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# REPORT TO THE CONGRESS



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## Unsafe Bridges On Federal-Aid Highways Need More Attention

Federal Highway Administration  
Department of Transportation

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BY THE COMPTROLLER GENERAL  
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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

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91 To the President of the Senate and the  
Speaker of the House of Representatives

This report describes the Federal Highway Administration's progress in identifying, improving, and replacing unsafe bridges on the Federal-aid highways and points out the need for more attention at both the Federal and State levels, if progress is to be made promptly.

We made our review of the bridge inspection and replacement responsibilities of the Federal Highway Administration, to assess the progress in implementing bridge safety programs established by the Congress following the collapse of the Silver Bridge at Point Pleasant, West Virginia, in 1967. Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of the report to the Director, Office of Management and Budget, and the Secretary of Transportation.

*Thomas G. Stearns*  
Comptroller General  
of the United States

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COMPTROLLER GENERAL'S  
REPORT TO THE CONGRESS

UNSAFE BRIDGES ON  
FEDERAL-AID HIGHWAYS  
NEED MORE ATTENTION  
Federal Highway Administration  
Department of Transportation

D I G E S T

The Federal Highway Administration estimates it would cost about \$10.4 billion to replace all 32,000 unsafe bridges on the Federal-aid highways. At the rate of financing under a special replacement program authorized by Congress, it would take 80 years to replace them.

GAO believes the Highway Administration should exercise more leadership in insuring that States consider replacing or improving unsafe bridges, when establishing construction priorities under all Federal-aid highway programs. GAO is making a number of recommendations to the Secretary of Transportation for that purpose. (See pp. 14 and 15.)

Bridge inventory and condition data compiled by the Highway Administration shows that about 7,000 bridges on Federal-aid highways are structurally unsound, and 25,000 are considered functionally obsolete because they are narrow, have low overhead clearance, and are poorly aligned with the roadway. (See p. 3.)

Congress authorized \$475 million in a Special Bridge Replacement Program for fiscal years 1972 through 1976. During this period ending March 31, 1975, the Highway Administration approved replacement projects under this program for 351 unsafe bridges.

The Federal share (75 percent) of the cost to replace these bridges is about \$310 million, about 90 percent of the special program funds available through fiscal year 1975. (See pp. 6 and 7.)

An additional 427 bridges have been approved for replacement under the Federal-aid highway construction programs during the same period. These bridges are primarily small ones, however, so that their replacement makes little impact on the total estimated cost of \$10.4 billion to replace unsafe bridges.

The Federal share to replace the 427 bridges is only about 1 percent of total funds obligated under the Federal-aid highway construction programs (excepting the Interstate System), to build new roads and to reconstruct and improve existing roads. (See p. 7.)

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The Department disagreed with GAO about the need for more emphasis in using Federal-aid programs to resolve the unsafe bridge problem. It believes the inspection and national inventory of bridges and replacements made under the Special Bridge Replacement Program satisfied the intent of legislation establishing those programs.

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The Department added that States are using other Federal-aid highway construction programs to replace bridges, and are using highway safety programs to improve bridge safety.

GAO's analysis of the 427 bridges approved under the highway construction programs shows that about two-thirds are in only four States. On the other hand, 14 States with a total of 9,600 unsafe bridges in the national inventory have replaced none.

Most other States have replaced a handful or less. Bridge replacement data was not compiled centrally and related to the unsafe bridges in the inventory, so that comprehensive analysis, planning, and reporting was not possible.

Annual safety reports of State Division Engineer Offices of the Highway Administration show that some bridges are included in various safety projects. This information cannot be related to the unsafe bridges in the national inventory.

The Highway Administration is not in a position to analyze comprehensively what is being done to render bridges safer, what remains to be done, and to plan and report accordingly. (See pp. 11 to 14.)

GAO is making some recommendations concerning qualifications and training of bridge inspectors and the development of new bridge inspection equipment. (See pp. 17 and 18.)

## CHAPTER 1

### INTRODUCTION

The tragic collapse of the Silver Bridge at Point Pleasant, West Virginia, in December 1967 resulting in 46 fatalities, aroused widespread concern about the safety of old bridges. Consequently, the Congress established a bridge inspection and replacement program for the Federal-aid highway systems.

Because bridges are costly, they have been traditionally designed for long life to meet forecasted load and traffic requirements. Many old bridges have been weakened by weather, erosion, vibration, metal fatigue, and other factors. Even more old bridges have become functionally obsolete, with traffic exceeding forecasts and roadways being widened and improved without corresponding improvements to these bridges.

### BRIDGE SAFETY LEGISLATION

The Federal-Aid Highway Act of 1968 (23 U.S.C. 116) required the Secretary of Transportation, with State highway departments, to develop national bridge inspection standards and to establish a training program for bridge inspectors. The act also required each State to maintain a current inventory of all bridges on the Federal-aid highway systems and authorized States<sup>1</sup> to use Federal-aid highway administrative and planning funds for training and inventory activities.

The Federal-Aid Highway Act of 1970 (23 U.S.C. 144) established the Special Bridge Replacement Program, which authorized \$100 million in fiscal year 1972 and \$150 million in fiscal year 1973 to replace unsafe bridges. The act states that the Federal share of the cost of bridges replaced under this program shall not exceed 75 percent.

The act requires the Secretary, in consultation with the States, to classify all Federal-aid system bridges located over waterways and other topographical barriers, according to their serviceability, safety, and essentiality for public use and, on the bases of those classifications, assign each bridge a priority for replacement.

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<sup>1</sup>Hereinafter meaning the 50 States, the District of Columbia, and Puerto Rico.

The Federal-Aid Highway Act of 1973 (23 U.S.C. 144) authorized \$175 million for the bridge replacement program--\$25 million for fiscal year 1974, and \$75 million each for fiscal years 1975 and 1976. The Federal-Aid Highway Amendments of 1974 (23 U.S.C. 144) authorized an additional \$50 million for fiscal year 1976 for bridge replacement and \$200 million to construct and improve non-Federal-aid system roads including, but not limited to, bridge replacement.

Other Federal-aid highway funds also can be used to replace bridges, including more than \$11 billion of impounded highway program obligational authority that has recently been released--\$2 billion by the President on February 11, 1975, to stimulate employment and the remaining \$9.1 billion as a result of Senate Resolution 69 passed April 24, 1975, disapproving the President's proposed deferral of highway program obligational authority.

#### SCOPE OF REVIEW

There are an estimated 560,000 bridges in the United States. About 230,000 are located on the Federal-aid highway systems; the majority of the remaining 330,000 bridges are located on rural roads and city streets. We made our review to assess the progress made in identifying and replacing unsafe bridges on the Federal-aid highway systems and in meeting the requirements of bridge safety legislation at the Federal Highway Administration's headquarters in Washington, D.C., at its regional and division offices responsible for the bridge programs in Ohio and Kentucky, and at the Transportation and Highway Departments in these States. We obtained additional information on unsafe bridges from the Transportation and Highway Departments in 13 other States.

## CHAPTER 2

### INCREASED EFFORTS NEEDED TO

### SOLVE THE UNSAFE BRIDGE PROBLEM

The Federal Highway Administration estimates from the bridge inventory information provided by the States that about 32,400 bridges on the Federal-aid highway systems are unsafe because of structural deficiencies, physical deterioration, or functional obsolescence. About 7,000 have structural defects, and 25,400 bridges are unsafe because they are functionally obsolete, due to inadequate width, clearance, approach alignments, or other limiting factors. These unsafe bridges represent about 14 percent of the 230,000 bridges reported on the Federal-aid systems as of September 30, 1974. The total cost to replace all unsafe bridges is estimated by the Highway Administration to be about \$10.4 billion.

The Federal-Aid Highway Acts of 1968 and 1970 together required the Administration, with the States, to inventory all Federal-aid system bridges and to assign replacement priorities on the basis of serviceability, safety, and essentiality. In April 1971 the Administration requested the States to furnish inventory and condition appraisals by July 1973. As of January 27, 1975, 32 States, the District of Columbia, and Puerto Rico had submitted complete bridge inventory information. The remaining States had submitted only partial data, so there are undoubtedly many other unsafe bridges not yet identified.

Among the unsafe bridges reported thus far, about 250 are closed to all traffic and 31,000 have lower load limits than the rest of the highway systems they serve. This imbalance in bridge/roadway capacity results from more emphasis given to constructing new or improved roadways in the States' highway programs, than to replacing or improving existing bridges on the same highways. Now, the safety and general usefulness of thousands of miles of new or improved roads on the Federal-aid systems are somewhat limited by unsafe bridges.

The 31,000 bridges with reduced load capacities are located on Federal-aid highway systems. Such bridges disrupt interstate and intrastate commerce by causing trucks and buses that are within a State's legal load limitation, but exceed reduced bridge capacities, to be diverted to less direct alternative routes or to carry less than capacity loads. Some examples follow:



1. One bridge near Crestline, Ohio, on U.S. Highway 30 North, is posted for 15 percent reduction in total weight and axle loads. A professional drivers' organization complained to State of Ohio officials that one common carrier freight hauler forces its drivers to carry loads over this bridge in excess of its posted capacity. This bridge was built in 1939 and, according to the Ohio Department of Transportation, its structural members and decking are weak. The common carrier mentioned by the professional drivers' organization and many other carriers and drivers apparently disregarded bridge posting limitations, rather than incur the extra cost associated with rerouting or carrying less than capacity loads.

