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BY THE COMPTROLLER GENERAL **RELEASED**  
Report To The Chairman, Subcommittee  
On Investigations And Oversight  
Committee On Public Works And Transportation  
House Of Representatives  
OF THE UNITED STATES

The Department Of Transportation's  
Program To Preserve The Highways:  
Safety Remains An Issue

Federal funding is available to the States to resurface, restore, and rehabilitate the Nation's roads--commonly referred to as 3R work. States can improve roads to the design standards for new construction or request approval from the Department of Transportation's Federal Highway Administration (FHWA) for an exception to the standards.

GAO reviewed 3R projects implemented between October 1980 and June 1982. GAO found that 142 of the 327 3R projects reviewed in six States contained one or more approved exceptions to standards. The safety effects of specific exceptions are unknown and will remain so until further data are developed. In approving these exceptions, FHWA's review of safety implications varied among its offices in the various States--e.g., some offices routinely made site visits or involved a safety expert, others did not.

An FHWA regulation effective July 1982 allows the States to develop their own standards for 3R work subject to FHWA approval. Regardless of the standards adopted, the States can continue to request exceptions. In light of the variations in FHWA's review of safety implications in approving exceptions, GAO recommends that FHWA develop uniform procedures for reviewing 3R projects that are not designed according to applicable standards.



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

B-212809

The Honorable Elliott H. Levitas  
Chairman, Subcommittee on Investigations  
and Oversight  
Committee on Public Works and Transportation  
House of Representatives

Dear Mr. Chairman:

As requested in your May 26, 1982, letter, this report discusses the practices in granting exceptions to design standards under the Federal Highway Administration's resurfacing, restoration, and rehabilitation program.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days from the date of the report. At that time we will send copies to the Secretary of Transportation and the Director, Office of Management and Budget. We will also make copies available to the House Committee on Public Works and Transportation, the Senate Committee on Environment and Public Works, and other congressional committees. We will also make copies available to others upon request.

Sincerely yours,

A handwritten signature in cursive script that reads "Charles A. Bowsher".

Comptroller General  
of the United States



D I G E S T

The Congress in 1976 amended Federal-aid highway legislation so that States could use Federal funds for preservation work. Preservation includes resurfacing, restoration, and rehabilitation--commonly referred to as 3R work.

The Federal Highway Administration (FHWA) in 1976 required the States to apply new construction geometric design<sup>1</sup> standards to 3R projects. These standards could be either the standards for new construction developed by the American Association of State Highway and Transportation Officials and adopted by FHWA (FHWA/AASHTO standards) or the States' new construction standards approved by FHWA. If the road on which 3R work was to be done did not meet the applicable standards for new construction (either FHWA/AASHTO or State standards), and the 3R improvement would not bring the road up to those standards, the States could request approval for an exception from FHWA.

FHWA issued a regulation, effective July 1982, that would allow the States to develop their own geometric design standards specifically for 3R work. Thus, the roads on which 3R work would be done were no longer necessarily subject to the requirements for new construction.

This report was prepared at the request of the Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation. The Chairman expressed interest in the safety effects of FHWA's proposed regulation (made final in July 1982) to allow States to adopt their own geometric design standards for 3R work rather than use new construction geometric design standards. GAO was asked to obtain information on the numbers, types, and safety effects of exceptions to new construction standards requested by the States in order to provide insight on the safety

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<sup>1</sup>Geometric design involves such factors as lane width, shoulder width, and steepness of hills.

effects of allowing States to develop their own 3R standards. GAO's review covers 3R projects authorized for construction between October 1980 and June 1982 in seven States.

GAO found that exceptions to design standards had been granted for 142 (or 43 percent) of the 327 3R projects examined in six States. (Statistics are not included for the seventh State reviewed because of problems in identifying exceptions.) The most common type of exceptions were to standards for vertical curves and shoulder widths. GAO found that the safety effects of the exceptions to new construction standards are not known and will not be known until further data are developed. (See pp. 13, 14, 21, and 34.)

#### STATES USED DIFFERENT STANDARDS FOR 3R WORK

When the 3R program was established, FHWA required the States to use the same geometric design standards that they would for new construction. These new construction standards could be either the FHWA/AASHTO standards or States' new construction standards approved by FHWA. Some States over a period of years worked out arrangements with their respective FHWA divisions for exceptions to these new construction standards. These arrangements evolved, in effect, into specific standards for 3R projects in these States.

At the time of GAO's review in the seven States, two States were using FHWA/AASHTO standards and three were using State standards for new construction for 3R work. In addition, two States had agreed with their respective FHWA division offices on standards specifically for 3R work, some of which were lower than the FHWA/AASHTO standards for new construction. For example, in these two States, the 3R standards for two-lane rural highways require only 10-foot lanes for a road with a 60-mph design speed and traffic volume of 250-400 vehicles per day. The FHWA/AASHTO new construction standards would require an 11-foot lane. (See pp. 8 to 10.)

#### STATES USE COST AND PREVIOUS ACCIDENT RECORDS TO JUSTIFY EXCEPTIONS

While States usually cited cost and low accident rates as justification for not correcting sub-standard features, the extent of information provided to support these justifications varied

among the States. For example, New York frequently addressed each substandard feature and cited such justifications as low accident rates at the project location and excessive cost. New York also frequently provided an estimate of the cost to correct substandard features. Georgia, on the other hand, did not address each substandard feature but justified all substandard features being retained with a standard statement to the effect that the State considered the exceptions to be acceptable because the improvements being made would improve pavement conditions and safety. (See pp. 16 and 17.)

LACK OF DATA WEAKENS ATTEMPTS  
TO EVALUATE SAFETY EFFECTS OF  
EXCEPTIONS

Neither FHWA nor the States have systematically reviewed the safety effects of specific exceptions. An FHWA division administrator told GAO that the state of the art in accident analysis is not adequate to establish cause-effect relationships. FHWA division officials and State officials also told GAO that studying the effects of exceptions is difficult because of the lack of sufficient before and after accident data on 3R projects.

However, two studies have been initiated on the safety effects of 3R improvements and on the most appropriate geometric standards for 3R work. FHWA is studying the safety impacts of 3R projects and expects an initial analysis of before and after accident data early in 1984.

Further, the Surface Transportation Assistance Act of 1982, approved January 1983, requires the Secretary of Transportation to arrange with the National Academy of Sciences to study the cost-safety effectiveness of geometric design standards in effect for highway construction and reconstruction to determine the most appropriate minimum standards to apply to 3R projects. (See pp. 21 to 23.)

FHWA REVIEW OF SAFETY VARIES

Although the effects of specific exceptions could not be determined, GAO did review how the FHWA divisions in the States reviewed considered safety when approving exceptions. (FHWA has a division in each State.) Usually, FHWA area engineers reviewed project site accident data when determining whether to approve an exception. In addition, two of the seven divisions routinely

made site visits before approving projects with exceptions. In another division the FHWA safety expert, in addition to the area engineer, routinely participates in reviewing the documentation supporting 3R project applications that requested exceptions. The three divisions routinely making site visits or having safety experts involved in reviewing 3R project documents are in a better position to analyze the safety aspects of 3R projects than the four that did not. (See pp. 25 to 29, and 34.)

#### DEVELOPMENT OF 3R STANDARDS

After 6 years (1976-1982) of unsuccessful attempts to develop national geometric design standards specifically for 3R work, FHWA issued a regulation, effective July 1982, to allow States the flexibility to develop their own standards specifically for 3R work, subject to FHWA approval. Once they are established, the States can request exceptions to these standards. Many of the States favoring the regulation did so because it provides flexibility and because it permits State and/or local development of 3R standards. Some safety groups, however, are concerned that if States are allowed to develop their own standards, they will not include needed geometric improvements in the scope of 3R projects and that the 3R program could become a resurfacing-only program. FHWA, however, questions this assumption, noting that appropriate safety improvements have been and will continue to be made in conjunction with 3R projects. Further, the National Academy of Sciences is to report on the most appropriate minimum standards to be used for 3R work. (See pp. 29 to 34.)

An FHWA official told GAO that as of October 19, 1983, 17 States had adopted standards specifically for 3R projects, 32 States had adopted standards for new construction (9 of these States adopted new construction standards pending development of 3R standards), and the remaining States had not indicated their intent. Regardless of the standards adopted, the States can continue to request exceptions to them. (See p. 32.)

#### RECOMMENDATION

In light of the variations in FHWA's review of safety implications when approving 3R project exceptions, and because the States can still request exceptions, GAO recommends that the

Secretary of Transportation direct the Administrator, FHWA, to develop uniform procedures for reviewing 3R projects that are not designed according to applicable standards. These procedures should address

- identification and documentation of substandard conditions by the State,
- division review of accident data,
- division site visits prior to project approval, and
- participation of the division's safety expert in reviewing documentation of 3R projects. (See p. 35.)

#### STATE COMMENTS

GAO asked the transportation departments of the seven States included in its review to comment on those sections of a draft report that pertained to them. All seven States responded to GAO's request for comments. GAO found their comments helpful in preparing this report and has incorporated them, where warranted, in the appropriate sections of the report.

#### AGENCY COMMENTS

The U.S. Department of Transportation generally concurred with GAO's draft report and its recommendation and stated that it is developing instructions to improve its procedures relating to approval of design exceptions. The Department agreed that additional emphasis needs to be placed on the use of accident data in the development of 3R projects and in FHWA determinations on projects with design exceptions.

Although agreeing with the usefulness of site visits prior to project approval, the Department suggested reviewing State photograph files of proposed project sites as an alternative to site visits. GAO did not review the adequacy of photographs as a substitute for site visits. However, GAO believes that a relevant consideration in using photographs is that they be current and present a composite picture of the entire project site.



C o n t e n t s

	<u>Page</u>
DIGEST	i
CHAPTER	
1	INTRODUCTION 1
	Description of the 3R program 1
	Program administration 3
	Objectives, scope, and methodology 4
	Handling State comments 6
2	ADMINISTRATION OF 3R PROGRAM VARIES AMONG THE STATES 7
	States were using different standards for 3R work 8
	States used different new construction standards 8
	FHWA and States agreed on 3R standards in some States 9
	Limited guidance results in varying arrangements for requesting exceptions 10
	Vertical curves and shoulder width most common exceptions 12
	State comments and our evaluation 15
	FHWA approval of exceptions often based on cost and previous accident record 16
	Problems in Illinois' 3R program 17
	Requirements for requesting exceptions 17
	Misunderstanding between FHWA and Illinois on the applicability of the 3R standards in urban areas 18
	Intermittent resurfacing projects did not have to meet 3R standards 18
	State comments 19
	Conclusions 19
3	SAFETY CONCERNS ABOUT THE 3R PROGRAM 21
	Granting exceptions has an unknown effect on safety 21
	State/FHWA divisions have not analyzed the safety effects of exceptions granted 22
	Study on safety impacts of 3R projects 22
	Data on the cost-safety effective- ness of varying design standards are not available 23
	State comments and our evaluation 24
	FHWA's safety considerations in approving projects with exceptions 25
	States had varying procedures for addressing safety in 3R projects 25

	<u>Page</u>
FHWA safety considerations in approving exceptions varied	26
Accident data	26
Site visits	27
Review by FHWA safety expert	28
States can now develop 3R standards	29
State comments and our evaluation	34
Conclusions	34
Recommendation	35
Agency comments	35

#### APPENDIX

I	Letter dated August 5, 1983, from the U.S. Department of Transportation	36
II	Letter dated July 18, 1983, from the Executive Director, Colorado Department of Highways	39
III	Letter dated June 30, 1983, from the State Highway Engineer, Georgia Department of Transportation	40
IV	Letter dated June 29, 1983, from the Secretary, Illinois Department of Transportation	43
V	Letter dated June 29, 1983, from the Director of Highways, Montana Department of Highways	46
VI	Letter dated July 13, 1983, from the Assistant Commissioner for Management, New Jersey Department of Transportation	47
VII	Letter dated June 29, 1983, from the Commissioner, New York Department of Transportation	49
VIII	Letter dated June 30, 1983, from the Secretary, Wisconsin Department of Transportation	51

#### ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
FHWA	Federal Highway Administration
GAO	General Accounting Office
NTSB	National Transportation Safety Board
3R	Resurfacing, Restoration, and Rehabilitation Program

## CHAPTER 1

### INTRODUCTION

In a May 26, 1982, letter, the Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, requested that we obtain information on the safety effects of geometric design standards used for Federal-aid highway preservation work. Geometric design standards refer to the dimensions of a highway's visible features, such as roadway width, sight distances, and alignment.

