

Testimony of
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REGARDING

STRUCTURALLY DEFICIENT BRIDGES IN THE UNITED STATES

**BEFORE THE
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE**

**OF THE
UNITED STATES HOUSE OF REPRESENTATIVES**

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Founded in 1914, AASHTO represents the departments concerned with highway and transportation in the fifty States, the District of Columbia and Puerto Rico. Its mission is a transportation system for the nation that balances mobility, economic prosperity, safety and the environment.



Introduction

Mr. Chairman, my name is Malcolm Kerley. I am the Chief Engineer for the Virginia Department of Transportation. I chair the Highway Subcommittee on Bridges and Structures of the American Association of State Highway and Transportation Officials (AASHTO). I am a registered Professional Engineer in the State of Virginia.

On behalf of AASHTO, I want to thank you for holding this hearing and to express our support for your proposed National Highway System Bridge Reconstruction Initiative. We appreciate the focus on infrastructure needs in America that you have brought forth along with the proposal to create a new trust fund dedicated to bridge infrastructure. The State Departments of Transportation (State DOTs) consider bridge safety and bridge preservation to be one of our highest priorities, and we take this responsibility to preserve the safety and mobility of the traveling public very seriously.

I am here to provide you and the public with the answers to some critical questions that have arisen since the tragic collapse of the Interstate 35W bridge in Minneapolis:

1. What have states done since the accident to make doubly sure the nation's bridges are safe?
2. How are states investing bridge money?
3. Are current funding levels adequate for the job at hand?

Every state conducts a thorough and continual bridge inspection and rehabilitation program. America's bridges are inspected every two years by trained and certified bridge inspectors, conditions are carefully monitored, and, where deterioration is observed, corrective actions are taken.

While we know all states comply with federal bridge inspection standards, each state has a responsibility to ensure that it develops more detailed program appropriate to its unique circumstances.

Since August 1, in compliance with federal requests, every state has reviewed or is in the process of re-inspecting its steel deck truss bridges. Based on the reports of this review, we can say that these bridges are safe.

Nonetheless, of the almost 600,000 bridges across the country, roughly 74,000 (or 12.4%) are classified as "structurally deficient." This means that one or more structural condition requires attention. This may include anything from simple deck repairs to reinforcement of support structures.

Classifying a bridge as “structurally deficient” does not mean that it is unsafe. But it does mean that work is needed.

How are states spending their bridge funding?

As age and traffic take a toll on bridge conditions, states wage a daily campaign to preserve them in good condition.

Reports alleging a diversion of federal bridge funding are misleading because they focus only on federal Bridge Program data and fail to look at the total picture of all the resources states commit to bridge improvements.

The fact is that states are spending dramatically more money on bridges than is provided under the federal Bridge Program.

- In 2004 the federal Highway Bridge Program provided some \$5.1 billion to the states.
- That year, states actually spent \$6.6 billion in federal aid for bridge rehabilitation. State and local funding added another \$3.9 billion for bridge repairs.
- As the FHWA reports, in 2004, a total of \$10.5 billion was invested in bridge improvements by all levels of government.
- This pattern was the case in the years prior to and since 2004.

Transfers between federal programs are simply a project management tool, and do not reflect actual levels of state bridge spending.

A case in point is that of the Maryland Department of Transportation’s bridge spending. News media reported that the department had transferred \$32.5 million of federal bridge funds to other categories in 2006. What the article failed to report, although the information was provided, was that while Maryland received \$168 million in the federal Highway Bridge Program over the last four years, it actually spent at least \$305 million to address bridge needs.

In addition, states are not credited with bridge spending when a bridge is rehabilitated as part of a larger transportation project. Again in Maryland, the state invested \$12 million as part of the \$65 million I-695 Beltway Project. However, that spending is not tracked at the state or federal levels as bridge investment.

Therefore, federal estimates are clearly well below actual state bridge expenditures.

In other examples, California since 1998 has received \$3.28 billion in federal bridge apportionments, but has spend at least \$4.8 billion on bridge projects.

Oregon’s 10-year state bonding program is providing \$1.3 billion of state funding for the rehabilitation of hundreds of deficient bridges. This is twice the amount they receive in federal bridge funding.

