and federal laws and regulations, for re-examining surface transportation programs. GAO reviewed program documents; analyzed bridge data; and met with transportation officials in states that have high levels of HBP funding and large bridge inventories, including California, Missouri, New York, Pennsylvania, Texas, and Washington.

## What GAO Recommends

GAO is recommending that DOT work with Congress to identify specific program goals in the national interest, develop and implement performance measures, incorporate best tools and practices, and review the program's funding mechanisms. DOT officials generally agreed with the findings and recommendations in this report, providing technical clarifications which we incorporated, as appropriate.

To view the full product, including the scope and methodology, click on [GAO-08-1043](#). For more information, contact Katherine Siggerud at (202) 512-2834 or [siggerudk@gao.gov](mailto:siggerudk@gao.gov).

# HIGHWAY BRIDGE PROGRAM

## Clearer Goals and Performance Measures Needed for a More Focused and Sustainable Program

### What GAO Found

Based on information gathered during bridge inspections that are generally conducted every 2 years, the HBP classifies bridge conditions as deficient or not; assigns each bridge a sufficiency rating reflecting its structural adequacy, safety, serviceability, and relative importance; and uses that information to distribute funding to states to improve bridges. Deficient bridges include those that are structurally deficient, with one or more components in poor condition, and those that are functionally obsolete, with a poor configuration or design that may no longer be adequate for the traffic they serve. While each state's HBP apportionment amount is largely determined by bridge conditions and bridges generally must be below a certain condition threshold to qualify for HBP funding, other bridges are also eligible for HBP funds because states may use the funds for a broad array of other purposes, such as bridge systematic preventive maintenance projects.

The HBP affords states discretion to use HBP funds and select bridge projects in a variety of ways. Some states are focused on reducing their number of deficient bridges, while other states are pursuing different bridge priorities. For example, California has focused on seismically retrofitting bridges, a safety concern for that state. Furthermore, some states have developed tools and approaches for selecting bridge projects that go beyond those required by the HBP, such as bridge management systems and state-specific bridge condition rating systems.

Bridge conditions, as measured by the number of deficient bridges and average sufficiency rating, improved from 1998 through 2007. However, the impact of the HBP on that improvement is difficult to determine, in part, because (1) the program provides only a share of what states spend on bridges and there are no comprehensive data for state and local spending on bridges and (2) HBP funds can, in some cases, be used for a variety of bridge projects without regard to a bridge's deficiency status or sufficiency rating.

The HBP does not fully align with GAO's principles, which are based on GAO's prior work and federal laws and regulations, in that the program lacks focus, performance measures, and sustainability. For example, the program's statutory goals are not focused on a clearly identified federal or national interest, but rather have expanded from improving deficient bridges to supporting seismic retrofitting, preventive maintenance, and many other projects, thus expanding the federal interest to potentially include almost any bridge in the country. In addition, the program lacks measures linking funding to performance and is not sustainable, given the anticipated deterioration of the nation's bridges and the declining purchasing power of funding currently available for bridge maintenance, rehabilitation, and replacement. Once the federal interest in bridges is clearly defined, policymakers can clarify the goals for federal involvement and align the program to achieve those goals. HBP sustainability may also be improved by identifying and developing performance measures and re-examining funding mechanisms.

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# Contents

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<b>Letter</b>		1
	Results in Brief	4
	Background	7
	The HBP Classifies Bridges Based on Their Condition and Provides Funds to States to Improve Bridge Conditions	11
	State DOTs Exercise Discretion in Determining How to Use HBP Funds and Select Bridge Projects for Funding	18
	Available Data Indicate That the Overall Condition of the Nation's Bridges Has Improved, but the Impact of the HBP Is Difficult to Determine	26
	The HBP Lacks Focus, Performance Measures, and Sustainability	32
	Conclusions	39
	Recommendation for Executive Action	40
	Agency Comments	41
<b>Appendix I</b>	<b>Scope and Methodology</b>	43
<b>Appendix II</b>	<b>Bridge Maintenance Responsibility, Type of Use, and Age</b>	46
<b>Appendix III</b>	<b>GAO Contact and Staff Acknowledgments</b>	52
<b>Table</b>		
	Table 1: Information on Bridge Characteristics and HBP Funding in States Selected for Site Visits, Fiscal Year 2007	44
<b>Figures</b>		
	Figure 1: Key Factors That May Contribute to a Bridge's Classification as Structurally Deficient	13
	Figure 2: Key Factors That May Contribute to a Bridge's Classification as Functionally Obsolete	15
	Figure 3: Process for Designating Bridges as Eligible for HBP Funding	16

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Figure 4: Trends in Numbers of Bridges and Deficient Bridges, 1998 through 2007	26
Figure 5: Number of Structurally Deficient and Functionally Obsolete Bridges, 1998 through 2007	28
Figure 6: Number of Deficient Bridges, by Bridge Owner, 1998 through 2007	29
Figure 7: Number of Deficient Bridges, by Rural and Urban Classification, 1998 through 2007	30
Figure 8: Application of Key Principles to the HBP	34
Figure 9: Bridge Inventory Count, Deck Area, and ADT, by Owner, 2007	47
Figure 10: Bridge Inventory Count, Deck Area, and ADT, by NHS Classification, 2007	48
Figure 11: Number of Bridges, by Year Built, 2007	48
Figure 12: Deck Area of Bridges, by Year Built, 2007	49
Figure 13: Range of Sufficiency Ratings, by Bridge Age, 2007	50
Figure 14: Bridge Deficiency Status, by Year Built or Reconstructed, 2007	51

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## Abbreviations

ADT	average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
Caltrans	California Department of Transportation
DOT	Department of Transportation
FHWA	Federal Highway Administration
HBP	Highway Bridge Program
HBRRP	Highway Bridge Replacement and Rehabilitation Program
MnDOT	Minnesota Department of Transportation
MoDOT	Missouri Department of Transportation
NBI	National Bridge Inventory
NBIP	National Bridge Inspection Program
NBIS	National Bridge Inspection Standards
NHS	National Highway System
NYS DOT	New York State Department of Transportation
PennDOT	Pennsylvania Department of Transportation
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act—A Legacy for Users
TxDOT	Texas Department of Transportation
WSDOT	Washington state Department of Transportation

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United States Government Accountability Office  
Washington, DC 20548

September 10, 2008

The Honorable Barbara Boxer  
Chairman  
The Honorable James Inhofe  
Ranking Member  
Committee on Environment and Public Works  
United States Senate

The Honorable Carl Levin  
Chairman  
The Honorable Norm Coleman  
Ranking Member  
Permanent Subcommittee on Investigations  
Committee on Homeland Security  
and Governmental Affairs  
United States Senate

The sudden collapse of the I-35W bridge in Minneapolis, Minnesota, on August 1, 2007, raised questions about the overall condition of the nation's bridges and the federal and state roles in funding and ensuring the safety of roads and bridges in the United States. Bridges are critical elements of the nation's transportation network, supporting commerce, economic vitality, and personal mobility. In 2007, there were nearly 600,000 bridges in the United States which carried the nation's passenger car, truck, bus transit, and commercial vehicle traffic over waterways, highways, railways, and other road obstructions. The Highway Bridge Program (HBP), which is administered by the Federal Highway Administration (FHWA) and is the primary federal program used to fund the replacement and rehabilitation and systematic preventive maintenance of bridges nationwide, provided over \$4 billion to states in fiscal year 2007. Since the Minnesota bridge collapse, there have been calls for increased investment in bridge infrastructure. On July 24, 2008, the House of Representatives passed legislation that would authorize an additional \$1 billion for fiscal year 2009 to address bridges, if passed by Congress, and shortly thereafter,

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a Senate companion bill to that legislation was introduced in the Senate Committee on Environment and Public Works.<sup>1</sup>

Calls for increased investment in bridge infrastructure coincide with increasing strains on traditional funding for infrastructure projects because the Highway Trust Fund, which funds the HBP and other highway programs, is projected to incur significant deficits in the years ahead. As a result, in 2007, we added financing the nation's federal transportation infrastructure to GAO's High Risk List.<sup>2</sup> We have also recently called for a fundamental re-examination of government programs and commitments, and have identified federal surface transportation programs as particularly ready for re-examination.<sup>3</sup> Such a re-examination would provide an opportunity to address emerging needs by eliminating outdated or ineffective programs, more sharply defining the federal role in relation to state and local roles, and modernizing relevant programs. Our prior work has found that the expansion of many federal surface transportation programs has resulted in broader program goals and varying priorities, making it difficult to determine the programs' impact. For example, federal transportation programs currently address a wide variety of transportation, environmental, and societal goals beyond the initial federal focus on highway infrastructure, such as promoting transit use in urban areas, supporting air quality improvements and the use of alternative fuels, providing access for transportation-disadvantaged populations (e.g.,

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<sup>1</sup>The House of Representatives passed H.R. 3999, the National Highway Bridge Reconstruction and Inspection Act of 2008, on July 24, 2008, and a Senate companion bill, S. 3338, was introduced in the Senate Committee on Environment and Public Works on July 25, 2008. Besides adding \$1 billion in funds to what was authorized for 2009 for HBP and other related programs in the most recent surface transportation authorizing legislation enacted in 2005, the legislation requires the Department of Transportation to strengthen bridge inspection standards, adopt a risk-based process for prioritizing certain bridge rehabilitation and replacement projects, ensure that states develop performance plans, and take other actions. We discuss the implications of our work on the HBP for related provisions of this proposed legislation in a testimony delivered at a hearing today before the Senate Committee on Environment and Public Works. See GAO, *Highway Bridge Program: Clearer Goals and Performance Measures Needed for a More Focused and Sustainable Program*, GAO-08-1127T (Washington, D.C.: Sept. 10, 2008).

<sup>2</sup>See GAO, *21st Century Challenges: Reexamining the Base of the Federal Government*, GAO-05-325SP (Washington, D.C.: Feb. 1, 2005) and GAO, *High Risk Series: An Update*, GAO-07-310 (Washington, D.C.: Jan. 31, 2007).

<sup>3</sup>GAO, *Surface Transportation: Restructured Federal Approach Needed for More Focused, Performance-Based, and Sustainable Programs*, GAO-08-400 (Washington, D.C.: Mar. 6, 2008).

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elderly, persons with disabilities, and low-income workers), and other goals.

This report responds to your request for information on how the HBP is carried out by federal, state, and local transportation officials, as well as any opportunities for program improvement. Specifically, the report addresses: (1) how the HBP identifies and addresses the condition of the nation's highway bridges, (2) how states use their HBP funds and select specific bridge projects for funding, (3) what available data indicate about the condition of the nation's bridges and the impact of the HBP, and (4) the extent to which the HBP aligns with principles we developed to guide the re-examination of surface transportation programs.

To determine how the HBP identifies and addresses the condition of the nation's bridges, we reviewed relevant legislation, regulations, and FHWA program documents; reviewed FHWA's historical data on the apportionment of HBP funds among states; and interviewed FHWA officials. To determine how state transportation departments use their HBP funds and select specific bridge projects for funding, we visited six states—California, Missouri, New York, Pennsylvania, Texas, and Washington—where we interviewed federal, state, and local transportation officials, including bridge owners and inspectors, and toured bridges. We selected this nongeneralizable sample of states because they have relatively high levels of federal bridge funding, large bridge inventories, and large inventories of bridges eligible for replacement or rehabilitation. To determine what available data indicate about the condition of the nation's bridges and the impact of the HBP, we analyzed data in FHWA's National Bridge Inventory (NBI)—the primary source of information on the nation's bridges—which contains information on each bridge's location, size, age, condition, inspection dates, and other information; reviewed relevant legislation and program documents; interviewed federal, state, and local transportation officials; and examined relevant GAO reports. To determine the extent to which the HBP aligns with our principles for re-examining federal programs, we compared HBP practices to the four key principles we identified in our previous work, including identifying clear federal goals and roles, incorporating performance and accountability into funding decisions, using best tools and approaches, and ensuring fiscal sustainability.<sup>4</sup> This

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<sup>4</sup>These principles were developed in our earlier work on 21st century challenges and were based on our institutional knowledge, our extensive program evaluation and performance assessment work for the Congress, and federal laws and regulations.

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report focuses on the HBP; the scope of our study did not include an investigation of the cause of the I-35W bridge collapse or an evaluation of the National Bridge Inspection Standards.<sup>5</sup> We conducted our review from October 2007 through September 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained meets these standards. More details on our scope and methodology can be found in appendix I.

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## Results in Brief

The HBP classifies bridges based on their condition and provides funding for states to improve their bridges. Using data gathered through bridge inspections, FHWA assigns each bridge in the NBI a sufficiency rating and classifies it as deficient—structurally deficient or functionally obsolete—or not deficient.<sup>6</sup> A structurally deficient bridge generally has some component, such as the bridge deck, rated in poor condition. A functionally obsolete bridge is generally in fair or better condition, but because of changing traffic demands and design standards, the bridge may no longer be suitable for the traffic it serves. A bridge generally must be either structurally deficient or functionally obsolete and have a sufficiency rating<sup>7</sup> of 80 or less to qualify for replacement or rehabilitation with HBP funding. However, other bridge activities—such as seismic retrofitting of bridges and systematic preventive maintenance projects—are also eligible for HBP funds, regardless of whether the bridge qualifies for replacement or rehabilitation. Despite the broad range of characteristics making a bridge eligible for the use of federal funds, each state’s HBP apportionment amount is determined largely by the deck area of bridges that are eligible for replacement or rehabilitation. HBP funds are apportioned to states using a needs-based process that considers each

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<sup>5</sup>The National Transportation Safety Board has an investigation under way to determine the cause of the I-35W bridge collapse. DOT’s Office of Inspector General has a study under way to evaluate the National Bridge Inspection Program.

<sup>6</sup>Routine bridge inspections are generally conducted every 24 months, but with FHWA approval, the inspection interval may be extended to 48 months on certain bridges.

<sup>7</sup>A sufficiency rating is a score from 0 to 100 assigned to each bridge, reflecting its structural adequacy, safety, serviceability, and essentiality for public use. A rating of 100 represents an entirely sufficient bridge, and 0 represents an entirely insufficient bridge.

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state's amount of structurally deficient and functionally obsolete deck area and other factors, including minimum and maximum funding guarantees.<sup>8</sup>

The HBP affords state transportation departments discretion in using their HBP funds, and as a result, states select bridge projects and use HBP funds in a variety of ways. For example, while the primary purpose of the HBP is to enable states to improve the condition of their structurally deficient and functionally obsolete bridges, the program does not require states to focus their resources on reducing their inventories of deficient bridges. As a result, state transportation departments we visited have established a range of bridge priorities. For example, Texas transportation officials have focused on reducing their number of structurally deficient bridges, while California transportation officials have focused on seismically retrofitting bridges. In addition, some states opt to transfer a portion of their HBP funds to fund other transportation priorities as allowed by the program. For example, between 1998 and 2007, 27 states transferred HBP funds to other Federal-aid highway programs.<sup>9</sup> State transportation officials we interviewed cited several reasons for not focusing their HBP resources on deficient bridges, including: deficient bridges are not necessarily unsafe; the HBP formula used for the apportionment of HBP funds provides no incentives for states to improve deficient bridges; and the high costs of improving some deficient bridges are prohibitive. Additionally, state transportation departments use a variety of criteria, tools, and methods to select among potential bridge projects. For example, officials in the six states we visited considered a range of criteria, including bridge condition ratings, average daily traffic, funding availability, and state and local transportation priorities, among others.