2. Many structurally deficient bridges are located on rural roads and present hazards to school buses, usually the most frequent heavy vehicles traveling over these bridges. One such bridge, on Federal-aid Route 1389 near Walnut Grove in Logan County, Ohio, partially collapsed while a loaded school bus was attempting to cross it on March 4, 1974. Two children suffered minor injuries in the accident. The bridge was posted for a 40-percent reduction in legal load limits. Although the bus did not exceed the posted limit, its weight apparently caused a bottom support beam to fail. (See photograph on p. 36.)

3. Because of the potential danger of another such accident, school buses in Logan County and other rural communities are detoured to alternative roads, causing children to ride additional miles to and from school. In other instances, school buses are stopped at the edge of potentially unsafe bridges, and students walk across and reboard the empty bus on the other side. (See photograph on p. 40.)

4. Many of the unsafe bridges in rural areas impede the flow of farm goods to market, possibly resulting in higher food prices for consumers. A study made by The Road Information Program in California indicated that many bridges on key farm-to-market routes either are 16 feet or less in width, or are incapable of carrying loads of more than 5 tons. The study indicated that, in some cases, improving rural roads and bridges would enable farmers to use larger trucks, thereby increasing efficiency and saving time and money for producers and consumers.

5. Minnesota State officials are also concerned over the effect of unsafe bridges on its agricultural

industry. Trucks are required to carry less volume which makes the transportation of crops more expensive.

6. A statewide survey of county bridges in Indiana made by Purdue University's Highway Extension and Research Project showed that more than 6,500 county bridges were unsafe for standard size school buses carrying 60 or 65 children. Many of the structures are inadequate for vehicles heavier than an automobile or pickup truck. Several schools have been forced to close temporarily as a direct result of road and bridge conditions, and many school districts have to reroute buses and incur heavier fuel bills. In Owen County, 96 of 124 bridges are 1 lane, and 34 have been declared unsafe. The Owen County commissioners placed a 1 ton maximum weight on many county bridges, which limits rural mail trucks, ambulances, sheriff and State police cars, and rural fire trucks.

7. One of the closed bridges is located over the Carquinez Strait on Interstate Highway 80 between Oakland and Sacramento, California. (See photograph on p. 33.) This bridge consists of two multiple land bridge spans, one for northbound traffic and one for southbound. The older span, built about 46 years ago, has been closed since November 1974 to all traffic, except for periods when heavy weekend traffic is backed up and the California Highway Patrol opens one lane for car traffic only. Both directions of traffic are accommodated over the newer span at all other times. The older span was closed because severe deterioration was discovered on major support beams. Tests are being made to determine whether the beams can be strengthened or whether the bridge needs to be replaced.

8. On February 23, 1975, a car crashed into a steel truss on a one-lane bridge over the Yadkin River near Siloam, North Carolina, causing a portion of the 387 foot span to collapse and drop into the river. (See photograph on p. 39.) Six other cars--their drivers unable to see in the fog and darkness--plunged into the river after the bridge span collapsed. These accidents caused four deaths and 15 injuries. This bridge was on State route 1003 which is part of the Federal-aid highway system. The bridge was inspected by the State in June 1972 and was rated structurally sound, although functionally obsolete because it was too narrow. North Carolina had submitted the bridge for replacement under the Special Bridge Replacement Program; however, it ranked only 46th out of the State's 151 bridge replacement candidates. In all probability it would not have been selected for replacement in the near future.

Photographs of other unsafe bridges are contained in appendix III.

### BRIDGE REPLACEMENTS--DIMENSIONS OF THE PROBLEM

In its administration of the Bridge Inspection program under section 116 of the Federal-Aid Highway Act of 1968 and of the Special Bridge Replacement Program under section 204 of the Federal-Aid Highway Act of 1970, the Highway Administration made progress in identifying unsafe bridges, establishing replacement priorities, and increasing State awareness of the unsafe bridge problem. However, much more needs to be done to improve the condition of bridges.

The cost of replacing the large number of unsafe bridges identified by the Highway Administration far exceeds the capability of the Special Bridge Replacement Program. Plans of the States for replacing unsafe bridges under Federal-aid highway construction programs or under State financing are not known by the Highway Administration. Also lacking is comprehensive information on safety improvements made or planned by the States to reduce traffic hazards at bridges that are functionally obsolete.

As of May 20, 1975, the 50 States, the District of Columbia, and Puerto Rico had submitted applications to the Highway Administration to replace a total of 16,275 bridges under the Special Bridge Replacement Program. The total estimated replacement cost shown on these applications is about \$4.6 billion. The Highway Administration determined that only about 4,300 of the 16,275 applications have a high enough priority to be considered eligible at this time for replacement under the special bridge program. The priorities are based on ranking bridges for structural condition, width, average daily traffic volume, and other factors.

#### Replacements under Special Bridge Replacement Program

From enactment of the Federal-Aid Highway Act of 1970 through March 1975, the Highway Administration approved replacing 351 of the 4,300 priority bridges under the Special Bridge Replacement Program. The total cost of these projects is estimated at \$412 million. Forty-four projects have been completed, and the remainder are in various stages of planning, design, or construction.

The Federal share of the estimated cost to replace the 351 approved bridge projects is about \$310 million. As of March 31, 1975, that represented all but about \$33 million of the special bridge funds allocated to the States through fiscal year 1975.

From earlier legislation, the Congress authorized an annual average of \$95 million of Federal funds for the Special Bridge Replacement Program (a total of \$475 million for fiscal years 1972 through 1976). At this rate of financing, replacement of all 32,400 unsafe bridges through the Special Bridge Replacement Program alone would require about 80 years (that is, the 75 percent Federal share of a total estimated cost of about \$10.4 billion). Even if funds were restricted to the 16,275 bridge replacement applications submitted by the States so far, the program would take over 30 years. The cost and time frames will be greatly increased if a high rate of inflation continues. Moreover, with 45,000 other bridges on the Federal-aid systems estimated by the Administration to be approaching unsafe conditions, the overall situation will worsen at the current rate of replacement.

#### Replacements under other highway programs

In addition to special bridge replacement funds, the States may apply for Federal-aid highway construction funds, or use local government financing, to replace unsafe bridges on the Federal-aid systems (i.e., the Primary, Secondary, and Urban Systems). In its third annual bridge replacement report to the Congress in December 1973, the Federal Highway Administration recommended that the States be encouraged to use other Federal-aid highway funds for replacing unsafe bridges, when they have exhausted their bridge replacement funds.

At our request, the Highway Administration compiled a list of bridge replacements financed under the Federal-aid highway construction programs. The list showed that 427 bridge replacement projects were approved by the Highway Administration from July 1, 1971, to March 31, 1975. The estimated cost is available on only 185 of these, showing an average cost per bridge of about \$100,000. At this average cost, the total costs for all 427 would be about \$43 million, a relatively modest addition to the \$412 million replacement costs under the Special Bridge Replacement Program, and a very small inroad on the \$10.4 billion estimated to be required to replace all 32,400 unsafe bridges.

Furthermore, the use of Federal-aid highway construction funds has not been uniform among the States. One State, for example, has 86 of the 427 approved replacement projects; and four States together have nearly two-thirds of the total. Fourteen States, with about 9,600 bridges rated unsafe on the inventory, have no replacement projects under the regular Federal-aid construction programs.

Officials of the Administration's Division offices in Ohio and Kentucky told us that they (1) had not encouraged those States to augment their bridge replacement program funds with Federal-aid highway construction funds and (2) could not readily determine how many unsafe bridges may have been replaced under Federal or State financed construction programs. These field offices, therefore, do not appear to have the capability to evaluate the overall progress of bridge replacements in the States under their jurisdiction, or to judge whether or not bridge replacements have been given proper priority in relation to other highway construction projects in those States. The data compiled by the Highway Administration at our request shows that Ohio, with nearly 1,000 unsafe bridges in the inventory, is replacing only 1 from highway construction funds; and Kentucky is replacing only 5 of more than 700 unsafe bridges from such funds.

The variation in the extent that States replace unsafe bridges under Federal-aid highway construction programs indicates that many States may not be adequately considering the unsafe bridge problem in formulating their highway construction plans.

#### Consideration of safety improvements pending replacement of unsafe bridges

In its fourth annual bridge report in December 1974, the Highway Administration said that many unsafe bridges would be replaced under other highway construction programs, although they cautioned that even under the most optimistic estimate such programs would cover only one-half the need. It recommended establishing a single, adequately financed, highway safety fund to enable the States to set their own priorities and allocate funds to either bridge replacement projects or traffic control devices at unsafe bridges. The Administration made the same recommendation in its 1975 Annual Report on Highway Safety Improvement Programs.

In hearings held on narrow bridges in June 1973 by the House Committee on Public Works, Subcommittee on Investigations and Review, officials of the American

Association of State Highway and Transportation Officials recommended that no decrease be made in the rate of bridge replacement and expressed the hope that the Special Bridge Replacement Program would be accelerated.

In reporting the Federal-Aid Highway Amendments of 1974, the Senate Committee on Public Works looked unfavorably at using regular Federal-aid funds for unsafe bridge replacements, but recommended increasing the previously authorized bridge replacement funds by \$75 million in each of fiscal years 1975 and 1976. The Senate reduced this amount to \$50 million each for fiscal years 1975 and 1976. The House provided no funds for bridge replacement in its bill on highways for those years. The Senate and House compromised on an increase of \$50 million in the Special Bridge Replacement Program for fiscal year 1976 only, a measure that was incorporated in the Federal-Aid Highway Amendments of 1974.