Progress made reducing deficiencies over past 15 years

The U.S. Department of Transportation reports that states have reduced, by almost half, the number of structurally deficient bridges on the nation's highway system since 1990 – from approximately 24 percent to 12 percent – despite the fact that traffic has grown markedly on Interstate and other arterials over the past decade. This effort reflects a long-term commitment of the state and federal governments to bridge safety, and we are proud that this progress has been made. The reduction in deficient bridges has even outpaced improvements in congestion, safety, and pavement deficiencies.

However, a huge backlog still remains.

Is Current Funding Adequate?

According to U.S. DOT's *2006 Conditions and Performance Report*, the backlog of needed repairs on National Highway System bridges alone total over \$32 billion, which includes over \$19 billion needed on Interstate Highway System bridges. Structurally deficient bridges on the National Highway System only represent one-tenth of the total number of structurally deficient bridges on the U.S. road network. As wear and tear on our nation's infrastructure continues, it will only continue to increase the needs in coming years.

During the last reauthorization of the federal transportation bill, our message to Congress regarding the need for more resources was heard – the Safe, Accountable, Flexible and Efficient Transportation Equity Act – a Legacy for Users increased guaranteed spending levels for transportation by 38 percent over the previous bill. For the Highway Bridge Program, SAFETEA-LU gradually increased annual funding levels by a more modest 6 percent over the life of the bill (from FY 2005 to FY 2009).

Far outpacing that increased funding have been dramatic increases in materials costs for steel, concrete, fuel, asphalt. States report that prices jumped 46 percent over the years from 2003-2006. In addition, the *Conditions and Performance* report attributes increases in the “cost to maintain highways” to the rising cost of construction in large urbanized areas due to environmental mitigation and construction strategies (such as night work) intended to reduce the impacts of work zones on users.

Aside from the well-documented dramatic increases in construction costs, there have been equally dramatic increases in traffic, especially heavy trucks, on the nation's major highways. Today, the average mile of Interstate highway carries 10,500 trucks per day. By 2035, that number is expected to more than double to 22,700 trucks per day.

The truck issue also extends to overweight vehicles. As an example, in Iowa, the DOT's Bridge Office issues an average of 50 permits per day for trucks weighing over 156,000 pounds, or approximately 7,500 permits per year. These trucks are roughly twice the standard “legal” weight limit, causing significant wear and tear on the system, but are necessary for the economic health of our country. And these numbers are only anticipated to increase.

Thus, we are left with a system that has challenges to meet, and a program that does not have enough funding to overcome the current backlog.

Current bridge deficiencies

Currently, of the almost 600,000 bridges across the country, roughly 74,000 (or 12.4 percent) are classified as “structurally deficient.” This classification means that one or more structural conditions require attention. Most bridges are inspected every two years by trained and certified bridge inspectors, conditions are carefully monitored, and where deterioration is observed more frequent inspection and corrective actions are taken.

It cannot be stated emphatically enough that the classification of a bridge as “structurally deficient” does not indicate that it is unsafe, though it may require the posting of a vehicle weight restriction. The terminology of “structurally deficient” is not a description of the safety and strength of the bridge, it is a description created for the purpose of allocating federal bridge funds based on need.

Comments on the National Highway System Bridge Reconstruction Initiative

Congressman Oberstar’s proposal suggests a four-point approach:

1. Significantly Improve Bridge Inspection Requirements

Within this strategy, five requirements have been proposed:

Immediately Update National Bridge Inspection Standards

The most recent update to the National Bridge Inspection Standards was implemented in January 2005. The program was changed significantly in several areas:

- The fracture-critical inspection interval was shortened (not to exceed 24 months) and the qualifications for underwater inspectors were increased (80 hours of training are now required).
- The qualification requirements for Program Managers and Team Leaders were increased. For example, non-licensed engineers must take a 10-day class and have 5 years experience, with most of that experience taking place directly in field inspection, to become a Team Leader.
- States must have a quality control and assurance program in place for their bridge inspection program. The program should include periodic field review of inspection teams, periodic bridge inspection refresher training for program managers and team leaders, and independent review of inspection reports and computations.