Bridge conditions, as measured by the number of deficient bridges and the average sufficiency rating of all bridges in the NBI, improved from 1998 through 2007, but it is difficult to determine the impact of the HBP. Over this period, the total number of deficient bridges declined by almost 12 percent, and the number of structurally deficient bridges decreased by 22

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<sup>8</sup>23 U.S.C. § 144(f) guarantees each state a minimum of 0.25 percent or a maximum of 10 percent of the total annual HBP apportionment.

<sup>9</sup>State funds from other Federal-aid highway programs such as the Interstate Maintenance Program and Surface Transportation Program have also been spent on bridges. FHWA data show that significant funds have flowed toward bridges from other programs which, from a national perspective, exceed outflows from the HBP.

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percent. In addition, the average bridge sufficiency rating slightly improved by 4 points, from 75 to 79, on a 100-point scale. Furthermore, bridges owned by local agencies and located on rural routes improved more than bridges owned by state agencies and located on urban routes, likely due in part to the requirement that states spend a minimum amount on such bridges. However, the impact of the HBP is difficult to measure for several key reasons. Without comprehensive data on total state and local spending on bridges, it is impossible either to definitively distinguish the impact of HBP funding from the impact of state and local bridge funding or to determine the extent to which states are substituting HBP funding for state and local funds that would otherwise have been spent on bridges. Additionally, as more activities have become eligible for HBP funding, measuring changes in the number of deficient bridges and average sufficiency rating captures only part of the impact of the HBP. Also, because NBI data do not readily permit the tracking of changes in the condition of a group of bridges across time, it is difficult to determine the impact of HBP funding on bridges. Our analysis of trends in bridge condition shows that a large share of the nation's bridges could soon become eligible for HBP funding for bridge rehabilitation and replacement projects. This anticipated spike in demand for limited HBP funding makes it increasingly important to be able to determine the impact of the HBP and have some level of assurance that the funds are being applied cost effectively to further nationally-defined goals for improving and preserving the nation's bridges.

The HBP does not fully align with principles established in our previous work and developed for re-examining surface transportation programs because the program lacks goals that are focused on a clearly identified federal or national interest, performance measures, and sustainability. For example, program goals, which are established in federal statute,<sup>10</sup> have expanded from improving deficient bridges to supporting seismic retrofitting, systematic preventive maintenance, and many other activities, thus expanding the federal interest to potentially include almost any bridge in the country. Additionally, funds are apportioned to states without regard to program performance because the HBP formula is based on a calculation of needed repairs to deficient bridges. Without performance measures to link funding and performance, states lack an incentive to improve the return on the federal investment and are not held accountable for the results of their investments. Our work has shown that

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<sup>10</sup>See 23 U.S.C. § 144.

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an increased focus on performance and accountability for results can help the federal government better target limited federal resources. In addition, the HBP generally lacks sufficient tools to determine the effects of the federal investment in bridges. In this regard, bridge management systems,<sup>11</sup> which are currently used by many states but not required by legislation, may be useful for prioritizing projects and making funding decisions to improve results and emphasize return on investment. Finally, the HBP's fiscal sustainability remains a challenge in light of aging bridge infrastructure, the overall fiscal imbalance facing the nation, and the lack of assurance that HBP funding is allocated to projects that are in the federal interest and provide the best return on investment. Accordingly, we are recommending that the Secretary of Transportation work with Congress to identify and define specific national goals for the HBP; determine the impact of the program by developing and implementing performance measures related to the program's goals; identify and evaluate best tools and practices, such as bridge management systems, that can potentially be incorporated into the HBP; and review and evaluate HBP funding mechanisms to align funding with performance and support a targeted and sustainable federal bridge program. In commenting on a draft of the report, DOT officials said that they generally agreed with our findings and recommendations, and they provided technical clarifications, which we incorporated in the report, as appropriate. DOT officials also commented that our re-examination principles had broader applicability than the HBP—noting that they had incorporated the principles into the Department's recent proposal for reforming surface transportation programs.

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## Background

Bridge safety first emerged as a high-priority issue in the United States in the 1960s, following the collapse of the Silver Bridge between Ohio and West Virginia, which killed 46 people. That collapse prompted national concerns about bridge conditions and safety and highlighted the need to repair and replace bridges before they collapse. Congress responded by establishing two major federal bridge programs: (1) the National Bridge Inspection Program (NBIP) to ensure periodic safety inspection of bridges and (2) what is now known as the HBP to provide a funding mechanism to

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<sup>11</sup>A bridge management system is a system of formal procedures and methods for gathering and analyzing bridge data to predict future bridge conditions, estimate maintenance and improvement needs, determine optimal policies, and recommend projects and schedules within budget and policy constraints.

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assist states in replacing and rehabilitating bridges.<sup>12</sup> Both of these programs generally define applicable bridges as publicly owned, over 20 feet in length, and located on public roads. Although the NBIP and HBP are separate programs, they are linked by the data collected through bridge inspections. For example, bridge information gathered through NBIP inspections is one factor used to determine the amount of HBP funding apportioned to states.

The NBIP establishes standards—National Bridge Inspection Standards (NBIS)—and program requirements for the proper safety inspection and evaluation of bridges. The primary purpose of these standards, which were first issued in 1971, is to ensure the safety of the traveling public. The NBIS establishes by whom, with what frequency, and how bridge inspections are to be completed, including the following:

- State departments of transportation (DOTs) must have a bridge inspection organization that is responsible for carrying out the NBIP’s national-level policies, procedures, and requirements for inventory, inspection, bridge load ratings, quality assurance, and reports.
- Bridges must be inspected as thoroughly as necessary to clearly establish their condition and to ensure their continued safe operation, using a detailed manual prepared by the American Association of State Highway and Transportation Officials (AASHTO). Routine bridge inspections are generally conducted every 2 years, but with FHWA approval, the inspection interval may be extended to 4 years on certain bridges. Bridges may be inspected more often than every 2 years, when past inspection findings justify an increased inspection frequency.
- Bridge inspectors must record bridge data, including bridge condition data, during the inspection and report that information to the NBI, maintained by FHWA headquarters.

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<sup>12</sup>The HBP was preceded by two other federal programs that assisted states in funding bridges. The first federal bridge program was the Special Bridge Replacement Program, which Congress established in 1970 to provide federal funding to states to support replacement of unsafe bridges on the Federal-aid highway system. In 1978, this program was replaced by the Highway Bridge Replacement and Rehabilitation Program (HBRRP), which expanded the federal funding role to assist states in rehabilitating and replacing deficient bridges, both on and off the Federal-aid highway system. The HBRRP has been further expanded through subsequent legislation and is currently known as the HBP.

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With the exception of federally owned highway bridges, state DOTs are responsible for inspecting bridges within their state, maintaining a current bridge inventory, and reporting bridge condition data to FHWA. According to the FHWA, state DOTs should have agreements in place that outline inspection processes and responsibilities for other local agencies within the state—such as cities, counties, toll authorities, and ports—and other state agencies that own and maintain bridges that carry public travel. Although state DOTs may delegate some bridge inspection responsibilities to other agencies or private contractors, they retain ultimate responsibility for ensuring that bridge inspections are completed and for inventorying bridges according to federal standards.

In accordance with the NBIS, states also prepare and maintain an inventory of their bridges and submit inventory updates to FHWA each year. The NBI, the primary source of information on the nation's bridges, is comprised of 94 data items collected by states and others during bridge inspections. The 94 data items include the minimum bridge data items that states are required to inspect and report on. The NBI contains information for each bridge describing its location, age, condition, and inspection dates. The NBI data also identify the ownership and size of the nation's bridges. For example, 2007 NBI data indicate that federal agencies owned about 1 percent of bridges, while state and local agencies owned 48 percent and 51 percent, respectively. State agencies, however, owned more than three-quarters of the nation's bridge deck area because state-owned bridges are typically larger. (See app. II for additional analysis of national bridge data and trends). Each year, state DOTs submit the latest information on all of their bridges to FHWA to update the NBI.

FHWA uses information in the NBI to annually apportion HBP funds to the states. The HBP provides funding assistance to the states to improve the condition of their bridges and specifies seven activities that states may undertake with program funds, including replacement; rehabilitation; painting; seismic retrofitting; systematic preventive maintenance; installation of scour countermeasures (to address the effects of sediment erosion around bridge piers and abutments); and anti-icing or deicing applications. In addition, FHWA has determined that bridge inspections, equipment for bridge inspections, and bridge management systems are consistent with the purpose of the HBP and therefore are also eligible for HBP funds. States may also spend program funds on other, nonbridge, transportation priorities by transferring up to 50 percent of their annual

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HBP funding to other core Federal-aid highway programs,<sup>13</sup> though a penalty is invoked by reducing the state's HBP funds in the succeeding year by the amount transferred. Planning for how HBP funds are spent is generally under the control of state DOTs; once states select bridge projects, they may apply to FHWA for the federal share of the costs, which is generally 80 percent of the project cost.<sup>14</sup>

Both the NBIP and HBP are administered by FHWA's Office of Bridge Technology and its 52 division offices located throughout the states.<sup>15</sup> FHWA's Office of Bridge Technology is responsible for developing and recommending program policies, regulations, instructions, and procedures, and for providing technical guidance to states. The division offices, each headed by an administrator, are FHWA's in-state contact for state transportation officials. Division office officials are responsible for monitoring compliance with bridge inspection standards and other legal requirements, reviewing and approving state applications for HBP funds, and providing technical guidance and advice to state officials about their bridges.

All bridges are grouped into one of two general categories: Federal-aid highway bridges and bridges not on Federal-aid highways. The NBIP and the HBP generally apply to both categories of bridges located on public roads.<sup>16</sup> Federal-aid highway bridges are generally located on the National Highway System (NHS), a 160,000-mile network that carries over 40

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<sup>13</sup>The majority of Federal-aid highway infrastructure funding is distributed through seven major programs, often referred to as core highway programs. These programs are the National Highway System Program, Surface Transportation Program, Interstate Maintenance Program, HBP, Congestion Mitigation and Air Quality Improvement Program, Highway Safety Improvement Program, and the Equity Bonus Program. Just as HBP funds may be transferred to these other Federal-aid highway programs, funds from these programs may also be spent on bridges.

<sup>14</sup>The federal share for bridge projects on the interstate system is 90 percent.

<sup>15</sup>The 52 FHWA division offices are located in each state, the District of Columbia, and Puerto Rico.

<sup>16</sup>The NBIP standards do not apply to pedestrian or railroad bridges, bridges on private roads, or tunnels. FHWA encourages states to require private organizations to inspect privately owned bridges according to those standards. States are not responsible for the inspection of bridges owned by federal agencies.

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percent of the nation's highway traffic.<sup>17</sup> Non-Federal-aid highway bridges are generally located on local or rural roads that carry lower volumes of traffic than state-owned bridges.<sup>18</sup>

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## The HBP Classifies Bridges Based on Their Condition and Provides Funds to States to Improve Bridge Conditions

The HBP classifies bridges based on their condition and determines how program funding is apportioned among the states to improve bridge conditions. Using the data collected by state and local governments during bridge inspections, FHWA calculates a sufficiency rating and classifies each bridge according to its deficiency status. Bridges generally are eligible to receive HBP funding for replacement and rehabilitation based on their sufficiency ratings and deficiency classifications.<sup>19</sup> HBP funds are apportioned to states using a needs-based process that considers the deck area of deficient bridges and other factors.

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## The HBP Classifies Bridges Based on Condition

Under the HBP, FHWA uses bridge inspection data to classify bridges in two key ways, by calculating a sufficiency rating and by determining deficiency status. First, sufficiency ratings are calculated using a formula that considers 20 of the 94 NBI data items that reflect a bridge's structural adequacy, safety, serviceability, and essentiality for public use. FHWA assigns each bridge in the NBI a rating between 0 and 100, indicating its sufficiency to remain in service. A rating of 100 represents an entirely sufficient bridge, while a rating of 0 represents an entirely insufficient bridge. FHWA uses sufficiency ratings primarily to determine HBP eligibility and apportion funds. States may consider sufficiency ratings in their prioritization processes but generally do not rely on these ratings to set their project priorities. FHWA program documents state that sufficiency ratings are not intended to be an accurate representation of priority for bridge replacement or rehabilitation projects. Secondly, FHWA classifies bridges as not deficient or deficient. Like the sufficiency rating, the classification of a bridge as deficient or not is calculated using a

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<sup>17</sup>The NHS is made up of five components, including (1) the interstate system, (2) selected other principal arterials, (3) the Strategic Highway Network, (4) Major Strategic Highway Network connectors, and (5) intermodal connectors that provide access between major intermodal passenger and freight facilities and other NHS components.

<sup>18</sup>States are generally required to spend at least 15 percent of their HBP funds on non-Federal-aid highway bridges.

<sup>19</sup>States may also use HBP funds on otherwise ineligible bridges for seismic retrofitting projects, systematic preventive maintenance, and installation of scour countermeasures.

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formula that is applied to data contained in the NBI. Bridges rated by inspectors as acceptable in condition, geometric configuration, and design are classified as not deficient, and bridges that receive low ratings on structural or functional bridge elements are classified as deficient.<sup>20</sup> In a 2007 report to Congress on the condition of the nation's bridges, FHWA noted that classifying a bridge as deficient does not immediately imply that it is likely to collapse or that it is unsafe.<sup>21</sup> According to FHWA, if proper vehicle weight restrictions are posted and enforced, deficient bridges can continue to serve most traffic conditions. FHWA requires that if a bridge owner determines that a bridge is unsafe, it must be closed to traffic.

