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Washington, D.C. 20548

Resources, Community, and  
Economic Development Division

B-275886

April 29, 1997

The Honorable John H. Chafee  
Chairman, Committee on Environment  
and Public Works  
United States Senate

Subject: Surface Transportation: States Are Experimenting With Design-Build Contracting

Dear Mr. Chairman:

This report responds to your request for information on design-build contracting and supplements information presented in our testimony of March 6, 1997.<sup>1</sup> As we testified, the Federal Highway Administration (FHWA) has established a pilot project to test and evaluate this new approach to procurement, which combines the responsibilities for designing and constructing a project in a single contract instead of separating these responsibilities, as is traditionally done. The report provides information on (1) the extent to which states have used design-build contracting under FHWA's pilot project; (2) the advantages, cited by proponents, of this approach over traditional contracting and the conditions under which the approach can be applied to highway projects; and (3) the obstacles to using the approach for highway projects.

In summary, we found the following:

- Under FHWA's pilot program, the states are experimenting with design-build contracting. As of January 1997, 13 states had initiated over 50 design-build projects that vary widely in cost. Although some of these

<sup>1</sup>Surface Transportation: Prospects for Innovation Through Research, Intelligent Transportation Systems, State Infrastructure Banks, and Design-Build Contracting (GAO/T-RCED-97-83).

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states have approved a second round of projects, only three states have completed one or more design-build projects.

- According to proponents, design-build contracting improves coordination between the designer and the builder, requires less monitoring by the sponsor or owner, and reduces the potential for legal disputes. Additionally, proponents maintain, the approach can save time and reduce costs. However, design-build contracting may not be applicable to some types of highway projects, such as a simple resurfacing. FHWA has concluded that the states' experience is still too limited to assess the broad benefits, costs, and applicability of the approach.
- Several obstacles limit the use of design-build contracting for highway projects: Laws in 17 states, as well as federal laws, do not permit the use of design-build contracts for most highway projects; the construction industry has been cautious about the approach because of liability and costs concerns; and funding may not keep pace with construction for larger projects.

#### BACKGROUND

FHWA is experimenting with design-build procurement for highway projects as part of a pilot program designed to test and evaluate various innovative contracting practices. The design-build approach, while becoming more common in the private sector for facilities such as industrial plants and refineries, does not yet have an established track record for highway or transit projects in the United States. FHWA's pilot program, called the Special Experimental Project 14 (SEP 14), grew out of a 1991 Transportation Research Board task force report that identified innovative procurement practices, such as design-build. Additionally, the Federal Transit Administration, also within the Department of Transportation, is funding demonstration projects to test the efficacy of design-build procurement.

Under a design-build contract, according to FHWA, a state highway agency identifies a project's desired end results and establishes minimum design criteria. Prospective offerors prepare proposals encompassing both the design and construction of the project, and the state highway agency subsequently selects the successful proposal on the basis of a combination of factors, including the quality of the design, the delivery time, and the cost. Under the traditional procurement approach, design and construction services must be separated and a construction contract, which generally goes to the lowest bidder, can be awarded only after the design is complete.

STATES ARE EXPERIMENTING WITH DESIGN-BUILD CONTRACTING

There is considerable interest in design-build contracting, according to FHWA officials, who cited the substantial number of relatively new projects proposed under SEP 14 as evidence of states' increasing interest in the approach. According to FHWA, as of January 1997, 13 states<sup>2</sup> had initiated over 50 design-build projects under the program, and additional projects are expected. For example, Florida has had positive experiences with a state-funded design-build program, having completed 13 projects totaling \$40 million. In 1996, the Florida legislature approved an additional \$60 million per year for design-build contracts. The Ohio legislature has also authorized a pilot program of new design-build projects. The cost of projects under the federal program ranges from \$1.4 billion for the reconstruction of I-15 in Utah to a few million dollars for various bridge projects.

