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# Key Points of Report

## An Audit Report on the Department of Transportation's Highway Design Function

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February 2000

### Overall Conclusion

An increased risk exists that the Department of Transportation (Department) may not be able to maintain effective controls over the design of highways because increased construction funding is putting additional pressure on a highway design function that appears to be at capacity. Since fiscal year 1996, the amount of new contracted construction has increased from \$1.5 billion to \$2.9 billion, an increase of 93 percent, while staffing in the design area increased by 15 percent. This significant increase in workload places a greater strain on the Department's ability to continue to manage the design process and minimize cost overruns and delays. Also, the Department has not developed a formal action plan to help its districts cope with the increased workload and disproportionate increase in resources.

The Department has a sufficient process for reviewing highway construction design plans. However, we noted instances where the process did not always work as intended, which occasionally resulted in increased construction costs.

### Key Facts and Findings

- Revisions to construction contracts caused by design errors or omissions increased by 55 percent in fiscal year 1999. This represents \$28,804,000. In comparison, the amount of new contracted construction for the year ending in February 1999 (the period that had the most impact on these revisions) increased by 20 percent.
- While construction expenditures increased by 17 percent in fiscal year 1999, the hours spent on construction inspection increased by 1 percent. The increased workload for construction inspectors raises the risk that the required inspections will not be performed adequately.
- The Department is achieving its main goal of meeting the schedule to contract for all construction projects. However, it is not achieving its targeted performance for the timeliness and quality of the design plans.
- The Department estimates it is currently meeting 43 percent of the State's identified transportation needs. Additional funding to meet a larger percentage of these needs would place an even greater strain on the Department's ability to continue to manage the design process and minimize cost overruns and delays.

### Contact

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## Office of the State Auditor

Lawrence F. Alwin, CPA

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*This audit was conducted in accordance with Government Code, Sections 321.0133 and 321.0134.*

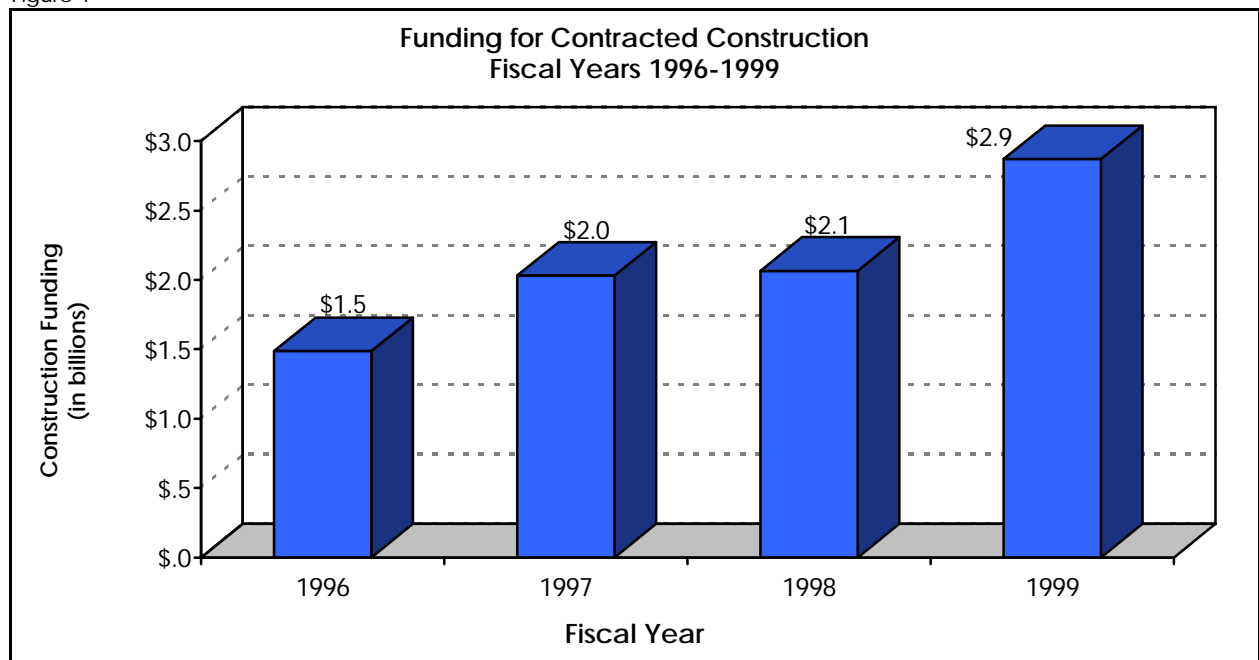
# Increases in Construction Funding and Disproportionate Increases in Design Resources Raise the Risk That the Department Will Not Be Able to Maintain Controls Over Design Review

There is an increased risk that the Department of Transportation (Department) may not be able to maintain effective controls over the design of highways because increased construction funding is putting additional pressure on a highway design function that already appears to be at capacity. Although the Department has a sufficient process for the review of highway construction design plans, we noted that errors and omissions in design plans increased by 55 percent in fiscal year 1999, which occasionally resulted in increased construction costs.