During the 1973 narrow-bridge hearings, the Chairman of the Subcommittee on Investigations and Review, House Committee on Public Works, recognized the eventual replacement of functionally obsolete bridges as a very long-range goal because of the enormous cost. He urged the Federal Highway Administration and the State highway departments to emphasize reducing traffic hazards at narrow bridges by making them more accommodating; e.g., installing better pavement marking and traffic control devices.

National planning to improve  
bridge conditions limited to  
special program only

The Highway Administration does not plan and direct the use of the major Federal-aid highway construction programs for bridge replacements or improvements; this is done under the Special Bridge Replacement Program. Although the Administration recommended that the States be encouraged to use highway funds for bridge replacements, we found no evidence that its field offices have been instructed to do so. Preliminary data on the 427 bridges approved for replacement under highway construction programs indicates that the Federal share of their estimated costs is only about 1 percent of the total Federal highway construction funds obligated for the Primary, Secondary, and Urban Systems from July 1, 1971, through March 31, 1975. With such a low rate of financing from highway construction funds, it is questionable whether replacing unsafe bridges is adequately considered in relation to other highway needs.

Using Federal highway construction or safety funds to improve safety at narrow bridges has not been emphasized by the Highway Administration, as urged by the Subcommittee on Investigations and Review of the House Committee on Public Works. Subject to a general review of plans by the Administration's field offices and in conformance with the Administration's standards and regulations, the States are allowed considerable latitude by the Highway Administration in selecting projects for funding under the safety programs. Some bridges are included among these safety projects, but the number is indeterminate and they cannot be related to the unsafe bridges in the Administration's national bridge inventory. Consequently, the Highway Administration is not in a position to analyze the States' progress in improving the safety conditions at hazardous bridges on Federal-aid highways.

Senate Resolution 69, passed April 24, 1975, disapproved the President's proposal for impounding highway obligational authority. This released approximately \$9.1 billion in Federal-aid funds to the States. As the result of obligational limitations set by the Office of Management and Budget many States in the past elected to fund their Interstate programs at higher rates than other highway construction and safety programs. Removing obligational limitations provides an excellent opportunity for the Federal Highway Administration and the States to use funds for bridge improvements and replacements, as well as other programs that had been curtailed.

#### CONCLUSIONS

The Special Bridge Replacement Program alone is not expected to finance replacement of all unsafe bridges on the Federal-aid systems. The estimated cost of \$10.4 billion to replace those identified, plus additional costs as others become unsafe, could not be met within this century except by a massive increase in the annual funding level of the program. The potential danger of collapse, the traffic hazards at narrow and/or poorly aligned bridges, and the lower load and speed limits of these bridges reduce both the safety and the economic efficiency of the Federal-aid highways.

The unsafe bridge problem on the Federal-aid highways requires more comprehensive planning for the use of all relevant Federal highway programs than is presently being done. Although the Federal Highway Administration made progress in setting priorities and funding replacements under the Special Bridge Replacement Program, the funds available replaced only about 1 percent of the unsafe

bridges over a 4-year period. With a few exceptions, the States placed little, if any, emphasis on replacing bridges under the Primary, Secondary, or Urban highway construction programs. Information is lacking on the States' progress in making safety improvements at structurally sound but hazardous narrow bridges.

We believe that the Federal Highway Administration should exercise leadership in a joint effort with the States to analyze broadly what needs to be done in bridge replacements and safety improvements, and how these requirements can be financed over the long range under the various Federal highway programs commensurate with other highway needs. The recent release of impounded highway fund authorizations provides the States with the largest amount of Federal highway assistance at one time in history. Careful planning and establishing priorities for highway work should enable the Highway Administration to insure that bridges are given adequate consideration in using these funds for better and safer highways.

#### AGENCY COMMENTS AND OUR EVALUATION

In an April 10, 1975, letter the Department of Transportation (See app. II.) took the position that it had substantially satisfied the intent of the Highway Acts of 1968 and 1970 in identifying and replacing unsafe bridges. The Department stated that we reviewed the Special Bridge Replacement Program too early, and that the program was delayed somewhat by the time required for bridge design and construction, environmental considerations, inadequate and irregular fundings, and other factors.

We do not question whether the Department satisfied the intent of the Highway Acts of 1968 and 1970. Our principal conclusion about the bridge problem is that it is of such magnitude that the marshalling of all pertinent highway programs, including the safety programs, is needed to make any prompt progress. The problem requires more emphasis on improving bridges by the Highway Administration, coordination on bridge problems among the program managers of the Administration, and increased management attention to priorities for bridge replacement in relation to other highway needs.

The Department believed there was no need to establish special procedures to encourage States to replace unsafe bridges under other highway programs, because the States were aware of the problem, and knew that the primary, secondary, and urban program funds could be used for this purpose. The Department added that a large number of bridges have been replaced with 100 percent State financing.



We recognize that the States may be aware of the problem and the availability of funds under various programs, but we are concerned with the adequacy of actions to highlight the problem and to convince the States to give bridge replacements a high priority.

An analysis of the 427 bridges being replaced under the Federal-aid highway construction programs shows that only a few States are replacing many bridges by these programs. If the number of bridges to be replaced in the top four States are eliminated, each of the other States is replacing an average of only one bridge a year under the other programs. The Highway Administration was unable to provide us information on bridges that may have been replaced with 100-percent State financing. We believe the Department should increase its efforts to convince the States to assign a higher priority to bridges under these programs.

The Department also believed that under the Special Bridge Replacement Program and the highway safety improvement programs the States are analyzing their bridge replacement and safety improvement needs and reporting their plans to the Administration for meeting these needs under the various Federal and State programs.

In addition, the Department stated that the procedures for the Highway Administration to prepare a plan of national priorities for assisting the States in bridge replacements and safety improvements are implicit in the Special Bridge Replacement Program and in the field offices' reviews of States' safety improvement plans. They pointed out that the applications submitted by each State for replacing bridges are rated and ranked in an order of priority. These rankings, together with the number of bridges rated unsafe in the National Bridge Inventory, are the bases for selecting bridges to be replaced and for allocating Special Bridge Replacement funds among the States.

We recognize that priorities have been established for replacing the most critical bridges under the Special Bridge Replacement Program. In considering the overall problem of unsafe bridge replacements and safety improvements, however, two factors about priorities are important.

1. Priorities are established only on bridges submitted by the States for replacement under that special program. Known as the "candidate list" this procedure has ranked about 16,000 bridges. As described on page 6, based on physical conditions and other factors, the Administration considers about 4,300 of these to be eligible

for replacement under the special bridge program. While the list of these eligible candidates is available to State and Highway Administration officials for planning purposes, many other unsafe bridges have not been ranked in priority order and are not considered in the Administration's planning. The latter group becomes visible only in grand totals of unsafe bridges by States or by type of deficiency.

2. The candidate list appears to have been used by the Highway Administration solely to decide with the States on bridges to be replaced under the Special Bridge Replacement Program. We found no evidence that the Administration has considered the priority that should be given to replacing bridges in relation to other construction needs under any of its other programs. As described earlier, very few States have replaced many unsafe bridges under the other Federal-aid programs during the past 4 years. An example of the need for greater emphasis may be seen in North Carolina, which is replacing 10 of its 151 candidates under the Special Bridge Replacement Program, but replacing none under the other Federal-aid programs. Recently, a narrow bridge, which ranked 46th in priority for replacement within the State, collapsed with tragic consequences.

The Department believes that there is adequate information available now on bridges replaced and on bridge safety improvements for periodic analyses on the status of the inventory because (1) when the States replace unsafe bridges under construction programs, they notify the Department to delete these bridges from the candidate list and (2) the annual reports of the Division Engineer Offices in each State describe safety projects under the various highway safety programs.

The Department had no comprehensive information readily available on bridges replaced under any program other than the Special Bridge Replacement Program. Upon our request, the Highway Administration searched its records for such information. The result was a list by States of the 427 projects previously mentioned in this report. (See p. 7.) Highway Administration officials advised us that these replacement projects cannot be cross-referenced to either the inventory of unsafe bridges (32,000) or the candidate list of replacement applications (16,000). In our opinion, therefore, the Administration is not in a position to comprehensively analyze progress in replacing unsafe bridges and to plan use of its various programs for that purpose.

The annual safety reports by the Administration's Division Engineers contain some information on safety projects at bridges. This information is not incorporated with the bridge inventory data maintained by the Administration. It is not possible to determine, therefore, how many of the 32,000 unsafe bridges are receiving some kind of safety improvement to reduce accident hazards pending eventual replacement.

Concerning the need to insure that the replacement of structurally deficient bridges is given adequate priority in relation to other construction projects, the Department said that the States are vitally interested in bridge replacement since this helps solve the pressing problem of inadequate and dangerous bridges.

In our opinion the relatively few States that have included many bridge replacement projects in their Federal-aid highway plans seems to be enough evidence of the need for Federal leadership in the planning and setting of priorities for highway construction projects.

#### RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation direct the Administrator of the Federal Highway Administration to:

- Encourage States to replace, repair, or improve the safety conditions of unsafe bridges with other Federal-aid funds.
- Request each State to make a comprehensive analysis of the short- and long-term needs for adequate safety improvements and/or replacement of its unsafe bridges, and report its plans to the Administration for meeting these needs through State and local financing and under Federal highway programs. Separate consideration should be given to (1) the more structurally deficient bridges clearly eligible for replacement under the Special Bridge Replacement Program; (2) structurally sound but functionally obsolete bridges that greatly limit the traffic capacity of important segments of Federal-aid highways; and (3) the provision of adequate safety improvements at hazardous bridges which would not be replaced for some time.
- Analyze the States' reported plans and prepare a plan of national priorities to assist the States

under the Federal highway programs to (1) replace structurally unsound bridges; (2) design and install suitable safety improvements at hazardous bridges; and (3) eventually bring functionally obsolete bridges up to the standards of safety and traffic capacity of the roadways on the Federal-aid systems.