There are two distinct types of deficient bridges—structurally deficient and functionally obsolete. A bridge is considered structurally deficient if the substructure, superstructure, or deck is rated in poor condition because of deterioration or damage, or the waterway opening provided by the bridge is determined to be insufficient to the point of causing intolerable traffic interruptions (see fig. 1).<sup>22</sup> For example, the I-35W bridge was classified as structurally deficient because its superstructure was rated as poor.<sup>23</sup>

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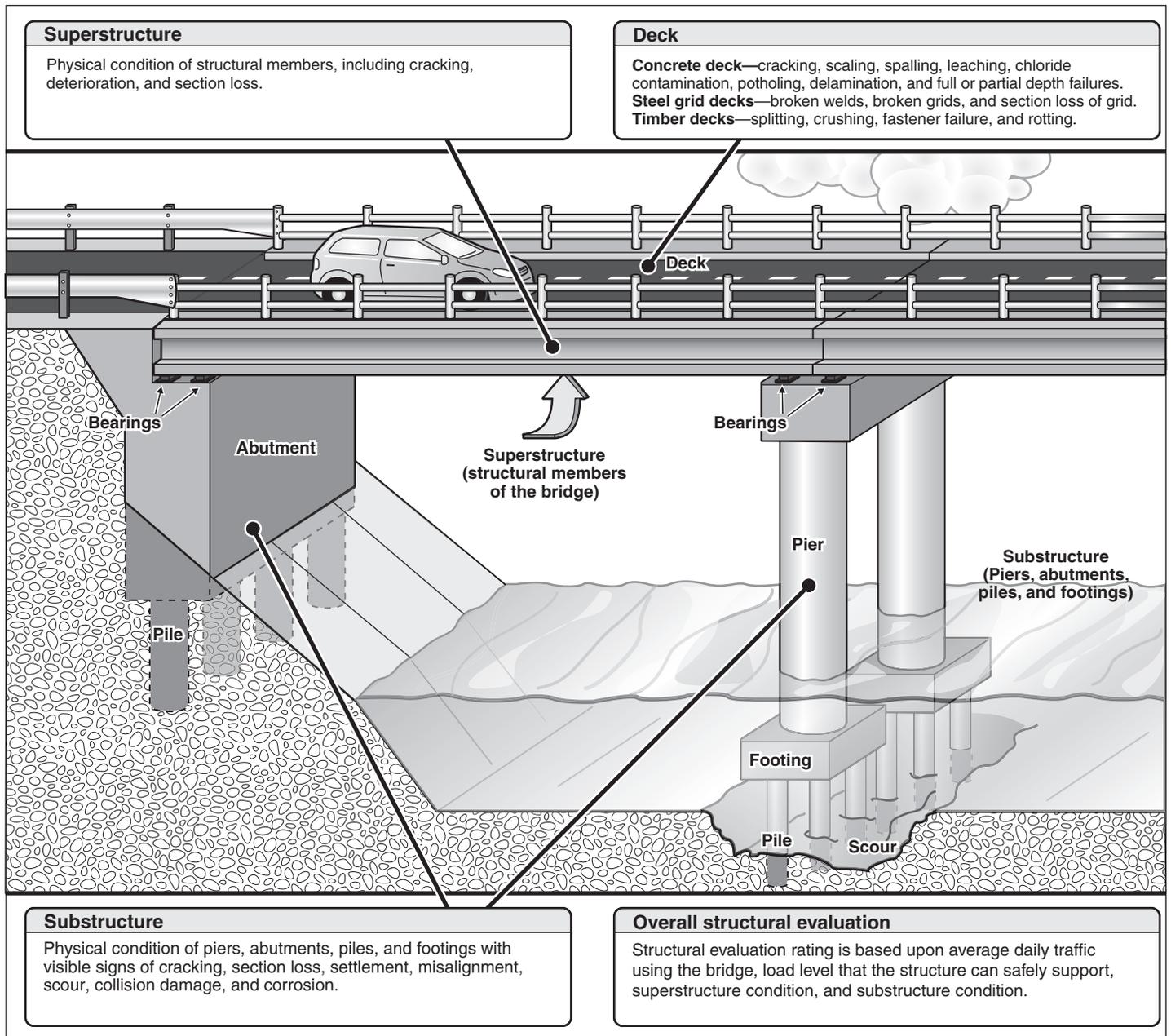
<sup>20</sup>Bridge condition ratings form the basis for assessing the structural condition of a bridge. Condition ratings use a rating system, where 9 indicates excellent, as-new condition, and 0 indicates a failed condition. Codes 7 through 9 indicate good to excellent conditions. Codes 5 and 6 indicate either fair or satisfactory conditions of the components. Codes 0 through 4 indicate failed conditions, conditions representing imminent failure of the component, critical conditions, serious, or poor conditions.

<sup>21</sup>DOT, *2006 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* (Washington, D.C., Jan. 22, 2007).

<sup>22</sup>The superstructure is the portion of a bridge structure that spans the obstacle the bridge is intended to cross. The substructure consists of all parts that support the superstructure.

<sup>23</sup>The cause of the I-35W bridge collapse has not yet been determined; National Transportation Safety Board expects to release the results of its investigation by December 2008. Although the National Transportation Safety Board's investigation is ongoing and no determination of probable cause has been reached, investigators have raised concerns about certain elements of the bridge (gusset plates) and issued a safety recommendation to FHWA that bridge owners conduct load capacity calculations to verify that the stress levels in all structural elements, including gusset plates, remain within applicable requirements.

**Figure 1: Key Factors That May Contribute to a Bridge's Classification as Structurally Deficient**



Source: GAO.

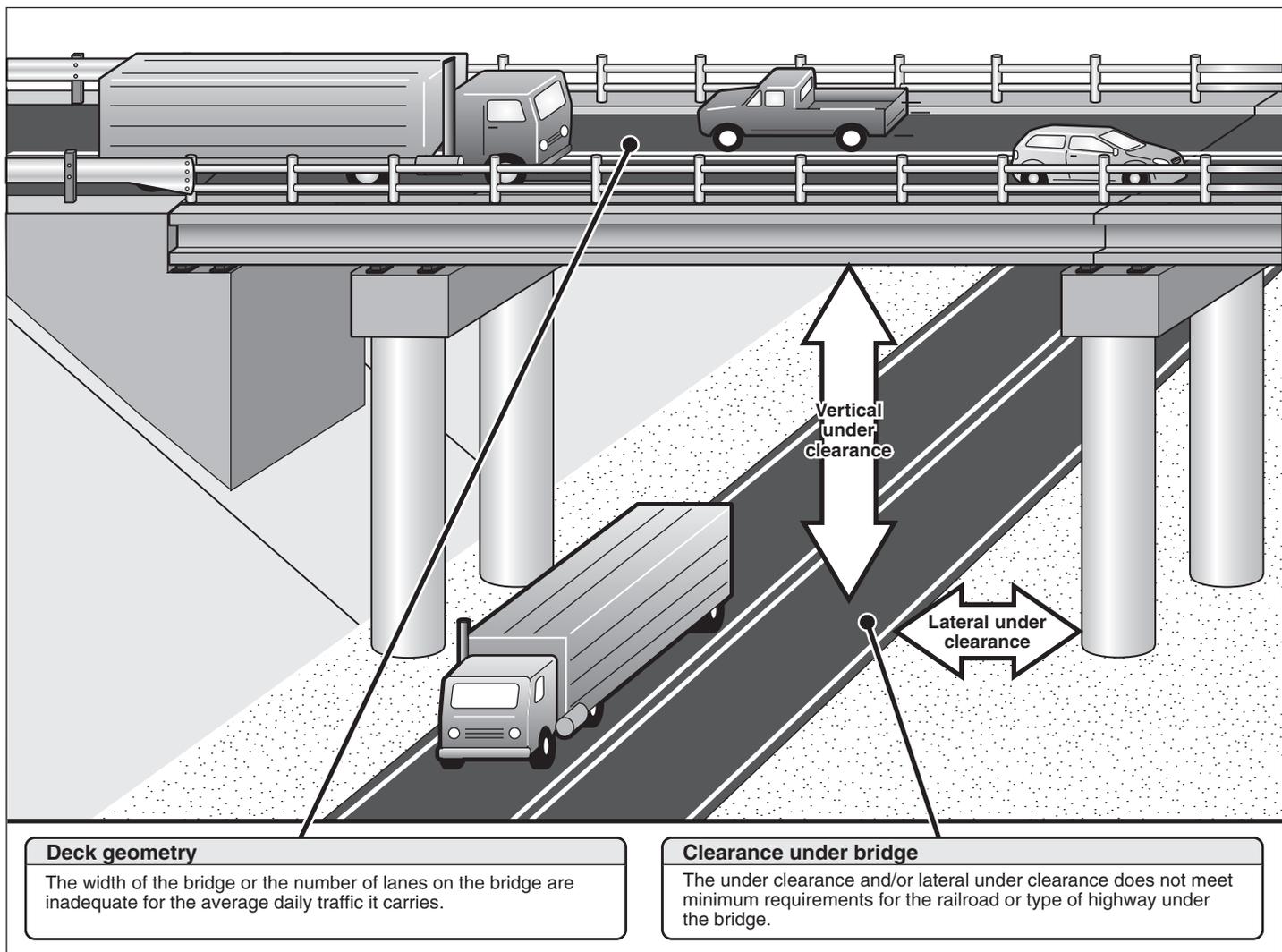
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A functionally obsolete bridge may be in good condition, but its poor configuration or design may no longer be adequate for the traffic it serves. Bridges are generally classified as functionally obsolete as a result of changing traffic demands or changes in geometric design standards since construction and are not structurally unsound. For example, geometric deficiencies, such as a bridge being narrower than current standards allow, may cause a bridge to be classified as functionally obsolete, but these deficiencies are not connected to the structural condition of the bridge. Factors that are considered in determining whether a bridge should be classified as functionally obsolete include clearances above or below the bridge, appropriate bridge deck geometry (the deck and roadway widths), alignment of the approach road (the reduction of speed as a vehicle crosses the bridge due to alignment of the road versus the bridge), count of average daily traffic using the bridge, and waterway adequacy (the likelihood of water to overtop the bridge) (see fig. 2). If a bridge is found to be both structurally deficient and functionally obsolete, it is classified as structurally deficient. As a result, about half of all structurally deficient bridges are also functionally obsolete.<sup>24</sup>

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<sup>24</sup>DOT, *2006 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance*.

**Figure 2: Key Factors That May Contribute to a Bridge's Classification as Functionally Obsolete**



Source: GAO.

## HBP Provides Funding to States to Improve Bridge Conditions

Based on bridge classifications, FHWA designates bridges as either HBP-eligible or not eligible. Bridges are determined to be eligible if they are both deficient and have a sufficiency rating of 80 or less. Bridges that are deficient and have a sufficiency rating of 80 or less may be eligible for rehabilitation, and bridges that are deficient and have a sufficiency rating of less than 50 may be eligible for replacement or rehabilitation. All other bridges are designated as not eligible (see fig. 3). However, the HBP allows

other activities to be funded with program funds, regardless of a bridge's eligibility. These activities include seismic retrofiting, scour mitigation, and systematic preventive maintenance projects.<sup>25</sup> Additionally, states may spend program funds on other, nonbridge transportation priorities by transferring up to 50 percent of their annual HBP funding to other core Federal-aid highway programs, though a penalty is invoked by reducing the state's HBP funds in the succeeding year by the amount transferred. Some of these transferred HBP funds may still be spent on bridges and, just as HBP funds may be transferred to other Federal-aid highway programs, funds from other Federal-aid highway programs may also be spent on bridges.

**Figure 3: Process for Designating Bridges as Eligible for HBP Funding**

Bridge classification		Sufficiency rating		Eligibility for Highway Bridge Program funds
<p><b>Not deficient</b></p> <p>Bridges with acceptable condition, configuration, and design</p>	<b>or</b>	81 - 100	=	<p><b>Not eligible</b></p> <p>(classified as not deficient and/or having a higher than 80 sufficiency rating)</p>
<p><b>Deficient</b></p> <p><b>Structurally deficient</b> Bridges in poor condition.</p> <p><b>or</b></p> <p><b>Functionally obsolete</b> Bridges with poor configuration and/or design.</p>	<b>and</b>	50 - 80	=	<p><b>Eligible for rehabilitation</b></p> <p>(classified as structurally deficient or functionally obsolete with a sufficiency rating of 80 or less)</p>
		0 - 49	=	<p><b>Eligible for replacement or rehabilitation</b></p> <p>(classified as structurally deficient or functionally obsolete with a sufficiency rating of less than 50)</p>

Sources: GAO analysis of FHWA data.

The Safe, Accountable, Flexible, and Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU), authorized a total of approximately \$21.6 billion in HBP funds for fiscal years 2005 through 2009. With three

<sup>25</sup>HBP also provides funds for bridge set-asides (or designated projects), historic bridges, and other projects.

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exceptions,<sup>26</sup> FHWA apportions, or divides, the annually authorized HBP funds among the states according to the HBP statutory apportionment process.<sup>27</sup> The starting point for this apportionment process is the program's needs-based formula. To determine states' funding needs for bridge replacement and rehabilitation, FHWA first determines each state's total bridge deck area in each of four categories: (1) Federal-aid highway bridges eligible for replacement, (2) Federal-aid highway bridges eligible for rehabilitation, (3) non-Federal-aid highway bridges eligible for replacement, and (4) non-Federal-aid highway bridges eligible for rehabilitation. Then, depending on the category (i.e., replacement or rehabilitation), the total deck area in each category is multiplied by either the state's replacement bridge construction unit cost or by the state's rehabilitation bridge construction unit cost,<sup>28</sup> respectively. Finally, the figures for the individual categories are totaled to arrive at the state's calculated bridge needs. The national bridge need is the sum of each state's calculated bridge needs. Each state's percentage of HBP funds is then calculated by dividing the state's calculated bridge needs by the national bridge need.

Three statutory provisions may trigger adjustments to a state's apportionment. First, a state's calculated apportionment will be adjusted, if necessary, to ensure that each state receives a statutorily guaranteed minimum of 0.25 percent or a maximum of 10 percent of the total annual HBP apportionment.<sup>29</sup> Second, if a state transferred money out of the HBP in the prior year, the state's calculated needs will be reduced by the transferred amount. Third, a state's apportionment will be supplemented by additional funding from SAFETEA-LU's Equity Bonus Program if the

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<sup>26</sup>The three exceptions include the following: (1) SAFETEA-LU requires that \$100 million for fiscal year 2005 be set aside for bridge projects at the U.S. Department of Transportation Secretary's discretion; (2) SAFETEA-LU requires that \$100 million for each of fiscal years 2006 through 2009 be set aside for nine bridge projects designated in SAFETEA-LU, see 23 U.S.C. § 144(g)(1); and (3) 1.25 percent of authorized program funds are set aside for metropolitan planning, see 23 U.S.C. § 104(f)(1).

<sup>27</sup>23 U.S.C. § 144(e).

<sup>28</sup>The 3-year average of each state's bridge construction unit costs is used as that state's replacement cost. The rehabilitation cost is then calculated as 68 percent of that state's bridge replacement cost.

<sup>29</sup>23 U.S.C. § 144(e). In fiscal year 2006, three states (North Dakota, Nevada, and Wyoming) received the minimum apportionment amount, and one state (New York) received the maximum amount of HBP funds allowable.