In fiscal year 1999, construction funding rose by 39 percent as a result of increased federal funding from the Transportation Equity Act for the 21st Century (TEA21; see text box). Figure 1 shows that new contracted construction has increased from \$1.5 billion in fiscal year 1996 to \$2.9 billion in fiscal year 1999, an increase of 93 percent. During this same period, staffing in the design area increased by 15 percent. Although the Department has increased its use of design consultants from 43 percent to 60 percent over the last four years, the design work that remains for the Department's in-house design function, as well as the resources needed to manage increased consultant use, still places a burden on the Department's resources. This significant increase in construction funding, and the resulting increase in workload, places a greater strain on the Department's ability to continue to manage the design process and minimize cost overruns and delays.

**What is TEA21?**  
 The Transportation Equity Act for the 21st Century guarantees a minimum level of federal funding for surface transportation programs.

Figure 1

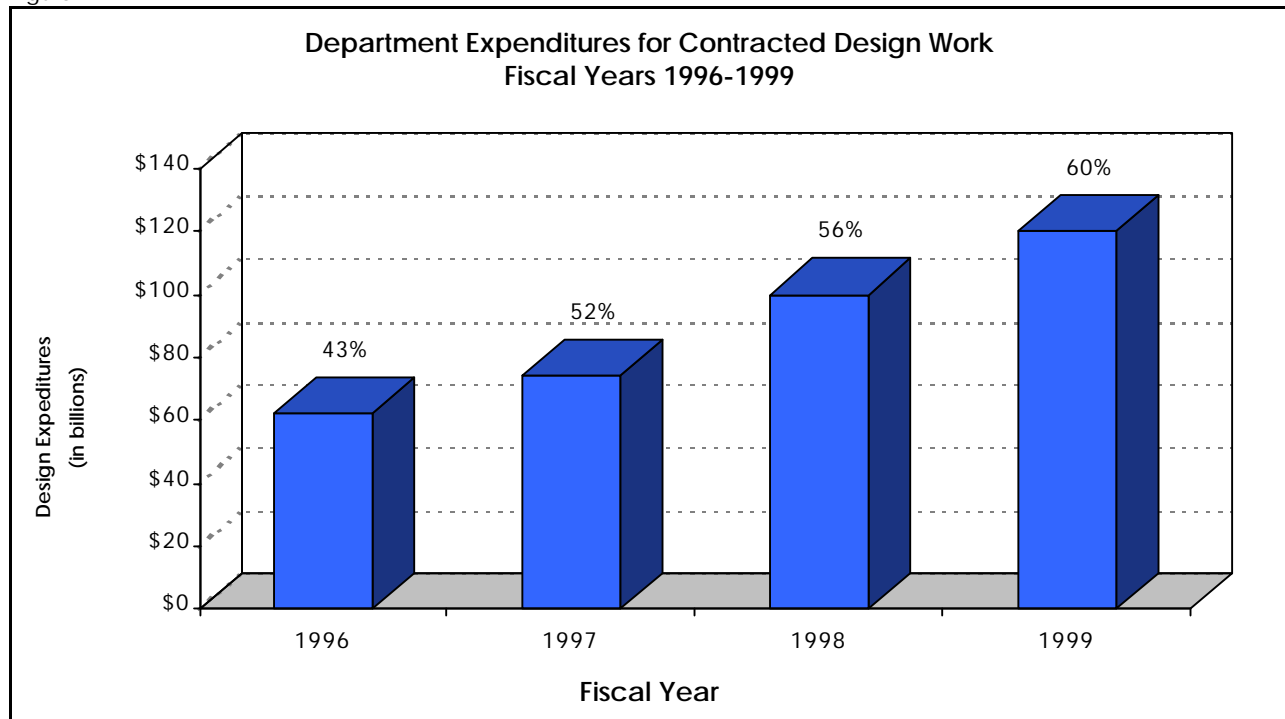


Source: Department's Design Division — Letting Volume Reports

Adding to this risk, we noted that the Department has not developed a formal action plan to help provide direction to its districts for coping with the increased construction funding. Although the districts are generally left responsible to devise their own strategies to deal with the increased workload, the Department could further assist them through enhanced communication of best practices, new initiatives, and other methods to maintain controls over the design function. An action plan and enhanced communication with and among districts would help districts meet the schedule to contract construction projects while still maintaining high quality in its design plans.

Although the Department has not developed an action plan, it has allowed districts to contract for some construction inspections. It has also increased its reliance on contracted design work from 43 percent in fiscal year 1996 to 60 percent in fiscal year 1999, as shown in Figure 2. However, these efforts do not appear sufficient to address the increasing demands on design function resources. The districts have supplemented these initiatives with some of their own strategies. Examples of these strategies are listed under Districts' Best Practices in the section titled "Additional Information on Recommendations."