The focus of the Federal-aid highway program has moved increasingly away from constructing new roads to improving and preserving existing roads. The Federal-Aid Highway Act of 1976 allowed Federal funds to be used for the first time for certain types of preservation work, such as resurfacing, restoration, and rehabilitation--commonly referred to as 3R. In light of the national trend of declining highway construction, Federal-aid funds spent on 3R work are expected to increase. The Surface Transportation Assistance Act of 1982 has increased the overall funding authorized for highways and has increased the percentage of Federal-aid funds that States must spend for preservation work from 20 to 40 percent, emphasizing the importance of preserving the highways.

### DESCRIPTION OF THE 3R PROGRAM

The Federal-aid highway program is a federally assisted State program. States own Federal-aid highways<sup>1</sup> within their respective boundaries and are solely responsible for selecting highway improvements and their construction. However, States are generally required to build projects according to Federal standards to receive funding for the Federal share of eligible costs.

Federal-aid funding may be used for constructing new highways on new locations, relocating existing highways, reconstructing highways to add lanes, and for associated safety work. It was not until 1976, however, that Federal-aid funds could be used for preservation work--resurfacing, restoration, and rehabilitation. The Federal-Aid Highway Act of 1976 amended the definition of construction by adding to it the terms "resurfacing," "restoration," and "rehabilitation."

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<sup>1</sup>The federal-aid system consists of the Primary, Interstate, Secondary, and Urban Systems. The Primary System consists of rural arterials and their extensions into urban areas. Interstates are technically part of the Primary System but are generally referred to as a separate system. Arterials are those routes that enable the quick movement of large numbers of vehicles from one place to another and are characterized by long-distance travel, high volumes, and high speeds. The Secondary System consists of rural major collector routes which funnel traffic to and from the arterial highways. The Urban System consists of urban arterials and collector routes not on the Primary System.

The primary purpose of 3R work, according to the Federal Highway Administration (FHWA), is to prolong and preserve the service life of existing roads. FHWA's June 28, 1976, advisory notice (N5040.19) on 3R work defines resurfacing, restoration, and rehabilitation as follows.

--Resurfacing. The placement of additional pavement layers, including protective systems for bridge decks, over the existing (or restored or rehabilitated) roadway or bridge deck surface to provide additional strength or to improve serviceability for a substantial time period.

--Restoration and Rehabilitation. Work required to return the existing pavement or bridge deck to a suitable condition for the placement of an additional stage of construction (bridge deck protective system or resurfacing).

According to the advisory notice, 3R projects are not intended to include maintenance work such as the following:

--Resurfacing of less than 3/4-inch minimum thickness or of short length.

--Patching and repairing minor failures.

--Undersealing of concrete slabs that is not part of restoration for resurfacing.

The Federal-Aid Highway Act of 1976 did not specify the geometric design standards to be used for 3R work. These standards consist of two types of criteria: design controls and design elements. Design controls ensure that the highway will accommodate the expected traffic requirements and encourage consistency and uniformity of operation. Controls include control of access, design speed, volume of traffic, and types of vehicles expected to use the road. Design elements include sight distance, vertical alignment, and cross section. Sight distance concerns stopping, passing, and intersection sight distances. Vertical and horizontal alignment concerns the steepness or grade of a hill, maximum superelevation (the bank of a curve), and degree of curvature (maximum permissible sharpness of horizontal curves). Cross section is made up of traveled ways, auxiliary lanes, shoulders, medians, and roadsides. The goal of good geometric design is to provide a safe, efficient, and economical system of highways consistent with volume, speeds, and the characteristics of the vehicles and drivers.

The FHWA June 28, 1976, advisory notice states that the geometric design standards used for new construction work would also apply to 3R projects. According to FHWA officials, these standards were developed through the consensus of State and Federal engineers based on professional judgment, experience of highway departments, and available research data on safety effects. The advisory notice stated further, however, that the applicability

of new construction standards for 3R work on nonfreeways<sup>2</sup> was under review, and in the meantime FHWA division offices were expected to use their "best judgment" as to exceptions to new construction standards considered appropriate for specific conditions in individual projects. These conditions, according to the notice, include traffic, terrain, safety, and economic aspects. Because 3R work is often done on roads that were built below geometric design standards for new construction, States could request exceptions to these standards if the 3R improvement would not correct all features that did not meet standards (referred to in this report as substandard).

FHWA issued a regulation, effective July 1982, which would allow the States to develop their own standards for designing 3R projects. The preamble to this regulation states that the geometric standards for new construction were not particularly appropriate for most 3R projects and that the new regulation would provide the States more flexibility to meet these needs. Although the States are now permitted to develop specific 3R standards, the issue of appropriate standards is still under study. (See ch. 3.)

The Federal-Aid Highway Act of 1978 provided specific funding for 3R work by requiring that 20 percent of a State's primary and secondary apportionments<sup>3</sup> be used for 3R work. Other apportionments can be used for 3R work but no specific amount is required to be used. Primary and secondary funds obligated for 3R work for fiscal years 1980-82 were \$614.6, \$602.4, and \$624.2 million, respectively. Title I of the Surface Transportation Assistance Act of 1982 increases the emphasis on preservation by providing that, beginning in 1984, not less than 40 percent of a State's Federal-aid primary, secondary, and urban apportionments be spent on projects for resurfacing, restoring, rehabilitating, and reconstructing existing highways. The act also increases the overall Federal funding authorized for highways.

#### PROGRAM ADMINISTRATION

FHWA administers the Federal-aid highway program through its headquarters office, 9 regional offices, and 52 division offices --one in each State and in Washington, D.C., and Puerto Rico. The headquarters office is responsible for developing and recommending program policies, regulations, instructions, and procedures and for providing technical guidance. The regional offices supervise

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<sup>2</sup>Freeways include Interstate highways and other roads where preference is given to through traffic by providing access connections only with selected public roads. Roads other than freeways provide access not only at public roads but also at grade crossings and driveways.

<sup>3</sup>States receive Federal funds to perform highway work on routes designated as part of the Federal-aid system. The Federal-aid system includes the Interstate, Primary, Secondary, and Urban Systems. Funds are apportioned to each system according to formulas prescribed by law.

division office operations, monitor and evaluate division office performance, and provide technical guidance to division offices.

The division offices, each headed by an administrator and under the jurisdiction of the regional offices, are responsible for day-to-day operations and for monitoring the highway programs. Their responsibilities include reviewing State applications for Federal-aid highway projects for approval, monitoring compliance with applicable standards and other legal requirements, and providing technical guidance and advice. The divisions are also responsible for reviewing and approving State requests, when appropriate, for exceptions to standards for 3R projects.

#### OBJECTIVES, SCOPE, AND METHODOLOGY

We made this review in response to a request from the Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation. In his May 26, 1982, letter, the chairman cited the subcommittee's fall 1981 hearings on FHWA's proposed regulation (which became final in July 1982) to allow States to adopt their own standards for 3R work rather than continue to have States use new construction standards for 3R work. A major issue discussed during the hearings was the safety effects of using State standards for 3R work that were less than those for new construction. In this regard, the chairman asked us to obtain information on exceptions and their effect on safety because this information could provide insight into the safety effects of allowing States to develop their own 3R standards that could be lower than new construction standards. Based on this request and subsequent discussions, it was agreed that we obtain information on the following questions:

- What percentage of a State's 3R projects are projects that involve an exception (to new construction standards) being granted, and of those where an exception is granted, how many involve only one exception, two, three, and so on?
- What kinds of exceptions are being granted?
- Is there a consistency to the kinds of exceptions being granted by the FHWA division administrator?
- To what degree do the exceptions have an effect on safety and are the States attempting to find this out if they do not already know?

We did our work primarily at FHWA headquarters in Washington, D.C., and seven of its division offices and seven State departments of transportation. Our review covered 380 primary and secondary 3R projects authorized for construction between October 1980 and June 1982.

We selected States within our Atlanta, Chicago, Denver, and New York Regional Offices to provide coverage to account for geographical variations in 3R projects. We chose two States in each

region<sup>4</sup> on the basis of preliminary data which indicated whether or not the States had written agreements with their FHWA division offices concerning 3R exception practices. We selected two States in each region--one that had an agreement and one that did not--taking into account the 1981 primary and secondary apportionment. The following States were included in our review: Colorado, Georgia, Illinois, Montana, New Jersey, New York, and Wisconsin.

For the States selected, we analyzed FHWA's Office of Engineering computer listing of 3R projects authorized for construction between October 1, 1980, and June 30, 1982. We did not verify the overall accuracy of this listing. We selected and reviewed projects funded from the 20 percent earmarked for 3R work that were in the construction phase and projects funded from other primary and secondary funds that were coded with 3R-type improvements--minor widening, restoration and rehabilitation, resurfacing, bridge rehabilitation, and minor bridge work--that were in the construction phase. Due to the large number of primary- and secondary-funded 3R projects in Illinois, we selected and reviewed a statistically valid random sample of 53 projects out of a universe of 173 projects.

In each FHWA division office we analyzed project files to determine whether FHWA granted an exception to new construction standards and/or negotiated 3R standards. We did not determine the degree to which the exceptions deviated from the standards, i.e., the number of feet a traffic lane might be less than standard. Such determination was beyond the scope of our review and the project files generally did not readily lend themselves to such a comparison. Furthermore, the safety effects of these deviations are not known and will not be known until further data are developed. In Illinois, neither FHWA files nor State files contained information on exceptions granted. Therefore, for 46 projects,<sup>5</sup> we reviewed plans, drawings, and other documentation in the State files for those geometric features, such as lane and shoulder width and shoulder type. For these features, we compared the existing and proposed dimensions to the applicable standards to determine whether the projects contained exceptions. We verified our determinations with a State engineer.

During our work we interviewed FHWA's Director, Office of Engineering, and that office's Geometric Design Branch officials; FHWA division highway and safety engineers; and State department of transportation officials. We also interviewed associations/research groups to obtain studies/information regarding the safety impacts of using less than new construction standards on 3R projects. Such groups included the American Association of State Highway and Transportation Officials, the Transportation Research Board, the National Transportation Safety Board, the National

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<sup>4</sup>In the Atlanta region, we selected one State.

<sup>5</sup>Files for the other seven 3R projects did not contain sufficient information to allow us to determine whether the project contained exceptions.

Association of Governors' Highway Safety Representatives, and the Center for Auto Safety.

Except as noted above, we made our review in accordance with generally accepted government auditing standards.

#### HANDLING STATE COMMENTS

We asked the heads of the transportation departments of the seven States included in our review to comment on those sections of our draft report that pertained to them. In keeping with our office policy we did not include the overall conclusions and recommendations, as these are addressed to the Secretary of Transportation.

All seven States responded to our request for comments. We found their comments to be helpful in preparing our report and have incorporated them, where warranted, in appropriate sections of the report.

## CHAPTER 2

### ADMINISTRATION OF 3R PROGRAM VARIES

#### AMONG THE STATES

FHWA approved exceptions to standards in the seven States we reviewed. The States were allowed to use different standards for 3R projects. These standards could be either the standards for new construction developed by the American Association of State Highway and Transportation Officials (AASHTO) and adopted by FHWA or State new construction standards approved by FHWA. Additionally, some States over a period of years worked out arrangements with their respective FHWA divisions for exceptions to these standards. These arrangements evolved, in effect, into 3R standards in these States. Thus, in requesting exceptions, the States were not necessarily starting from a common base.

The responsibility for approving State requests for exceptions to geometric standards was delegated to FHWA division offices, but because they were provided with little specific guidance, the divisions and their respective States worked out their own arrangements for requesting and approving exceptions. Consequently, some States were not requesting exceptions for all highway features that did not meet standards.

Vertical curves and shoulder widths were the most common exceptions the divisions approved. About 43 percent of the projects in six of the States contained one or more exceptions. State and FHWA project files in Illinois did not contain requests for exceptions or specific identification of substandard conditions and, thus, we obtained only limited information on exceptions; therefore, we did not include Illinois in our comparisons.

The States usually justified retaining substandard features on the basis of the high costs to bring the features up to standard coupled with low accident rates at the project location. While the justifications were based on cost and safety, some States provided specific justifications for each substandard feature while others provided only a general statement encompassing all substandard features.

Several problems existed in the administration of Illinois' 3R program. Illinois did not document exceptions in project files and believed it had to obtain approval for only significant exceptions. Also, the FHWA division and the State disagreed over the applicability of 3R standards in urban areas which resulted in the State not requesting approval for exceptions in several urban projects. In addition, FHWA's regional office and its division office disagreed on the division's policy of not requiring the State to comply with 3R standards for certain resurfacing projects.