These recent updates to the National Bridge Inspection Standards demonstrate that the Federal Highway Administration is diligent in updating and advancing inspection standards.

In addition, states frequently supplement federal inspection requirements with more detailed data collection and analysis. For example, 40 states currently employ an element level inspection process that focuses on individual components of a structure.

While all states comply with federal bridge inspection standards, states have undertaken their responsibility to develop a more detailed program appropriate to their unique circumstances.

Nonetheless, AASHTO stands ready to work with the National Transportation Safety Board and the Federal Highway Administration to cooperatively revise and implement bridge inspection standards if recommended.

Immediately Inspect All Structurally Deficient Bridges on the NHS

Responding to the request by the Federal Highway Administration, states have reinspected or evaluated as a precaution, the more than 700 steel deck truss bridges similar in design to the I 35W bridge that failed in Minneapolis. However, it should be noted that the cause of the failure of the Minneapolis bridge has not been determined nor directly attributed to a deficiency in the inspection process.

Under the current inspection process, all federal-aid bridges are inspected at least every two years. States routinely schedule structurally deficient bridges for more frequent inspections, perhaps every year or even every six months.

The current bridge inspection program has developed a sound database of bridge conditions on which to evaluate funding needs and which can serve as a future baseline of improvements.

A blanket federal mandate for massive and immediate reinspections of structurally deficient bridges on the NHS would result in repetition of work that has been done perhaps only a few months ago. It would serve to disrupt the cycle of inspections of other bridges, and stretch both manpower and financial resources thin.

Since there are currently 6,175 structurally deficient bridges on the NHS, a sudden requirement to re-inspect would be both inefficient and costly, diverting funds from bridge repair needs. For example, Pennsylvania has approximately 600 of these bridges. At an average rate of \$4,000 per bridge inspection, this aspect of the proposal could cost more than \$2.4 million in Pennsylvania alone.¹

States are making substantial investments in bridge inspection. For example, the state of Virginia spends \$13.5 million per year. Oregon spends \$8 million and California spends some \$14 million.

Any proposal to intensify the level of bridge inspections should consider focusing such efforts on the most critical concerns. A classification of a bridge as structurally deficient may be the result of a very low rating in one of three categories, decking, superstructure and substructure. In California, for example, 95 percent of structural deficiency is based upon

deck cracking and paint issues. While such deficiencies may contribute to a rough ride, they do not render the bridge susceptible to failure. Any effort to target more intensive inspection requirements should be focused on those bridges which have superstructure or substructure deficiencies.

It is also important to remember that there are many bridges labeled structurally deficient because of superficial deck cracking, waterway clearance, paint condition, and issues not related to the overall integrity of the bridge. It may be necessary to revisit the definition of “structurally deficient” before requiring additional non-routine inspections.

Recalculate the Load Rating for All Structurally Deficient NHS Bridges

Recalculating load ratings requires recent or additional inspections to make the new ratings meaningful, and significant resources would need to be diverted from other National Bridge Inspection Standards activities. Load rating is already a required entry for each bridge in the NBI database each time the bridge is inspected. This does not, however, mean that a recalculation of the load ratings is always needed. Many times, recalculation is only performed if the bridge has shown significant changes since its last inspection. Since calculating a load rating is something that can be done as part of the inspection, it seems that it would be sufficient to recalculate all of the load ratings for structurally deficient bridges as they are being inspected on their usual two-year cycle, instead of requiring immediate recalculation, which would disrupt the normal cycle of National Bridge Inspection Standards activities and be an inefficient use of time and funding.

FHWA to Conduct Annual Compliance Reviews

Most FHWA division offices are currently performing annual audits of each state’s National Bridge Inspection Standards program.

Institute Computerized Bridge Management Systems

Currently, 43 states plus Puerto Rico and the District of Columbia along with several local agencies (including Los Angeles and Phoenix) and six international agencies are using an AASHTO BRIDGEWare® software program called *Pontis*®. This is a computer-based bridge management system developed to assist in the challenging task of managing an agency’s structures. Pontis can store bridge inventory and inspection data, formulate network-wide preservation and improvement policies for use in evaluating the needs of each bridge in a network, and make recommendations for what projects to include in an agency’s capital plan for deriving the maximum benefit from limited funds.