Figure 2



Source: Department's Finance Division

Section A:

## The Department's Design and Construction Inspection Functions May Be at Capacity

With the increased level of funding the Department has received, the design and construction inspection functions appear to be at capacity. The Department has a sufficient process for the review of highway construction design plans. This process includes multi-level reviews designed to identify and correct errors and omissions, as well as ensure compliance with state, federal, and Department design criteria and requirements.

However, the increased workload without a corresponding increase in resources places a strain on the Department's ability to continue to manage the design process and minimize cost overruns and delays. (See Appendix 2 for a detailed description of the design process.) The following factors indicate design and construction inspection functions that may be at capacity:

- Department records indicate that the revisions to construction contracts caused by design errors or omissions increased by 55 percent in fiscal year 1999. This represents \$28,804,000 in revisions to the construction contracts. In comparison, the amount of new contracted construction for the year ending in February 1999 (the period that had the most impact on these revisions) increased by 20 percent. Although this factor does not provide an exact correlation between the timing of revisions and construction contracts, it does encompass the period during which most design errors generally arise. The Department has only been tracking the cause of construction contract revisions since 1997.
- Some construction projects that experienced revisions to the contract due to design errors or omissions resulted in increased construction costs. Examples include the following:
  - Road-widening project – A \$15.4 million project was canceled shortly after construction started because of design errors. These design errors cost the district over \$1.1 million, which it paid to the contractor before the project was canceled. These costs included mobilization, barricades, surveying, and delay reimbursement.
  - Road-improvement project – During construction, a contract revision of \$467,000 and a 10-day delay occurred because the design plans omitted materials necessary to complete the project. This omission resulted in a 40 percent increase over the original contract amount of \$1,200,000.
  - Road-improvement project – A contract revision of \$1.2 million and a 56-day delay occurred due to errors in the calculation of the quantities of the original contract items. This contract revision represented a 62 percent increase from the original contract amount.
- While construction expenditures increased by 17 percent in fiscal year 1999, the hours spent on construction inspections increased by 1 percent. The

increased workload for construction inspectors raises the risk that the required inspections will not be performed adequately. Construction inspection is vital to ensuring that the contractor is meeting the standards required by the design. The inspection function also helps ensure that the roadways will be safe for motorists.

- The Department is achieving its main goal of meeting the schedule to contract for construction projects. However, the Department is currently not achieving its targets for internal performance goals relating to the timeliness and quality of design plans submitted. This may be an indicator that quality and timeliness are being sacrificed to keep pace with the increased workload. The timeliness and quality of design plans submitted by the districts is an important element in minimizing cost overruns and delays. These two internal performance goals are:
  - No more than 10 percent of design plans should be submitted late to the Design Division. In fiscal year 1998, 26 percent of the districts' plans were submitted late; in fiscal year 1999, this rate decreased to 21 percent. Some districts experienced a greater rate of late design plans. In the Laredo district, 55 percent of projects in fiscal year 1998 were submitted late. That percentage increased to 100 percent in fiscal year 1999. Construction funding in Laredo increased by 185 percent in fiscal year 1999.
  - No more than 10 percent of design plans should be revised after they have been submitted to the Design Division. In fiscal year 1998, 28 percent of the districts' plans submitted for review required revision. In fiscal year 1999, this rate slightly decreased to 26 percent. Some districts experienced a greater rate of design plan revisions. The Paris District's rate of revisions increased from 37 percent in fiscal year 1998 to 54 percent in fiscal year 1999.
- District management, including district engineers, area engineers, and design and construction managers, expressed concerns about their ability to meet the schedule to contract for construction projects while producing quality design plans. Specifically, districts stated they are struggling to compete for design staff with private industry and local and county governments. The districts state that the experience level of key district design personnel is decreasing. The districts raised concerns that these staffing issues will significantly contribute to additional delays and errors in design, as well as increased construction costs.
- In the last month of fiscal year 1999, the Department contracted for \$540 million of highway construction projects. This is almost two and a quarter times the average amount the Department contracted for each month in fiscal year 1999. This increased workload raises the risk for design plan errors and omissions.
- According to a Department Internal Review report, the Laredo District Area Offices were not able to perform complete and thorough plan reviews of design projects because there were not enough design staff to handle the increased workload.

Section B:

**Some Districts Are More at Risk Than Other Districts**

Certain districts are more at risk than others because their funding has increased more dramatically than the Department as a whole. New contracted construction for 13 of the 25 districts has at least doubled from fiscal year 1996 to fiscal year 1999. Some districts experienced large increases in construction funding with proportionately small increases in design staff and design work performed by consultants, as shown in Table 1.