STATES WERE USING DIFFERENT  
STANDARDS FOR 3R WORK

FHWA allowed States to use different standards for 3R work. FHWA stated in its June 1976 advisory notice that the design standards for federally aided new construction would also apply to 3R projects. These standards could be either the standards for new construction developed by AASHTO<sup>1</sup> and adopted by FHWA (FHWA/AASHTO standards) or State new construction standards approved by FHWA. The advisory notice also stated that the applicability of new construction standards for 3R work was under review. Some States over a period of years worked out arrangements with their respective FHWA divisions for exceptions to these new construction standards. These arrangements evolved, in effect, into specific standards for 3R projects in these States that were in some cases less than those for new construction. Thus, because States used different standards for 3R work, an exception in one State may not be an exception in another.

In 1982 FHWA issued a regulation which would allow the States to develop their own standards specifically for 3R projects. (See ch. 3.). At the time we completed our work in the seven States, none had adopted 3R standards pursuant to this regulation although one subsequently did so.

States used different new  
construction standards

Five of the States we reviewed were requesting exceptions to new construction standards. Two of the States, New Jersey and New York, were requesting exceptions to FHWA/AASHTO standards, while Georgia and Montana were requesting exceptions to their States' new construction standards developed under certification agreements with FHWA. The fifth State, Wisconsin, was requesting exceptions to its State construction standards for its primary and urban roads through agreement with the FHWA division office and to AASHTO standards for its secondary roads. Thus, although these five States were requesting exceptions to "new construction" standards, an exception in one State may not be an exception in another.

In an effort to give States more latitude and a greater share of the responsibility in carrying out the Federal-aid highway program, FHWA, through a concept known as certification acceptance, has allowed the States to substitute their standards and procedures for those of FHWA. Certification acceptance, authorized by the Federal-Aid Highway Act of 1973 (23 U.S.C. 117(a)), is granted if FHWA determines that the States can carry out the

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<sup>1</sup>The American Association of State Highway and Transportation Officials is an organization which represents the 52 State highway and transportation agencies (including the District of Columbia and Puerto Rico). Among other functions, AASHTO develops and issues standards, specifications, policies, and guides for the States to use on all highway projects.

intent of policies and objectives as set forth in 23 U.S.C.--the Federal-aid highway legislation. Twenty-five States have adopted some form of certification acceptance. The State and FHWA enter into an agreement which specifies what functions the State may perform and references certain State regulations and design standards that will be used in administering the Federal-aid highway program. Once the State's design standards are incorporated in the certification acceptance agreement, these standards become the standards for federally assisted new construction.

Wisconsin and the FHWA division office have entered into an agreement whereby the State will request exceptions to its new construction standards for 3R work on Federal-aid primary and urban roads. According to an FHWA official, these State standards are equal to or exceed the FHWA/AASHTO standards. The State, however, requests exception to FHWA/AASHTO standards for work on Federal-aid secondary roads.

While State new construction standards generally conform to FHWA/AASHTO standards, some differences exist. For example, we requested an FHWA engineer to compare Georgia's standards to the FHWA/AASHTO standards. Many of the standards for specific highway features such as lane width are based on ranges in average daily traffic. The engineer told us a direct comparison of the State's new construction standards to FHWA/AASHTO standards was difficult because Georgia's and FHWA/AASHTO's average daily traffic ranges did not coincide. For example, Georgia's standards for two-lane highways provide for the following ranges in average daily traffic levels: Under 99, 100-399, and 400-999. However, FHWA/AASHTO standards provided for the following ranges: 50-250, 250-400, and 400-750. The engineer told us that based on his spot check analysis, Georgia's standards did not always meet FHWA/AASHTO standards at lower traffic volumes but exceeded most FHWA/AASHTO standards at higher volumes.

#### FHWA and States agreed on 3R standards in some States

In December 1981, AASHTO reported on its survey of State highway departments on issues concerning the non-Interstate 3R program. The survey results showed that 31 of the 42 States responding had established a working arrangement or interim guidelines with the FHWA division administrators concerning the standards to be applied to non-Interstate 3R projects and 16 had reduced these arrangements to writing. In some cases, the written arrangements were, in effect, specific standards for 3R work. FHWA division offices in two of the States we reviewed--Illinois and Colorado--agreed on minimum standards specifically for 3R work for their respective States.

Illinois' 3R standards had their origin in a State highway rehabilitation program initiated in 1969. Recognizing that it did not have sufficient funds to reconstruct the highways to new construction standards, Illinois developed "expedient construction standards." Under these standards, pavements and some bridges would be widened, but other features, such as shoulder width and alignment, would not be brought up to new construction standards.

In 1975 Illinois approached its FHWA division office requesting Federal aid to finance further highway rehabilitation using these expedient standards. The FHWA division found that while these standards allowed considerably more miles of highway to be improved per dollar than would have been provided using new construction standards, the standards could be improved to address all features of the full roadway and roadside and give safety more consideration. FHWA and Illinois then agreed on the standards that would apply to roads having an average daily traffic of 3,000 vehicles or less. These standards were renegotiated in 1978. In October 1980, Illinois came under certification acceptance and incorporated its 3R standards into its certification acceptance procedures.

According to the FHWA division administrator for Colorado, the State's 3R standards were based on Illinois' 3R standards and the FHWA-developed 3R standards. (As discussed on pp. 29 and 30, the FHWA-developed 3R standards were never adopted for use on 3R projects.) The FHWA division administrator told us that the FHWA division initiated the development of the standards to provide more efficient procedures for better management of FHWA's 3R project approval process. He also said that the safety implications of the reduced standards would not be significant enough to require a case-by-case review of the exceptions to new construction standards.

Illinois and Colorado 3R standards for two-lane rural highways are in certain respects less stringent than new construction standards, but they also differ from each other in certain respects. For example:

- AASHTO standards and Colorado's 3R standards would require only 10-foot traffic lanes for a design speed of 50 mph and average daily traffic volume of 250-400. Illinois standards would require only 9-foot lanes at the same design speed and traffic volume.
- AASHTO standards would require 11-foot lanes at a design speed of 60 mph and traffic volume of 250-400. Colorado and Illinois 3R standards for the same design speed and traffic volume require only 10-foot lanes.
- AASHTO standards would provide maximum values for how sharp a curve may be under varying design speeds. Illinois and Colorado would under certain conditions allow curves to exceed these values if the curves were posted with signs advising motorists to reduce speed.

#### LIMITED GUIDANCE RESULTS IN VARYING ARRANGEMENTS FOR REQUESTING EXCEPTIONS

FHWA headquarters delegated the authority for approving exceptions to geometric design standards to the FHWA divisions but provided little specific guidance with the delegation. Essentially, the divisions were to use their best judgment in granting exceptions. As a result, the divisions and their respective

States have worked out their own arrangements for requesting and granting exceptions.

According to FHWA's 1976 advisory notice, division offices were to consider traffic, terrain, safety, and economic aspects when approving exceptions. FHWA's Director, Office of Engineering, told us that no additional formal guidance was provided to the divisions on granting exceptions. The various divisions and their respective States worked out their own arrangements for requesting exceptions. For example, three of the States reviewed would not request exceptions for substandard curves and/or sight distances if they were posted with reduced speed signs or other warning signs while four of the States would.

--The FHWA Assistant Division Administrator in Georgia told us that if a curve was posted with a sign advising the motorist to reduce speed to safely negotiate the curve, the State would not request an exception if the motorist did not have to significantly reduce speed. If the curve was extremely sharp, requiring a significant reduction in speed, the State would request an exception.

--Colorado's negotiated 3R standards permit substandard curves to remain in place if they are properly signed and if, according to a State official, there is no accident problem. Illinois standards also permit properly signed curves to remain if the difference between the design speeds of the road and the curve does not exceed specified amounts.

--New Jersey, New York, Montana, and Wisconsin would request exceptions for substandard curves that were posted with warning signs.

A further example of the varying arrangements for requesting exceptions worked out between the States and the FHWA divisions was the development of specific standards for 3R projects. Under the agreements between the FHWA division and Colorado, the State was required to notify the FHWA division if any project contained features that did not meet new construction standards. However, Colorado was required to specifically identify and justify only those design features which would not meet the 3R standards. This notification consisted of a letter to the FHWA division requesting the exception and containing a statement similar to the following:

"This project contains certain design features which are exceptions to the standards referenced in FHPM 6-2-1-1. [This refers to the section of FHWA's Federal-Aid Highway Program Manual which cites the design standards for Federal-aid projects.] All such features meet the 'Minimum Guidelines for RRR-Type Work on Other Than Expressways and Freeways' transmitted with your letter of May 2, 1979 with the following exceptions: (None or list and justify)."

An FHWA Office of Engineering Geometric Design Branch headquarters official told us that these standards evolved after years of the State requesting the same exceptions to new construction standards and having FHWA approve these exceptions. According to this official, these 3R standards did not result in blanket approval of exceptions because the division still had to approve each 3R project.

VERTICAL CURVES AND SHOULDER WIDTH  
MOST COMMON EXCEPTIONS

As table 1 shows, the six<sup>2</sup> States requested exceptions for 43 percent of the 327 3R projects we reviewed. Most projects contained only 1 or 2 exceptions, although seven projects contained over 10 exceptions.

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<sup>2</sup>Neither FHWA's Illinois division nor State project files contained information on substandard conditions retained in Illinois 3R projects and, as discussed on page 5, we were able to obtain only limited information on the numbers and types of exceptions retained. Accordingly, we are not including Illinois in the following tables.

Table 1

Number of Exceptions Requested and Approved  
per Project by State

<u>Number of exceptions per project</u>	<u>Number of projects with approved exceptions</u>						<u>Total</u>
	<u>Colo.</u>	<u>Ga.</u>	<u>Mont.</u>	<u>N.J.</u>	<u>N.Y.</u>	<u>Wis.</u>	
1	4	29	14	2	3	14	66
2	2	15	3	-	4	8	32
3	1	4	-	-	1	3	9
4	-	4	5	-	-	3	12
5	1	1	1	-	2	1	6
6	-	-	-	-	1	1	2
7	-	-	-	-	2	-	2
8	-	-	-	-	-	2	2
9	-	-	1	-	1	1	3
10	-	1	-	-	-	-	1
Over 10	-	-	1	1	3	2	7
<b>Total projects with exceptions</b>	<b><u>8</u></b>	<b><u>54</u></b>	<b><u>25</u></b>	<b><u>3</u></b>	<b><u>17</u></b>	<b><u>35</u></b>	<b><u>142</u></b>
<b>Total projects reviewed</b>	<b>38</b>	<b>86</b>	<b>28</b>	<b>19</b>	<b>63</b>	<b>93</b>	<b>327</b>
<b>Percent of projects with exceptions</b>	<b>21</b>	<b>63</b>	<b>89</b>	<b>16</b>	<b>27</b>	<b>38</b>	<b>43</b>

Notes: Colorado had negotiated 3R standards with FHWA and was required to specifically identify exceptions only when these standards were not met. Only two of the projects reviewed contained exceptions to these standards. However, eight projects contained exceptions to new construction standards and these exceptions are included in the above table and in tables 2 and 3. As discussed in this chapter, the States were not all applying the same standards; thus, what might be an exception in one State may not be in another.

As table 2 shows, the most common exceptions were for vertical curves (the crest of a hill and the sag at the bottom of a hill) followed by exceptions for shoulder width. However, as table 3 shows, the exceptions for vertical curves occurred in only 30 projects while exceptions for shoulder width occurred in 95 projects.

Table 2

Number of Exceptions Requested and Approved  
by Type of Exception

<u>State</u>	<u>Type of exception</u>									<u>Total exceptions</u>
	<u>Clear zone</u>	<u>Lane width</u>	<u>Shoulder width</u>	<u>Grade</u>	<u>Verti- cal curve</u>	<u>Hori- zontal curve</u>	<u>Bridge width</u>	<u>Verti- cal clearance</u>	<u>Other</u>	
Colo.	-	2	4	-	-	4	-	-	6	16
Ga.	1	20	34	-	-	1	43	3	-	102
Mont.	-	-	25	16	23	8	1	-	2	75
N. J.	-	-	1	-	-	11	1	-	-	13
N. Y.	-	1	4	20	55	38	8	-	9	135
Wis.	<u>5</u>	<u>4</u>	<u>27</u>	<u>8</u>	<u>34</u>	<u>26</u>	<u>5</u>	<u>-</u>	<u>2</u>	<u>111</u>
Total	<u>6</u>	<u>27</u>	<u>95</u>	<u>44</u>	<u>112</u>	<u>88</u>	<u>58</u>	<u>3</u>	<u>19</u>	<u>452</u>

Notes: Vertical curves include sight distance. Horizontal curves include degree of curvature and sight distance.

Substandard features occurring along the entire roadway (such as lane and shoulder width) are counted once. Other features that occur at spot locations, such as curves and bridges, are counted each time they occur.

In Montana, exceptions were requested for narrow roadway width. According to the FHWA division administrator, lane width was usually made to standard at the expense of shoulders; hence the exceptions are shown here as shoulder width.