Once inspection data have been entered, Pontis can be used for maintenance tracking and federal reporting. Pontis integrates the objectives of public safety and risk reduction, user convenience, and preservation of investment to produce budgetary, maintenance, and program policies. Additionally, it provides a systematic procedure for the allocation of resources to the preservation and improvement of the bridges in a network. Pontis accomplishes this by considering both the costs and benefits of maintenance policies versus investments in improvements or replacements.

Responses from an informal August 2007 AASHTO survey¹ found that 17 of 37 states use an in-house computerized bridge management system that allows for prioritization and monitoring of elements in conjunction with either Pontis data collection or an in-house database. In some cases, Pontis is used by the states as a data collection system only, but many states are also using the management capabilities of Pontis, which allow them to predict bridge element deterioration levels and prioritize spending.

As noted, most states have some form of computerized bridge management system in place; however, the complexity and abilities vary. The goal of this effort may be to better define the abilities a state should have within its bridge management system and allow for flexibility within each state to accomplish these goals in the most efficient manner possible.

2. *Provide Dedicated Funding*

While providing dedicated funding for a short-term program such as the NHS Bridge Reconstruction Initiative is desirable, AASHTO recommends retaining as much flexibility as possible to allow engineers and policy makers the ability to focus money where it will do the most good, not necessarily where a mathematical formula says it should go.

In addition, to help ensure quicker implementation of this proposed temporary program, AASHTO recommends considering the provision of funding with no requirement for state or local match, which will get money out to projects more quickly and will not preempt other infrastructure needs by taking away state matching funds that have already been committed to other needed projects.

3. *Distribute Funds based on “Public Safety and Need”*

To make quick progress in this effort, it seems logical to attack the most pressing needs first through a program that identifies the greatest needs through a review of existing bridge data. In addition, AASHTO applauds the effort to eliminate earmarks in this and other transportation programs, as these earmarks take funding away from previously prioritized projects. However, in whatever manner the funds are ultimately distributed, it is recommended that flexibility be provided so that the funding can be used in the most efficient and effective manner, as has been demonstrated already by current state spending for bridge projects.

4. *Establish an NHS Bridge Reconstruction Fund*

If a new fund is established, AASHTO recommends ensuring that the funding for this program comes from a new funding source, so as not to divert existing funding from other critical needs.

Moving Forward

This proposal is a great *first* step toward the level of total investment that is needed to meet the infrastructure challenges of the future. However, while we continue to make progress in addressing bridge replacement and rehabilitation needs, there just isn't enough money to close the gap. And each year, as bridges continue to age and deteriorate, it is an uphill battle to keep up with the demands.

According to the 2006 *Conditions and Performance* report, maintaining the current investment level of \$10.5 billion annually would reduce the backlog of bridge needs by half over 20 years. An investment level of \$12.4 billion per year for bridge system rehabilitation would eliminate the backlog by 2024, excluding any kind of necessary spending on expansion or enhancements. Congressman Oberstar's initiative proposes to eliminate the backlog of needs for structurally deficient bridges on the National Highway System over five years. That would allow other bridge investment to be directed to the remaining non-NHS bridge needs, and to keeping pace with deterioration that may occur in the future.

And of course, the gap between available funding and needs for bridges is reflective of the larger funding and needs gap that exists for the entire surface transportation system. Current overall needs, or "cost to improve" the highway and bridge system in its entirety, stands at \$131.7 billion per year, or 87.4 percent higher than what we spent in 2004.

In addition to providing needed additional funding, we recommend investigating what can be done to streamline processes that delay the implementation of needed repairs on our nation's highway system, including reducing environmental red tape and allowing the use of proprietary engineering-related products that could spur innovation in long-term solutions.