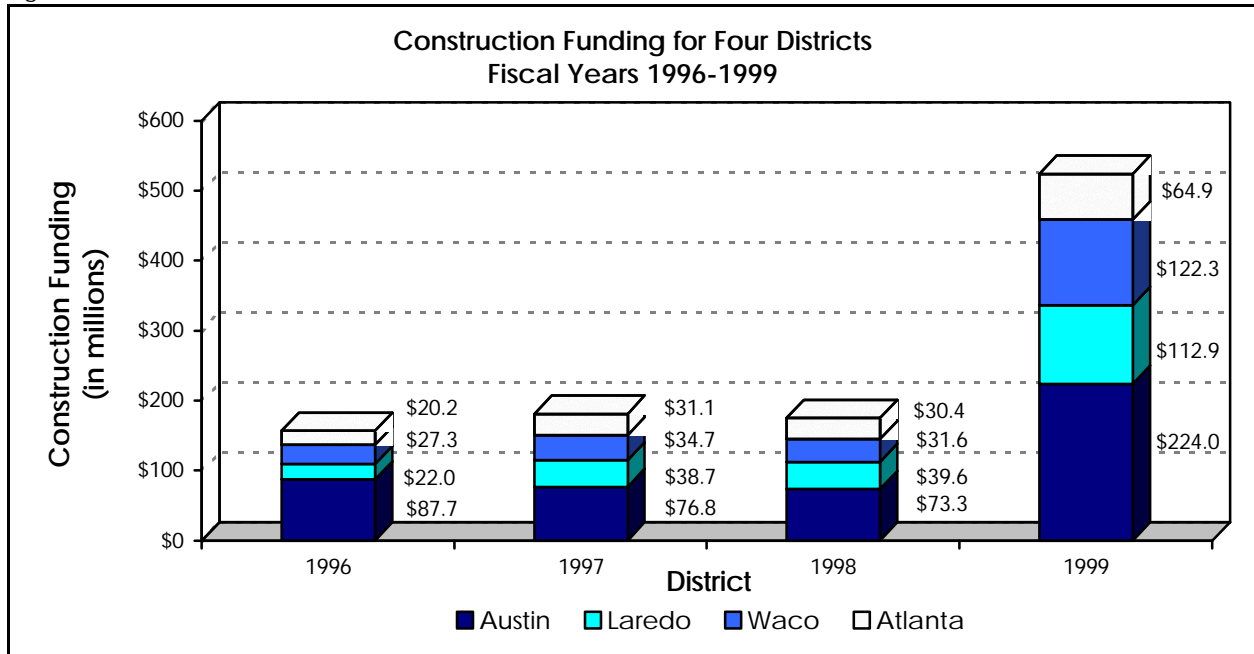
Table 1

District	Increase in New Contracted Construction Fiscal Year 1998 to 1999	Increase (Decrease) in District Design Staff Fiscal Year 1998 to 1999	Increase (Decrease) in Amount of Consultant Design Work Fiscal Year 1998 to 1999
Waco	287%	(1%)	(8%)
Austin	206%	18%	22%
Laredo	185%	2%	75%
Atlanta	125%	5%	44%

Source: Department's Design Division, Human Resources Division, and Finance Division

Figure 3 shows the significant increase in new contracted construction experienced by four districts. The Laredo District experienced a 413 percent increase in new contracted construction since fiscal year 1996. During this same period, the Waco District's new contracted construction increased by 348 percent. Also, the Austin and Atlanta districts' new contracted construction increased by 155 percent and 145 percent, respectively. With substantially increased funding, the risk exists that districts may not have adequate resources to maintain quality design plans that minimize cost overruns and delays.

Figure 3



Source: Department's Design Division - Letting Volume Reports

Section C:

### The Possibility of New Funding Sources Increases the Risk That the Controls Over Design Review Will Not Be Maintained