- Request the States to report on safety improvements and replacements of unsafe bridges in the Federal-aid inventory under all Federal and State highway programs so that the condition of the inventory can be analyzed periodically and reported to the Congress.
- Direct the Federal Highway Administration regions and divisions to insure that the replacement of structurally deficient bridges is being given adequate priority in relation to other construction projects, when reviewing State proposals for Federal financing under all of the Federal-aid highway programs.

## CHAPTER 3

### OBSERVATIONS CONCERNING BRIDGE INSPECTIONS

The Federal-Aid Highway Acts of 1968 and 1970 (23 U.S.C. 116 and 144), as administered by the Federal Highway Administration, focused and coordinated the efforts of the Federal and State Governments on bridge safety. National Bridge Inspection Standards were developed by the Highway Administration in conjunction with the States' highway officials and other organizations. Bridges have been inspected and inventoried, and for the first time the Nation knows something about the physical condition of most of the bridges on the Federal-aid systems.

#### INSPECTOR QUALIFICATIONS AND TRAINING

One of the principal provisions of the bridge inspection standards is that the person in charge of a bridge inspection team should

- be a registered professional engineer, or be qualified for registration, or
- have at least 5 years' experience in bridge inspections and have attended a comprehensive training course.

Our review of the qualifications of a number of bridge inspectors in two States showed that many were not professional engineers and had less than 5 years' experience. Only a minority, therefore, was qualified under the standards to lead a team or to inspect complex structures without qualified supervision.

The National Bridge Inspection Standards also require the States to provide periodic training for bridge inspectors. The Administration developed a 3-week bridge inspection training course, which is available to the States. The Administration, however, did not require States to use the course and relatively little use has been made of it.

The Chief design engineer of one State told us that his State considers the course too technical. That State gave all bridge inspectors a 2-day seminar in 1972, and plans to conduct another one this year. He also said that the State's staff of bridge inspectors are under the supervision of registered professional engineers. He informed us that the more complicated structures are inspected by experienced engineers, from both the Highway Department and engineering consulting firms.

The Administration headquarters had made no overall determination as to whether bridge inspection personnel in the various States possess the specified experience or training qualifications. Also, there was no information available in the Administration concerning any evaluation of the specific training courses being offered in each State. Further, the Administration's Division Offices in the two States visited had not evaluated the experience and training of the State bridge inspection personnel.

RECOMMENDATION TO THE  
SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation have the Federal Highway Administration instruct its regions and divisions to assess the adequacy of training and experience qualifications of bridge inspectors to insure that inspections are performed by qualified personnel.

AGENCY COMMENTS AND OUR EVALUATION

The Department said that its field offices make such assessments as part of the annual management review of States' bridge inspection programs and are required to discuss bridge inspector training and experience qualifications in annual maintenance reports. It also said that Administration headquarters personnel had participated in some of these reviews in the past.

The Department stated, however, that it shared our concern about inspector qualifications and training. It estimated that nationwide inspector qualifications are only "fair," although it believes the qualifications of team leaders in all States meet the intent of the standards. The Department also stated that it believes that the training of inspectors is less than desirable and that it would continue to encourage and assist the States in upgrading the quality of their inspectors.

Our review of the Administration's 1974 maintenance reports for 14 States showed that, while all reports discussed the bridge inspection program, only 6 reports specifically discussed bridge inspector training and/or experience qualifications. In view of the critical role of the bridge inspectors in assessing the condition of bridges, identifying those most in need of replacement, and the Department's concern about inspector qualifications and training, the Department should consider taking more aggressive action to insure that the States take the necessary action to upgrade the quality of their bridge inspectors.

## RESEARCH AND DEVELOPMENT

Identifying structural defects caused by stress, corrosion, and fatigue is becoming increasingly more important because Federal-aid system bridges are becoming older, the volume of heavy truck traffic over these bridges is increasing, and the maximum weight trucks are allowed to carry has been increased by recent legislation.

The Administration is trying to improve bridge inspection quality by laboratory research and field tests to develop equipment capable of detecting structural defects not visible to the naked eye. Current bridge inspection methods rely on visual examination and may not detect metal cracking caused by stress, corrosion, or metal fatigue, which could cause a sudden catastrophic failure. The 1967 collapse of the Silver Bridge in West Virginia has been attributed to a small crack not detectable by visual inspection.

Beyond visual inspection lies a whole body of non-destructive test methods, including dye penetrants, radiographs, magnetic particle identifications, and ultrasonics. All of these need further development before they can be used to supplement the bridge inspector's visual examinations. The Administration is participating with nine States in field evaluations of two types of inspection equipment called acoustic crack detectors and magnetic crack definers. The first instrument uses ultrasonic principles to detect cracks as small as three-quarters of an inch in length up to 10 feet. The second instrument establishes a magnetic field to identify the precise location and length of cracks. Field evaluations of these instruments are expected to be completed in October 1975.

## RECOMMENDATION TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation have the Federal Highway Administration intensify its efforts to develop inspection equipment that can be used by bridge inspectors to detect structural defects not visible to the naked eye to protect the public against bridge failures.

## AGENCY COMMENTS AND OUR EVALUATION

The Department stated that the need for better inspection techniques and equipment is one of the Administration's research priorities and that efforts are underway to identify these needs and ideas. It also stated that

additional research will be undertaken soon by amending existing contracts and by writing new contracts.

We believe that the Department's priority emphasis and plans for increased research, if aggressively pursued, should lead to better bridge inspection equipment and techniques.



INFORMATION ON UNSAFE BRIDGES

ON FEDERAL-AID HIGHWAYS

BY STATE

State	Inventory of unsafe bridges as of 9-30-74			State applica- tions for re- placement as of 5-20-75 (note a)	Estimated cost	Special Bridge Replacement Program as of 3-31-75			Replacements under other highway programs 7-1-71 to 3-31-75
	Struc- turally defi- cient	Function- ally obso- lete	Total			Number	Funds allocated	Replace- ments approved	
					(000 omitted)			(000 omitted)	
Ala.	56	368	b424	258	\$ 139,892	\$ 4,055	24	\$ 4,647	9
Alaska	20	15	35	11	15,791	6,617	16	9,453	-
Ariz.	18	63	b81	31	10,248	2,585	5	2,219	-
Ark.	504	816	b1,320	23	41,706	4,128	2	4,867	-
Calif.	179	250	b429	32	115,977	14,410	8	3,484	2
Colo.	43	91	b134	29	5,656	3,047	17	3,659	17
Conn.	9	35	44	65	85,733	6,823	1	8,343	-
Del.	17	25	42	18	20,216	4,016	1	4,892	1
D.C.	-	4	4	1	950	428	1	950	3
Fla.	70	971	1,041	374	123,097	10,169	5	6,108	5
Ga.	398	590	b988	74	41,315	5,567	8	13,514	67
Hawaii	20	44	64	14	7,979	2,090	1	2,648	-
Idaho	31	11	42	105	22,110	6,775	1	8,141	3
Ill.	173	1,898	2,071	691	210,094	18,589	8	7,742	-
Ind.	5	2	b7	26	26,296	4,667	9	11,923	3
Iowa	289	617	906	36	45,335	6,217	2	7,347	26
Kans.	621	942	1,563	1,878	177,004	6,037	24	4,552	86
Ky.	304	433	b737	356	92,945	5,706	7	4,537	5
La.	162	2,456	2,618	65	55,421	11,189	3	11,556	-
Maine	67	17	84	38	42,827	2,205	4	5,754	4
Md.	47	187	b234	68	43,742	3,773	4	3,553	-
Mass.	25	103	b128	28	42,782	12,434	1	14,580	1
Mich.	216	264	480	1,340	193,430	10,759	9	16,567	3
Minn.	73	846	919	513	290,117	13,474	6	40,548	2
Miss.	218	36	b254	225	39,895	2,744	9	3,228	52
Mo.	255	331	586	12	22,278	6,161	8	11,350	-
Mont.	14	11	25	23	28,357	2,937	5	6,308	2
Nebr.	465	1,211	b1,676	2,819	468,029	7,769	3	7,147	4
Nev.	12	162	b174	6	1,487	2,152	9	1,465	1
N.H.	46	310	356	266	93,145	2,488	4	2,938	3
N.J.	29	52	b81	31	54,646	4,530	6	17,620	4
N. Mex.	31	557	588	529	106,452	3,901	11	2,529	4
N.Y.	65	62	b127	249	150,872	16,163	9	16,484	2
N.C.	9	744	b753	151	5,903	7,006	10	12,455	-
N. Dak.	125	268	393	738	111,173	2,422	6	3,193	6
Ohio	405	547	952	226	132,181	10,441	7	8,209	1
Okla.	601	2,182	2,783	135	29,566	6,009	9	4,165	66
Oreg.	35	112	147	54	29,226	3,285	9	3,514	13
Pa.	214	746	960	404	550,557	11,794	3	13,627	-
R.I.	1	19	b20	21	30,935	1,450	1	141	-
S.C.	130	523	653	30	19,474	3,370	17	4,948	3
S. Dak.	157	966	1,123	1,142	103,783	3,621	12	2,307	8
Tenn.	117	134	251	17	42,485	3,864	4	1,479	3
Tex.	50	786	836	217	82,399	15,428	12	18,127	-
Utah	18	5	23	126	34,238	2,770	3	5,450	-
Vt.	37	520	557	75	27,207	2,471	1	750	2
Va.	74	1,106	1,180	171	77,896	19,038	2	19,932	4
Wash.	56	198	254	670	240,513	14,160	4	10,577	2
W. Va.	354	934	b1,288	1,075	83,695	8,547	1	8,353	2
Wis.	48	1,172	1,220	515	119,372	7,931	5	20,509	5
Wyo.	20	288	308	122	9,709	1,842	10	2,030	2
Puerto Rico	83	374	457	152	41,450	2,692	4	1,695	1
<b>Total</b>	<b>7,016</b>	<b>25,404</b>	<b>32,420</b>	<b>16,275</b>	<b>\$4,587,586</b>	<b>\$342,746</b>	<b>351</b>	<b>\$412,114</b>	<b>427</b>
Administra- tion								7,250	
<b>Total</b>								<b>\$349,996</b>	