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state's calculated apportionment is below certain state-specific statutory thresholds.<sup>30</sup>

Although states have discretion in determining which bridges they choose to spend program funds on, each state is required to spend at least 15 percent of its program funds for non-Federal-aid highway bridges.<sup>31</sup> FHWA, however, may reduce the minimum non-Federal-aid highway bridge expenditure requirement after consultation with state and local officials, if FHWA “determines that the state has inadequate needs to justify the expenditure.”<sup>32</sup>

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## State DOTs Exercise Discretion in Determining How to Use HBP Funds and Select Bridge Projects for Funding

The HBP affords state DOTs discretion in determining how to use their HBP funds, and as a result, states use HBP funds and select bridge projects in a variety of ways. For example, the state DOTs we visited have established a range of priorities for their HBP funds—from reducing the number of their deficient bridges to seismically retrofitting their bridges—and some opted to transfer their HBP funds to fund other transportation priorities. Although the key purpose of the HBP is to enable states to improve the condition of their deficient bridges, some state transportation officials explained that they do not focus on reducing their inventories of deficient bridges and being classified as deficient does not always indicate that a bridge is unsafe. Instead, state DOTs use a variety of criteria, tools, and methods to select among potential bridge projects. For example, officials in the six states we visited consider a range of criteria, such as bridge condition ratings, average daily traffic over bridges, local transportation priorities, or funding availability when prioritizing and selecting among potential bridge projects.

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<sup>30</sup>Since SAFETEA-LU, the Equity Bonus Program has provided funding to states based upon equity considerations. The Equity Bonus Program guarantees that each state will receive (1) at least a statutorily specified percentage (referred to as the “relative rate of return”) of its estimated contribution to the Highway Account of the Highway Trust Fund and (2) a minimum percentage of funding in excess of the average annual program apportionments the state received under prior authorizations.

<sup>31</sup>SAFETEA-LU eliminated the 35 percent cap on non-Federal-aid bridge expenditures.

<sup>32</sup>See 23 U.S.C. §144(g)(2)(B).

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States Use HBP Funds to Decrease Their Inventories of Deficient Bridges, Address Other State-Identified Bridge Priorities, or Address Other Transportation Priorities

The HBP gives states three key flexibilities in determining how to use their HBP resources, some of which were noted earlier in this report. First, the HBP has evolved to allow states to use program funds not only for bridge replacement and rehabilitation, but also for seismic retrofitting projects, systematic preventive maintenance projects, and installation of scour countermeasures on any bridge, regardless of the bridge's condition. Thus, states have the flexibility to use HBP funds on bridge projects that may not immediately reduce their inventory of deficient bridges. Secondly, states have flexibility in determining how to split HBP resources between state and locally owned bridges. Aside from a requirement to distribute funds equitably, the only HBP requirement applicable to states' allocation of program funds is that states must spend a minimum (15 percent) on non-Federal-aid highway bridges. Third, states can transfer up to 50 percent of their annual HBP apportionment to other core transportation programs.

In part due to these flexibilities, some states we visited (three of the six states) had specific goals to reduce their inventories of deficient bridges, while others did not. For example, Texas Department of Transportation (TxDOT) officials were highly focused on reducing the number of their deficient bridges through two specific goals that they established in August 2001—to have 80 percent of Texas bridges nondeficient<sup>33</sup> by September 2011 and to eliminate all structurally deficient “on-system” bridges. (TxDOT's on-system bridges are located on the designated state highway system and are administered by TxDOT.) TxDOT officials reported progress toward achieving these goals; they have increased their nondeficient bridges from 70 to 77 percent of their total bridge inventory during the period from fiscal year 2001 through fiscal year 2006, and they have reduced the number of their structurally deficient on-system bridges from 763 to 483 over the same time period. The other three states we visited had not established such clear goals to reduce their inventories of deficient bridges. For example, according to officials at the California Department of Transportation (Caltrans), that agency strives to select the appropriate project at the right time, regardless of bridge deficiency designations. Caltrans's selected projects may address bridge condition needs or vulnerabilities such as scour or seismic risk. Accordingly, bridge seismic retrofitting projects have received the majority of California's HBP

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<sup>33</sup>TxDOT's precise goal is to make 80 percent of Texas bridges in “good or better” condition by September 2011. To be classified in good or better condition, a bridge is not structurally deficient, functionally obsolete, or substandard for load only. A bridge is considered substandard for load only if it is not structurally deficient or functionally obsolete but has a load capacity less than the maximum load capacity permitted by state law.

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funds over the past 10 years. Caltrans officials told us that, as a result, the state's progress in reducing the number of its deficient bridges has been slow. However, those officials also noted that the majority of California's structurally deficient bridges are classified as such because of cracks in the bridge deck, which are not considered an immediate safety hazard.

State transportation officials we interviewed highlighted several reasons why they may not focus their HBP resources on reducing their inventories of deficient bridges:

- *Deficient bridges are not necessarily unsafe.* Many state transportation officials we interviewed told us that some of the deficient bridges in their states are in at least reasonably good condition and are safe. For example, a New York State Department of Transportation (NYSDOT) official explained that a bridge may be in excellent condition yet not meet current geometric design standards and, therefore, may be classified as functionally obsolete. As noted earlier in this report, FHWA has also reported that deficient bridges are not always unsafe and, if proper vehicle weight restrictions are posted and enforced, deficient bridges can continue to serve most traffic conditions.
- *The HBP funding formula may create a disincentive to improve deficient bridges.* Many federal and state transportation officials we met with stated that the HBP apportionment formula provides no incentive for states to reduce their inventories of deficient bridges and may actually provide a disincentive because reducing the number and deck area of deficient bridges reduces a state's HBP funding eligibility. State DOT officials in four of the six states we visited noted this potential disincentive, but most stated that it had no impact on their decisions because they have other incentives—such as professionalism and accountability to the public—to maintain their bridges in good condition. In addition to these reasons, Missouri Department of Transportation (MoDOT) officials told us that they are not concerned that improving their bridges will lower their annual HBP funding apportionment because a loss in apportioned funds could be made up with funds from the Equity Bonus Program.
- *Some deficient bridge projects can be cost-prohibitive.* Some state officials explained that certain large-scale bridge projects—often the most traveled, urban bridges on interstate corridors—are too expensive to be

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implemented with HBP funds alone.<sup>34</sup> For example, Washington state DOT (WSDOT) officials explained that costly “mega projects” that emerge as top priorities through their prioritization process may be delayed by a lack of funds. Mega projects are projects with an estimated total cost greater than \$500 million. For example, Washington state is considering several very expensive bridge mega projects to improve mobility and safety (the SR 520 floating bridge in the Seattle area is estimated to cost \$2 billion, the Columbia River Crossing is estimated to cost \$2 billion, and the Alaskan Way Viaduct in downtown Seattle is estimated to cost \$4 billion) that would clearly exceed the state’s available HBP funding (e.g., about \$153 million in fiscal year 2007). Transportation officials in Washington state and other states we visited acknowledged that bridge mega projects such as these could easily exhaust a state’s entire HBP apportionment for many years, potentially to the detriment of all other bridge needs in that state. Some officials explained that they are looking to congressionally designated funds for these mega projects. Two other approaches are also available to fund mega projects. First, because of funding limitations, NYSDOT frequently splits large, expensive projects into multiyear contracts. This approach helps them complete mega projects but also means that a large share of their annual funding is programmed before they receive it, thus reducing budgetary flexibility. Second, in response to the challenge of its so-called “budget buster” bridge projects—costly bridge rehabilitation or replacement projects that exceed a transportation district’s funding capacity—the Minnesota Department of Transportation (MnDOT) has developed a new funding source for major bridge projects called the Statewide Bridge Preservation Fund. This state funding source will provide 100 percent of the funds for “budget buster” bridge replacement projects, with MnDOT districts paying all other costs associated with those projects, such as widening the highway approaches to the bridges. The Statewide Bridge Preservation Fund was approved by MnDOT’s Transportation Program Committee in January 2006, prior to the I-35W Bridge collapse, but the first bridge replacement contract under this program will be let in November 2009.

In addition to determining their overall bridge priorities and goals, states exercise discretion in determining how much emphasis they place on the improvement of larger urban (often state-owned) bridges versus smaller rural (often city or county-owned) bridges. In the four states we visited that were able to provide an estimate, the percentage of HBP funds

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<sup>34</sup>GAO has a study under way examining other federal mobility programs designed to meet national and regional transportation priorities, which also include some large highway bridge projects.

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apportioned to non-Federal-aid highway bridge owners (generally county and city governments) ranged from approximately 15 percent to 55 percent. Missouri, for example, is attempting to improve the condition of its small rural bridges by letting a 30-year contract to address the needs of 802 small (an average of 147 feet long), largely rural, mostly deficient, state-owned bridges.<sup>35</sup> MoDOT plans to use HBP funds to cover around 80 percent of the expenses associated with this effort, and state funds would cover the remaining 20 percent.

Finally, states have discretion to spend their HBP funding on other state transportation priorities by transferring up to 50 percent of their annual HBP funds to other core programs. According to FHWA data, from 1998 through 2006, 27 states transferred approximately \$2.8 billion (or about 7 percent of the \$37 billion in HBP funds distributed over that period) in HBP funds to other Federal-aid highway programs. However, FHWA data show that significant funds have flowed toward bridges from other programs which, from a national perspective, exceed outflows from the HBP. Transfers by the Pennsylvania Department of Transportation (PennDOT) account for about half of the total transfers from the HBP over this time. PennDOT officials told us that they transferred funds out of the HBP to provide more flexibility in funding their transportation program. While it is impossible to know the effects of PennDOT's transfers on state bridge conditions, PennDOT has consistently had the highest or second highest HBP apportionment of all states, which reflects the state's consistently poor bridge conditions. Caltrans officials also told us that they transferred HBP funds to pay for projects that would otherwise not qualify for HBP funding, such as seismically retrofitting transit bridges and pedestrian bridges over highways. While the HBP apportionment formula is set up to penalize states that transfer funds out of the HBP, this penalty does not necessarily affect all transferring states because the penalty reduction may be made up through Equity Bonus Program funds. For example, although PennDOT has transferred a large share of its HBP funds to other transportation programs since 1998, it has continued to receive the highest or second highest HBP annual apportionment because the penalty reduction is made up with Equity Bonus Program funds. States also have discretion to spend other federal, state, and local funds on bridges, but the extent to which they do so is unknown because there are no comprehensive data available on total state and local investment in bridges.

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<sup>35</sup>Missouri has a total of 24,017 bridges, 43 percent of which are state-owned.

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## State Departments of Transportation Use a Variety of Criteria, Tools, and Methods to Select Among HBP-Eligible Projects

State DOTs consider various criteria to prioritize and select bridge projects for funding. The HBP requires that funds be shared fairly and equitably throughout the state but provides little role for FHWA in prioritizing or selecting bridge projects apart from assigning sufficiency ratings and establishing eligibility. Partly because of this discretion, officials in the six states we visited considered a range of criteria, including bridge condition ratings, average daily traffic, detour options, funding availability, and local transportation priorities. Some states, such as Texas and Missouri, also allow their state DOT district offices and local agencies to determine some criteria for selecting bridge projects for funding. For example, MoDOT officials require MoDOT district offices and local agencies to consider bridge conditions, economic benefits, and environmental impacts when selecting bridge projects within their region, but also allow each region to define independently some of the criteria for evaluating proposed bridge projects. Similarly, TxDOT officials stated that their 25 district offices are allowed to determine some of the criteria for selecting bridge projects for funding, and districts' selection criteria sometimes include local citizen interests, local politics, and environmental and business interests.

Some states have developed tools and approaches beyond those required by the HBP and NBIS—such as bridge management systems, element-level inspections, and state-specific condition ratings—to help them gauge bridge conditions and further inform their selection of bridge projects for funding. For example, all of the states we visited were considering adopting, or have already adopted, some form of bridge management system. A bridge management system is a system of formal procedures and methods for gathering and analyzing bridge data to predict future bridge conditions, estimate network maintenance and improvement needs, determine optimal policies, and recommend projects and schedules within budget and policy constraints. In short, bridge management systems are one means by which transportation officials can employ asset management principles to help them determine the most efficient way to allocate limited HBP resources among competing bridge priorities. For over 5 years, FHWA has actively encouraged, but has not required, states to use bridge management systems, in part, by providing transportation officials with relevant training and technical support.<sup>36</sup> Additionally, for

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<sup>36</sup>There is currently no federal requirement that states use a bridge management system. The Intermodal Surface Transportation Efficiency Act of 1991 introduced a requirement that states implement bridge management systems by December 1993, but this requirement was repealed by the National Highway System Designation Act of 1995.

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states to use HBP funds for bridge systematic preventive maintenance projects, states must use a systematic process, such as a bridge management system, to assess the cost-effectiveness of the activity in extending the life of the bridge. As of 2007, 43 states were, to varying extents, using a comprehensive bridge management software system called PONTIS, which FHWA and AASHTO developed to assist states in selecting bridge projects. PONTIS stores bridge inventory and inspection data, helps officials evaluate the needs of each bridge in a network, and recommends projects to include in an agency's capital plan to derive the maximum benefit from limited transportation funds.

In addition, all of the states we visited required bridge inspectors to gather "element-level" bridge condition data, thereby exceeding NBIS requirements. While the NBIS requires bridge inspectors to rate the condition of the three major bridge components—the superstructure, substructure, and deck—an element-level inspection requires a more detailed breakdown of these bridge components. Instead of the NBIS's single superstructure rating, element-level inspection requires individual condition assessments for girders, floor beams, pins, and hangers, for example. Element-level data provide a more detailed picture of a bridge's overall condition. Some state DOT officials said that the more detailed data provided by element-level inspections (rather than the basic federally required inspection data) allowed them to more precisely evaluate bridge conditions and better select bridge projects for funding.

Finally, some state DOTs use their own bridge rating systems to better gauge bridge conditions and to inform their selection of bridge projects for funding. For example, NYSDOT requires bridge inspectors to rate bridge components using the federal condition rating scale and also use a New York-specific condition rating scale to rate all New York State defined bridge elements. New York's scale expresses the overall bridge condition in a single number, which is calculated by rating up to 47 bridge elements and weighting them according to their importance to the structure. New York officials told us that their more nuanced condition rating system is better than the federal rating for prioritizing bridge work. Caltrans officials also use a state scale, the California Bridge Health Index, which they developed to help them prioritize bridge projects on the state highway system. The Bridge Health Index is a single-number assessment of a bridge's condition based on the bridge's economic worth, determined from the results of element-level inspections. Unlike FHWA's sufficiency rating, the Health Index provides insight into the structural condition of a bridge without regard to the bridge's functional adequacy. Caltrans officials stated that they have discovered many management applications for the

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Bridge Health Index, including performance measurement, resource allocation, budget management, and selection of the best option for bridge preservation.

State DOTs also use different methods to prioritize and select bridge projects for funding. Whereas some states we visited had highly centralized prioritization processes, others allowed the process to vary across the state. Additionally, two state DOTs we visited prioritize all of their bridge projects (regardless of who owns the bridges) in one process, while others have separate processes for state and locally owned bridge projects. WSDOT, for example, has a highly centralized process for prioritizing state-owned bridge projects but uses a separate method—a Bridge Replacement Advisory Committee made up of city and county representatives—to prioritize and select non state bridge projects for HBP funding. MoDOT has a mixed process, in which staff prioritize “major” bridge projects—bridges with an overall length of 1,000 feet<sup>37</sup>—centrally and allow “nonmajor” bridge and road projects to be prioritized and selected by MoDOT district offices in collaboration with metropolitan planning organizations, regional planning commissions, and other stakeholders. To standardize these district-level processes across the state, MoDOT has developed a statewide “Framework for Transportation Planning and Decision-Making,” which delineates a standardized point system to score and rate potential bridge projects, but which also allows the relevant MoDOT district office and local agencies to determine 5 to 25 percent of the scoring value. Finally, PennDOT follows a more decentralized, collaborative process. PennDOT officials explained that although they provide their 11 district offices with a ranking of their statewide bridge priorities, their final prioritization of all bridge projects is carried out by Pennsylvania’s 23 planning organizations (metropolitan planning organizations and rural planning organizations) and their corresponding PennDOT district offices.