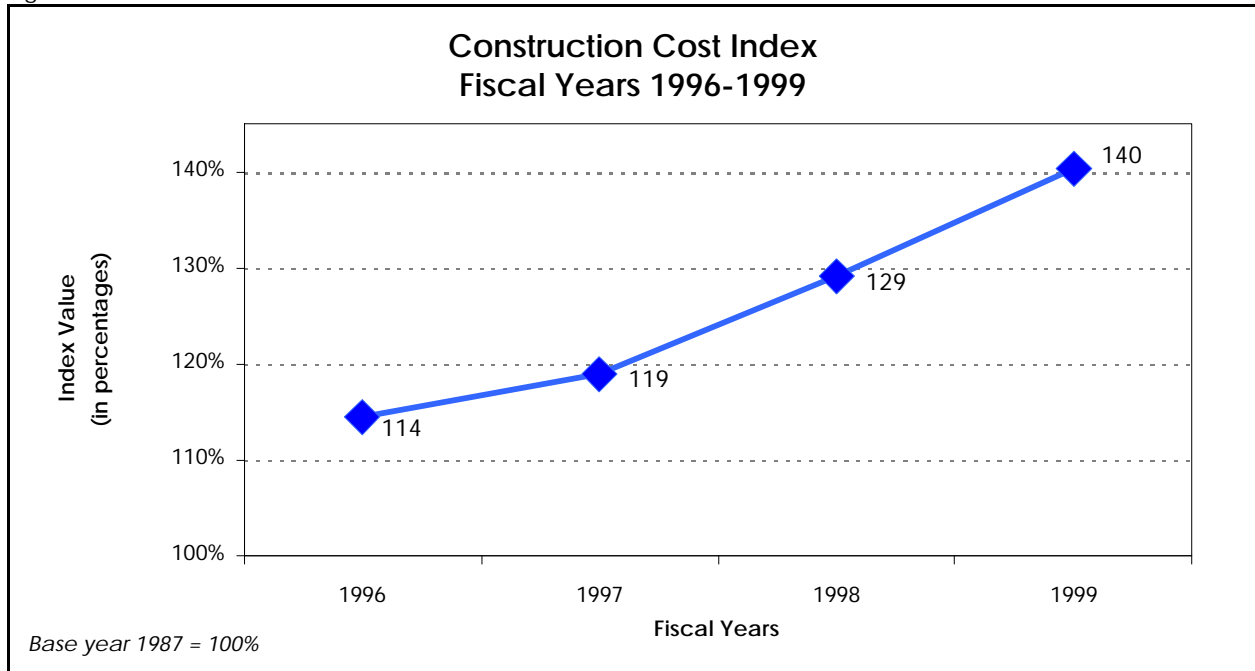
Future increases in funding will make it even more difficult for the Department to maintain its review process for design plans, creating a greater risk that design errors and omissions will occur.

With the current level of funding, the Department estimates it is meeting 43 percent of the State's identified transportation needs. This creates the opportunity for a continual search for additional funding to meet a higher percentage of these needs. For example, the Comptroller of Public Accounts recommended that \$700 million in GARVEE bonds be issued (see text box). Increases in highway construction funding will place an even greater strain on the Department's current level of staffing.

**What are GARVEE Bonds?**  
Grant Anticipation Revenue Vehicles, or **GARVEE** bonds, are highway construction bonds that are backed by future obligations of federal highway funds, as issued by the Federal Highway Administration.

In addition, increases in construction costs place greater importance on the Department's ability to maximize the use of available highway construction funds. As construction costs increase, any cost overruns and delays will take more funds away from other construction projects. The construction cost index, which measures the prices the Department must pay for construction, rose from 129 in fiscal year 1998 to 140 in fiscal year 1999, a 9 percent increase (see Figure 4). Since fiscal year 1996, these construction costs have increased by 23 percent.

Figure 4



Source: Department's Construction and Maintenance Division



## Recommendations

The Department should develop a formal action plan to provide direction and guidance to the districts for coping with increased construction funding. Although the districts are generally left responsible to plan their own strategies to deal with the increased workload, the Department could further assist the districts through enhanced communication of best practices, new initiatives, and other methods to maintain controls over the design function. The appropriate strategies for coping with the increased workload will differ from district to district. This action plan and enhanced communication should consider, but not be limited to, the following concepts. See page 17 for additional information on these recommendations. The Department's response to this report begins on page 9.

- Adapt and implement effective strategies and proposed solutions from districts. Each of the seven districts we visited has developed or is planning to develop various strategies to cope with the tremendous additional workload. Some of these coping strategies could be applied to any district. Other strategies may be more appropriate for a group of districts with similar characteristics. A coordinated effort by the Department to solicit strategies from all 25 districts, analyze them, and then make recommendations for pilot testing could greatly benefit all districts.
- Adapt and implement other states' best practices and innovative contracting methods. The Department should evaluate and consider testing or implementing some of these processes to help districts cope with the increasing workload of projects. The Federal Highway Administration (FHWA), as well as the American Association of State Highway and Transportation Officials, encourages states to share best practices and test innovative contracting methods. Under the Special Experimental Projects No. 14 provision (SEP-14), the FHWA encourages states to use non-traditional, or innovative, contracting practices. These practices, according to FHWA, have the potential to enhance the quality of the nation's highways and minimize the impact of construction on road users.
- Determine the feasibility of reallocating staff. The Department should perform a comprehensive staffing assessment of all districts' construction administration, construction inspection, and design staff to determine where the most critical needs are. Staff should then be reallocated, if only on a temporary basis as appropriate. This would allow the Department to assist those districts experiencing the greatest increase in construction workload.
- Expand use of general engineering consultant (GEC) concept to leverage design management resources. The Department should consider using a GEC to help leverage district design staff in districts where resources are stretched to the breaking point. Under the GEC concept, an engineering consultant is hired to manage a group of engineering consultants. A GEC could manage multiple consultant design contracts, relieving overextended district design functions. The Houston District is using the GEC concept in its \$700 million I-10 West Corridor Improvements project.