As of January 1997, the I-15 Corridor Reconstruction in Utah was the largest design-build project. This 26-kilometer-long project will replace all existing pavement and will add one high-occupancy-vehicle lane, one general-purpose lane, and one auxiliary lane in each direction. All but three structures along the project's corridor will be replaced, including more than 130 bridges and most of the existing interchanges. Three new railroad grade separations will also be built.

Several states are using design-build contracting for a variety of smaller projects. For example, Alaska is converting a 4-kilometer-long railroad tunnel into a combined railroad-highway facility. Florida has completed 13 design-build highway projects costing a total of \$40 million, and the state legislature has approved another \$60 million per year for use in design-build projects. Michigan is using the approach to deploy an Intelligent Transportation System (ITS) traffic management system on I-75 and I-696. Maine and South Carolina are using design-build contracting to replace bridges. Arizona and California have each completed a design-build project through FHWA's Emergency Relief Program: Arizona replaced a flood-damaged bridge for \$3.5 million, while California replaced an earthquake-damaged highway ramp on I-10 for \$3.8 million. The design-build approach is well suited to emergency relief work, which emphasizes the quick reconstruction of damaged facilities. Appendix I lists the states' design-build projects under SEP 14.

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<sup>2</sup>Alaska, Arizona, California, Colorado, Florida, Maine, Michigan, Minnesota, New Jersey, North Carolina, Ohio, South Carolina, and Utah.

While interest in design-build contracting may be increasing, the states are still experimenting with the approach and their experience is limited. Only three states—Arizona, California and Colorado—have completed at least one federally funded design-build project, and these projects are all relatively small.<sup>3</sup>

PROPONENTS CITE ADVANTAGES OF DESIGN-BUILD CONTRACTING FOR CERTAIN TYPES OF PROJECTS

Proponents suggest that combining the responsibility for a project's design and construction has several advantages. First, when one party is responsible for a project's cost and schedule, the project's sponsor or owner does not have to coordinate the activities of the designer and builder. Instead, this coordination occurs within the design-build team. Design-build contracting can also reduce the administrative burden on the sponsor or owner because it requires monitoring only one contract rather than several different design and construction contracts. Finally, when the contractor and the designer are jointly responsible for the quality of the final product, the potential for disputes and litigation between them is diminished.

According to proponents, design-build contracting can also save time and costs. Time savings can be achieved by overlapping some design and construction activities, so that some construction can begin before all designs for a project have been completed. Under traditional contracting, all designs must be completed before construction can begin. Cost savings may be achieved when the cooperative relationship between the designer and the contractor allows for building value engineering<sup>4</sup> into the project. Finally, earlier information on a project's total costs may be available under a design-build contract because the project's design and construction costs are determined and guaranteed simultaneously rather than sequentially.

The Utah Department of Transportation expects to achieve significant time savings by using design-build contracting for the I-15 Corridor Reconstruction. Specifically, the department estimates that, by using the design-build approach,

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<sup>3</sup>California is also using design-build contracting for several nonfederally funded toll roads, including the San Joaquin Hills Corridor, Eastern Transportation Corridors, and Foothill Transportation Corridors. These three projects will cost approximately \$2.5 billion. Virginia and Colorado have also used design-build contracting for non-federal-aid toll road projects.

<sup>4</sup>Value engineering is a formal technique used by contractors or independent teams to identify methods of constructing projects more economically.

it can reduce the project's duration by as much as 3 years. According to the department, the benefits of using this approach include (1) rapidly correcting existing problems and bringing the highway up to current Interstate standards, (2) minimizing disruption to the public and adjacent communities, and (3) completing the project in time for the Salt Lake City Winter Olympics in 2002.

According to the Executive Director of the Design-Build Institute of America, despite the advantages claimed for it, design-build contracting is not appropriate for all types of projects, and this approach should be applied only to appropriate projects. As a rule, such projects have a strong creative design component. Projects that do not involve much design work, such as resurfacing an existing roadway, are not suitable for design-build contracting because they would derive little benefit from integrating the work of the designer and the contractor. The traditional contracting approach would make more sense for such projects.