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<sup>37</sup> According to MoDOT officials, Missouri has around 203 “major” bridges, 53 of which cross the Mississippi and Missouri Rivers. Major bridges comprise around 25 percent of Missouri’s total bridge deck area.

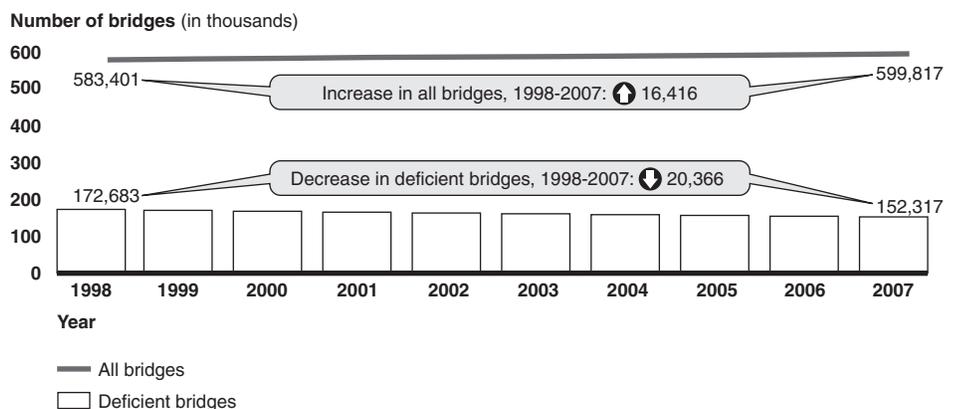
## Available Data Indicate That the Overall Condition of the Nation's Bridges Has Improved, but the Impact of the HBP Is Difficult to Determine

From 1998 through 2007, bridge conditions, as measured by deficiency status and the average sufficiency rating of all bridges in the NBI, improved nationwide, but it is difficult to determine the impact of the HBP. Over this period, the number of deficient bridges declined by almost 12 percent and the number of structurally deficient bridges decreased by 22 percent. In addition, the average bridge sufficiency rating improved slightly. Improvements were most notable in bridges owned by local agencies and on rural routes. However, because HBP funding is only a share of total funding for bridges, available bridge condition measures capture only a part of the impact of the HBP, and because NBI data do not readily permit the tracking of changes in the condition of a group of bridges across time, it is difficult to determine the impact of the HBP.

## Overall Bridge Condition Has Improved since 1998

Data indicate that the total number of deficient bridges—including structurally deficient and functionally obsolete bridges—has decreased over the last 10 years, even as the total number of bridges has increased. From 1998 to 2007, the number of deficient bridges declined by nearly 12 percent, from 172,683 to 152,317, even with the addition of more than 16,000 new bridges to the NBI (see fig. 4).

**Figure 4: Trends in Numbers of Bridges and Deficient Bridges, 1998 through 2007**



Source: GAO analysis of FHWA data.

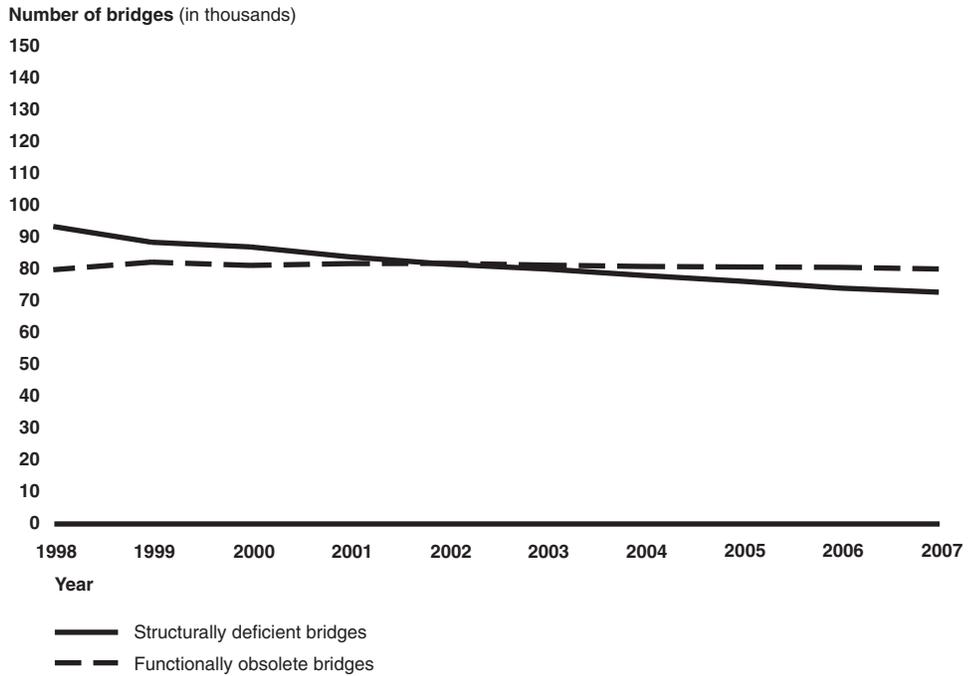
Note: Deficient bridges include both structurally deficient and functionally obsolete bridges.

The decline in the overall number of deficient bridges over the past decade reflects a reduction in the number of structurally deficient bridges. From 1998 through 2007, the number of structurally deficient bridges decreased by 22 percent, from 93,118 to 72,519 (see fig. 5). During that same period, the number of functionally obsolete bridges increased slightly from 79,565

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to 79,798, an increase of 233 bridges. The reduction in the number of structurally deficient bridges, rather than functionally obsolete bridges, over this time period may reflect bridge owners' efforts to address the deterioration or damage that are characteristics of structurally deficient bridges. Although reducing or eliminating structurally deficient bridges may not always be a state's highest priority, structurally deficient bridges often require maintenance and repair to remain in service. By contrast, functionally obsolete bridges do not necessarily require repair to remain in service and, therefore, are unlikely to be transportation officials' top priority for rehabilitation or replacement. However, because functionally obsolete bridges that are also structurally deficient are recorded in the NBI as structurally deficient, data may understate the improvement in functionally obsolete bridges. Likewise, if a structurally deficient bridge becomes functionally obsolete, this change would not be reflected as an increase in the number of functionally obsolete bridges.

**Figure 5: Number of Structurally Deficient and Functionally Obsolete Bridges, 1998 through 2007**



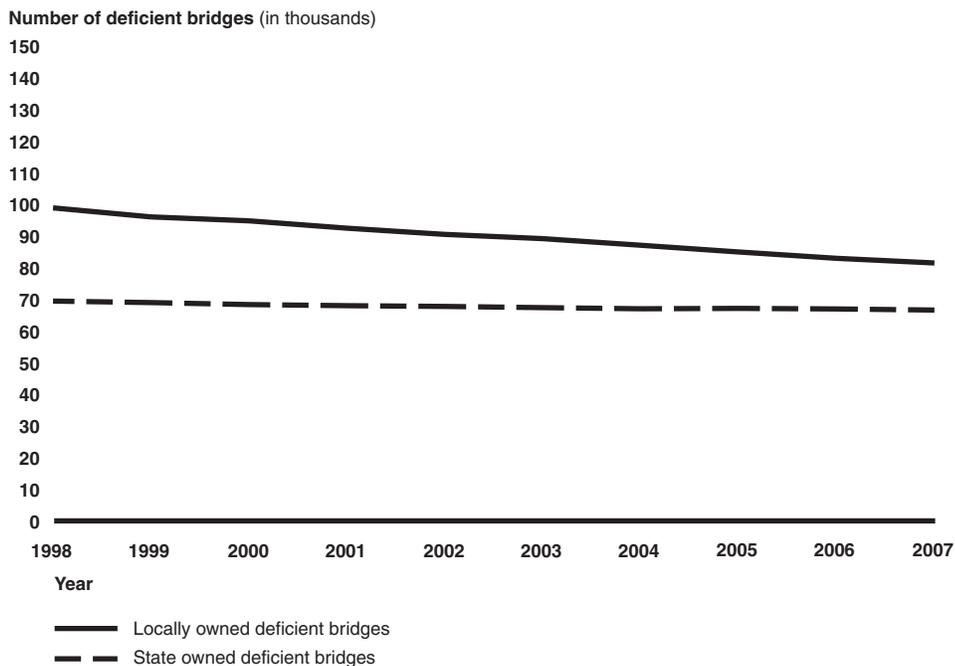
Source: GAO analysis of FHWA data.

The average sufficiency rating of all bridges—including both deficient and not deficient bridges—also improved slightly between 1998 and 2007, from 75 to 79 on the sufficiency rating’s 100-point scale. Additionally, while structurally deficient bridges generally have lower sufficiency ratings (average rating of 42 in 2007) than functionally obsolete bridges (average rating of 69 in 2007), the average sufficiency ratings of both types of deficient bridges improved slightly over the last decade.

Most of the improvements in bridge conditions over this period are attributable to improvements in bridges that are owned by local agencies and bridges on rural routes. The condition of locally owned bridges and bridges on rural routes have steadily improved since 1998, which may be attributable to the federal bridge program requirement—under HBP and some of its predecessor programs—that states spend a minimum amount of their apportionment on non-Federal-aid highway bridges. For example, from 1998 through 2007, the average sufficiency rating for bridges owned by local agencies improved from 71 to 77, and the number of deficient bridges decreased by over 17 percent, from 99,492 to 82,101. During that

same period, for bridges owned by state agencies, the average sufficiency rating improved from 79 to 82, and the number of deficient bridges decreased by 4 percent, from 70,066 to 67,232 (see fig. 6).

**Figure 6: Number of Deficient Bridges, by Bridge Owner, 1998 through 2007**



Source: GAO analysis of FHWA data.

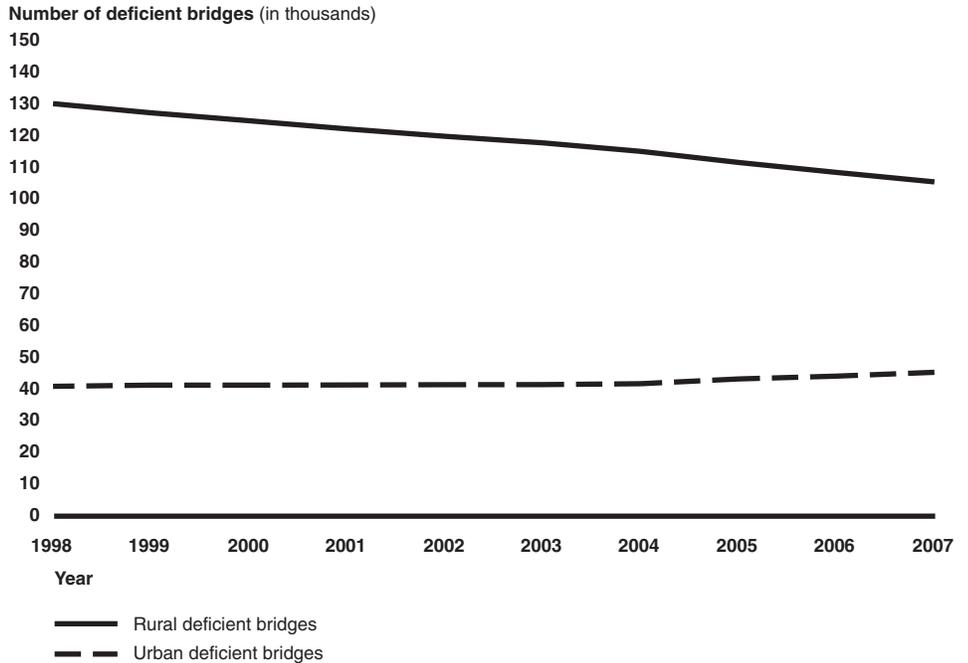
Note: Deficient bridges include both structurally deficient and functionally obsolete bridges.

Although the number of deficient rural bridges declined from 1998 through 2007, the number of deficient urban bridges increased.<sup>38</sup> For example, from 1998 to 2007, the number of deficient rural bridges decreased by about 19 percent, from 130,910 to 106,209.<sup>39</sup> During that same period, however, the number of deficient urban bridges increased by about 11 percent, from 41,659 to 46,086 (see fig. 7). The average sufficiency rating for both rural and urban bridges improved slightly from 1998 through 2007; for rural bridges, the average rating increased from 74 to 78, and for urban bridges, the average rating increased from 79 to 82.

<sup>38</sup>Bridges are coded in the NBI by either a rural or urban classification. A bridge is coded as rural if it is not located inside a designated urban area.

<sup>39</sup>Approximately 75 percent of the nation's bridges are rural, and 25 percent are urban.

**Figure 7: Number of Deficient Bridges, by Rural and Urban Classification, 1998 through 2007**



Source: GAO analysis of FHWA data.

Note: Deficient bridges include both structurally deficient and functionally obsolete bridges.

**It Is Difficult to Determine the Impact of the HBP Due to Lack of Comprehensive Information on State and Local Spending, Expansion of Bridge Project Eligibility, and Limitations in NBI Data**

The impact of the federal investment in the HBP is difficult to measure, in part, because there are no comprehensive data for state and local spending on bridges. For example, while FHWA does track a portion of bridge capital spending on a state by state basis, the data does not include (1) state spending on bridges located on local roads and (2) most local government spending on bridges. Also, while FHWA generates a single, national-level estimate for total bridge expenditures at all government levels, this estimate cannot be used to determine the impact of the HBP by state or by bridge because it is a national aggregate. Furthermore, neither of these two FHWA data sources on bridge spending includes noncapital activities funded by the HBP, such as systematic preventive maintenance, anti-icing and deicing applications, and painting. In addition, while two of the state DOTs we visited had data on state bridge spending, none was able to provide comprehensive data on total state and local investment in bridges. This lack of comprehensive information on state and local spending makes it impossible to (1) distinguish the impact of HBP funding from other funding to improve bridge conditions and (2) determine the

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extent to which states are substituting increased HBP funding for state and local funds that they would otherwise have spent on bridges. While there is no state-by-state data on total state and local spending on bridges, some officials we interviewed estimated that, in their states, such spending ranged from the minimum match amount (generally 20 percent of the HBP apportionment amount) to more than four times the state's apportioned HBP funds. Federal funding for transportation programs, including the HBP, has increased in recent years, but it is difficult to determine the impact of the increased federal investment on state and local agencies' decisions to invest in bridges. Our previous work has shown that although the federal investment in HBP and other Federal-aid highway programs has increased over time, this investment has not resulted in commensurate increases in the nation's total government spending (federal, state, and local) on its highway system.<sup>40</sup> More specifically, as the level of federal funding has increased since the mid-1990s, states have not maintained their level of effort in highway spending, and federal funds have increasingly been substituted for state funds. This suggests that increased federal highway funding influences states and localities to substitute federal funds for state and local funds they otherwise would have spent on highways and bridges.