- Consider the Construction Industry Institute's (CII) design effectiveness criteria to complete internal measurement initiatives. The Department should consider using the CII's design effectiveness criteria to achieve a complete process to measure design effectiveness. CII reports that these criteria should be included for an overall evaluation of design effectiveness. The criteria could be added to the Department's current internal performance measures.
- Consider PricewaterhouseCoopers' report recommendations for improving the design process. PricewaterhouseCoopers noted in its *Highway Design Cost Comparison* report (February 1999) that the Department's project design schedules could be improved by:
  - Hiring multiple design firms to create a "pool" of consultants so districts will not have to go through the lengthy procurement process for each project
  - Evaluating the in-house staffing and training implications of the increased use of design consultants, specifically the development of project management capabilities

# Management's Response



DEWITT C. GREER STATE HIGHWAY BLDG. • 125 E. 11TH STREET • AUSTIN, TEXAS 78701-2483 • (512) 463-8585

January 26, 2000

Mr. Lawrence F. Alwin, State Auditor  
State Auditor's Office  
PO Box 12067  
Austin, TX 78711-2067

Dear Mr. Alwin:

Thank you for your agency's thorough and professional work on the recent Design Function Audit at the Texas Department of Transportation. We agree with the overall assessment from the audit, and appreciate the opportunity to provide these elaborating comments and responses.

### **Overall Conclusion**

*Audit Statement* — The Department has a sufficient process for reviewing highway construction design plans. (However) increased construction funding is putting additional pressure on a highway design function that appears to be at capacity.

*Comment* — We agree that the Texas Department of Transportation has a sufficient process for the review of plans. We also agree that increased construction funding increases the risk of maintaining effective control over the design and construction process. We have mitigated these increased risks and maintained effective controls primarily by increasing the use of consultants for plan development, by streamlining the process to contract for these services, and by reassigning internal staff to maximize outsourcing effectiveness. We also have increased efficiencies in the design and construction inspection process – by increasing / improving the use of automation, intensified training programs, increasing the use of standard plan sheets, and realigning some responsibilities between districts and divisions. One major effort to increase the productivity of both department and consultant designers was the rewrite of our Design Manual, an effort nearing completion. This will provide comprehensive guidance on project development for use by in-house and consultant designers.

As noted elsewhere in your report, some districts do feel they “struggle” to compete for design staff with private industry and local governments, and this certainly adds to the pressure on our design function. The entire construction industry is experiencing significant labor shortages. To help deal with this issue, the department is taking advantage of the additional salary levels provided by the 76<sup>th</sup> Legislature. These additional ranges bring us closer to being competitive with other employers. We also use a number of other practices to help us attract and retain employees including a summer hire program, a Rapid Hire Program for critical job families, tuition reimbursement, extensive technical training, and career ladders. Every engineering graduate has the opportunity to participate in job rotation to help meet the professional engineering licensing requirements, and receives guidance from currently licensed professional

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engineers on the entire process of becoming licensed. The department encourages participation in professional societies to further enhance individuals professional potential and satisfaction

### **Key Facts and Findings**

*Audit Statement* — Revisions to construction contracts caused by design errors or omissions increased by 55 percent in fiscal year 1999. This represents \$28,804,000.

*Comment* — While we agree with this statistic, we also feel that it may easily be read as a broader indicator than it truly is. TxDOT has only been tracking the cause of these revisions (change orders) since 1997. There is insufficient data upon which to imply a trend. Also, the \$28,804,000 is less than 1% of the contracted amount for 1999, and only a portion of this amount represents actual lost production.

Design error revisions are of two basic types. The most common type results from omissions or miscalculations of materials, or work. These costs would be incurred on the project, whether shown in the original plans or not. The majority of design error change orders are of this type, including the last two examples included in the audit report. The second type of design error is when we incur cost for rework, delays, inefficiencies, etc. These costs would not have been needed to construct the project as finally built.

While we don't believe this rate is unreasonable, we do continue to try and minimize these types of contract changes. Our plan review process includes differing levels of review, (area office, district, and / or division), depending on the type of project, the specific expertise needed, and where that expertise is available. We monitor all change orders and address adverse trends and / or significant specific change orders. We have intensified the use of design concept conferences early in the project development process, to uncover any fundamental flaws, and to get early buy-in on projects from all interested parties, including the Federal Highway Administration.

We believe design errors will decrease as project delivery experience of consultant engineers and TxDOT contract managers increases. To enhance this learning curve a task force of consultant engineers and TxDOT contract managers was formed to identify best practices occurring around the state. A manual, the *Consultant Project Delivery Guide*, has been completed, and workshops are currently scheduled in five districts, starting in mid-February, where the task force will share the results of their work.

