

97-4 Management of the Highway Program, Department of Transportation

Summary

The Department of Transportation is responsible for planning, designing, constructing, and maintaining the state and local highway program, which in fiscal year (FY) 1996-97 will spend \$867.9 million on 11,813 miles of state highways and local road projects funded in part by state and federal funds. Limited revenues and continuing demands for increased funding of transportation programs, as discussed in Legislative Audit Bureau report 96-19, raise legislative concerns about whether the Department and its largest program, the state and local highways program, are well managed and whether current funds are used cost-effectively.

Apart from the state and local highway program and providing local road and transit aids, the Department has experienced limited growth or actual declines in expenditures and staffing levels since FY 1987-88. In constant dollars, expenditures for motor vehicle registration and regulation declined 3.2 percent, while increases for State Patrol and general operations were 4.3 percent and 1.9 percent, respectively. In contrast, expenditures for the state and local highway program increased 28.1 percent in constant dollars during the last ten years.

Since the late 1980s, concerns about improving highway program management have increased as a result of:

- federal legislation that requires balanced consideration of all modes of transportation, not just highways;
- state efforts to reduce staffing levels and rely, when it is cost-effective, on private firms to perform functions such as engineering;
- increased demand for major highway improvements, for which expenditures have increased 98.1 percent since FY 1987-88;
- concerns that highway construction contracts are managed cost-effectively; and
- a decline of 9.3 percent in constant dollars spent on routine highway maintenance performed by counties under contracts with the Department.

We examined the Department's response to these and other federal and state funding and policy issues.

Planning

Several concerns regarding the process for selecting major highway improvement projects were discussed in report 96-19, including the criteria used to evaluate proposed projects and the role of the Transportation Projects Commission in the project enumeration process. For the program to rehabilitate existing highways, questions have included whether the planning process identifies highways most in need of repair, whether only repairs and improvements that are most needed are planned, and whether plans are completed on a timely basis so that public expectations for project completion can be met.

In planning highway rehabilitation projects, the Department has developed systematic methods for evaluating pavement conditions to determine which segments of each state highway need to be given priority for resurfacing, reconditioning, and reconstruction. While the types and quality of rehabilitation are guided by federal and industry construction standards, there is a need for continual review and updating of construction standards as new techniques and experience warrant. For reconstruction projects, the Department completes life-cycle cost analyses to determine the most cost-effective combinations of road base design, pavement composition, and pavement thickness over the life of a road when material costs and amounts, roadway dimensions, truck and automobile traffic levels, soil conditions and drainage

requirements, and ongoing maintenance costs are taken into account. Because reconstruction projects typically represent only 24.5 percent of annual rehabilitation program costs, extending similar life-cycle cost analysis to the balance of the program, especially larger resurfacing projects, could further ensure cost-effective use of available funds.

In addition, some of the Department's district offices have recognized the need to improve planning efficiency by involving design, construction, maintenance, and environmental staff in a team approach that limits the scope of planned work to essential tasks and speeds project completion; these techniques are now being adopted statewide. In response to concerns about project delays that increase costs, planning staff have identified a need to work more closely with local officials, who must make certain decisions on a timely basis.

Design and Construction Engineering

The Department's expenditures for design and construction engineering services include the costs of both staff engineers and private consultants, and will increase from \$59.9 million in FY 1987-88 to an estimated \$118.2 million in FY 1996-97. This is a cumulative change of 35.8 percent above inflation.

A portion of this increase can be explained by a FY 1989-90 salary adjustment of 15.5 percent for all engineering staff, based on a study of private-sector engineering salaries. The Department also points to the increased workload associated with its expanded responsibilities for mitigating environmental and other effects of highway projects, and with the expansion and acceleration of the major highway improvement program. The Department's accounting system does not capture all the costs of environmental mitigation and historic preservation efforts, but it appears that studies to determine what steps will be needed to address environmental and historical concerns account for at least \$1.9 million of the growth in annual engineering costs. In addition, it appears that at least \$5 million is spent annually to complete draft environmental impact statements for major improvements that have not been enumerated by the Legislature and will not begin construction for at least ten years. Some \$6.1 million is spent annually to design projects to be built in future years.

The Department can identify other causes for the growth in engineering expenditures, including efforts to provide more detailed designs to contractors so they can prepare more accurate bids, increased design work resulting from requirements to avoid environmental damage, and a shift to building more difficult reconstruction projects and fewer resurfacing projects. However, the costs of these workload changes have not been identified, making efforts to control these costs more difficult.

The Department has taken some steps to control engineering costs. Advanced design technology has been used to automate some engineering design functions and has led to an increase in efficiency, although all districts have not made full use of available technology. Automation and increased reliance on private engineering firms have led to a 12.7 percent reduction in engineering staff since 1988, although this reduction was offset by increases in nonengineering positions such as environmental specialists and computer-aided drafting and design specialists.

In an effort to measure engineering performance, the Department has compared the cost of design engineering and engineering oversight of construction projects to total project costs since FY 1993-94. However, these measurements have not demonstrated any trend in engineering efficiency and are insufficient to provide managers with guidance on how to improve performance. Furthermore, these measures show no significant difference between the cost of district staff and the cost of consulting engineers, who provide 40 percent of design engineering and 30 percent of construction engineering.

We believe a systematic effort is needed to identify the most important cost factors and to track their increases over time, so that managers can direct their cost-control efforts to those tasks that cause inefficiency and increased costs. Additional efforts are needed to determine why one-quarter of project designs require addenda to correct errors before bidding can proceed. With such information, managers in the Department would also be better able to evaluate when contracting with private firms for engineering services would be most cost-effective.