Although the states are becoming more interested in design-build contracting, FHWA still considers the approach experimental. According to FHWA, an overall assessment of the broad benefits, costs, and applicability of design-build remains limited by the small number of completed projects. FHWA has concluded that it will encourage states to evaluate design-build contracting on a project-by-project basis under SEP 14.

#### OBSTACLES LIMIT THE USE OF DESIGN-BUILD CONTRACTING

State procurement laws limit the widespread use of design-build contracting. A 1996 survey conducted by the Design-Build Institute of America identified procurement laws in 17 states that do not permit the use of combined design and construction contracts. Laws in 12 of these states also do not allow the use of design-build contracts by subcontractors. According to a 1995 study by the Building Futures Council, some state laws generally prohibit design-build procurement indirectly, rather than directly, by requiring the separation of design and construction services. Specifically, construction services can be awarded to the lowest bidder only after the design is complete. The Council noted that requiring the separation of design and construction services and selecting the lowest bid is a decades-old practice based on concerns over waste, fraud, and abuse, not on considerations of efficiency.

While FHWA is experimenting with design-build contracting under its authority to engage in research activities, current federal law precludes the general use of this approach for projects conducted under the federal-aid highway program. Changes in legislation would be required to give FHWA the authority to issue

regulations allowing design-build contracting as a procurement option for federal-aid highway projects. FHWA has not sought this authority. FHWA believes that the current experimental program is appropriate because no consensus has emerged within the highway construction industry on the desirability of the design-build approach.

FHWA identified the lack of consensus on design-build contracting within the construction industry through a special 1994 government-industry working group. The group included FHWA and state officials, along with representatives of the Associated General Contractors of America, the American Road and Transportation Builders Association, the American Consulting Engineers Council, and the National Society of Professional Engineers. None of the papers submitted by these groups supported the use of design-build contracting for highway projects. One official from FHWA's Office of Engineering told us that he has asked industry representatives about their organization's position on design-build and the representatives could not respond because their membership was split on the issue.

As noted in a 1993 report to FHWA, the highway construction industry has been cautious about design-build contracting for various reasons. Professional design firms fear that, as subcontractors to the builder, they would be caught between the owner's demands for quality and the contractor's concerns about costs. Design firms are also concerned about bearing the cost of developing preliminary designs and then losing the competition for the contract. Trade associations have indicated that small contractors may not be able to compete with large firms because small firms cannot easily bear the burden of design costs and warranties. Contractors are concerned about financial risks if long-term warranties<sup>5</sup> are part of a design-build project. Contractors may finance performance bonds of limited duration to ensure that the promised work will be completed as specified, but the bonding industry has been reluctant to issue longer-term bonds guaranteeing the performance of the highway. Contractors

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<sup>5</sup>When highway contracts include a warranty clause, contractors guarantee to a highway agency that the feature under warranty will perform as expected over a specified number of years. FHWA's regulations provide that state highway agencies may include warranty provisions covering specific construction projects or features, with limited exceptions, in National Highway System construction contracts and, as allowed under the Intermodal Surface Transportation Efficiency Act, may follow their own procedures for warranties in construction contracts for federal-aid highways outside the National Highway System.

are also concerned about the difficulty of predicting traffic and weight factors in giving a warranty. Finally, contractors have been concerned that unknown environmental, geological, operational, or political risks could be transferred to them in the warranty of a design-build project.

A final obstacle to the use of design-build contracting, especially for larger highway projects, is that funding may not stay abreast of construction. When the design-build approach is applied to expensive "mega-projects," the financing can be complex, precisely because under a design-build contract, the construction may be completed more quickly than under a traditional contract. Faster construction means that funds will be required more quickly, posing difficulties if the project's revenue stream does not keep pace. For example, in our review of a large design-build transit project, the extension of the Bay Area Rapid Transit System (BART) to San Francisco International Airport, we found that BART plans to borrow funds to cover cash shortfalls during construction. With design-build contracting, BART may save construction costs but will incur additional financing costs. For the I-15 Corridor Reconstruction, FHWA has required Utah to provide a financing plan to ensure a sound financial basis for the project, given the magnitude of the project relative to Utah's regular federal-aid program. As of January 14, 1997, Utah was still developing this plan. In contrast, for smaller projects with established and adequate revenue streams, concerns about financing may not limit the use of design-build procurement.