*Audit Statement* — While construction expenditures increased by 17 percent in fiscal year 1999, the hours spent on construction inspection increased by 1 percent. The increased workload for construction inspectors raises the risk that the required inspections will not be performed adequately.

*Comment* — While we agree with the statistic cited, and agree that the inspection workload has increased significantly in recent years, we don't feel the implication that it increased by 17% in 1999 is realistic. As cited elsewhere in your report, the construction cost index is increasing in Texas – a 9% increase from fiscal year 1998 to 1999. That alone significantly impacts any such analysis. The same amount of work, needing the same amount of inspection, now costs more. Also impacting the reasonableness of such a general analysis is that different construction techniques / products, while requiring similar inspection resources, may have very different

costs. Recent trends in the department show an increase in the use of concrete pavement. The hours per dollar ratio of inspection is much lower for concrete pavement than for asphaltic concrete pavement (ACP). Even with the same product, different projects will not necessarily have the same ratio. The costs difference between an 8" and 12" surface rises faster than the inspection time needed to assure an acceptable end product.

In addition, we have modified some specifications to place more of the responsibility for quality control testing on contractors. One example is the QC/QA spec for Hot Mix. The main role of department inspectors under this spec has changed to verification / quality assurance testing. We are currently evaluating similar modifications to other specifications.

*Audit Statement* — The Department is achieving its main goal of meeting the schedule to contract all construction projects. However, it is not achieving its targeted performance for the timeliness and quality of the design plans.

*Comment* — We agree that we are achieving the critical goal of meeting our letting schedule. However, the referenced "targeted performance" for timeliness and quality of plans are not formal performance goals which all districts are expected to achieve. These were established more as something to strive for, a way to more formally measure districts against other districts, and against their own past performance. The process of measuring / comparing, rather than the specific measure, was the more important element of this innovation. We would like to achieve these targets, every district, every year, but there are many legitimate reasons we do not.

*Audit Statement* — Additional funding to meet a larger percentage of these (state transportation) needs would place an even greater strain on the Department's ability to continue to manage the design process...

*Comment* — We agree, and we will continue reassessing our processes, and making the changes needed to take advantage of whatever additional funding may be forthcoming, from whatever sources. We will refine innovations already instituted, (such as those discussed above under Overall Conclusion) and develop others. We will also consider seeking legislative and budgetary changes in the next session, as we did in the last session, if necessary to deal with future funding increases.

However, there is an implication in the report that tremendous increased workloads may be imminent, and we find this to be potentially misleading. The report states that in the last month of the fiscal year, the department contracted for \$540 million of construction projects, an amount almost two and a quarter times the average amount contracted for monthly in fiscal year 1999. While we agree with the statistic, there are several reasons for this "bubble" at the end of the fiscal year, and this single statistic should not be used to imply a long term trend of this magnitude. Our goal is to have a relatively level contract amount each month. But if scheduled projects are not contracted, for whatever reason, other projects, which are ready, are substituted. As these substitutions occur throughout the year an available funding bubble can develop. This happens because the annual federal funding obligation limit can not be carried over at the end of a fiscal year. The law provides for redistribution on August 1<sup>st</sup> each year from those states unable to obligate their allocations. We historically have used our allocation and received an additional allocation from unused obligations of other states, the additional funding coming near the end of our fiscal year. (For a complete explanation see [www.fhwa.gov/reports/fifahi03.htm](http://www.fhwa.gov/reports/fifahi03.htm)).

**Recommendations**

*Audit Recommendation* — Develop a formal action plan to provide direction and guidance to the districts for coping with increased construction funding.

*Response* — TxDOT develops the Unified Transportation Plan (UTP) that contains 10 years of projects and funding for each TxDOT district. The district engineers are responsible and accountable for designing and constructing the UTP as approved by the Texas Transportation Commission. The basic philosophy of TxDOT's administration is to provide general policy guidance to district engineers, leaving them the flexibility to select the most appropriate methods to meet the diverse needs, and take advantage of varying resources, around the state.

However, the administration does have in place several formal methods of giving direction and guidance to the districts, on all issues, including the impact of increased funding. Quarterly district engineer / division director meetings are held where input from all participants is solicited, openly discussed, and acted upon as determined appropriate. The executive director meets with each district engineer for an annual performance plan and evaluation. We will continue with these avenues of two-way communication, and others, as necessary to deal with *all* funding issues. (Additional particulars are discussed in the following sections.)

*Audit Recommendation* — Adopt and implement effective strategies and proposed solutions from districts.