<sup>a</sup> Applications are submitted by the States and do not necessarily correspond to the Highway Administration's inventory of structurally deficient or functionally obsolete bridges. Some States have yet to complete bridge inventories although others have submitted bridge replacement applications for bridges which the Administration does not consider eligible for replacement. For example, as of May 20, 1975, only 4,279 of the 16,275 applications received were for bridges considered eligible for replacement under the Special Bridge Replacement Program.

<sup>b</sup> States having incomplete bridge inventories as of 1-27-75.



OFFICE OF THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

ASSISTANT SECRETARY  
FOR ADMINISTRATION

April 10, 1975

Mr. Henry Eschwege  
Director  
Resources and Economic Development  
Division  
U. S. General Accounting Office  
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in response to your request for the Department's comments on the General Accounting Office (GAO) report on progress in identifying and replacing unsafe bridges. We advised you on March 31, 1975, that a substantive reply would be submitted on or about April 7.

The report concludes that the Special Bridge Replacement Program alone is not expected to finance replacement of all critically deficient bridges on the Federal-aid systems. With an annual average of about 95 million dollars in Federal funds, it would take about 80 years to replace the 32,400 bridges currently identified as critically deficient. Even if funds were restricted to replacing the 7,000 structurally deficient bridges, it would take nearly 20 years.

It is the Federal Highway Administration's (FHWA) position that its implementation of pertinent sections of the two Federal-aid Highway Acts (1968 and 1970) has substantially satisfied the intent of the law in identifying and replacing unsafe bridges. FHWA believes the GAO review was begun much too early in the life of the program to make a valid judgement of its progress. The lead time required for bridge design and construction, environmental delays, inadequate and irregular funding, obligational limitations, and division of responsibilities among several governmental levels have all delayed, to some extent, the Special Bridge Replacement Program.

I have enclosed two copies of the Department's reply.

Sincerely,

*William S. Heffelfinger*  
for William S. Heffelfinger

Enclosure  
(two copies)

DEPARTMENT OF TRANSPORTATION REPLYTOGAO DRAFT OF REPORT TO  
THE CONGRESS OF THE UNITED STATESONSLOW PROGRESS IN IDENTIFYING  
AND REPLACING UNSAFE BRIDGESFederal Highway Administration  
Department of TransportationSUMMARY OF GAO FINDINGS AND RECOMMENDATIONS

Through September 1974, the Federal Highway Administration (FHWA) has approved replacement of 302 deficient bridges estimated to cost \$347 million. The total number of deficient bridges on the Federal-aid highway system is 32,400, of which 7,000 are structurally inadequate and 25,400 functionally obsolete. Considering the total estimated cost of \$10.4 billion to replace structures known to be deficient, plus the cost of those approaching this critical stage, the problem cannot be solved without a massive increase in the annual funding of this program. Since the States' long-term plans for overall bridge replacement, as well as their plans and cost estimates for safety improvement at hazardous bridges are unknown or unavailable on a comprehensive basis, it is very difficult to properly assess the extent of the deficient bridge problem, the progress being made by the States' programs, and the requirements for Federal funding and guidance. The report also expressed concern about the qualification and training of bridge inspectors [See GAO note.] and noted the need for more research on bridge inspection.

The GAO recommended that the Federal Highway Administrator:

- (1) encourage States to replace, repair, or meliorate hazards at critically deficient bridges with other Federal-aid funds;
- (2) request States to analyze and report their needs for adequate safety improvements, including bridge replacement;

GAO note: Deleted comments relate to matters presented in draft report but omitted in this final report.

- (3) analyze the States' plans and prepare a plan of national priorities for FHWA programs;
- (4) require the States to report on safety improvements and replacement of Federal-aid bridges;
- (5) direct FHWA Regions and Divisions to [See GAO note.] emphasize bridge replacement;
- (6) intensify efforts to develop new scientific bridge inspection equipment; and
- (7) instruct FHWA Regions and Divisions to assess the adequacy of training and experience qualifications of bridge inspectors.

#### SUMMARY OF DEPARTMENT OF TRANSPORTATION POSITION

It is the position of the FHWA that we have substantially satisfied congressional intent in our implementation of Section 116 of the Federal-Aid Highway Act of 1968 and Section 204 of the Federal-Aid Highway Act of 1970, pertinent to the Bridge Inspection Program and the Special Bridge Replacement Program, respectively.

The lead time required for bridge design and construction, environmental delays, inadequate and irregular funding, obligational limitations, and division of responsibilities among several governmental levels have all delayed, to some extent, the Special Bridge Replacement Program.

GAO's survey was begun much too early in the life of the program to make a valid judgement of its progress.

In regard to inspector qualifications, FHWA reviews indicate that bridge inspectors, on the whole, are qualified and performing adequately.

The GAO's recommendations do not cite any tasks that are not implicitly or explicitly, being performed by this Administration.

Finally, FHWA will continue to implement the National Bridge Inspection Standards and expedite the Special Bridge Replacement Program.

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.

POSITION STATEMENTSlow Progress in Replacing Bridges

The finding of this report that bridge replacement progress is slow is not new. The four Annual Reports to Congress made by the Administration have documented that funding of the program is inadequate for the replacement needs. Although, historically, about 35 percent of regular Federal-aid highway funds are utilized for bridge construction, this source of funds is unlikely to make substantial contributions to the replacement program. The large difference between needs and resources is not unique to the bridge replacement program. Highway Administrators are faced with a continual choice between priorities; and increased inflation and reduced resources make their task more difficult.

The GAO report has ignored the greatest accomplishment of the Bridge Inspection Program and the Bridge Replacement Program. These programs have identified deficient bridges, permitted the setting of priorities, significantly strengthened bridge inspection capabilities of State and local governments, and provided a strong beginning to this much needed program.

In terms of obligated funds, the performance to date has been most satisfactory. Attachment 1 shows bridge replacement expenditures superimposed on the graph of funds available for financing this program. The significant features of the chart are as follows:

- a. In Fiscal Years 1972 and 1973, practically all funds made available through budget control were obligated.
- b. The lack of an assured flow of Special Bridge Replacement Program funds from year to year has caused a slowdown. The drastic reduction in the FY 1974 appropriations to \$25 million did much to reduce the momentum of the Bridge Replacement Program.
- c. The estimated \$260 million Federal-aid cost of the 302 bridges replaced or being replaced as of September 30, 1974, compares very favorably with the total allocation of \$269 million.
- d. Additional disruptions occurred when available funds were transferred from the special obligational reserve into a pool with the other Federal-aid programs.

In addition to funding problems, the administrative difficulties concerned with initiating new programs are considerable. Some of the important factors causing delays are as follows:

- a. Lead time - as many as 10 years may elapse between the planning stages of a major highway facility (such as a large bridge) and its opening to traffic. The Special Bridge Replacement Program was not enacted until the end of 1970, and the initial allocations were not made until August 1971, just 4 years ago.
- b. Environmental delays - the procedures instituted to protect the environment have resulted in both delay and postponement of some major projects. Typical of projects delayed for these reasons are: The Minnesota River Bridge in Minnesota, North East Cape Fear River Bridge in North Carolina, and the Niantic River Bridge in Connecticut, all of which had been approved for replacement as the highest priority bridge in each State from the inception of the Special Bridge Replacement Program.
- c. Large projects - some States are holding their funds until their allocation and matching monies are sufficient to fund a major bridge. This situation exists in Texas, California and Delaware.
- d. System responsibilities - the word "State" is used throughout the report. It is evident that "State" refers to the State highway agency responsible for the State highway system and to the FHWA for the Federal-aid highway system. One problem not discussed in the report is that many miles of Federal-aid highway systems are not on State systems, and the State highway agency's only responsibility for these roads is the administration of Federal-aid highway programs. In these instances, State law or regulations require the local level (counties, cities, etc.) to provide the funds to match Federal-aid highway funds. The reluctance or inability of these local governments to participate in the Special Bridge Replacement Program has a definite effect upon the progress of the program.

Despite these problems, we note as an example of progress that as of September 30, 1974, Alabama had 19 bridges in the design stage; Alaska, Kansas, and South Carolina had 11, 18, and 13 bridges, respectively, under construction; and Colorado and Oregon had 10 and 7 bridges, respectively, open to traffic. Since that time, many more bridges have been completed.

Bridge Inspectors Unqualified

The GAO expresses concern that FHWA has been unable to determine the adequacy of either inspector qualifications nationwide or of inspector training, and implies that inspector qualifications and training may be less than what is needed.