### OBSERVATIONS

The states' experience with design-build procurement is still too limited for FHWA to draw any broad conclusions about the benefits, costs, and applicability of the approach for highway projects. However, early experience suggests that when time is at a premium, revenues can quickly cover construction costs, or a project includes a creative design component, the design-build approach may be appropriate. Design-build contracting may also be useful for disaster relief projects, such as those in Arizona and California, which emphasize the quick reconstruction of damaged facilities.

### AGENCY COMMENTS

We provided a draft of this report to DOT for review. We discussed the draft with the Chief, Highway Operations Division, Office of Engineering, FHWA, who indicated, in general, that the report was factually correct and that FHWA had no disagreement with its contents. He noted that since January 1997, two additional states—Alabama and Pennsylvania—have received FHWA's approval to

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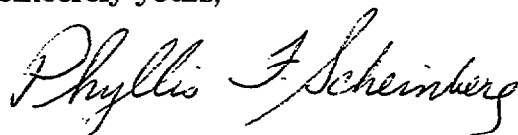
participate in the Special Experimental Project. He also provided editorial clarifications, which we incorporated into the report.

#### SCOPE AND METHODOLOGY

We conducted our review from October 1996 to April 1997 in accordance with generally accepted government auditing standards. To determine the status of FHWA's Special Experimental Project, we obtained project documents and interviewed officials from FHWA's Office of Engineering. To determine the status of design-build contracting in the states, we reviewed surveys by the Design-Build Institute of America and the Building Futures Council. To determine the efficacy of design-build contracting, we interviewed officials in FHWA and the Design-Build Institute of America. In addition, we reviewed reports by FHWA consultants and the Transportation Research Board.

Major contributors to this report were Joseph Christoff and Robert Ciszewski. Please call me at (202)-512-3650 if you or your staff have any questions.

Sincerely yours,

A handwritten signature in cursive script that reads "Phyllis F. Scheinberg".