There are some indications that the quality of engineering services provided by private consultants is not as uniformly high as that provided by state staff, but the procedures established for reviewing engineering quality are not routinely followed. District staff do not always complete evaluations of consultants' designs once projects are completed.

Guidelines for estimating the expected cost of consultant contracts are not always followed by district staff, who rely instead on past experience when beginning detailed contract negotiations. Using these procedures to evaluate consultants, sharing the results among all districts, and strengthening contract-negotiating procedures would enhance the Department's ability to ensure cost-effective use of consultants.

Construction

Competition within the industry appears to have limited most highway construction cost increases, and limited competition does not appear to have affected asphalt paving contract prices. Nevertheless, additional efforts are needed to control cost overruns and evaluate contractor performance.

Expenditures for highway construction projects have grown 6.1 percent above inflation since FY 1987-88, which is significantly less than the increase in expenditures for engineering and for the state and local highway program as a whole. In general, federal officials and others believe that the highly competitive construction industry in Wisconsin has worked to limit cost increases. In FY 1994-95, 435 construction contracts were distributed among 113 different primary construction contractors.

However, asphalt paving contracts are an exception to the general pattern of industry competition. Over one-half of single bids received in FY 1994-95 were for contract proposals with at least 50 percent of their costs related to asphalt paving, and 37.7 percent of asphalt paving contracts awarded were based upon a single bid. There are only two primary asphalt companies in Wisconsin, and they rarely compete with each other for road construction contracts. Nevertheless, officials in the Department of Transportation, who have monitored these two companies in conjunction with the Department of Justice, believe they have not engaged in illegal activity, such as collusion to fix prices.

Although there are contract provisions for assessing damages when projects fail to meet established completion dates, liquidated damages are seldom assessed because project delays are not always controllable and because litigating disputed damage claims can be costly. To control construction costs, the Department will need to:

- strengthen the process used in negotiating contract change orders, which increase project costs after the bidding process is complete; and
- routinely follow established procedures for evaluating contractor performance, so the results can be considered in the process for prequalifying contractors for future projects.

Maintenance

Although expenditures for traffic and maintenance operations have declined 9.3 percent in constant dollars since FY 1987-88, the maintenance program remains satisfactory by several measures. Nevertheless, counties, which perform most maintenance activities under contracts with the State, identify several concerns.

While the current arrangement allows the State to avoid the costs associated with maintaining a large workforce by sharing the cost of the county workforce, counties that staff to cover peak winter workload demands with only reasonable amounts of overtime face some degree of overstaffing during non-peak times. Counties are also concerned that changing state maintenance requirements sometimes limit their use of large equipment already purchased in anticipation of state funding through the equipment reimbursement formula. Most important, county officials are concerned that the current amount of state funding for maintenance is insufficient to fund the cost of completing all the work required by state maintenance manuals. While the work actually completed is negotiated throughout the year with each county, county officials are concerned about their potential liability for accidents that may result from performing less maintenance than called for in the requirements. Three counties Dodge, Milwaukee, and Racine did not sign the state maintenance contract for 1996 at the beginning of that year in part because of these concerns, although they continued to provide services and to be reimbursed.

Wisconsin is the only state to rely exclusively on counties to perform maintenance on state highways. Some jurisdictions have taken steps to rely more on private firms to perform routine highway maintenance activities, but the results of such efforts in Massachusetts, Michigan, and the Province of British Columbia have not yet shown significant

savings. Substantial administrative costs have been identified in these efforts because detailed specifications for work to be performed must be developed in advance, and monitoring is required to ensure contract provisions are fulfilled.

Other Management Initiatives

In addition to setting performance goals for various activities in the highway program, the Department has undertaken other efforts to promote efficiencies and savings over time, including:

- increasing the ratio of staff to managers, which was 4.7 to 1 in 1994 and 6 to 1 in 1997, with a goal of 9.4 to 1 by 2000;
- initiating a major reorganization in both the central office and the districts;
- establishing a goal to increase by 2000 the proportion of highway program expenditures on construction, real estate, and utilities from \$3.49 for every \$1.00 spent for planning and design to \$4.00.

However, savings are not likely to occur without continued management attention, not only to measuring performance in the areas of planning, engineering, and construction, but also to the Department's overall organization and ongoing efforts to develop strategies for reducing the costs associated with highway improvements. To aid in these efforts, we recommend the Department of Transportation:

- enhance or develop information systems that provide managers with accurate and timely costs by expenditure type, including, for example, design cost information for environmental, planning, and public information costs; utilities; right-of-way; construction; and construction engineering;
- refine performance measures so that they measure progress toward goals more accurately, and identify additional goals;
- implement program changes and efficiency procedures that have been developed to address specific problems, periodically evaluate results, and make changes if results differ from expectations; and
- develop a mechanism to share information on new methods that have been proved successful in one district with all other districts, so that district improvements can become department-wide improvements.

If such efforts as life-cycle cost analysis, improved design quality, construction quality management, and contract change order cost controls are successful, some millions of dollars may be saved. However, such savings are unlikely to have a significant effect on the many demands for increased funding we described in report 96-19. Because more than 64 percent of the \$867.9 million in expenditures for the state and local highway program will pay for construction costs, achieving substantial savings in the highway program will require reductions in the number, scope, or quality of highway construction projects. Slowing the pace at which major improvements are completed, limiting the scope of rehabilitation projects to only essential safety improvements, or developing rehabilitation standards that place more emphasis on cost reductions will be required to limit the growth in highway program expenditures.