As discussed in this chapter, the States were not all applying the same standards; thus, what may be an exception in one State may not be in another.

Table 3

Number of Projects Containing Approved Exceptions  
by Type of Exception

State	Number of projects and type of exception									Number of projects with exceptions	Number of projects reviewed
	Clear zone	Lane width	Shoulder width	Grade	Vertical curve	Horizontal curve	Bridge width	Vertical clearance	Other		
Colo.	-	2	4	-	-	3	-	-	3	8	38
Ga.	1	20	34	-	-	1	20	2	-	54	86
Mont.	-	-	25	5	8	4	1	-	2	25	28
N.J.	-	-	1	-	-	2	1	-	-	3	19
N.Y.	-	1	4	7	9	9	5	-	2	17	63
Wis.	<u>5</u>	<u>4</u>	<u>27</u>	<u>2</u>	<u>13</u>	<u>6</u>	<u>4</u>	<u>-</u>	<u>2</u>	<u>35</u>	<u>93</u>
Total											
by type	6	27	95	14	30	25	31	2	9	-	-
	==	===	===	===	===	===	===	==	==	===	===

Notes: Vertical curves include sight distance. Horizontal curves include degree of curvature and sight distance.

In Montana, exceptions were requested for narrow roadway width. According to the FHWA division administrator, lane width was usually made to standard at the expense of shoulders; hence the exceptions are shown here as shoulder width.

As discussed in this chapter, the States were not all applying the same standards; thus, what may be an exception in one State may not be in another.

While the States were requesting exceptions to retain some substandard features, other substandard features were scheduled to be corrected during the project. For example, a project in New York contained 12 substandard vertical curves and 3 substandard horizontal curves (curves formed by a bend in a road). New York planned to correct nine to standard and requested exceptions for the remaining curves.

State comments and our evaluation

Georgia, while agreeing that the statistics in our draft report concerning exceptions granted were accurate, expressed concern that the magnitude of the exceptions was not discussed. Georgia observed that a significant difference does exist, for example, between a 2-foot exception to lane width standards and a 6-foot exception. Georgia noted that the majority of its exceptions were of the former type. Georgia also noted that for those projects where exceptions had been requested for bridge widths, the approach guardrails were upgraded to current standards.

Determining the magnitude of the exceptions was beyond the scope of our review. Our objective was to provide information on the number and types of exceptions granted. Further, as we point

out in our report, few data are available on the effects on safety of specific design elements. With respect to the exceptions for bridge width, many of the project files did indicate that guard-rails would be upgraded.

FHWA APPROVAL OF EXCEPTIONS OFTEN  
BASED ON COST AND PREVIOUS  
ACCIDENT RECORD

For the States reviewed, FHWA divisions approved State requests for exceptions to standards essentially on the basis of State justifications citing additional cost to correct the substandard features and low accident rates at project locations. In the absence of uniform guidance on granting exceptions, the divisions reached agreements with their respective States on the information to be provided to the divisions justifying the retention of substandard features in the project. Some of the States provided specific justifications for each substandard feature while others provided only a general statement justifying all substandard features.

In three of the States reviewed--Montana, New Jersey, and Wisconsin--additional cost was the most frequently cited reason for retaining rather than correcting substandard conditions. Usually this reason was cited in combination with other reasons, such as low accident rates at the project location or the need for additional right-of-way. New York most frequently cited low accident rates, in combination with cost and other reasons such as the need to acquire right-of-way (which may be time-consuming, controversial, and costly). New York and New Jersey frequently provided specific justifications for each substandard feature retained, with New York and Wisconsin frequently including estimated costs to correct the substandard feature.

Montana's requests for exceptions did not provide specific justification for each substandard feature to be retained nor did the requests provide estimates of the cost to correct these features. Rather, each request for exceptions identified the substandard features to be retained and included a statement similar to the following:

"From a safety standpoint this section of highway will be improved by virtue of the improved driving surface. It is in the public interest to deviate from standards to improve the existing roadway as proposed within the present funding limitations."

Colorado had negotiated 3R standards with FHWA and was required to specifically identify and justify exceptions only when these standards were not met. Only two of the projects reviewed contained exceptions to these standards. Colorado specifically addressed and justified each substandard feature in these two projects. The State cited, among other reasons, the low accident rates and encroachment on wetland areas. Georgia, on the other hand, did not address each substandard feature but justified all features being retained in a project with the following statement.

"Due to the improvements being made by this project, which will improve the pavement condition and safety, the Department considers the exceptions to the geometric design standards, which have been listed in this report, to be acceptable."

In Illinois the justification for retaining substandard features was generally not documented. However, a State official informed us that many of the exceptions were discussed with FHWA at coordination meetings.

#### PROBLEMS IN ILLINOIS' 3R PROGRAM

In Illinois, disagreements on the requirements for requesting exceptions for 3R projects existed not only between State and FHWA division officials but also between FHWA division and regional officials. Illinois officials did not believe that they had to obtain approval for all exceptions. Even though the FHWA division office approved 3R standards, State and division officials were not in agreement on the circumstances under which the standards applied in urban areas. Furthermore, FHWA regional officials do not agree with the policy whereby the division was not requiring the State to comply with the 3R standards on intermittent resurfacing projects.

As a result of our review, Illinois and the FHWA division have agreed that the State must document and request exceptions for all deviations from standards and that the 3R standards apply only to projects with a daily traffic volume of 5,000 vehicles or less. In addition, we discussed the division's position regarding the standards for intermittent resurfacing with the FHWA Regional Administrator who disagreed with the division and is pursuing the matter with the division.

#### Requirements for requesting exceptions

Illinois' certification acceptance agreement did not require the State to request exceptions for all substandard features but only those that were "significant." For those exceptions that the State believed were not significant, the State was initially required to document them only in project files.

Federal regulations (23 C.F.R. 640.113) provide that if the State finds that exceptions to certification acceptance standards are appropriate on a project, such exceptions shall be brought promptly to FHWA's attention for consideration. However, according to the FHWA Division Administrator in Illinois, FHWA told the State when it came under certification acceptance that it did not have to request exceptions unless they were significant but should document them in project files. The Assistant Division Administrator told us, however, that the division had clarified that position by telling the State that any exceptions had to be brought to the FHWA's attention either through a formal exchange of correspondence or at coordination meetings. However, the State's Chief, Location Section, Bureau of Location and

Environment, told us that he has been operating under the assumption that the State did not have to request exceptions that were not significant.

Based on our review of project files, we identified two projects that contained exceptions to the State's 3R standards. We found approval for these exceptions in the project file or in the minutes of a coordination meeting between the State and FHWA. We also found six additional projects that contained exceptions to the applicable new construction standards, but found no indication in the project files that FHWA had approved these exceptions.

As a result of our review, the FHWA Assistant Division Administrator sent a letter to the State Director of Highways clarifying the division's policy on exceptions. The letter stated that our review had disclosed the need to assure that project records adequately document decisions relating to the approval of design exceptions. Further, it stated that "design approval for exceptions should not be granted until the FHWA waiver has been obtained."

#### Misunderstanding between FHWA and Illinois on the applicability of the 3R standards in urban areas

We were able to identify six projects where Illinois did not obtain FHWA approval for exceptions. The State did not request approval because it believed the 3R standards applied and project conditions met these standards. However, according to the FHWA Assistant Division Administrator, the 3R standards did not apply to these projects and thus the State was required to comply with the State's new construction standards, and if it did not, it was required to request an exception.

Illinois' negotiated 3R standards apply to rural and urban areas. However, Illinois and FHWA did not agree on whether the standards applied to all urban roads or only to those with an average daily traffic volume of 5,000 vehicles or less. According to the FHWA Division Administrator, the average daily traffic volume limitation of 5,000 vehicles or less cited in the standards applied to both urban and rural roads. The State, on the other hand, believed that the 5,000 limitation applied only to rural roads. After discussions with the FHWA Assistant Division Administrator and the Chief of the State's Location Section, Bureau of Location and Environment, the State agreed that the 3R standards apply only to roads with traffic volumes of 5,000 vehicles or less.

#### Intermittent resurfacing projects did not have to meet 3R standards

FHWA division policy did not require projects for resurfacing of intermittent sections of road to meet 3R standards. In March 1982 FHWA approved the State's request to use Federal funds for resurfacing intermittent sections of road to repair winter storm damage. The State requested the program on the basis that winter

damage had accelerated the already deteriorating conditions of the roads in Illinois. The FHWA Assistant Division Administrator told us that the State did not have to comply with the State's 3R standards for these projects but only had to meet the criteria specified in the State's February 24, 1982, request for Federal funding for these projects. This request provided "dimensional guidelines for intermittent resurfacing work," which allowed the State to retain, among other features, the existing surface width. Because these project files often did not contain information on the road such as design speed and average daily traffic volume necessary to determine what the standard should be, we could not identify how many of these projects actually contained substandard features.

The FHWA Assistant Regional Administrator for Engineering and Operations disagreed with the division's position that the State does not have to meet the 3R standards for these projects. He told us that the 3R standards should apply to intermittent resurfacing projects and said that he plans to pursue this issue with the division.

#### State comments

In commenting on our draft report, Illinois emphasized that the apparent discrepancy between State practice and FHWA policy in reporting deviations from standards occurred because FHWA did not clearly notify the State of the change in policy. The State noted that it had taken steps to revise the procedures to obtain FHWA approval for all deviations from standards. The State also stated that while there was no documentation to verify that FHWA was involved in decisions to deviate from standards, many of these deviations were discussed at meetings with FHWA and that all involved agreed that the deviations were not significant and did not impact negatively on safety. The State noted, however, that it was improving its documentation of exception decisions.

#### CONCLUSIONS

Although all of the States we reviewed requested exceptions to standards for 3R projects, the conditions under which a feature would be considered substandard were not necessarily the same among the States because they were not using the same standards. They were using two types of new construction standards--FHWA/AASHTO standards, or States' standards. Additionally, two of the States, through agreement with their FHWA divisions, developed specific standards for 3R projects that in some instances were lower than new construction standards. Thus, what might be an exception in one State might not be in another.

The numbers and types of exceptions approved were affected by the State/FHWA division arrangements for identifying and requesting exceptions. The number of exceptions would be lower in those States that were not requesting exceptions for curves that were posted and in those States that were using 3R standards that were less than new construction standards. Although the types and amount of information justifying exceptions varied, the States

generally justified, and the FHWA divisions approved, exceptions on the basis of excessive cost to correct the substandard features and the low accident rates at the project locations.

## CHAPTER 3

### SAFETY CONCERNS ABOUT THE 3R PROGRAM

Neither FHWA nor the States have systematically reviewed the safety effects of specific exceptions to new construction standards on 3R projects. Difficulty in linking specific geometric design features to accident rates hinders the analysis of the potential safety effects of using reduced standards.

Because of the lack of data, we did not attempt to determine the safety effects of granting exceptions. Rather, we obtained information on how the States consider safety when designing projects with exceptions and how FHWA considers safety when approving exceptions. FHWA headquarters did not provide any specific guidance to the divisions on how safety should be considered when approving exceptions. FHWA divisions' safety considerations in approving exceptions varied. Most of the divisions were reviewing accident data for project locations, some divisions were routinely performing site inspections of 3R projects with exceptions, and one division routinely involved its safety expert in reviewing documentation of projects with exceptions.

Since the implementation of the 3R program in 1976, considerable debate has occurred over the appropriate standards for 3R work. After several attempts to establish uniform standards for 3R work, FHWA issued a regulation, effective July 1982, allowing the States to develop their own standards. Many of those favoring the regulation did so because it provided flexibility and permitted State and/or locally developed standards. Some safety groups oppose the regulation because they believe it could cause the 3R program to become a resurfacing-only program and that needed safety improvements will not be made. Other safety groups have commented that the regulation should require accident analyses of 3R project locations. One of the safety groups filed suit (dismissed in June 1983) seeking to set aside the regulation, and a Federal study has been authorized by the Surface Transportation Assistance Act of 1982 to determine the most appropriate standards for 3R projects.

#### GRANTING EXCEPTIONS HAS AN UNKNOWN EFFECT ON SAFETY

The safety effects of granting exceptions is unknown. None of the seven FHWA division offices or State departments of transportation we reviewed had attempted to systematically evaluate the safety effects of the specific exceptions that FHWA granted. Several FHWA division and State officials pointed out the high cost and difficulties of doing these evaluations.

We could not even make a general assessment of the potential safety effects of granting exceptions due to the lack of cost-safety effectiveness data on varying design standards. The congressionally mandated study currently in the planning stages may provide more conclusive information on this issue.