Conclusion

AASHTO and the State DOTs stand ready to help Congress address the needs for transportation infrastructure in America. The tragic Minneapolis bridge collapse rightly raises concerns about the condition and needs of the nation's bridges. AASHTO and the State DOTs continue to work with NTSB and others as they investigate the cause of this tragic event, and when a cause has been identified we are committed to working jointly with Congress to address the issue head-on and to correct the situation in the most expedient way possible. Until that time, it is important to avoid premature speculations, and diligently obtain all relevant data to arrive at the appropriate solution.

Attachment

Background on the National Bridge Inspection Standards (National Bridge Inspection Standards)

The National Bridge Inspection Program applies to all bridges longer than 20 feet. State inspectors are required to submit data from their bridge inspections to FHWA on an annual basis (by April 15th). These data form the National Bridge Inventory. The National Bridge Inspection Standards program sets up a mechanism to identify the nation's structurally deficient and functionally obsolete bridges, to evaluate the overall conditions of bridges nationwide, and to form the statistical basis for developing the cost-to-repair estimates that are used in the Highway Bridge Program apportionment formulas.

Inspections

In general, there are three types of inspections: routine inspections, fracture critical inspections, and underwater inspections. During routine inspections, engineers and trained inspectors look for any signs of distress that could compromise the structural integrity of the bridge. The conditions are documented, monitored, and repairs are recommended if necessary. Inspectors may also order additional investigation if needed, such as taking samples of the concrete deck for testing. The same process is followed on the superstructure and the substructure (foundations). In addition, specialized teams of engineers and technicians conduct "fracture critical" inspections of steel bridges and underwater inspections of bridge piers that are in waterways.

The federal government sets the standards for bridge inspection (23 CFR 650, subpart C), and these standards are the basis for the Bridge Inspectors Reference Manual. This manual is used by federal, state, and contractor personnel for guidance in bridge inspection. The manual outlines how, with what frequency, and by whom bridge inspection is to be completed.

States are responsible for the inspection (and conformance with federal requirements) of all public highway bridges within the state (except for those owned by the federal government or tribally owned). Inspections are conducted by state employees or certified inspectors under contract to a state DOT.

Frequency of Inspections

- In general, the required frequency for bridge inspection is every 24 months. States may identify bridges that require less than a 24-month frequency. States can also request FHWA approval to inspect certain bridges on an up to 48-month frequency (usually newer bridges).
- Frequency of underwater inspection is generally 60 months, but may be increased to 72 months with the permission of the FHWA Division Office.
 - All states meet these requirements, and many exceed them. For example, many states, such as Ohio, inspect all of their bridges on an annual basis, and several states also inspect structures measuring less than 20 feet in length, which is not required by the National Bridge Inspection Standards.
- The most common on-site inspection is a visual inspection by trained inspectors, one of whom must meet the requirements of "team leader," as described by the National Bridge Inspection Standards .

Load Ratings

- Load rating of a bridge must be under the responsibility of a registered Professional Engineer.
 - Load rating is part of the required National Bridge Inspection Standards inspection and must be evaluated each time a bridge is inspected.
 - Structures that cannot carry legal loads must be posted.
- FHWA inspectors in Division offices conduct audit inspections on an annual basis to assure that states are complying with the bridge inspection requirements.

Qualifications of Inspectors

- The National Bridge Inspection Standards sets rigorous standards for the qualifications and training of bridge inspection personnel, including varying levels of education, professional certification (such as a Professional Engineer or certified bridge inspector certification), directly-related experience in bridge inspection, and comprehensive training through FHWA-approved outlets for the different levels of oversight.

Funding Allocation to States

- No state receives more than 10 percent of the total, nor less than ¼ percent of the total apportionment in any given year.
- Funding is allocated based on the following factors:
 - Deck area of deficient bridges
 - Unit price on a state-by-state basis
- Federal share for the Highway Bridge Program (HBP) is typically 80 percent, with 90 percent for Interstate bridges (but can go as high as 95 percent in select cases).
- Funding remains available until expended.
- Up to 50 percent of HBP funding may be transferred to the National Highway System (NHS) or the Surface Transportation Program (STP).
- 15 percent or more of HBP funds must be spent on non-Federal-aid bridges

¹ AASHTO Standing Committee on Highways issued an informal survey to its members in early August 2007 in response to the Minneapolis bridge collapse. These are responses from that survey.