[See GAO note.]

The National Bridge Inspection Standards do not list specific requirements for an ordinary inspector, but rather for the individual in charge of a bridge inspection team. The team leader must possess the following minimum qualifications:

1. Be a registered professional engineer; or
2. Be qualified for registration as a professional engineer; or
3. Have a minimum of 5 years' experience in bridge inspection assignments in a responsible capacity and have completed a comprehensive training course based on the "Bridge Inspector's Training Manual."

While it is necessary that the team leader be in daily physical contact with the inspection of each bridge, he need not be present 100 percent of the time, nor lead only one team at a time. He, however, should be able to supervise each inspection personally and closely. In cases of small, very simple bridges, an adequate inspection may be made by a single man with minimal experience. The number of inspectors participating in a bridge inspection generally varies according to the complexity and condition of the structure. For more complex structures, often more than one inspector participates in the inspection; however, as stated in the report, one inspector is sometimes used on small, simple structures. While FHWA discourages one man teams from the viewpoint of safety, there are circumstances where there would be no objection.

The FHWA shares the concern about inspector qualifications and training. At this time, a conservative estimate of inspector qualifications would be "fair." Training of inspectors is somewhat less than desirable. Some States, e.g., Tennessee, Florida, and Washington have very well-qualified inspectors in adequate numbers. This is the result of carefully planned, thorough training and/or an experienced, permanent, established inspection staff. In general, inspectors are doing an adequate job in most States and the experience of inspectors should improve. FHWA will continue to encourage and assist the States in upgrading the quality of their inspectors.

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.

[See GAO note.]

We believe that the qualifications of the team leaders being used for the Bridge Inspection Program by all States substantially comply with the intent of the National Bridge Inspection Standards.

REPLY TO SPECIFIC RECOMMENDATIONS

The recommendations made by GAO are quoted below with appropriate responses:

- a. "--establish procedures that will encourage States to replace, repair, or improve the safety conditions of critically deficient bridges with other Federal-aid funds."

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.



There is no need to establish special procedures, since replacement of badly deteriorated or obsolete bridges has always been permitted under primary, secondary, or urban programs. The States are aware of this, as evidenced by the number of bridges replaced with primary, secondary or urban funds. It should also be noted that a significant number of bridges have been replaced with 100 percent State funding.

- b. "--request each State to make a comprehensive analysis of the short-range and long-term needs for adequate safety improvements and/or replacement of its critically deficient bridges and report its plans to the Federal Highway Administration for meeting these needs through State and local financing and under Federal highway programs."

This recommendation is a reality under the Special Bridge Replacement Program and the interlocking Highway Safety Improvement Program (HSIP) of the Title II Safety Program. These programs permit replacement of many old and weak bridges, while meliorating the hazards of the numerous marginal and obsolescent structures which must remain in service.

- c. "--analyze the reported plans of the States, and prepare a plan of national priorities for Federal Highway Administration programs to assist the States in replacing the structurally unsound bridges, in designing and installing suitable safety improvements at hazardous bridges, and eventually in bringing functionally obsolete bridges up to the standards of safety and traffic capacity of the rest of the Federal-aid systems."

Analysis of the States' plans and needs and development of priorities are implicit in the internal procedures of the Special Bridge Replacement Program. For each bridge submitted for replacement, a sufficiency rating is computed. This sufficiency rating, weighted as shown in the Federal-Aid Highway Program Manual for the Special Bridge Replacement Program, ranks the bridges in descending order of criticality beginning with the most important structurally deficient bridges, and progressing through those with varying degrees of structural soundness although functionally obsolete, to those hazardous bridges whose serviceability and essentiality for public use are of lesser importance. The complete list of such bridges is sent to each State for planning purposes, and a smaller list of the most critical, for selection. The inventory of bridges, submitted in compliance with the National Bridge Inspection Standards, enables us to analyze the States' needs overall, to compare them with the rest of the country, and to allot bridge replacement funds proportionately. This constitutes an analysis of needs and determination of priorities. Review of the States' safety improvement plans are carried out by the respective FHWA Division Offices under normal Federal-aid procedures as shown in Volume 6, Chapter 8, Section 2, Subsection 1, of the Federal-Aid Highway Program Manual.

- d. "--require the States to report on safety improvements and replacement of critically deficient bridges in the Federal-aid inventory under all highway programs, in order that the condition of the inventory can be periodically analyzed and reported to the Congress."

The States need not make additional special reports on bridges replaced, since virtually all desired data is already available and submitted annually. Bridges replaced under the Special Bridge Replacement Program can be found readily. Replacement of other Special Bridge Replacement Program candidates can also be noted by their deletion from the candidate file and the reasons furnished therefor. Consequently, the Bridge Division has complete information available on bridge replacement under any Federal-aid program.

At present, there is no formal way to identify the bridges replaced by States with their own funds, but such data is available in State files.

Comprehensive information about the States' progress in safety is contained in the annual report on the programs established by the Highway Safety Act of 1973. Every year, each FHWA Division Engineer submits a report to the Office of Traffic Operations, reporting on his State's safety improvements. This permits FHWA to evaluate the State's overall highway safety improvements program and the progress made in implementing each of the programs established by the Highway Safety Act, as well as the effectiveness of the improvements made.

- e. "--direct the Federal Highway Administration Regions and Divisions [See GAO note.] to assure that the replacement of structurally deficient bridges is being given adequate priority in relation to other construction projects, when reviewing State proposals for Federal financing under all of the Federal-aid highway programs."

Most of the States are vitally interested in bridge replacement, since it helps solve one of their most pressing problems, that of inadequate and dangerous bridges. Periodic field inspections are made by all levels of FHWA offices. To increase the number of inspections would require more personnel.

[See GAO note.]

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.

- f. "--intensify its efforts to develop inspection equipment to detect structural defects not visible."

The need for better inspection techniques and equipment is one of FHWA's research priorities. The Acoustic Crack Detector-Magnetic Crack Definer (ACD-MCD) project is only a part of a coordinated program conducted by research to determine new methods and equipment to be used in the inspection and preservation of existing bridges. In addition to the perfecting of an eyebar probe (to be included as an attachment in the ACD-MCD contract), two additional research contracts are underway and another contract is expected to be finalized this fiscal year.

Informal discussions are held at technical meetings in an effort to identify needs and ideas which could lead to the development of additional new inspection equipment and procedures.

- g. "--instruct the Federal Highway Administration Regions and Divisions to assess the adequacy of the training and experience qualifications of bridge inspectors."

This is done by our field offices as part of their annual management review of the States' inspection program. In addition, as mentioned before, the Bridge Division's Design and Inspection Branch also participates in some of these reviews. The annual maintenance reports are required to discuss these areas.

[See GAO note.]

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.

[See GAO note.]

GAO note: Deleted comments related to matters presented in draft report but omitted in this final report.

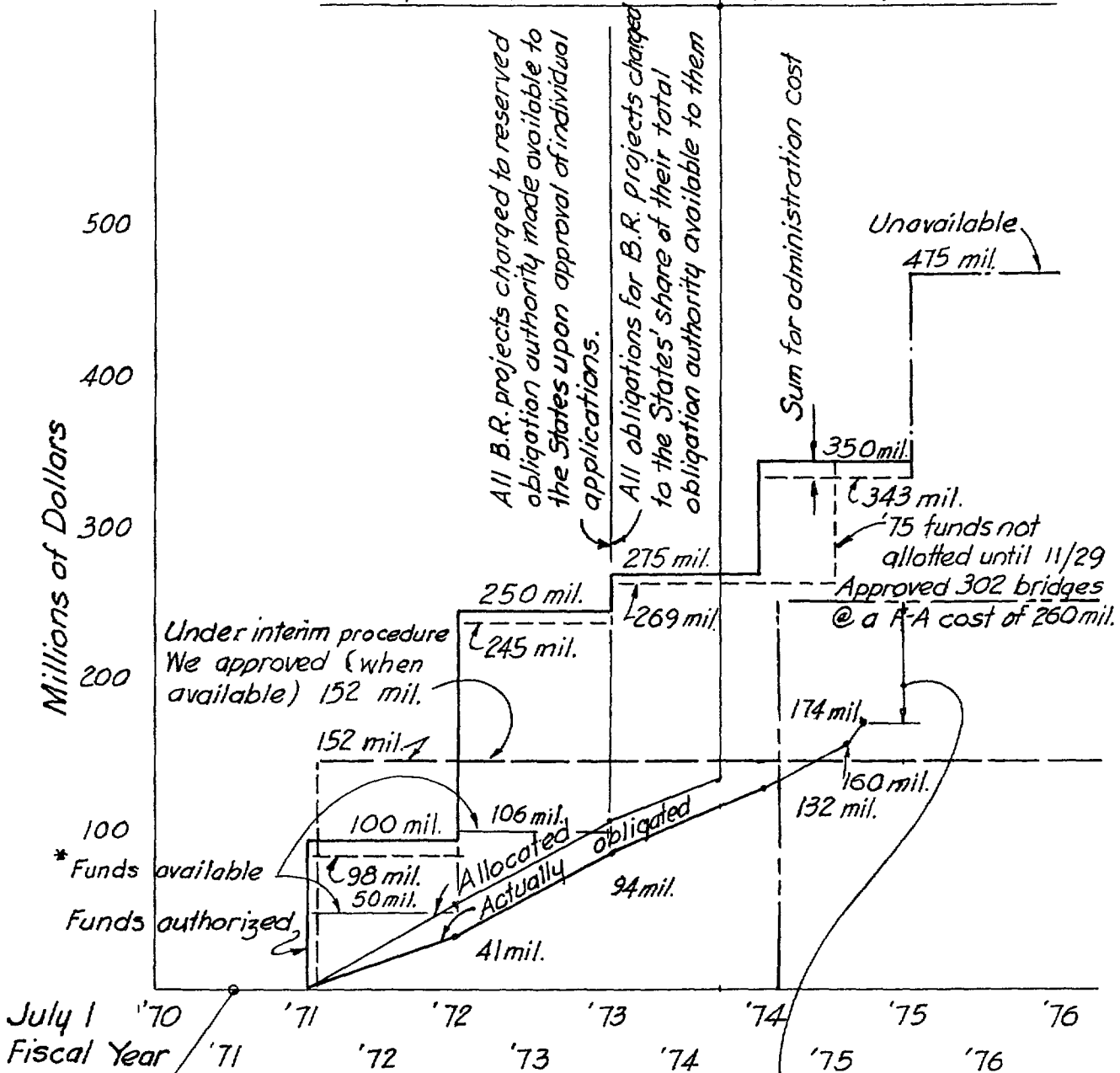
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J. R. Coupal, Jr.  
Deputy Administrator