States/FHWA divisions have not analyzed  
the safety effects of exceptions granted

FHWA division and State officials gave the following reasons for not attempting to analyze the safety effects of granting exceptions:

- Illinois FHWA division and State officials told us that up to now there was not enough hard data for them to undertake a study of the impact that their negotiated 3R standards had on safety.
- FHWA's Assistant Division Administrator in Georgia acknowledged that the lack of safety analysis of exceptions is a deficiency in FHWA and State procedures for approving 3R projects. However, Georgia's Deputy Commissioner of Transportation stated that any studies assessing the impact of 3R work would be premature because not enough before and after safety data have been generated.
- FHWA division officials in Colorado and Montana cited division studies which concluded that not enough time had lapsed to make judgments on trends in before and after accident data.
- The FHWA Division Administrator in New York said that the safety effects of substandard features are unknown and the state of the art in accident analysis is not adequate to establish a cause-effect relationship. The division's Safety and Program Coordinator said that a detailed evaluation system would be needed to establish the safety benefits of 3R projects. However, such a system would not be feasible because it is quite expensive.
- The FHWA Safety Coordinator in New Jersey stated that the safety impact of design exceptions is not known. He said that assessing the potential safety effects of design exceptions requires detailed, time-consuming analysis and that caution must be exercised in interpreting the results.

Analyzing the effect of specific exceptions on a project-by-project basis is difficult because any before and after project accident analysis would usually be based on the same geometric design features. For example, if the State wants to resurface a road with 10-foot lanes and the standard requires 11-foot lanes, the State would request an exception. Any before and after analysis of the accident rates would be based on the 10-foot lanes. Before and after accident analysis could show only the effect of the resurfacing on that road and not the effect of not widening the 10-foot lanes to 11-foot lanes.

Study on safety impacts of 3R projects

FHWA's Safety and Design Division, Office of Safety and Traffic Operations Research and Development, is currently conducting a study on the safety impact of 3R projects. According to the Chief

of the Safety and Design Division, the study will analyze the effects of various types of 3R improvements on travel speed and safety.

In obtaining data for this study, the Safety and Design Division requested the States to submit type of improvement data on nonfreeway 3R project locations (either State or federally funded) that did not include high-hazard locations. FHWA suggested that the States select typical types of projects to increase the probability of selection of similar types of projects among the States. In addition, FHWA emphasized selecting projects involving a single type of improvement, such as resurfacing only.

Before and after accident data will be collected on project sites from eight States to determine whether the improvements had any significant effect on accident rates. However, according to the Chief of the Safety and Design Division, because accident rates can fluctuate from year to year regardless of the type of improvement made to the road, changes in accident rates cannot be attributed solely to the improvement to the road.

The study's findings will be based on 196 project locations. The most prevalent types of improvements are resurfacing only or resurfacing in conjunction with pavement widening or shoulder upgrading. Other improvements in the study sample include bridge section repairs, alignment or slope improvements, and a large number of miscellaneous or "other" type of work.

The Chief of the Safety and Design Division told us that the "after" data will be submitted by September 1983 and the initial analysis of the before and after data will be completed in March 1984. In addition, the Chief told us that FHWA has submitted a request to the Office of Management and Budget to expand the study to include more than eight States. She said that if Management and Budget approves this request, FHWA may have 20 to 30 States participating in the study.

Data on the cost-safety effectiveness of varying design standards are not available

Because of the lack of cost-safety effectiveness data on using varying geometric design standards, it is also difficult to estimate the potential impact of using exceptions to new construction standards. Officials from the Center for Auto Safety, the National Transportation Safety Board, and the Transportation Research Board agreed that there is not much specific data on the cost-safety effectiveness of geometric design elements.

The Surface Transportation Assistance Act of 1982 mandates that the Secretary of Transportation make arrangements with the National Academy of Sciences to conduct a study of the cost-safety effectiveness of geometric design standards currently in effect for construction and reconstruction of highways to determine the most appropriate minimum standards to apply to resurfacing, restoration, and rehabilitation projects. A contract has been signed for a prestudy to determine the scope and work plan for the final

study. According to an FHWA official, the work plan is due in January 1984. Possibly the final study will provide greater insight into the safety effects of using less than new construction standards for 3R work.

Part of the problem in determining the cost-safety effectiveness of using different dimensions (lane width, degree of curves, etc.) for various design features is that most States do not link accident data to roadway geometrics. A 1979 Transportation Research Board-sponsored report entitled "The Cost and Safety Effectiveness of Highway Design Elements" demonstrates the problem in finding States with accident data linked to roadway geometric data. The study attempted to quantify the safety effects of using various dimensions of specific design elements such as pavement width, shoulder width, and surface type. The researchers had difficulty in finding States that had composite files linking accident and geometric inventory data. None of the States the researchers visited had a composite file of both accident and geometric inventory data. Therefore, the researchers had to merge the data bases of States that had adequate location identification in both files. Only three States met this condition.

The Research Board-sponsored report states that about 50 design features were found to have some type of safety relationship. However, the effects of these design features on safety have not been conclusive and for some features the effects have been contradictory. The study analyzed the features of pavement width and shoulder width and surface type for rural two-lane highways. The study concludes that (1) the effect of design elements on safety can be quantified, (2) the methodology used in the report could be incorporated into a State's design process, (3) pavement width has a small effect on accident experience, and (4) additional research is required to quantify the safety effects of additional features.

In April 1982 FHWA's Office of Highway Safety reported that most States do not have integrated highway information systems. According to the report, an integrated highway information system can show that certain highway elements or combinations of elements, while not involved in a sufficient number of accidents in a particular location, are involved in a disproportionate number of accidents when analyzed on a statewide basis. This information, according to the report, could be used to determine the cost effectiveness of implementing statewide improvements to eliminate hazardous elements. The report states that to date little analysis has been done to identify hazardous elements using highway information systems. Furthermore, the report states that while most States have automated their data files, most States have not achieved computerized data file integration to perform the analysis described above.

#### State comments and our evaluation

New York and Wisconsin commented on our discussion concerning the lack of assessment of the safety effects of exceptions. New York noted that if a substandard feature has existed for a number

of years without a demonstrated accident history and conditions are not expected to change, it could be cost effective to retain the feature. Wisconsin stated that an evaluation of the accident history of an existing road or street provides a good indication of the safety effects of retaining substandard features.

We recognize that an analysis of project site accident data is valuable in considering whether to retain a substandard feature and that the absence of accidents might be a valid consideration in retaining substandard features. However, as we point out, we found a lack of systematic evaluations of the safety effects of specific exceptions.

#### FHWA'S SAFETY CONSIDERATIONS IN APPROVING PROJECTS WITH EXCEPTIONS

Because of the lack of data on the safety effects of exceptions, we reviewed how FHWA and the States considered safety in 3R projects with exceptions. FHWA headquarters did not provide any specific guidance to the divisions on how safety should be considered when granting exceptions. State procedures for addressing safety in designing 3R projects often influenced the types and extent of safety information FHWA reviewed. We found that some FHWA divisions were reviewing State accident data, routinely making site visits to projects with exceptions, and having the division safety experts review 3R projects with design exceptions.

#### States had varying procedures for addressing safety in 3R projects

Procedures for addressing safety in 3R projects varied among the States. Colorado has one of the more formalized procedures. It has two procedural directives for addressing safety: one overall safety directive and one specifically for 3R-type projects. The safety directive for 3R projects requires that State district offices proposing resurfacing projects submit a staff recommendation establishing whether particular hazardous conditions exist that should be corrected. This directive requires checking accident rates, checking for roadside obstacles, and determining whether excessive curvature or improper superelevation are contributing to accidents and making sure guardrails meet height requirements. State district office personnel are also required to address the State's overall procedural directive for safety. In addition to addressing procedural directives, the State also conducts field inspections to identify safety problems.

A brief description follows of how other States considered safety:

- New York's procedures require an accident history for any project containing substandard features, and when justifying such features, the accident history must be compared with the appropriate statewide average accident rate.
- Wisconsin's procedures provide that State district offices submit accident histories of project locations that contain

substandard features. The State office compares the location's accident rate to the statewide average, analyzes the types of accidents occurring, and assesses the potential for accidents.

- Georgia's procedures require a team composed of State maintenance, design, and traffic safety engineers and an FHWA engineer to inspect federally assisted 3R projects. These procedures also provide that accident history and traffic data be assembled before an inspection.
- In Montana, the Chief of the State's Preconstruction Bureau told us that when the State develops 3R projects it performs an accident analysis. The accident analysis shows accident rates, fatality rates, and severity rates. In addition, State engineers inspect the project to identify any hazardous locations.
- A New Jersey official said that the State evaluates accident data and takes this evaluation into consideration in developing project plans and in requesting exceptions to standards. The official noted further that originally the State did not supply accident data to FHWA when requesting exceptions but is now doing so.
- Illinois-negotiated 3R standards require that high-accident locations be identified and corrected.

#### FHWA safety considerations in approving exceptions varied

FHWA headquarters' June 28, 1976, advisory notice on 3R activities did not specify how or what safety aspects should be considered. Safety considerations were generally the responsibility of the area engineer assigned to review a project. For the most part, his review was limited to safety information, usually accident data, that the State submitted with its request for an exception. However, one division office routinely visits 3R project sites that have design exceptions, and one other division office routinely visits 3R project locations regardless of whether there is a design exception. In six of the seven division offices, FHWA safety experts were not routinely involved in reviewing projects with design exceptions.

#### Accident data

For the most part, FHWA's safety considerations involved reviewing accident data submitted by the States. We reviewed FHWA project files to determine the types of accident data included with 3R project documents and found the following:

- All but 4 of the 25 projects with exceptions in Montana contained accident data. The data were based on statistics generally covering the 4 years prior to the date FHWA approved the exception.

- All of New York's 17 projects with exceptions we reviewed referenced or contained some accident data. The types of accident data provided ranged from annual totals of accidents for several years to a detailed analysis of safety benefits of the project. In 5 of the 17 projects, the accident history was compared to the statewide average accident rate.
- None of the three projects with exceptions we reviewed in New Jersey contained accident data from the State. Two of these projects contained limited accident data from FHWA.
- All of the eight 3R projects with exceptions in Colorado contained accident data. The source of accident data for seven projects was the State's annual summary of accidents which contains accident rates for all Colorado highways by section and reference mileposts. The sources for the other project were the State's spot accident location list and hazard index.
- Of the 35 projects with exceptions in Wisconsin, 5 project files did not contain accident rate data.

FHWA project files in Georgia and Illinois did not contain accident data. In Georgia, State district safety engineers were to provide accident and safety information during joint State-FHWA site reviews. However, our review of project files showed that district safety engineers did not participate in review team inspections for 30 percent of the 3R projects approved between October 1, 1980, and June 30, 1982. In addition, FHWA engineers did not participate in 52 percent of the site reviews of these projects; therefore, it is questionable whether FHWA reviewed accident data for more than half of the 3R projects. In Illinois, exceptions were discussed at coordination meetings with the State; therefore, we could not determine whether accident data were provided to FHWA.

We noted that two of the division offices we reviewed were starting to emphasize the inclusion of accident data in 3R project proposals. A May 1982 FHWA review of New Jersey's procedures and practices in the design exception process indicated that only a few projects provide accident data and accident history. As a result of this review, in June 1982 FHWA requested that the State include an accident analysis and the project's safety benefits in 3R project proposals. In Montana, FHWA division officials told us that at one time they verbally requested accident data for specific 3R projects with exceptions but later requested that accident data be included in all future requests for 3R project exceptions. Division officials could not provide us with the date of this policy change.

#### Site visits

Some FHWA division offices were routinely making site visits prior to approving 3R projects, others were not. However, the criteria used to determine whether a visit was needed were not uniform among the divisions:

- In New York, the division administrator has requested that whenever feasible, site visits be made to all projects with exceptions to evaluate substandard features. Project files show that FHWA made site visits to all but one of the 3R projects with exceptions.
- In Colorado, the division made site visits to some projects with exceptions. According to an FHWA division project engineer, although there are no specific criteria to determine whether a site visit should be made, some of the factors considered included accident rates, right-of-way acquisition issues, or extent of truck traffic. Project files show that FHWA made site visits to two of eight projects with exceptions and in both cases recommended some revisions to the State's original design.
- In Wisconsin, the division made site visits to most 3R projects, including those without exceptions, prior to approving the State's final design plans. Project files show that site inspections were made at 30 of the 35 projects with exceptions that we reviewed. (An FHWA district engineer told us FHWA makes visits to all primary and secondary projects but may not always document them.)
- In Georgia, prior to June 11, 1980, State procedures provided that prior to a formal request for a 3R project, an FHWA division engineer, along with State engineers, make a site visit to the proposed 3R project. In June 1980, the division administrator advised the State that due to the experience the State had attained and in view of the division's staffing difficulties, an FHWA engineer would no longer be included in site visits. Project files show that FHWA participated in 48 percent of the site visits to 3R projects.
- In Montana and New Jersey, FHWA division officials told us that their engineers visit some projects; however, they had no formalized procedures for making these site visits. Generally, they said, the decision was left to the judgment of the FHWA engineer. An FHWA official in Illinois told us that the division generally does not make site visits.