The impact of the HBP is also difficult to measure because available bridge condition data capture only part of the total impact of the HBP. As discussed earlier, states can and do use HBP funds for a variety of activities, in addition to rehabilitating and replacing their deficient bridges. Therefore, simply measuring changes in the number of structurally deficient or functionally obsolete bridges does not reflect the full impact of the program, since these measures do not capture the impact of the HBP investment in the other eligible activities that do not necessarily result in an immediate reduction in the number of deficient bridges. Without quantifiable performance measures to track the full range of desired outcomes for the HBP, it is difficult to measure the program's impact and determine the extent to which the program is serving its stated purpose.

Another difficulty in determining the impact of the HBP funding occurs because the NBI does not readily permit changes in the condition of a group of bridges to be tracked across time. Each bridge in the NBI is

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<sup>40</sup>GAO, *Federal-Aid Highways: Trends, Effect on State Spending, and Options For Future Program Design*, [GAO-04-802](#) (Washington, D.C.: Aug. 31, 2004).

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assigned an identifying number by the relevant state DOT. However, the identifying number for a bridge at a specific location may change over the life of that bridge. Such a change may occur when a state either renumbers, replaces, or closes and subsequently reopens a bridge. As a result, it is difficult to track changes in the condition of any specific bridge or group of bridges to determine if, for example, the same bridges that were deficient in 1998 are still deficient today, to see how many bridges have been replaced, or to determine the impact of new bridges added to the inventory (which may not be funded by the HBP) on the overall condition of the nation's bridges.

Evaluating the impact of the HBP is important not only to understand the outcomes of past spending but also to determine how to sensibly invest future federal resources. The number of HBP-eligible bridges is expected to increase as a large share of the nation's bridges built in the 1960s and early 1970s age and become eligible for rehabilitation and replacement as a group. The average age of bridges currently in the NBI is approximately 35 years, the average age of bridges with a sufficiency rating of 80 or less is 39 years (a deficient bridge with this rating becomes eligible for rehabilitation), and the average age of bridges with a sufficiency rating less than 50 is 53 years (a deficient bridge with this rating becomes eligible for replacement).<sup>41</sup> This suggests that as the age of bridges in this group rises, so will the number of HBP-eligible bridges. As a result, states and local agencies may see a spike in their need for bridge rehabilitation and replacement funding over the next 15 years (see appendix II for additional analysis of bridge trends). In this environment of increasing demand for limited resources, it is especially important for FHWA and Congress to be able to evaluate the impact of the HBP in order to ensure that the program is providing an acceptable return on investment and addressing national transportation priorities.

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## The HBP Lacks Focus, Performance Measures, and Sustainability

The current program, while generally helping to improve bridge conditions, does not have goals and performance measures that align with federal funding. In this way, the program mirrors the challenges of the overall federal surface transportation program. Even though the goal of improving deficient bridges may seem clear and performance-oriented, the structure of the program provides little linkage or assurance of any direct

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<sup>41</sup>The age of a bridge is based on the number of years since it was built or reconstructed.

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impact on either the safety of the nation's bridges or attention to national problems that transcend individual states, such as freight mobility and congestion. Additionally, the goals of the program have broadened to include other activities, and the federal apportionment formula generally provides funds to states without reference to achieving specific outcomes.

While some have called for increased funding for the HBP as one possible response to the concerns raised by the I-35W bridge collapse, we believe that there is merit in evaluating the performance and impact of the HBP to ensure effectiveness, particularly in light of the breadth of current and future demands that will likely be placed on limited federal funding. Bridge infrastructure, like most of the nation's physical infrastructure, is under strain. In addition, steady increases in road usage, congestion, and the aging of the nation's bridges will likely continue to present challenges in the future.<sup>42</sup> Moreover, the Highway Trust Fund, which provides the funding for the HBP, faces an imbalance of revenues and expenditures and other threats to its long-term sustainability. Given the nation's infrastructure challenges and the federal government's fiscal outlook, we have called for a fundamental re-examination of government programs. We have found that many current transportation programs do not effectively address identified transportation challenges, such as freight bottlenecks and growing congestion. Addressing these challenges requires strategic approaches, effective tools and programs, and coordinated solutions involving all levels of government and the private sector.<sup>43</sup>

We have identified several key principles that could be informative as policymakers assess federal surface transportation programs, including the HBP. We developed these principles based on prior analyses of existing surface transportation programs, as well as a body of work that we have developed for Congress, including our High-Risk and Performance and Accountability reports.<sup>44</sup> The principles can serve to help refocus federal transportation programs to improve the effectiveness of the federal investment in transportation, meet the nation's transportation needs, and ensure a sustainable commitment to transportation

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<sup>42</sup>GAO, *Physical Infrastructure: Challenges and Investment Options for the Nation's Infrastructure*, [GAO-08-763T](#) (Washington, D.C.: May 8, 2008).

<sup>43</sup>[GAO-05-325SP](#).

<sup>44</sup>[GAO-08-400](#).

infrastructure.<sup>45</sup> We examined the HBP to determine the extent to which it is aligned with these principles and identify opportunities to improve its performance and sustainability (see fig. 8).

**Figure 8: Application of Key Principles to the HBP**

Key principles	Critical questions	Assessment of HBP
 <p><b>Create well-defined goals and roles based on identified areas of federal interest.</b></p>	Does the HBP have clear goals and a defined federal role? What is the federal interest in bridges?	Goals of the HBP are numerous and have expanded from focusing on the improvement of deficient bridges to other areas such as seismic retrofitting. As a result, the federal interest has been expanded to potentially include almost any bridge. Additionally, there is no clear federal role in the HBP and state and local governments have broad discretion in allocating HBP funds.
 <p><b>Incorporate performance and accountability into funding decisions.</b></p>	Does the HBP have performance measures which are linked to federal funding?	The condition of bridges has improved overall, but there is no clear tie between program funding or activities and the degree of progress attained. Although the HBP formula is based on bridge deficiency status and sufficiency ratings, this may not be the best proxy for bridge safety or risk, and there are several other activities that HBP funds can be spent on.
 <p><b>Employ best tools and approaches to help improve return on investment.</b></p>	Do HBP funds encourage state and local governments to maximize the safety or mobility benefit of their investment and to invest their own resources?	The program lacks tools to determine the effects of federal investment in bridges. Bridge management systems, an optional tool for bridge owners, provide a useful approach for prioritizing projects and making funding decisions.
 <p><b>Ensure fiscal sustainability.</b></p>	Are HBP expenditures affordable and sustainable in the long term?	Program sustainability remains a challenge due to the aging bridge infrastructure, lack of assurance about the impact of federal HBP funding, and the nation's fiscal challenges.

Source: GAO.

### Program's Statutory Goals Are Not Focused on a Clearly Identified Federal Interest

The expansion of the HBP's purpose from improving deficient bridges to supporting seismic retrofitting, systematic preventive maintenance, and many other projects, has greatly expanded the universe of eligible bridges. As a result, the federal interest has been expanded to potentially include almost any bridge in the country. Our previous work has emphasized the importance of identifying clear areas of federal or national interest as a first step in determining program goals. For example, if mobility is

<sup>45</sup>Also see GAO, *Surface Transportation Programs: Proposals Highlight Key Issues and Challenges in Restructuring the Programs*, [GAO-08-843R](#) (Washington, D.C.: July 29, 2008).

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determined to be a key federal interest and a primary goal, the program could be targeted toward bridges whose conditions have the most impact on congestion and economic competitiveness and that carry higher levels of traffic or freight than those bridges in remote areas that may serve only a few people each day. If rehabilitating and reducing deficient bridges is determined to be a key federal interest, then it could still be better incorporated into the goals of the program. For example, the DOT's Inspector General has proposed that FHWA develop a data-driven, risk-based approach to bridge oversight to better identify and target those structurally deficient bridges most in need of attention.

Once the federal interest in bridges is clearly defined, policymakers can clarify the goals for federal involvement and define the federal government's role in working toward goals that more directly address national transportation priorities. The federal role should be defined in relation to the roles of state and local governments, regional entities, and the private sector. Where the national interest is greatest, the federal government may play a more direct role in setting priorities and allocating resources, as well as fund a higher share of program costs. Conversely, where the national interest is less evident—for example, where the economic benefits are more locally focused or there are varying regional preferences—state and local governments and others could be expected to assume more responsibility.

Once the national interest has been defined, our principles call for basing the federal share of bridge projects on the level of federal interest. For example, the federal interest may be greater for Federal-aid highway bridges, whereas state and local governments may have greater interest in non-Federal-aid highway bridges and the funding shares could reflect those relative interests. The federal interest may also be greater in bridge projects that are too expensive for states to undertake without additional federal assistance or in projects that extend beyond the borders of a single state. Under the current HBP structure, the federal share is generally 80 percent of the total project costs. The cost sharing arrangement should be structured so that the level and share of federal funding reflects the benefits the nation receives from investment in a bridge project; however, in reality, this cost sharing appears to reflect historical levels of funding for many surface transportation programs without reference to whether the cost share should vary by project or whether state and local governments could assume more responsibility.

Alternatively, HBP funds could be directed to a greater degree to bridges in the national interest by re-establishing the cap on or reducing the

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minimum requirement for states' spending of federal funds for non-Federal-aid highway bridges. Since 1978, a minimum of each state's apportionment was to be spent on non-Federal-aid highway bridges. Until the enactment of SAFETEA-LU, there was also a maximum, 35 percent, that could be spent on non-Federal-aid highway bridges. SAFETEA-LU eliminated the ceiling, opening up the entire state HBP apportionment to spending on non-Federal-aid highway bridges. Furthermore, the fact that bridge condition improvements are more heavily concentrated in local and rural bridges, rather than state-owned urban bridges, may reflect states' efforts to adhere to this HBP requirement, despite arguably greater federal interest in urban and larger bridges that are likely to carry more traffic and interstate commerce.

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## No Clear Tie between Program's Funding and Performance

The HBP apportionment formula is not linked to the states' performance in reducing their inventories of deficient bridges. Because, as discussed earlier, the formula is based on a calculation of states' portion of the total cost of needed repairs to deficient bridges, it does not consider a state's efforts or effectiveness in reducing its inventory of deficient bridges or controlling costs. Additionally, because the formula does not factor in other eligible program activities, such as systematic preventive maintenance, there is no link between the apportionment formula and the states' performance of these activities. As a result, the incentive to improve return on investment—the public benefits gained from public resources expended—is reduced. Further, a bridge's deficiency status and sufficiency rating may not be the best proxy for bridge safety or risk. For example, states we visited and officials we spoke with identified other priorities for bridge projects, such as seismic retrofitting, that are a greater safety concern for their bridge programs. Also, because the apportionment formula is based on eligible deficient bridge deck area, as states reduce the number of deficient bridges, they could become eligible for less HBP funding, which has created a potential disincentive for states to eliminate deficient bridges. However, state transportation officials we interviewed indicated that other factors, such as accountability to the public, responsibility for good management of limited resources, and professional integrity provide incentives for them to maintain and improve bridges.

Our work has shown that an increased focus on performance and accountability for results can help the federal government target resources to programs that best achieve intended outcomes and national priorities. Tracking specific outcomes that are clearly linked to clear program goals provides a strong foundation for holding grant recipients responsible for achieving federal objectives and measuring overall program performance.

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These principles indicate that, for the HBP, developing specific performance measures could help make the program more outcome-oriented. For example, if maintaining or improving mobility were established as a program goal, measures could be used to track outcomes of federal funding for bridge improvements, such as a reduction in the number of bridge closures or weight restrictions on highly used routes. Furthermore, directly linking the allocation of resources to program outcomes would increase the focus on performance and accountability for results. For example, modifying the apportionment formula to link funding with improvements in bridge conditions would create incentives for states to focus on results.

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### The Program Lacks Tools to Determine the Effectiveness of the Federal Investment

Our work has shown that the effectiveness of any federal program can be increased by promoting and facilitating the use of the best tools and approaches to improve results and emphasize return on investment. For example, we have found that the use of certain tools and approaches, such as economic analysis comparing projects, improved management of existing capacity, and public-private partnerships, can improve surface transportation program results and return on investment. According to FHWA, state, and local transportation officials we spoke with, bridge management systems, such as PONTIS, also provide a useful approach for prioritizing projects and making funding decisions. Although the use of management systems is optional for bridge owners, almost all states employ some type of bridge management system, and all of the states we visited had implemented or considered implementing bridge management systems to help make project selection decisions. Because these systems analyze data to help states identify and prioritize needs, their use could help the HBP more directly address national priorities.

A competitive project selection process is another approach that our work has shown can improve results and return on investment. Such a process allows agencies to direct program funds to achieve national interests and goals. We have previously reported that a competitive selection process with clearly defined selection criteria can help identify projects that maximize the public benefits in the federal interest and hold grant recipients accountable for results.<sup>46</sup> Applying this approach to the HBP would allow FHWA to better target federal funding toward projects that achieve identified national interests and goals. Potential formula elements

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<sup>46</sup>GAO-08-400.

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could include a bridge's safety risk level, traffic levels, or some other measure of importance on a national level.

Given the projected growth in federal deficits, constrained state and local budgets, and looming Social Security and Medicare spending commitments, the resources available for discretionary programs will be more limited—making it imperative to maximize the national public benefits of any federal investment through a rigorous examination of the use of such funds. Exploring and using best tools and approaches, such as the ones we describe here, could help the HBP more directly focus on national priorities and provide a more informed process for prioritizing and selecting bridge projects for funding.

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## Program Sustainability Remains a Challenge

The nation's overall fiscal imbalance makes it implausible to improve the HBP merely by increasing federal contributions. The sustainability of the HBP and other surface transportation programs depends not only on the level of federal funding but also on the allocation of funds to projects that provide the best return on investment and address national transportation priorities.<sup>47</sup> The anticipated deterioration of the nation's bridges—and the declining purchasing power of currently available funding for bridge construction, repair, and maintenance—present challenges to the sustainability of the HBP, particularly in light of the long-term pressures on the Highway Trust Fund and the governmentwide problem of fiscal imbalance. With the expansion of HBP goals, any bridge is potentially eligible for some degree of federal HBP funding, and the discretion that the HBP gives states in determining priorities and selecting bridge projects for funding has led to varying national bridge priorities from state to state. Without links between federal goals and performance, the HBP's effectiveness is unknown. Given the future fiscal challenges facing the nation, the effectiveness of the federal investment can be improved by better targeting the use and impact of such funds.

The aging of the nation's bridges, discussed earlier in this report, coupled with the declining purchasing power of currently available funding and recent growth in construction costs, presents specific sustainability challenges for the HBP. Although transportation revenues have continued to increase in nominal terms, the federal and state motor fuel tax rates have not kept up with inflation. As a result, according to DOT and FHWA

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<sup>47</sup>GAO-08-400.