### BRIDGE REPLACEMENT PROGRAM DEVELOPMENT CHART

April 22, 1974

Approval on a project by project basis by Washington Office      Full allocation made. Approval given to Field

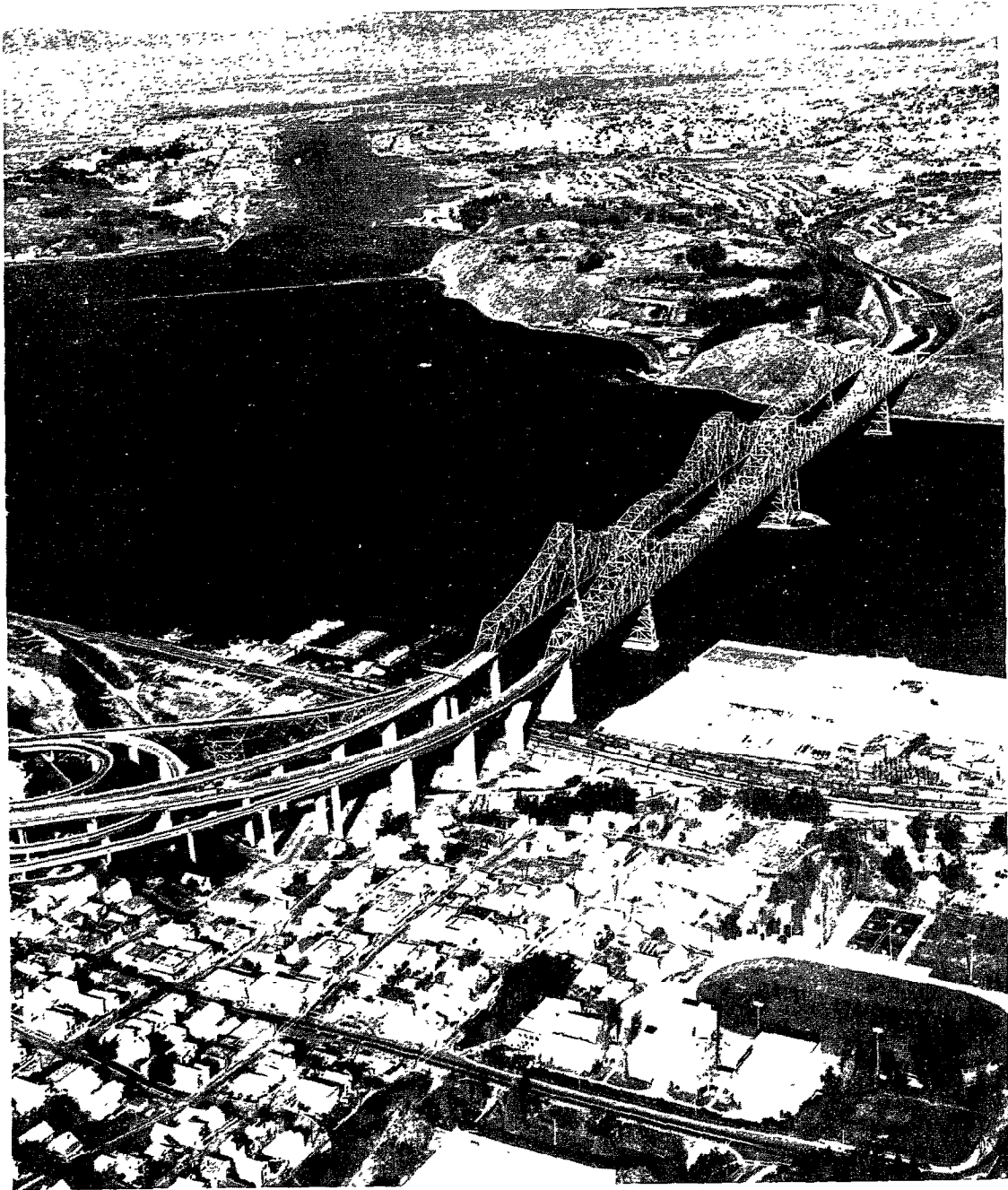


S.B.R.P.  
F.A. Act 1970

\* Funding limitation reflects O.M.B.'s limit on total obligation authority.

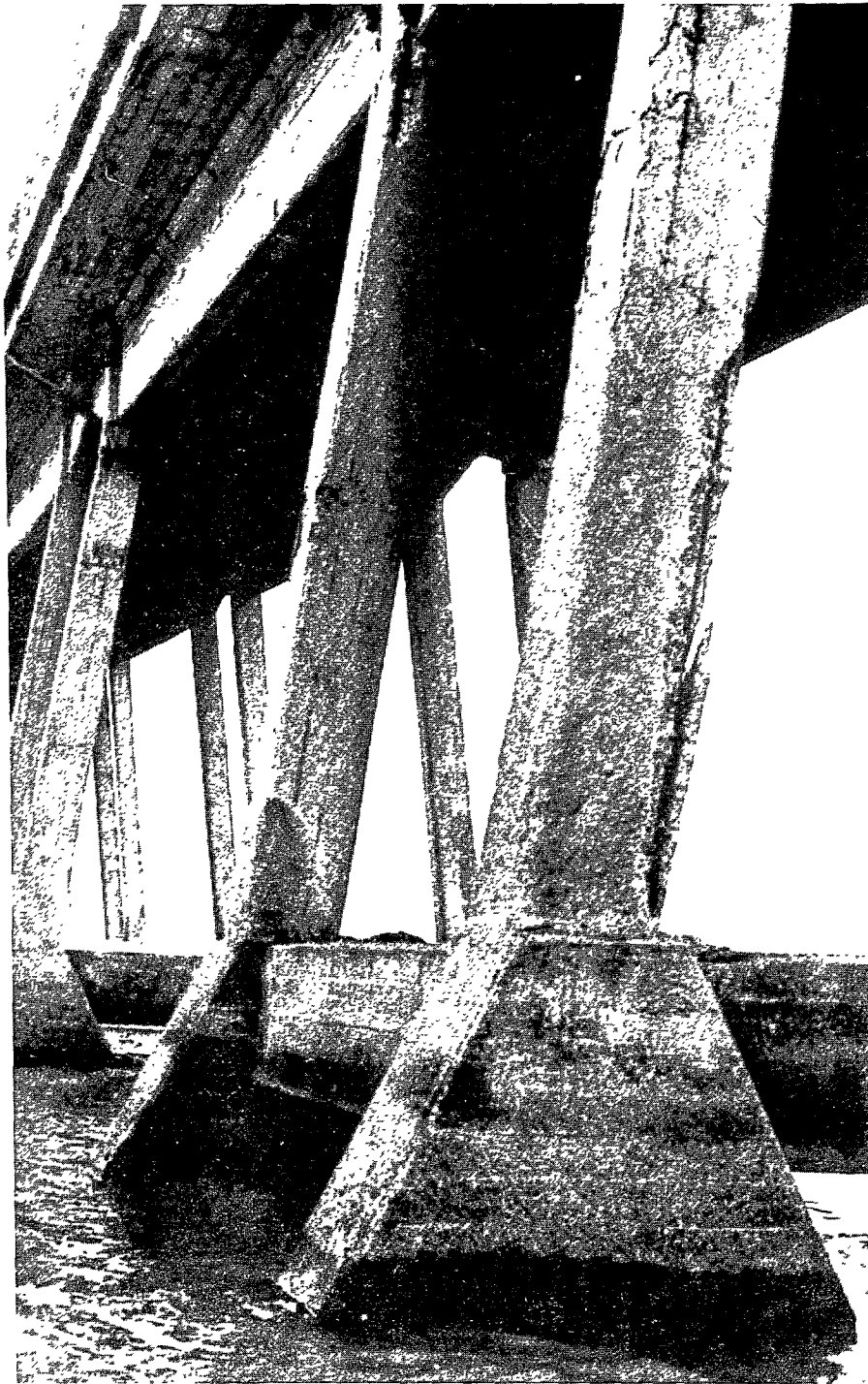
- Delays
1. E.I.S. approval.
  2. State uses funds that lapse first. SBRP funds do not lapse.
  3. State accumulating funds to build expensive bridges.
  4. Design and planning time.