#### Review by FHWA safety expert

In only one of the seven divisions we reviewed was the division safety expert routinely involved in reviewing documentation of 3R projects with exceptions. In Montana, the FHWA division safety engineer told us that while there are no formal procedures for reviewing safety aspects of 3R projects, he is routinely asked for his comments. He told us that he reviews accident data and by informal note to the project engineer he recommends whether FHWA should approve the project.

FHWA division officials in Colorado told us that, while the traffic and safety expert is not routinely involved in the review of 3R projects, the area engineer would usually coordinate with

the safety expert if there were concerns about safety. According to Georgia's Assistant Division Administrator, the reason why a safety expert did not review projects with design exceptions was that each FHWA area engineer who makes an onsite inspection checks the safety aspects of exceptions. However, as previously discussed, FHWA did not participate in over half of the inspections of 3R projects.

#### STATES CAN NOW DEVELOP 3R STANDARDS

Between June 1976 and July 1982, the issue of what geometric design standards should be used for 3R was intensely debated. After several unsuccessful attempts to develop standards for 3R work, FHWA published a regulation, effective July 1982, allowing States to develop their own standards for 3R work subject to FHWA approval. Most of those commenting favorably on the regulation were State highway agencies while some safety groups opposed it. The issuance of the 1982 regulation, however, has not resolved the issue of what standards are appropriate for 3R work. A Federal study of appropriate standards has been authorized, and a safety group filed suit seeking to set aside the regulation.

On August 25, 1977, FHWA issued a notice of proposed rulemaking suggesting the following alternatives for establishing geometric design standards for 3R work:

- Continue operating under the existing system where States must request exception to the new construction standards.
- Adopt the 3R standards developed by the American Association of State Highway and Transportation Officials (AASHTO) in 1977.
- Allow each State to develop its own criteria using AASHTO's 3R standards or other material as a base.

FHWA received about 200 comments on the proposed rule, with some groups indicating a preference for one of the alternatives and some groups criticizing the three alternatives without offering substitutes. Because of the number of severely adverse comments made on AASHTO's 3R standards, FHWA decided not to adopt them and stated that it would develop national 3R standards.

On August 23, 1978, FHWA published a notice proposing that FHWA-developed 3R standards be used for 3R work. Although the proposed standards were not to be as stringent as those for new construction, they were to be higher than AASHTO's 1977 3R standards. More than 100 comments were received on the proposal. Several highway agencies and AASHTO commented that the development of a design guide should be AASHTO's responsibility in cooperation with FHWA.

Because of comments regarding the proper Federal role in the 3R program, in May 1979, FHWA published a notice stating that it had decided to set up four working groups to summarize and evaluate the comments on the 1978 proposal and to prepare options for

the FHWA Administrator's decision. One of these working groups prepared a regulatory impact analysis which included a technical report entitled "RRR Alternative Evaluations for Non-Interstate Rural Arterial and Collector Highway Systems." Based on a review and evaluation of this report and the comments submitted to the public docket on the August 1978 proposal, the task force concluded and recommended that individual State standards would be the best approach. On January 5, 1981, FHWA issued a notice proposing that each State develop its own 3R standards.

Most of the favorable responses on the proposal came from State highway departments. The reasons cited most frequently by those favoring the regulation were the flexibility permitted and the provision for State and/or local development of standards. Several safety groups were opposed to the regulation because they were concerned that States would have the incentive to fund resurfacing-only projects and not address needed safety or geometric improvements. Two other safety groups were concerned about the lack of a requirement for accident analyses for 3R project locations.

According to the National Transportation Safety Board (NTSB), an independent agency established to promote transportation safety and formulate safety recommendations, there is a strong incentive for States to use 3R funds for resurfacing-only projects because they cost considerably less than projects involving more substantial improvements. Furthermore, NTSB reported that two safety implications result from resurfacing-only projects. In a September 1981 report entitled "Safety Effectiveness Evaluation, Federal Highway Administration Non-Interstate Resurfacing, Restoration, and Rehabilitation Program," NTSB stated that not only do resurfacing-only projects not reduce the hazards of roads that do not meet standards for new construction, but some experts claim that resurfacing-only increases these hazards because operating speeds increase after a surface is repaved.

The Center for Auto Safety, a nonprofit organization which monitors Government agencies charged with regulating the automobile industry, also is concerned about resurfacing-only projects. When the Center commented on FHWA's regulation allowing States to develop their own geometric standards, the Center cited an FHWA Office of Highway Safety draft report entitled "Safety Impacts of Resurfacing Rural Roads" which concludes that resurfacing increases running speeds and most potential roadway and roadside dangers are magnified when speeds increase.

The issue of the safety effects of resurfacing-only projects has not been resolved. The draft report on the impacts of resurfacing-only projects cited by the Center was never formally reviewed or published by FHWA. A safety engineer with FHWA's Office of Highway Safety told us that a current FHWA study on 3R-type improvements may provide some further data on this issue. (See p. 22 for details on the study.)

Neither safety group advocates that all highways should be brought up to standards for new construction. Both NTSB and the

Center for Auto Safety, in commenting on FHWA's regulation on geometric design standards, stated that sections proposed for 3R work should be evaluated against uniform, specific criteria to determine which elements of a highway should be upgraded and to what extent.

Two groups, the National Association of Governors' Highway Safety Representatives and the National Highway Safety Advisory Committee, were concerned that the regulation did not require accident data to be a part of project design approval. The National Association of Governors' Highway Safety Representatives, the highway safety support affiliate of the National Governors' Association, stated that accident histories should be compiled for sites proposed for 3R work. The Chairman of the National Association of Governors' Highway Safety Representatives testified on October 28, 1981, before the Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, that the proposed regulation (which subsequently became final in July 1982), allowing each State to develop its own standards for 3R work, falls short in the degree to which it addresses safety. The association believes that in order to maximize safety to the appropriate extent, an analysis of the accident history should be conducted at all sites proposed for 3R work. Sites identified as having high accident rates should have safety upgrading as an integral component of 3R work. In subsequent discussions with the chairman, he told us that regardless of whether the States are currently conducting accident analyses on sites proposed for 3R work, FHWA should require all States to do so.

Another safety group, the National Highway Safety Advisory Committee, a Presidentially appointed committee that provides the Secretary of Transportation with information on highway safety, also stated that accident analyses should be included as an integral part of the project design process. In commenting on FHWA's proposed regulation on 3R standards, the committee stated that the regulation fails to balance 3R needs with safety needs. A January 1979 report by the committee's Highway Environment Task Force recommended the 3R proposal be withdrawn and replaced with the following:

- The national average accident rate be calculated for each functional classification by rural and urban roads utilizing 3 years of accident data.
- The accident rate be calculated within the proposed 3R project site utilizing 3 years of accident data and compared to the national average rate for the functional classification on the system for which the project is proposed.
- If the accident rate is above the national average for the functional system, a traffic safety engineering study would be done to determine what elements contributed to the poorer accident experience and deficiencies would be upgraded.

--If the accident data is average or below for the project, when compared to the national average for that functional classification, the project would proceed utilizing standards developed by the States.

FHWA published a regulation, effective in July 1982, stating in the preamble that the geometric standards for new construction are not particularly appropriate to most 3R projects. FHWA stated that to provide more flexibility to meet State and local needs and to lessen the cumbersome Federal approval process, States could develop their own 3R standards or procedures for designing 3R projects. The standards or procedures developed had to be conducive to safety, durability, and economy of maintenance. States could also continue to use new construction standards and request exceptions on a project-by-project basis if they desired.

In responding to some of the safety group concerns, FHWA stated in the preamble to the regulation that its primary reason for adopting this approach is that with the limited amount of funds expected to be available for highway improvements, greater overall system safety and fewer total accidents could be achieved by improving more miles of highway with less costly improvements than by improving fewer miles completely to new construction standards. Further, FHWA questions the assumption that 3R work will involve only resurfacing, citing that appropriate safety improvements have been and will continue to be made in conjunction with 3R work. FHWA also questions the assumption that accident rates will increase following 3R work and claims there are no discernible differences in before and after accident rates for resurfacing-only projects.

According to a Geometric Design Branch official, FHWA did not specifically address requiring accident histories because the regulation's general philosophy was to provide maximum flexibility to the States in developing and implementing 3R projects. Furthermore, the official said that FHWA's July 1982 technical advisory notice (explaining how to implement the regulation) states that a State's geometric design standards or procedures should address, among other factors, accident experience. The notice also states that accident rates can be an important factor in establishing both the priority and the scope of 3R projects.

At the time we completed our field work, none of the seven States included in our review had adopted 3R standards pursuant to the final regulation. Subsequently, an FHWA Geometric Design Branch official told us that as of October 19, 1983, the following States had adopted standards for 3R work pursuant to the July 1982 regulation: California, Colorado, Connecticut, Florida, Indiana, Iowa, Kentucky, Michigan, Minnesota, Mississippi, New Mexico, Pennsylvania, South Dakota, Tennessee, and Vermont. These States can request exception to these standards. (We did not review these standards.) He also told us that two States--Illinois and Washington--had adopted 3R standards previously approved under certification acceptance agreements. Additionally, he said 32 States had adopted standards for new construction for their 3R projects (nine of these States did so pending development of 3R

standards) and the remaining States had not indicated their intent.

Even though FHWA issued the final regulation on geometric design standards, the issue of what standards are appropriate for 3R work is continuing. The Surface Transportation Assistance Act of 1982, approved January 6, 1983, states that it is the Congress' intent that any federally funded 3R project shall be constructed in accordance with standards to preserve and extend the service life of highways and to enhance highway safety. Furthermore, the act also requires that the Secretary of Transportation arrange with the National Academy of Sciences to study the safety-cost effectiveness of geometric design standards in effect for construction/reconstruction to determine the most appropriate minimum standards for 3R work.

In October 1982 the Center for Auto Safety filed suit against FHWA challenging FHWA's July 1982 regulation on design standards for non-Interstate 3R projects. The Center alleged that the final regulation fails to ensure that 3R projects comply with the mandate of 23 U.S.C. 109(a) that projects on any Federal-aid system be designed and constructed in accordance with the standards best suited to adequately meet existing and probable future traffic needs and conditions in a manner conducive to safety, durability, and economy of maintenance. Regarding safety, the Center alleged that FHWA's final regulation does not meet the mandate of conduciveness to safety because, rather than require that 3R projects enhance safety, the regulation permits States to obtain funding for simple resurfacing projects. Furthermore, the Center also alleged that the regulation does not ensure that highway safety conditions will not be adversely affected when simple resurfacing projects--the principal types of 3R projects--are permitted without mitigation of hazardous design features.

FHWA asked the court to rule in its favor because, among other things, a March 1983 amendment to the final regulation made it consistent with new statutory language in the Surface Transportation Assistance Act of 1982 that the standards must enhance highway safety. The July 1982 regulation stated that 3R projects should be designed and constructed in a manner that will prevent deterioration of safety. The amended regulation, however, conforming to the statute, states that 3R projects shall be designed and constructed in a manner that will enhance highway safety. The suit was dismissed on June 16, 1983.

As part of FHWA's Office of Engineering Geometric Design Branch's responsibility to monitor regional management activities relating to highway geometrics, in March 1983, the Geometric Design Branch initiated field reviews to monitor 3R design activities pursuant to the final regulation. The review team usually includes two representatives from FHWA headquarters--a representative from the Office of Engineering and Office of Highway Safety--and one or two regional and one or two division representatives. The field review includes a physical inspection of 12 to 24 3R projects completed in the past 3 years. As part of this review, the team will make a subjective assessment of whether the

project improvements enhanced, detracted from, or lost the opportunity to improve highway safety. Two States in each of FHWA's nine regions are scheduled for review. Reviews have been completed in four States, and FHWA expects to issue a summary report once all the reviews are completed.

#### State comments and our evaluation

In commenting on the safety implications of 3R projects, two States, Georgia and New Jersey, stated that 3R projects by improving the roadway also improved safety. Georgia, for example, noted that deteriorated pavement which has lost its skid resistance and which has potholes that cause drivers to veer is unsafe. Georgia stated that the preservation work corrects these unsafe conditions at the same time it is correcting structural deficiencies, thus making the roadway safer.

Our report was directed toward providing information on exceptions to design standards. We agree that 3R projects do improve the roadway condition. However, the effects of resurfacing on overall safety are not clear. As discussed in our report, one safety group has stated that not only do resurfacing-only projects not reduce the hazards of roads that do not meet standards for new construction, but some experts claim that they increase the hazards because operating speeds increase after a surface is repaired.