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data, the purchasing power in real terms of revenues generated by federal and state motor fuel tax rates has been declining since 1990.<sup>48</sup>

Furthermore, the cost of building and maintaining bridges has increased steadily over the last few years, at a rate that exceeds inflation. In particular, the price of construction materials has increased significantly in the last few years because of rising concrete and steel prices.

According to our work, two tools that could improve the sustainability of the HBP are a maintenance-of-effort requirement for grantee spending and tolling. First, the potential substitution of federal funds for state and local funds under the HBP and other federal transportation programs may be reduced by establishing a maintenance-of-effort requirement, whereby state or local grantees would be required to maintain their own level of funding in order to receive federal funds. Such a requirement could discourage states and local governments from substituting federal support for funds they themselves would otherwise have spent. Secondly, our work has shown that removing barriers to, or even promoting, tolling can lead to more efficient management of existing infrastructure and capacity. For example, the tolling of bridges could not only raise funds for bridge maintenance and repairs but potentially improve the performance and reliability of the bridge. The introduction of tolling that varies with time of day or congestion could increase the speed of traffic, increase capacity, and provide new revenues and potentially leverage existing revenue sources.<sup>49</sup> For example, Caltrans owns and operates seven toll bridges in the San Francisco Bay area where toll funds are used for bridge-related transportation priorities, including bridge replacement and rehabilitation projects, improvements in critical traffic bottlenecks, and seismic retrofitting projects.

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## Conclusions

Although many aspects of the HBP are carried out at the state level—with ultimate responsibility for bridge inspection and project selection residing with the states—the federal government bears responsibility for ensuring that the program achieves results that are in the federal interest and that the program's resources are allocated efficiently. The purpose of the HBP has greatly expanded over the years, making nearly any bridge potentially

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<sup>48</sup>GAO, *Surface Transportation: Strategies Are Available for Making Existing Road Infrastructure Perform Better*, [GAO-07-920](#) (Washington, D.C.: July 26, 2007).

<sup>49</sup>See GAO, *Highway Finance: States' Expanding Use of Tolling Illustrates Diverse Challenges and Strategies*, [GAO-06-554](#) (Washington, D.C.: June 28, 2006).

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eligible for federal funding. As a result the federal interest in bridges lacks focus. Additionally, many state officials told us that measures used by the HBP to apportion federal funds—bridge deficiency status and sufficiency ratings—are not necessarily good proxies for the safety or risk associated with specific bridges. Even though data indicate that the number of structurally deficient bridges has declined over the last 10 years, most of this improvement has been in locally owned and rural bridges. Oftentimes, the largest and most critical bridges carrying more interstate commerce are too expensive to be funded by the HBP and so require other funding sources to be replaced or rehabilitated. Moreover, without comprehensive data on state and local spending on bridges, it is impossible either to distinguish the impact of HBP funding from the impact of state and local bridge funding or to determine the extent to which states are substituting HBP funding for state and local funds that would otherwise have been spent on bridges. Absent clear goals and related performance measures for the HBP, it is difficult to determine the overall effectiveness of the program's investment in bridges.

Our principles have suggested several ways to improve the HBP to ensure that it is more focused and performance-based in the future. For example, tools such as bridge management systems provide bridge managers with a more systematic approach to prioritizing projects and making funding decisions. Our work has shown that some states have developed bridge management systems and other tools that generally exceed federal standards. Additionally, linking program goals to performance measures to determine whether goals are met and using that information to select projects and make funding decisions, can create incentives for state and local governments to improve the performance of their bridge programs as well as the overall transportation system. As the projected revenue shortfall in the Highway Trust fund rapidly approaches, and as bridge costs rise and infrastructure continues to age, incorporating strategies to better ensure the fiscal sustainability of the HBP is also critical.

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## Recommendation for Executive Action

To improve the focus, performance, and sustainability of the HBP, we recommend that the Secretary of Transportation work with Congress to:

- identify and define specific national goals for the HBP;
- determine the performance of the program by developing and implementing performance measures related to the goals for the HBP;

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- identify and evaluate best tools and practices that can potentially be incorporated into the HBP, such as bridge management systems; and
  - review and evaluate HBP funding mechanisms to align funding with performance and support a targeted and sustainable federal bridge program.

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## Agency Comments

We provided a draft of this report to DOT for review and comment prior to finalizing the report. DOT officials said that they generally agreed with the findings in the report and they provided technical comments, which we incorporated, as appropriate. DOT officials also commented that they thought our re-examination principles had broader applicability than just the HBP—noting that DOT had incorporated our principles into the department’s recent proposal for reforming surface transportation programs. DOT’s reform proposal, released in July 2008, recommends consolidating the existing network of over 100 surface transportation programs into eight broad, intermodal programs.<sup>50</sup> The officials noted that DOT’s reform proposal articulates a narrower federal interest and a framework for performance management tied to clearer goals for surface transportation programs. We have not commented on DOT’s reform proposal, and the outcome of that proposal in the surface transportation reauthorization debate that will occur during 2009 is uncertain. However, we agree with DOT that our re-examination principles are applicable at a broader level than a specific program like HBP. In fact, we developed our principles because of (1) our concerns, raised in prior work, that many federal surface transportation programs are not effective at addressing key transportation challenges such as growing congestion and freight demand and (2) our conclusion that our principles could help drive the re-examination of those programs and help assess options for restructuring the entire federal surface transportation program.<sup>51</sup>

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<sup>50</sup>DOT, *Refocus, Reform, Renew: A New Transportation Approach for America* (Washington, D.C.: July 29, 2008).

<sup>51</sup>See [GAO-08-400](#).

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We are sending copies of this report to the appropriate congressional committees and to the Secretary of Transportation. We will also make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact me at (202) 512-2834 or [siggerudk@gao.gov](mailto:siggerudk@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff that made key contributions to this report are listed in appendix III.

A handwritten signature in black ink that reads "Katherine Siggerud". The signature is written in a cursive, flowing style.

Katherine Siggerud  
Managing Director, Physical Infrastructure Issues

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# Appendix I: Scope and Methodology

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To determine how the Highway Bridge Program (HBP) identifies and addresses the condition of the nation's highway bridges, we reviewed relevant legislation, program documents, and the Federal Highway Administration's (FHWA's) historical data on the apportionment of HBP funds among states, and we interviewed FHWA officials. One key information source was FHWA's draft *Bridge Program Manual*, which is a collection of all of the basic program and technical information needed by FHWA bridge engineers to perform their duties. In addition to reviewing documents, we met with senior FHWA bridge officials in Washington, D.C., and division offices to learn how bridges are inspected, inventoried, and classified and how FHWA apportions HBP funds to states.

To determine how states use their HBP funds and select specific bridge projects for funding, we visited six states—California, Missouri, New York, Pennsylvania, Texas, and Washington—where we conducted interviews with federal, state, and local transportation officials and visited six bridges. We chose these six states based on their relatively high levels of HBP funding, large bridge inventories, and large structurally deficient bridge inventories. Of the states meeting these criteria, we selected states that varied on key characteristics of interest, including the proportion of state versus locally owned bridges, whether the state has transferred funds out of the HBP since 2000, and officials' comments on any notable or innovative state bridge or inspection programs. Although the limited number of site visits means that we are not able to generalize our results to all states, we chose this methodology because, given the impracticality of visiting all states, in-depth information from six states with relatively high levels of HBP funding, large bridge inventories, and high numbers of structurally deficient bridges allows us to report on how those states with the most at stake have used federal bridge funding and implemented the program. During these site visits, we interviewed FHWA division office staff, state transportation department officials, and local (city and county) bridge owners to learn how states use their HBP funds and select specific bridge projects for funding and what, if any, role FHWA officials had in these decisions. In addition, we visited six bridges, accompanied by state and local transportation officials, in four of these states to learn more about how the National Bridge Inspection Program (NBIP) and HBP affect bridge inspection and management decisions. Table 1 provides information on some key bridge characteristics and HBP funding in each state that we visited.

**Table 1: Information on Bridge Characteristics and HBP Funding in States Selected for Site Visits, Fiscal Year 2007**

State	HBP funding apportionment	Total number of bridges	Number of structurally deficient bridges
California	\$407,727,157	24,189	3,140
Missouri	154,835,091	24,059	4,432
New York	468,357,103	17,361	2,128
Pennsylvania	479,847,760	22,325	5,802
Texas	200,596,088	50,266	2,186
Washington	153,284,192	7,686	401

Source: GAO analysis of FHWA data.

To determine what available data indicate about the condition of the nation’s bridges and the impact of the HBP, we analyzed data in FHWA’s National Bridge Inventory (NBI), reviewed relevant legislation and program documents, and interviewed federal and state transportation officials. We analyzed NBI data from 1998 through 2007 to determine the current condition of the nation’s bridges and 10-year trends in the number, size, condition, age, ownership, and characteristics of bridges nationwide. Based on reviews of data documentation, interviews with relevant officials, and tests for reasonableness, we determined that the data we used were sufficiently reliable for the purposes of our study. The relevant literature we reviewed included federal legislation, regulations, and policies related to the HBP. Finally, we interviewed FHWA division office staff and state DOT officials to learn how agencies decide to use HBP funds, track total spending on bridges, and measure their performance.

To determine the extent to which the HBP aligns with principles established in our prior work to guide the re-examination of surface transportation programs, we compared HBP practices to our key principles involving identifying clear federal goals and roles, incorporating performance and accountability into funding decisions, using best tools and practices, and ensuring fiscal sustainability. In addition, to identify opportunities to improve the HBP, we analyzed information from our interviews with federal and state transportation officials, recent DOT Office of Inspector General testimony, Congressional Research Service reports, legislation proposed in Congress, and our prior work on related issues.

We conducted this performance audit from October 2007 through September 2008 in accordance with generally accepted government

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auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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# Appendix II: Bridge Maintenance Responsibility, Type of Use, and Age

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The NBI provides information on bridges in the United States, including which level of government is responsible for maintaining them, their level of use, and age. The following analyses address the extent of federal, state or local governments' responsibility for bridge reconstruction and maintenance, the extent to which bridges are on the National Highway System (NHS), and challenges associated with the aging of bridges.<sup>1</sup>

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## Bridge Maintenance Responsibility

Bridges vary significantly in their size and use, including daily traffic. As a result, the reconstruction needs and maintenance responsibilities also vary. For example, some bridges are relatively small and have relatively light use, such as a county highway bridge, while other bridges are significantly larger and carry high levels of interstate highway traffic. Bridge deck area, which provides insight into the relative size of a bridge, and average daily traffic (ADT), which indicates the number of vehicles using each bridge, can both be useful indicators of reconstruction needs, maintenance responsibility, and costs associated with their ownership.<sup>2</sup> Therefore, analyses of bridge ownership responsibilities are more complete when they consider the size of the bridge deck area and ADT, as well as the number of bridges owned.

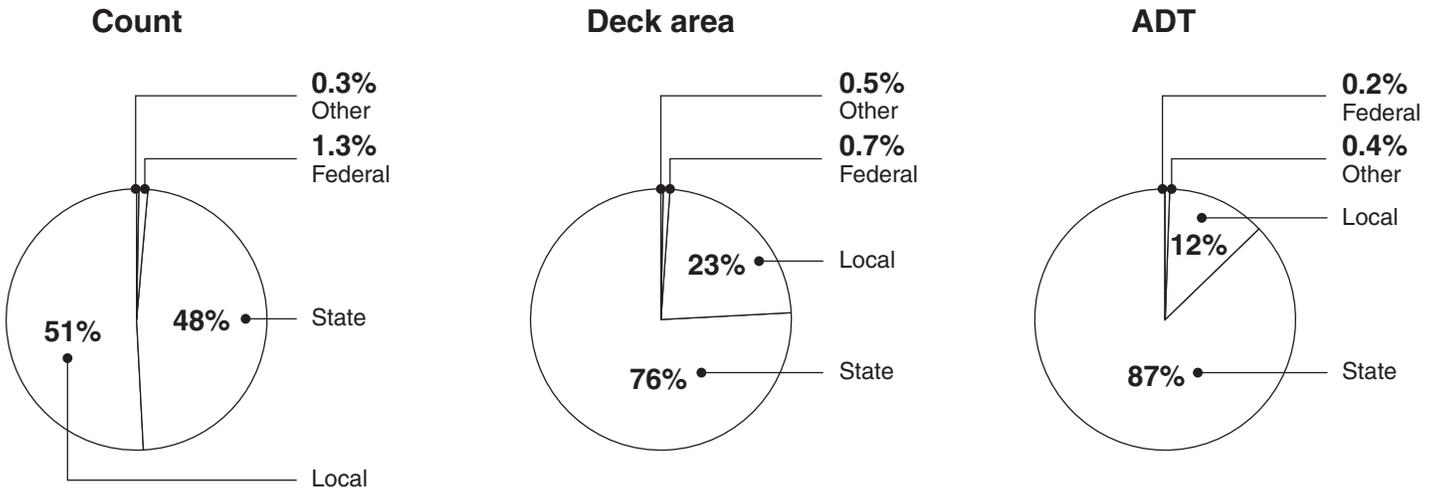
As shown in figure 9, number of bridges owned is fairly evenly split between state (48 percent) and local government agencies (51 percent). However, state agencies are responsible for 76 percent of the nation's bridge deck area and 87 percent of the ADT crossing bridges. This indicates that while state and local agencies are responsible for maintaining about the same number of bridges, the states have significantly larger bridges to maintain and the majority of vehicle traffic uses the state-maintained bridges.

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<sup>1</sup>The NHS consists of approximately 160,000 miles of roadway important to the nation's economy, defense, and mobility. It includes interstate highways and other principal arterials in rural and urban areas, the Strategic Highway Network that provides defense-related access, and intermodal connectors.

<sup>2</sup>Bridge deck area data in this appendix does not include bridges classified as culverts where no deck width is required to be recorded in the NBI and a deck area can not be calculated.

Figure 9: Bridge Inventory Count, Deck Area, and ADT, by Owner, 2007

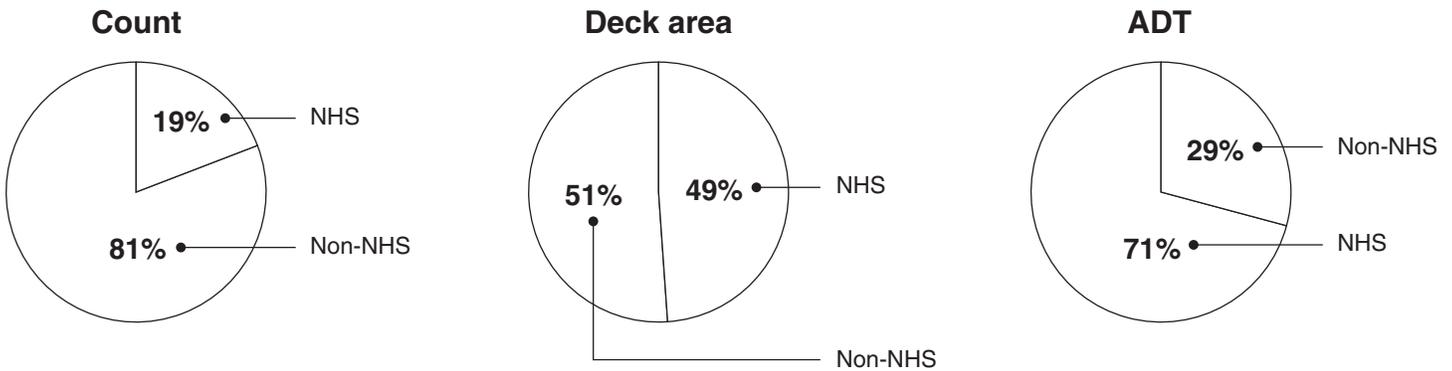


Source: GAO analysis of FHWA data.