PLATE I



**Recently closed span of the Carquinez Bridge over the San Pablo Bay on Federal-aid Interstate Route 80 in California**

(Photograph furnished by the California Highway Department)



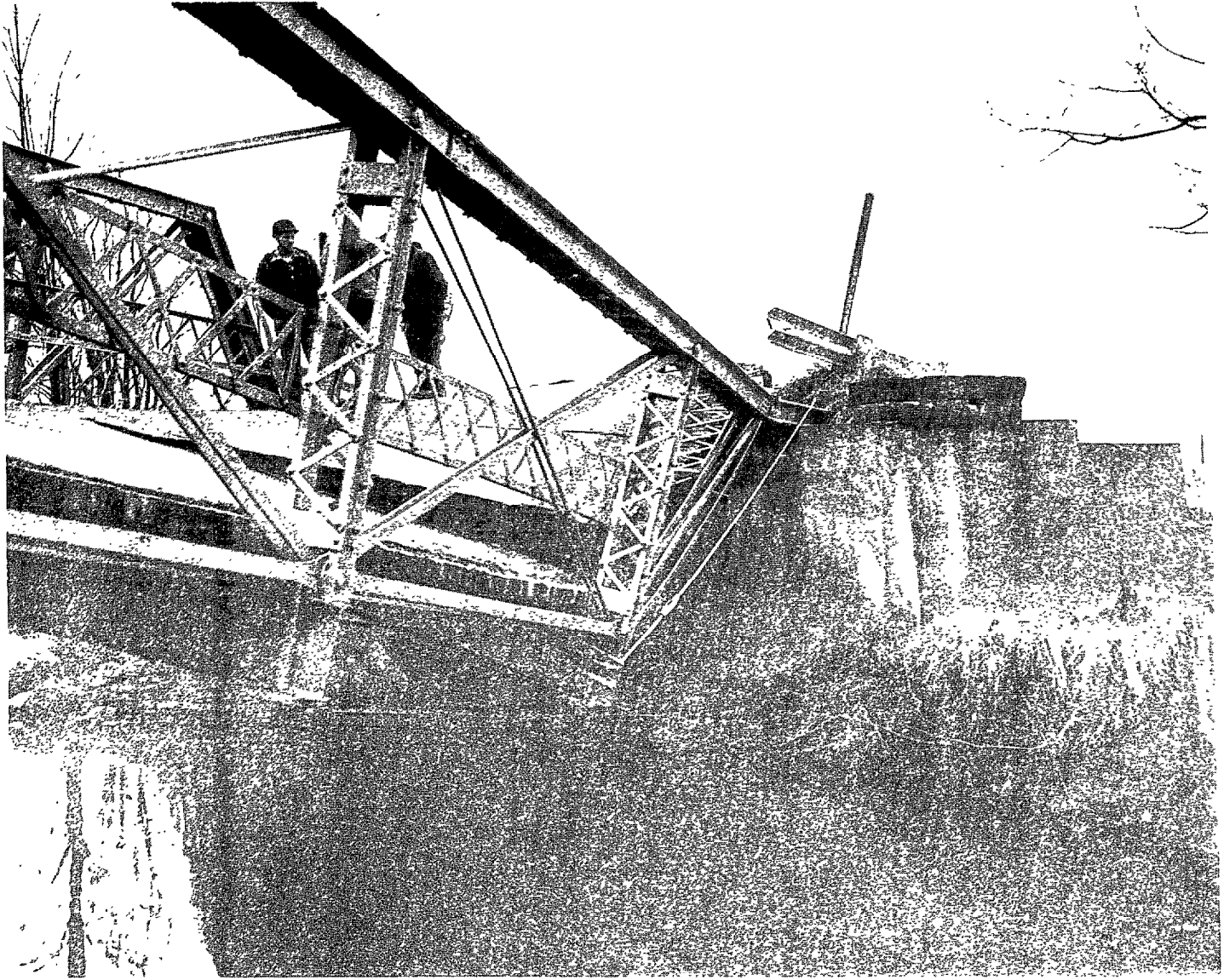
**Deteriorated substructure of bridge over the San Joaquin River Federal-aid system  
Route 84, Antioch, California**

(Photograph furnished by the California Highway Department)



Posted bridge on Federal-aid system Route 129 in Butler County, Ohio  
(GAO Photograph)





**Collapsed bridge on Federal-aid Route 1389 in Logan County, Ohio**  
(Photograph furnished by the Ohio Highway Department)



**Closed lanes on structurally deficient bridge over the Rocky River on Federal-aid system Route 6A in urban Cleveland, Ohio**

(GAO Photograph)

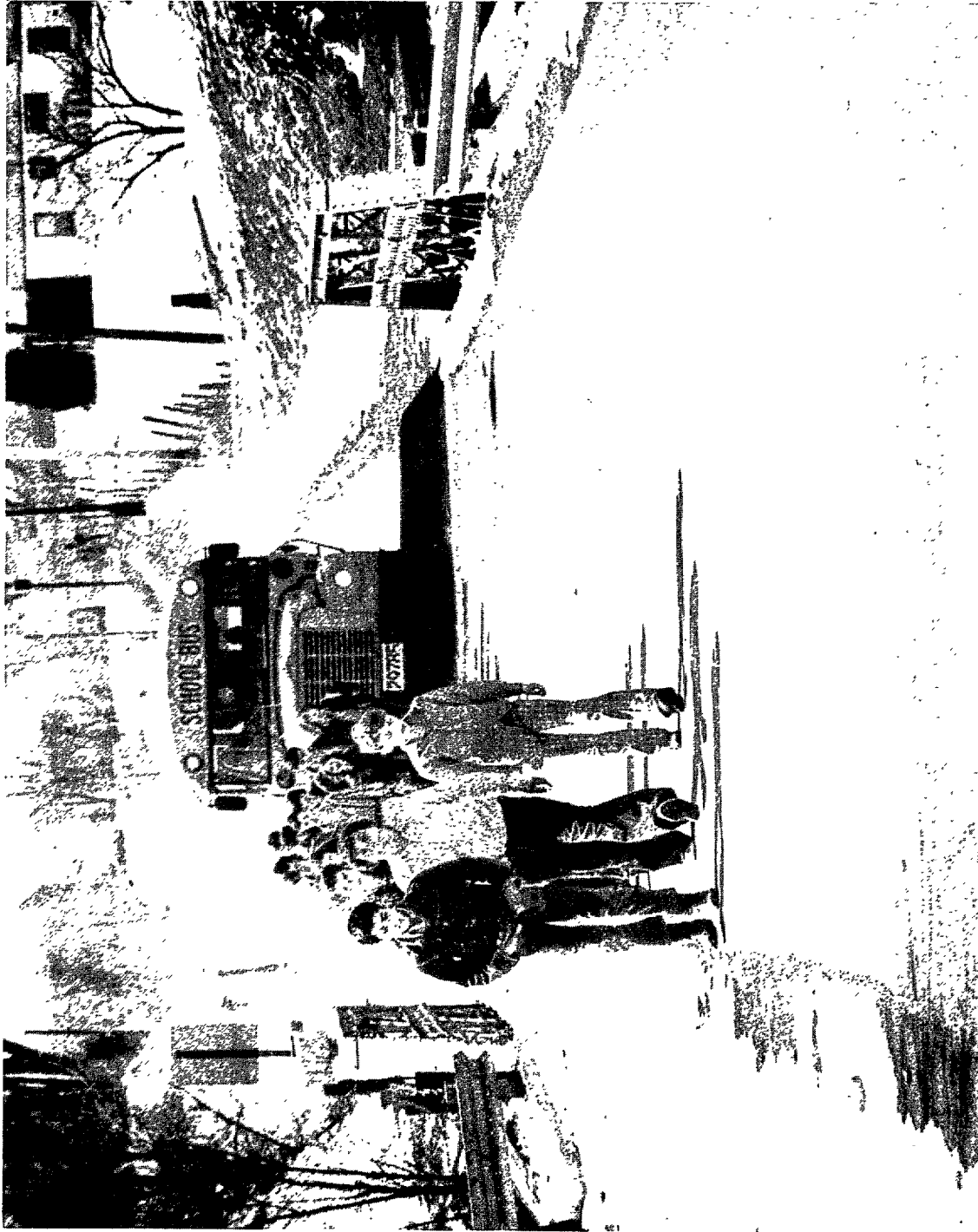


**Deteriorated wooden deck on Federal-aid system Route 874 in Dunn County, North Dakota**  
(Photographs furnished by North Dakota Highway Department)



**Collapsed Federal-aid system bridge on Route 1003 at the Yadkin-Serry County line, North Carolina**

(Photograph furnished by Federal Highway Administration)



School children walk across unsafe bridge on Federal-aid system route in Logan County, Ohio.  
(Photograph furnished by Bellefontaine Examiner)

PRINCIPAL OFFICIALS  
RESPONSIBLE FOR ADMINISTERING  
ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
<u>DEPARTMENT OF TRANSPORTATION</u>		
SECRETARY OF TRANSPORTATION:		
William Coleman	Mar. 1975	Present
John W. Barnum (acting)	Feb. 1975	Mar. 1975
Claude S. Brinegar	Feb. 1973	Feb. 1975
John A. Volpe	Jan. 1969	Feb. 1973
Alan S. Boyd	Jan. 1967	Jan. 1969
ADMINISTRATOR, FEDERAL HIGHWAY ADMINISTRATION:		
Norbert T. Tieman	May 1973	Present
Ralph R. Bartelsmeyer (acting)	July 1972	May 1973
Francis C. Turner	Feb. 1969	June 1972
Lowell K. Bridwell	Apr. 1967	Jan. 1969

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