#### CONCLUSIONS

The safety effects of using less than the FHWA/AASHTO new construction standards are unknown and will continue to be so until further data on the safety-cost effectiveness of using variations to these standards are developed. Both the congressionally mandated study and FHWA's study of 3R improvements may provide further insight into the safety-cost effectiveness of geometric design standards and appropriate standards for 3R work.

FHWA's safety considerations when approving 3R projects varied among the divisions. Although we could not demonstrate any adverse effects from the variations in the divisions' safety considerations, those divisions routinely performing site inspections and having safety engineers review documentation of 3R projects having exceptions are in a better position to assess safety issues independent of the State's safety analysis. Safety considerations could be maximized if all divisions performed these types of reviews.

In the light of the variations in FHWA's review of safety implications when approving 3R projects with exceptions, and because the States can still request exceptions, we believe uniform procedures should be developed for reviewing projects with exceptions.

## RECOMMENDATION

We recommend the Secretary of Transportation direct the Administrator, FHWA, to develop uniform procedures for reviewing 3R projects that are not designed according to applicable standards. These procedures should address

- identification and documentation of substandard conditions by the State,
- division review of accident data,
- division site visits prior to project approval, and
- participation of the division's safety expert in reviewing documentation of 3R projects.

## AGENCY COMMENTS

The Department of Transportation stated that it generally concurred with our report and our recommendation and is in the process of developing instructions for its field offices to improve their procedures relating to approving exceptions. The Department agreed that further emphasis must be placed on using accident data during development of 3R projects, and that accident data should be provided to FHWA for use in making determinations on projects with design exceptions.

With respect to FHWA divisions making site visits prior to approving projects that do not meet standards, the Department recognized the usefulness of such visits but would modify our recommendation. It suggested that as an alternative to site visits, an FHWA review of State photologs (photographic files of highways) for the project site would accomplish the purpose of reviewing existing safety conditions of the highway. We did not review the use of photologs and therefore can make no judgments on their adequacy as a substitute for site visits. We believe, however, that a relevant consideration in using photographs is that they be current and present a composite picture of the entire project site.

Further, the Department agreed with our recommendation that FHWA division safety experts participate in reviewing documentation of 3R projects having requests for design exceptions. The Department, however, believes that the participation should be on a sampling basis. Our recommendation did not necessarily imply that the safety expert review documentation for all projects with exceptions, but rather that FHWA establish criteria for setting forth when and how the safety experts should participate. However, where exceptions are to be granted, we believe they should be involved in the approval process.



U.S. Department of  
Transportation

Assistant Secretary  
for Administration

400 Seventh St., S.W.  
Washington, D.C. 20590

**AUG 5 1983**

Mr. J. Dexter Peach  
Director, Resources, Community  
and Economic Development Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Peach:

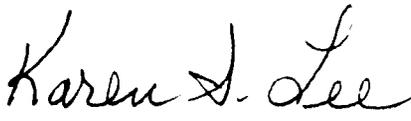
This is in response to your letter requesting Department of Transportation (DOT) comments on the General Accounting Office (GAO) draft report, "The Department of Transportation's Program to Preserve the Highways: Safety Remains an Issue," RCED-83-154, dated June 17, 1983.

The GAO recommended that the Federal Highway Administration (FHWA) develop uniform procedures for reviewing 3R projects that are not designed according to applicable standards. These procedures should address (1) documentation of substandard conditions, (2) Division review of accident data, (3) Division site visits prior to project approval, and (4) participation of the Division's safety expert in reviewing documentation of 3R projects.

The Department of Transportation (DOT) generally concurs with the report and its recommendations, and is currently in the process of developing instructions to the field to improve its procedures related to approval of design exceptions. Furthermore, the DOT agrees that further emphasis must be placed on the use of accident data during the development of 3R projects. Accident history as well as potentially hazardous conditions should be identified and evaluated on all 3R projects by the State. On those projects being considered for design exceptions, accident data should be furnished to the FHWA for use in making the determination.

If we can be of further assistance, please let us know.

Sincerely,

*for*   
Robert L. Fairman

Department of Transportation Reply To GAO Draft Report  
On The Department of Transportation's Program to Preserve  
the Highways: Safety Remains an Issue (342749)

Summary of General Accounting Office (GAO) Findings and Recommendations

The GAO reviewed the Department of Transportation's (DOT's) program to preserve the highways. Preservation includes resurfacing, restoration and rehabilitation - commonly referred to as 3R work. The report was prepared at the request of the Chairman, Subcommittee on Investigations and Oversight of the House Committee on Public Works and Transportation, who was concerned about the safety effects of allowing States to adopt their own geometric design standards for 3R work rather than continue to use standards established for new construction. The GAO found (1) that the safety effects of using less than the AASHTO standards were unknown, and (2) that the Federal Highway Administration (FHWA) safety considerations for approving 3R projects varied widely from Division to Division. The GAO recommended that the FHWA develop uniform procedures for reviewing 3R projects that are not designed according to applicable standards. These procedures should address (1) documentation of substandard conditions, (2) Division review of accident data, (3) Division site visits prior to project approval and (4) participation of the Division's safety expert in reviewing documentation of 3R projects.

Summary of DOT's Position

The DOT generally concurs with the report and its recommendation, and is currently in the process of developing instructions to the field to improve its procedures related to approval of design exceptions. Furthermore, the DOT agrees that further emphasis must be placed on the use of accident data during the development of 3R projects. Accident history as well as potentially hazardous conditions should be identified and evaluated on all 3R projects by the State. On those projects being considered for design exceptions, accident data should be furnished to the FHWA for use in making the determination. On the issue of Division site visits prior to project approval, the DOT appreciates the usefulness of such visits but recommends modification in the GAO recommendation to insert the words "or review of the photologs within the project limits" after the word "visits" (p.p. V and 35). Because of time and cost constraints, site visits may not always be practical and utilization of the State's photolog will accomplish the purpose of reviewing the existing safety condition of the highway. Finally, on the issue of participation of the Division's safety expert in reviewing documentation of 3R projects, the DOT agrees that the FHWA Division's safety program engineer should review both the State's and the Division's 3R procedures and participate in the review - on a selected sampling basis - of the documentation submitted for those projects that includes a request for a design standard exception.

In addition to the above comments, the following suggestions for improving the accuracy of the report are offered for your consideration:

1. The report indicates (on page 33) that the law suit brought by the Center for Auto Safety is still pending. That suit was dismissed by the U.S. District Court with prejudice on June 16, 1983.
2. At several points, the report refers to the FHWA field engineers as project engineers. Their proper title is area engineer.
3. At several points, the report refers to FHWA standards. These standards are actually developed by the American Association of State Highway and Transportation Officials (AASHTO) and adopted by the FHWA for use on Federal-aid projects.

GAO NOTE: Agency comments with respect to our recommendation are included on page 35. The suggestions for improving the accuracy of our report have been included as appropriate. Agency references to page numbers of the draft report have been revised to correspond to the proper pages of this report.

# STATE OF COLORADO

**DEPARTMENT OF HIGHWAYS**

4201 East Arkansas Ave  
Denver, Colorado 80222  
(303) 757-9011



July 18, 1983

Mr. J. Dexter Peach, Director  
Resources, Community, and Economic  
Development Division  
U.S. General Accounting Office  
441 G Street, N.W. - Room 4915  
Washington, D.C. 20548

Dear Mr. Peach:

I have reviewed Colorado's portion of your draft report entitled "The Department of Transportation's Program to Preserve the Highways: Safety Remains an Issue" per your request dated June 17, 1983.

Our comments are submitted to you on the original copy of the report which you submitted to us.

Thank you for the opportunity to review and comment on this draft report.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Joe".

JOSEPH DOLAN  
Executive Director

Enclosure

A handwritten signature in cursive script, appearing to read "By - Robert A. Clewinger".

GAO NOTE: Comments have been incorporated in the report as appropriate.



**Department of Transportation**  
**State of Georgia**  
 No. 2 Capitol Square  
 Atlanta, Georgia 30334-1002

THOMAS D. MORELAND  
COMMISSIONER

HAL RIVES  
STATE HIGHWAY ENGINEER  
DANIEL O. KELLEY  
TREASURER

June 30, 1983

Mr. J. Dexter Peach, Director  
Resources, Community and Economic  
Development Division  
U. S. GENERAL ACCOUNTING OFFICE  
441 G Street, N. W. - Room 4915  
Washington, D. C. 20548

Dear Mr. Peach:

Reference is made to your letter dated June 17, 1983, to Mr. Thomas D. Moreland, Commissioner, Georgia DOT, with which you enclosed for our review and comments segments from your Draft Report entitled "The Department of Transportation's Program to Preserve the Highways: Safety Remains an Issue".

The comments which follow, while they are written from the Georgia perspective, would, I think, have general applicability. Please accept them as constructive:

1) The draft segments reviewed by this office did not contain a discussion of the underlined purpose of the 3R Program. The underlined purpose is to preserve the Nation's transportation system. Certainly, in doing this, safety should be considered, is considered, and the preservation process itself increases highway safety factors.

In essence, if new construction standards are to be applied to 3R projects, then there is no need for a 3R Program. The monies going into the 3R Program should simply have been used to augment the existing new construction programs. It is evident, since a new program was developed, therefore, that the prime purpose of the new program, without being detrimental to safety, was to preserve the Nation's highways.

[GAO COMMENT: The underlying purpose of the 3R program is described in chapter 1 of this report.]

2) The preservation process itself increases highway safety. This fact was not discussed in the draft segments reviewed by this office even though this fact was discussed with the representatives of the General Accounting Office when they were in Atlanta. This comes about from the fact that a deteriorated pavement structure which has lost its skid resistance, which through deformations in its section can collect water not only causing skidding and hydro-planing but also a spray effect on following vehicles, which has potholes that cause

drivers to veer and which has deteriorating pavement markings, is unsafe. The preservation process corrects these unsafe conditions while at the same time it is correcting the structural deficiencies and providing for the preservation of the life of the roadway for years to come.

In essence, without any other considerations, the preservation process makes the roadway section safer for the operation of vehicles. This point was left out of the draft segments and should be included.

**[GAO COMMENT: State comments and our evaluation of them are included on page 34 of this report.]**

3) With respect to Georgia itself, the statistics given in Tables 1, 2 & 3 concerning Exceptions Requested and Approved are accurate. The statistics fail, however, to discuss the magnitude of the exception requested. For instance, twenty exceptions on lane width were requested. There is a significant difference if the requested exception was to reduce the lane width from the standard of 24' to an existing 22' or whether it was to reduce it from a standard of 24' to an existing 18'. The majority of these exceptions were in the first of these categories. The same type of reasoning applies to shoulder widths. The magnitude of the exception requested rather than the number of exceptions requested has much more meaning.

With respect to bridge width exceptions, the report ignores and does not discuss the fact that bridge width exceptions had a corresponding upgrading of bridge approach guardrail to current standards as to length of guardrail, post spacing and anchorage devices.

Therefore, while there were a number of exceptions requested, the magnitude of the exceptions in terms of their real meaning is not discussed at all in the report.

**[GAO COMMENT: State comments and our evaluation of them are included on page 15 of this report.]**

4) The Draft Report also ignores the safety enhancements other than those inherent in the preservation process that were included by the Georgia DOT in its 3R projects. During State Fiscal Year 1983, which ends on June 30, 1983, 11.1 per cent of the 3R money was for specific safety enhancement items. This amounted to \$3,460,044 out of the total 3R monies expended by the State of Georgia. These safety enhancements included lane widenings, passing lanes, turn lanes/intersection improvements, bridge widenings, guardrail upgrading and the re-striping of the roadways on every project. A list of our State Fiscal Year 1983 3R Projects which included specific safety enhancements is attached.

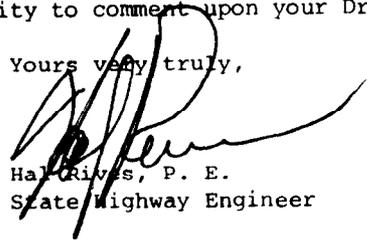
In addition, many safety improvements were accomplished with our Maintenance Forces on 3R Projects for which no tabulation of costs were made.

In closing I must repeat that such a report which deals with safety as an issue in the 3R Program is certainly incomplete if it does not discuss the safety enhancements that are not only inherent in the roadway preservation process but are also included as additional items over and above those needed for preservation as a part of the 3R Program. This has been done in Georgia as is evident from the discussion above. I firmly believe it has been done in other States and your report is incomplete without including those statistics in such a discussion.

[GAO COMMENT: Our review was directed toward providing information on exceptions to design standards. Further, our review covered projects authorized for construction between October 1, 1980, and June 30, 1982, and did not include the fiscal year 1983 activities cited by the State.]