## Extent of Bridges on National Highway System

Analysis of the NHS classification provides one means of identifying bridges that may have national significance in terms of the national economy, defense, and mobility. As shown in figure 10, NHS bridges constitute 19 percent of all bridges but account for 49 percent of all bridge deck area and carry 71 percent of the average daily traffic crossing bridges in the United States. While only one-fifth of bridges are on the NHS, they account for almost half of the deck area to be maintained and can affect mobility significantly if they are not adequately maintained.

Figure 10: Bridge Inventory Count, Deck Area, and ADT, by NHS Classification, 2007



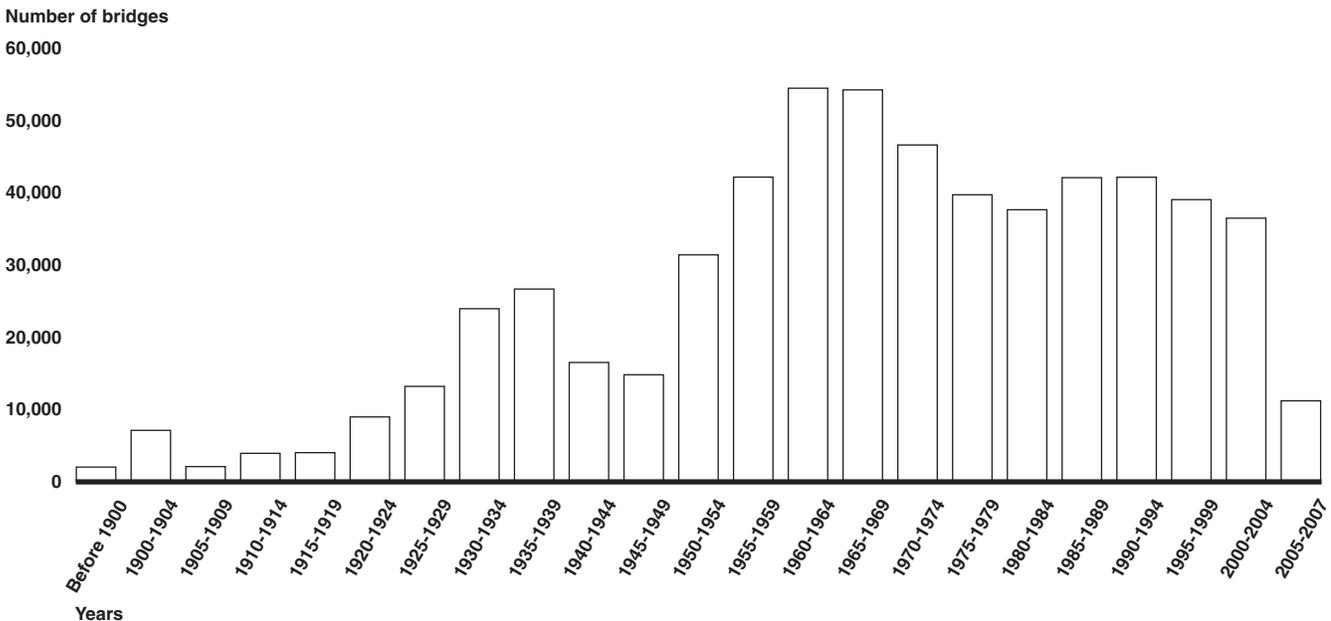
Source: GAO analysis of FHWA data.

Note: NHS classification is unknown for 115 of the 599,817 bridges in the United States.

## Challenges Associated with Aging of Bridges

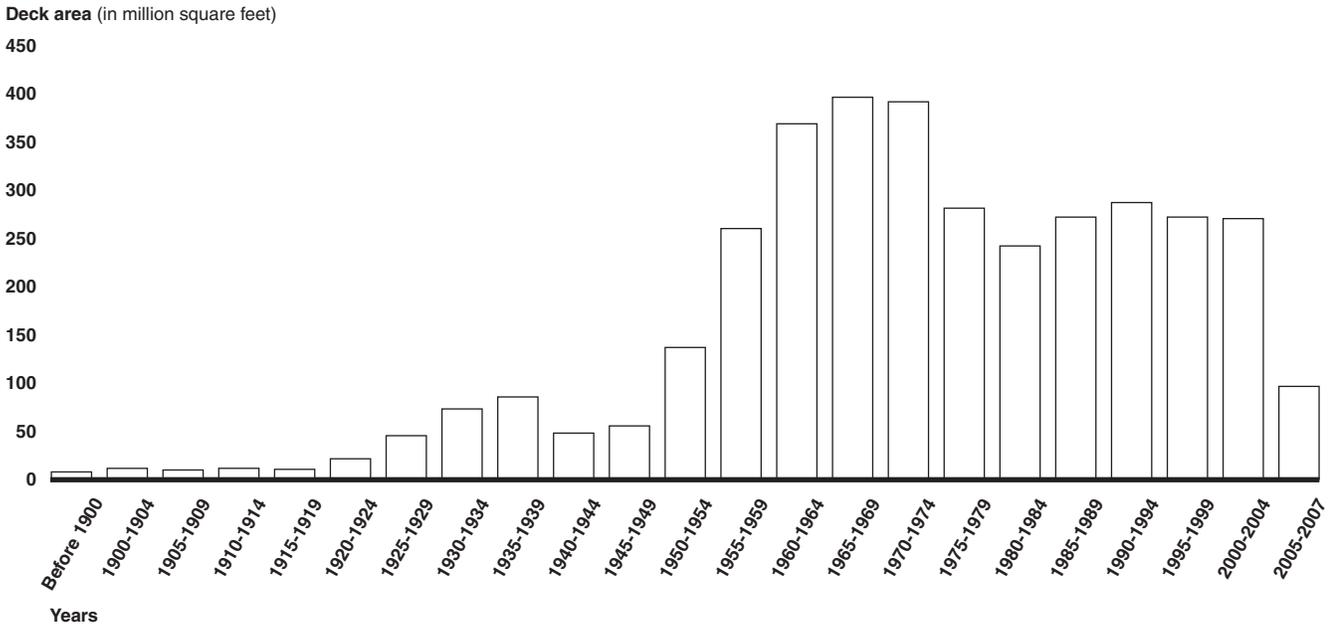
Addressing the scope of deficient bridges will likely be a growing challenge as larger numbers of bridges built after 1950 reach the age when they may need to be rehabilitated or replaced. The number of bridges constructed in the United States increased greatly beginning in the 1950s (see fig. 11), and these bridges were also generally larger than bridges built in earlier decades. For example, figure 12 shows how the total square feet of bridge deck being constructed significantly increased starting in 1950.

Figure 11: Number of Bridges, by Year Built, 2007



Source: GAO analysis of FHWA data.

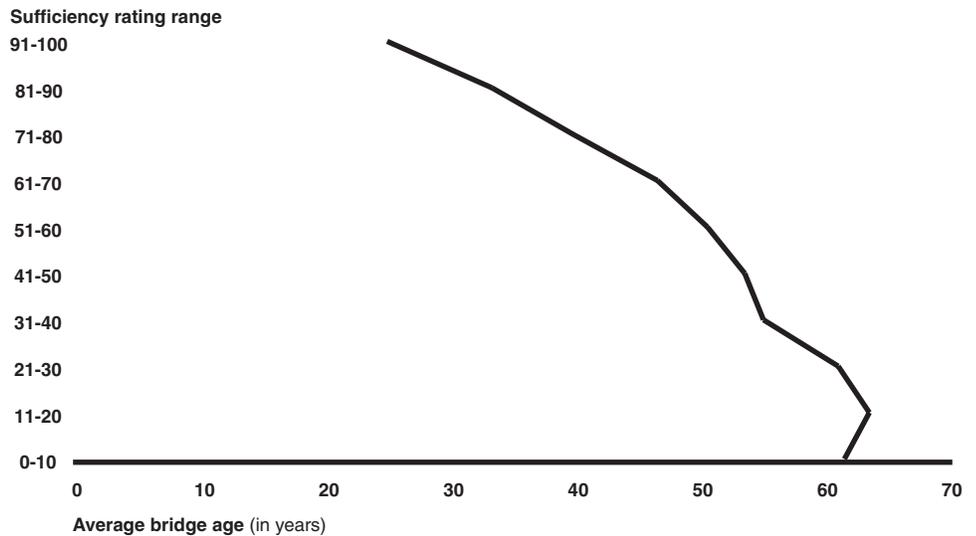
**Figure 12: Deck Area of Bridges, by Year Built, 2007**



Source: GAO analysis of FHWA data.

Bridges have life spans that are dependent on factors such as materials, environment, level of use, and level of maintenance. One measure of condition is the sufficiency rating, which declines on average over time as a bridge ages (see fig. 13). As noted earlier in this report, (1) when a bridge has a sufficiency rating of 80 and below and is determined to be structurally deficient or functionally obsolete, it is eligible for HBP funds for rehabilitation and (2) when a bridge has a sufficiency rating below 50, and is determined to be structurally deficient or functionally obsolete, it is eligible for HBP funds for rehabilitation or replacement. Based on data for the bridges in the NBI, an average bridge would have a sufficiency rating low enough to make it eligible for rehabilitation when it is 39 years old and for replacement when it is 53 years old.

Figure 13: Range of Sufficiency Ratings, by Bridge Age, 2007



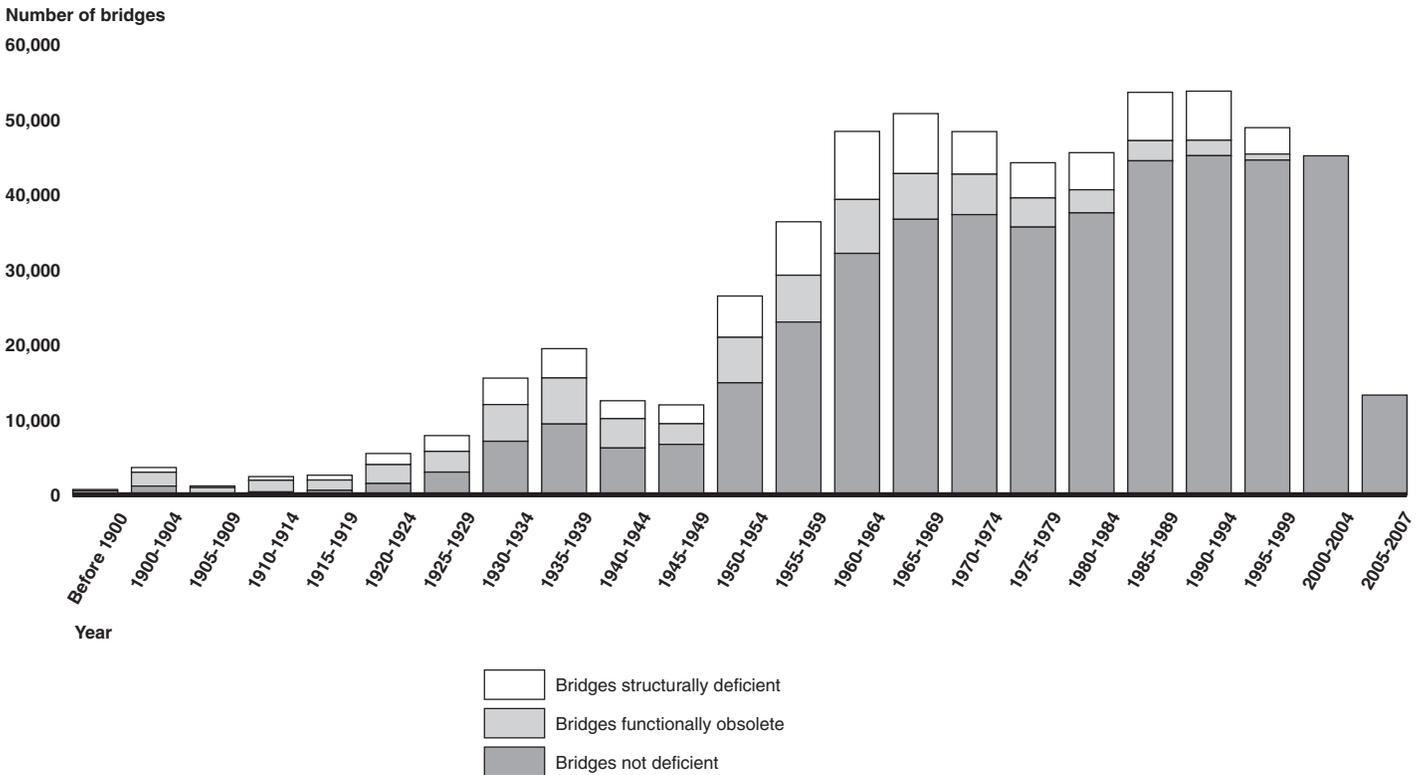
Source: GAO analysis of FHWA data.

Note: Bridge age is based on the year the bridge was built or the year the bridge was reconstructed, whichever occurred later. One percent of the total number of bridges is not included due to missing or incorrectly coded data.

As shown in figure 14, the number of deficient bridges is greatest for those built from 1950 through 1974, during which years the number of bridges and deck area of bridges built in the United States peaked. These bridges are now from 34 to 58 years old. The combination of an increased number and size of bridges built after 1949 that are now deficient and sufficiency ratings that decrease as bridges get older indicates that bridge conditions will likely begin to deteriorate resulting in more deficient bridges. The increase in the number and size of bridges built in 1950 and after will likely place a greater demand on the HBP for bridge rehabilitation and replacement than bridges built before 1950.

**Appendix II: Bridge Maintenance  
Responsibility, Type of Use, and Age**

**Figure 14: Bridge Deficiency Status, by Year Built or Reconstructed, 2007**



Source: GAO analysis of FHWA data.

Note: Bridges are categorized by the year they were built or last reconstructed, whichever came later. Bridges fewer than 10 years old or fewer than 10 years since reconstruction are not allowed to be classified as structurally deficient or functionally obsolete, so no deficient bridge data appear for bridges after 1997.

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# Appendix III: GAO Contact and Staff Acknowledgments

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## GAO Contact

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## Staff Acknowledgments

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