Phyllis F. Scheinberg  
Associate Director,  
Transportation Issues

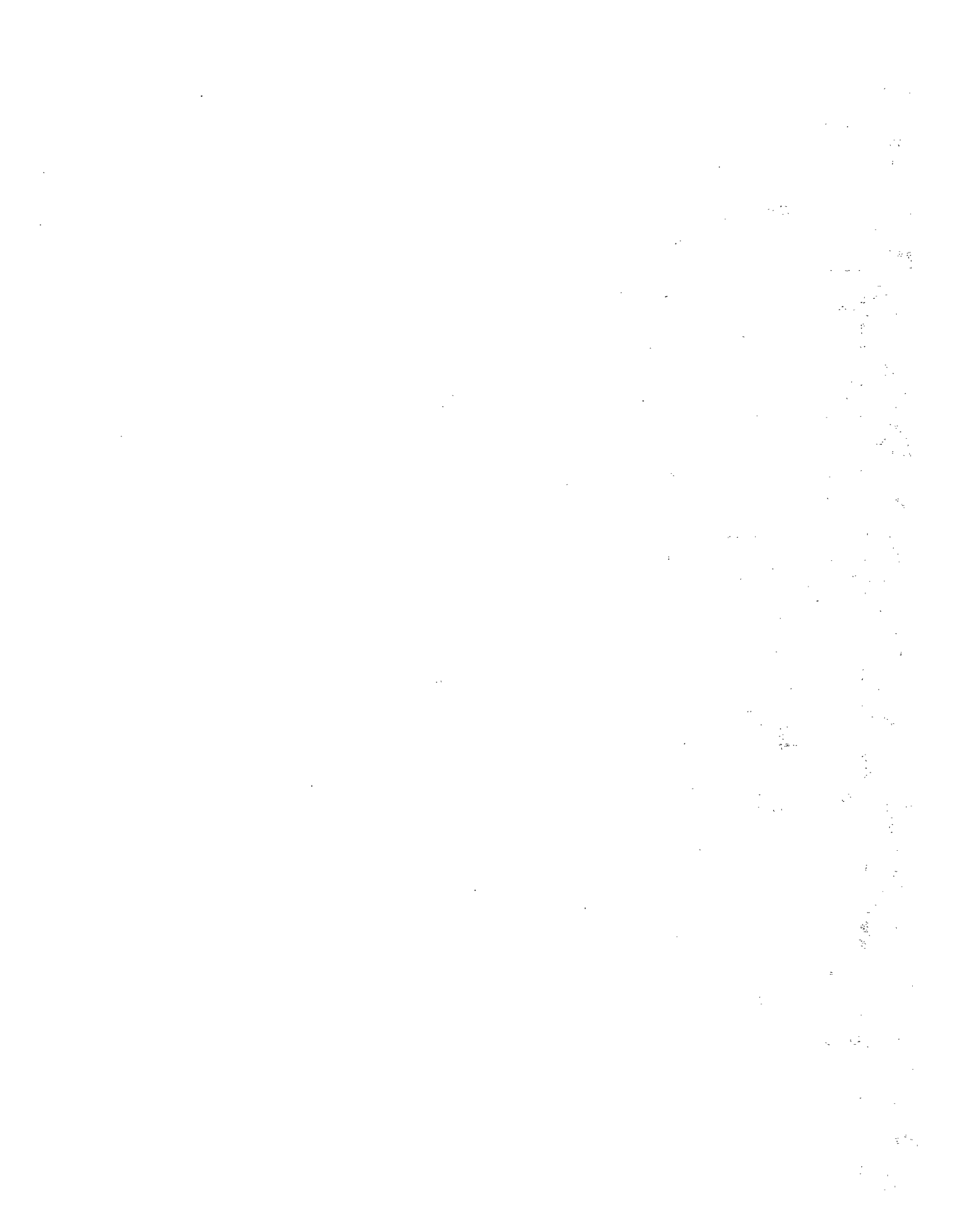


STATE PROJECTS USING DESIGN-BUILD CONTRACTING  
UNDER FHWA'S SPECIAL EXPERIMENTAL PROJECT 14,  
AS OF JANUARY 1997

State	Description of projects
Alaska	Construct an ocean class vessel for the Marine Highway System; convert a railroad tunnel to combined rail-highway use near Whittier, Alaska.
Arizona	Replaced a flood-damaged bridge using \$3.5 million in Emergency Relief Program funds; <sup>a</sup> develop a freeway management system on I-17.
California	Replaced an earthquake-damaged road/ramp structure on I-10 using a \$3.8 million in Emergency Relief Program funds.
Colorado	Improve pavement/sidewalk/curb/ and gutter in Woodland Park, Colorado.
Florida	Completed 13 projects totaling \$40 million.
Maine	Build a new four-lane bridge across the Kennebec River.
Michigan	Deploy a traffic management system on I-75 and I-696; build a new interchange at I-94 and Vining Road in Romulus; begin using design-build contracting in its Bridge Rehabilitation program; rehabilitate 9.8 kilometers of pavement on U.S. 23; design and build a ferry boat for the Beaver Island Transportation Authority.
Minnesota	Reconstruct 14 kilometers of pavement on I-35.
New Jersey	Use design-build contracting for 17 bridge and roadway projects.
North Carolina	Deploy a freeway traffic management system on I-77 in Charlotte.
Ohio	Replace two bridges.
South Carolina	Replace bridges on S.C. 418 over the Enoree River and S. 316 over Reedy Creek; replace a bridge on U.S. 1/601 over the Wateree River.
Utah	Furnish and install a \$1.5 million freeway surveillance system in the Salt Lake City area; reconstruct I-15 for an estimated \$1.4 billion.

<sup>a</sup>FHWA did not have cost data available for all projects under its Special Experimental Project 14.

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