Thank you for the opportunity to comment upon your Draft Report.

Yours very truly,



Hal Crivens, P. E.  
State Highway Engineer

HR/bl

attachment



# Illinois Department of Transportation

Office of the Secretary  
2300 South Dirksen Parkway / Springfield, Illinois/62764  
Telephone 217/782-5597

June 29, 1983

Mr. J. Dexter Peach, Director  
Resources, Community, and Economic  
Development Division  
U.S. General Accounting Office  
441 G Street, N.W. - Room 4915  
Washington, D.C. 20548

Dear Mr. Peach:

Thank you for the opportunity to comment on the Illinois specific segments of your draft report entitled "The Department of Transportation's Program to Preserve the Highways: Safety Remains an Issue" that are based on a review of resurfacing, restoration, and rehabilitation (3R) projects in Illinois.

The Illinois Department of Transportation and Illinois Division of the Federal Highway Administration are greatly concerned with the type of work associated with 3R projects in that the safety of the motorist be improved as a result of the upgrading of an existing roadway to 3R criteria. For this reason, I am disappointed that your report stressed the negative aspects of your findings rather than indicating that 3R criteria resulted in a definite improvement to an existing roadway. These negative findings deal primarily with the documentation of approval of deviations from 3R criteria rather than the end result of the project.

As was explained in great detail to your representative, when IDOT opted for certification acceptance procedures, the Department and the FHWA Division Office agreed that only significant deviations needed to be approved by the FHWA. All other deviations could be approved by IDOT. After operating for over a year, the FHWA Division Office determined that it had exceeded its authority in delegating approval of minor deviations to the State. This determination occurred after many projects had already been processed under certification acceptance procedures. Unfortunately, when the FHWA made its determination, it did not clearly notify IDOT about this change in policy. This is what caused the apparent discrepancy between IDOT practice and FHWA policy. Steps have now been taken to revise procedures to obtain FHWA approval of all deviations.

I also wish to point out that while there is not documentation to verify the FHWA was involved in the deviation action, many of these deviations were discussed at regular coordination meetings with the FHWA. Also, in reviewing the deviations with your representative, it was explained that all involved agreed the deviation was not significant and did not have a negative impact on traffic operation or safety.

[GAO COMMENT: State comments in paragraphs 3 and 4 are included on page 19 of our report.]

More important to IDOT, though, is the implication that 3R projects in Illinois consist of mainly resurfacing and widening and resurfacing with minor related work and that we do not have a feeling for the impact of 3R policy deviations on motorist safety.

[GAO COMMENT: Discussions of the scope of the 3R projects which were included in appendix I of the draft report have been deleted. A more detailed analysis of the types of work being done will be included in a follow-on report to the Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation. Further, it was not our intention to imply that the State did not have a sensitivity for the impact of the exceptions on motorist safety, but rather to provide information on the exceptions being granted.]

The agreed upon guidelines with the FHWA require: (1) all high accident locations be corrected; (2) horizontal and vertical alignment be improved if not adequate for 45 mph; (3) bridges narrower than pavement width be corrected immediately; (4) bridges narrower than that permitted to remain by AASHTO be replaced within five years; and (5) adequate clear zones be provided. The deviations discovered by your representative were not to these major points. Rather, deviations were granted mainly to parking lane width and auxiliary traffic lane widths in urban areas when right-of-way costs were prohibitive. The safety of the motorist was considered before these deviations were granted and, in all instances, the operational and safety aspects of the roadway were improved.

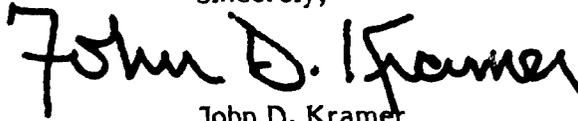
[GAO COMMENT: We agree that the State guidelines generally provide for the improvement cited by the State. We agree further that the deviations noted by us related primarily to lane widths, etc., but as noted on page 5 because State and FHWA documents did not clearly identify substandard conditions, we generally restricted our review to these latter types of features.]

Your review did indicate that our documentation procedures needed improving, and I have instructed my staff to take the necessary actions immediately. However, I cannot overemphasize the importance that your report address the positive commitment of the Department and the Illinois Division of the FHWA to safety on 3R projects. The 3R Program must continue because it is not economically feasible or environmentally acceptable to upgrade Illinois' entire highway system, let alone the National system to current new-construction standards.

[GAO COMMENT: State comments are included on page 19 of our report.]

If additional meetings are desired to clarify my comments, please let me know. Again, thank you for the opportunity to comment on your draft report.

Sincerely,

A handwritten signature in black ink that reads "John D. Kramer". The signature is written in a cursive, slightly slanted style.

John D. Kramer

## DEPARTMENT OF HIGHWAYS



TED SCHWINDEN GOVERNOR

2701 PROSPECT

STATE OF MONTANA

HELENA, MONTANA 59620

June 29, 1983

J. Dexter Peach, Director  
Resources, Community &  
Economic Development Division  
U.S. General Accounting Office  
441 G Street N.W. - Room 4915  
Washington, DC 20548

Dear Mr. Peach:

The Montana Department of Highways does not have any comments on your draft report entitled "The Department of Transportation's Program to Preserve the Highways: Safety Remains an Issue."

Sincerely,

  
Gary J. Wicks  
Director of Highways

32:GJW:KFS:cg:10N

cc: D. M. Harriott  
S. C. Kologi  
K. F. Skoog  
FHWA - HPD-MT



JOHN P. SHERIDAN, JR.  
COMMISSIONER

STATE OF NEW JERSEY  
DEPARTMENT OF TRANSPORTATION  
1035 PARKWAY AVENUE  
CN 600  
TRENTON, N. J. 08625

July 13, 1983

Mr. J. Dexter Peach, Director  
Resources, Community, and Economic  
Development Division  
U.S. General Accounting Office  
441 G Street, N.W. - Room 4915  
Washington, D.C. 20548

Dear Mr. Peach:

Your letter of June 17, 1983, to Commissioner John P. Sheridan, Jr., relative to the draft report entitled "The Department Of Transportation's Program To Preserve The Highways: Safety Remains An Issue," has been referred to this office for response. You have requested that we provide written comments on this draft report.

The State of New Jersey has been requesting exceptions to new construction standards for projects categorized as resurfacing, restoration, and rehabilitation in order to ensure that maximum safety facilities would be constructed at a reasonable cost and these facilities would provide the most benefit to the general public.

We do not agree with the statement on page 26, which states "...New Jersey did very little to address safety in 3R projects." Our concern has been and will continue to be for providing a safe facility under all conditions. Although we may not adhere entirely to the standards for new construction on 3R projects, the standards that are used provide for a safe and efficient facility. In most instances, the mere fact that we provide a new, smooth riding surface of improved skid resistance results in a significant safety benefit for a 3R project.

Originally, we did not supply accident data to the Federal Highway Administration with our requests for design exceptions, although we did evaluate the accident data that was available and did take this into consideration during the development of the contract plans. When full

compliance with design standards was not possible, a design exception was requested. Presently, when asking for design exceptions on any project, the accident data and associated analysis is included.

We believe that the statement "According to the State's safety coordinator, safety was not a consideration in developing 3R projects in the past but it is something the department is working on." is totally erroneous, and we believe there must have been a misunderstanding or misinterpretation of the discussions held with the various members of this Department and your staff.

[GAO COMMENT: Report revised to reflect the State's clarification of how it considers safety, see page 26. The State's comment on the safety improvements resulting from resurfacing is discussed on page 34.]

We trust you will take our comments into consideration when you develop the final report.

Very truly yours,



Michael F. Barrett

Assistant Commissioner for Management

GAO NOTE: Page references to our draft report in the State's letter have been revised to correspond to the proper pages of this report.



STATE OF NEW YORK  
DEPARTMENT OF TRANSPORTATION  
ALBANY, N.Y. 12232

JAMES L. LAROCCA  
COMMISSIONER

JUN 29 1983

Mr. J. Dexter Peach, Director  
Resources, Community, and Economic  
Development Division  
U.S. General Accounting Office  
441 G Street, N.W. - Room 4915  
Washington, D.C. 20548

Dear Mr. Peach:

Thank you for sending a draft copy of your report. I find the information presented generally reflective of the approach to resurfacing, restoring and rehabilitating (3R) projects in New York. However, I do wish to make the following observations.

On Pg. 16, the order of emphasis should be reversed. Our foremost consideration is an evaluation of the accident rate at or near the feature considered for retention followed by a cost estimate when it is found that the rate is low. In addition to the accident rate, additional cost and need for additional right-of-way there are other influencing features considered. These are: environmental impacts, property impacts, plans for major upgrading of the road in the future and compatibility with adjacent sections of roadway.

**[GAO COMMENT: The discussion of justifications for requesting exceptions on page 16 of this report has been revised for clarity.]**

The discussion on Pgs. 21 and 22 refers to the lack of an assessment of the safety effects of retaining substandard features. It is very difficult to make such an assessment that is meaningful and useful. However, if a substandard feature has existed for many years without a demonstrated accident history and conditions are not expected to change significantly, it could very well be cost effective to retain the feature.

**[GAO COMMENT: State comments and our evaluation of them have been included on page 24 of the report.]**

On Pg. 39 the use of the term "major reconstruction" is misleading. Although we do improve many substandard features under 3R projects, we do not consider this to be "major reconstruction" and do not concur with the use of the term in this context.

**[GAO COMMENT: Discussions of the scope of the 3R projects which were included in appendix I, page 39, of the draft report have been deleted. A more detailed analysis of the types of work being done will be included in our follow-on report.]**

Thank you for allowing us to review and comment on your draft report. I would appreciate receiving a copy of the final report.

Kind regards.

Sincerely,



James L. Larocca  
Commissioner

**GAO NOTE:** Page references to our draft report in the State's letter have been revised to correspond to the proper pages in this report.



State of Wisconsin \

DEPARTMENT OF TRANSPORTATION



OFFICE OF THE SECRETARY  
P.O. Box 7910  
Madison, WI 53707-7910

June 30, 1983

Mr. J. Dexter Peach, Director  
Resources, Community and Economic  
Development Division  
U.S. General Accounting Office  
441 G Street, N.W. - Room 4915  
Washington, D. C. 20548

Dear Mr. Peach:

We have reviewed segments of your draft report you provided us entitled "The Department of Transportation's Program to Preserve the Highways: Safety Remains An Issue."

Our comments are only valid when related to the segments you furnished out of context of the total draft. A review of the total draft may have given us a different understanding of the safety issue and resulted in different review comments. We appreciate, however, the opportunity to comment on the portions of the draft report you sent to us.

[GAO COMMENT: It is our policy in obtaining comments from persons and organizations outside the Federal Government to provide only those facts applicable to their activities.]

Wisconsin DOT has new construction standards for State and County Trunk Highways that were developed within the framework of AASHTO requirements. Our practice relative to 3R projects is to request FHWA approval for exceptions to these standards rather than FHWA/AASHTO standards as indicated on page 8.

[GAO COMMENT: Report revised accordingly.]

The example cited on pages 10 and 11 about exceptions for substandard curves and/or sight distance where speed and no passing signs are posted and enforceable implies an unsafe condition is being permitted to remain. We do not believe that this is the case. Geometrics which accommodate the maximum legal speed are not substandard. For example, a 40 mph speed limit on a street with compatible geometrics capable of handling this speed is a safe condition and in agreement with the standards for that speed.

[GAO COMMENT: The discussion on pages 10 and 11 of the report has been revised to reflect Wisconsin's position that geometrics which accommodate the maximum legal speed are not substandard. Further, it was not our intent to imply that unsafe conditions were allowed to remain, but rather to point out differing practices in requesting exceptions.]

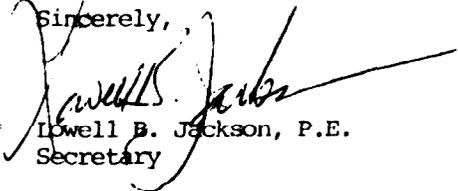
We cannot verify the specific numbers contained in Tables 1 to 3, as they were taken from randomly selected project files. If correctly interpreted, however, they should be accurate.

We do not believe it accurate to say, as indicated on page 21 of the draft report, that the safety effects of granting exceptions to standards is unknown. An evaluation of the accident history of an existing highway or street for which an exception to standards is requested to permit retaining an existing feature gives a good indication of the safety effects.

[GAO COMMENT: State comments and our evaluation of them are discussed on page 24 of this report.]

Thank you again for including us in the review process of your draft report.

Sincerely,



Lowell B. Jackson, P.E.  
Secretary

LBJ:sjt

GAO NOTE: Page references to our draft in the State's letter have been revised to correspond to the proper pages in this report.

(342749)

CF

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