*Response* — The agenda for the quarterly district engineer / division director meetings (discussed above) is developed with input solicited from all participants. District engineers, divisions, and the administration discuss common problems, strategies, and possible specific solutions – solutions from districts and elsewhere. Strategies and solutions with merit are implemented, either statewide, or as they meet the needs in different regions of the state. Topics discussed include funding, staffing, engineering, and other issues. Regional district engineer meetings are held periodically where regional issues and successes are discussed. Annual meetings are held for key personnel within functional activities, where the responsible division(s) and district personnel share information, problems, and solutions. The format of the annual Transportation Conference also encourages and fosters the sharing of issues and solutions among districts, highlighting those considered to be the most successful, sharing the lessons from those which are not, and identifying those needing additional attention from the administration. The use of TxDOT's Intranet is expanding, with several districts posting local solutions for evaluation / use by other districts.

In addition to these long-standing practices, the current administration established a position to evaluate the operations of each district, and help identify widespread issues and solutions. This position, Special Assistant to the Executive Director, is currently held by Mr. Gene Adams, P.E. Mr. Adams has already visited each district at least once in this position, evaluating operations in wide ranging areas such as district administration, design, construction, maintenance, traffic operations, among other functions.

We will continue these efforts to bring forward effective strategies and solutions from districts, divisions, and elsewhere.

*Audit Recommendation* — Adopt and implement other states' best practices and innovative contracting methods.

*Response* — We currently seek out other states', and other countries' best practices via a number of avenues. A main source of information comes from TxDOT's participation in the American Association of State Highway and Transportation Officials (AASHTO), including active participation on many technical sub-committees. Sub-committee meetings, and the professional relationships developed through this participation bring TxDOT a wealth of information from other transportation departments, on engineering, contracting, and other issues. We also share the costs of development for studies and products designed to incorporate best practices from member states. TxDOT has been in the forefront of the development of many initiatives to streamline the delivery of transportation systems, including for example the development of the *SiteManager* system to automate the management of construction projects.

TxDOT's Materials Section Director is Vice-Chair of the AASHTO Sub-committee on Materials, and recently traveled to Europe as part of a group of engineers participating in the International Scanning Program sponsored by FHWA. The objective of this trip was to benchmark certain practices in the United States against those in Europe. As another example, TxDOT has a member on the AASHTO Sub-committee on Research, ensuring that TxDOT is well informed on issues from other states and countries.

As well as joint funded research and development through AASHTO and other national organizations, TxDOT contracts with several state institutions, including the Center for Transportation Research and the Texas Transportation Institute, to research specific issues and products. These research projects may deal with any number of engineering, contracting, and / or funding issues. The work done through these contracts brings TxDOT a great deal of information and evaluation of other states' best practices and innovations. Results from this type of research has been adapted and implemented by TxDOT for many years.

We will continue to seek out, evaluate, and implement other states', and countries' best practices, as appropriate to maintain and improve the highly regarded transportation system in Texas.

*Audit Recommendation* — Determine the feasibility of reallocating staff.

*Response* — The current administration conducted a staffing review and adjusted allocations and made organizational changes where judged appropriate. This resulted in increased allocations to engineering functions, to make every effort possible, within available resources, to address the most critical needs. Recently a Bridge Division was reestablished to emphasize this critical design function and make more direct support available to the districts in a very specialized area.

While we agree that in some districts the local work force has not kept pace with recent increases in construction funding, Laredo for example, we do not believe that temporary reallocations are an appropriate technique. Reallocations are based on long term expected workload changes in particular districts and / or area offices. Temporary shortages are addressed by outsourcing, or by other department offices performing work which can be effectively done off site. This was the case in the Laredo district example cited. While the area offices having staff to conduct all plan reviews is desirable, it was not practical in this relatively new district with significant funding increases. The plans were therefore reviewed by district staff and / or Austin divisions.

We will continue to analyze staffing needs, and make adjustments as appropriate.

*Audit Recommendation* — Expand use of general engineering consultant (GEC) concept to leverage design management resources.

*Response* — TxDOT is expanding the use of the GEC concept. As appropriate large-scale projects are initiated, districts are using this technique. We will continue to evaluate and expand the use of this technique. The experiences of those districts that have implemented this technique will be shared among all districts through the most appropriate communication routes. This will include information on viable candidate projects, how to best manage contracts for general engineering consultants, and any other significant issues uncovered.

*Audit Recommendation* — Consider Construction Industry Institute's (CII) design effectiveness criteria.

*Response* — Our designers and construction inspectors currently do formal and informal constructability reviews and we meet regularly with contractors and suppliers to address design and construction issues. We will consider other elements of CII's design effectiveness criteria, as they are appropriate to state government transportation delivery.


*Audit Recommendation* — Consider Price Waterhouse Coopers' report recommendations for improving the design process.

*Response* — TxDOT is, and has, considered recommendations from the Price Waterhouse Coopers' report. We hired a statewide pool of firms to do bridge inspection and some bridge design work. Also, some regional pools have been used to do design work for certain types of projects in a group of districts. In several instances individual districts have hired a pool of firms for certain design work. We believe that the pool concept is generally best utilized at the district level, and districts are encouraged to hire more pools.

TxDOT is continually evaluating the changing needs for training on contract negotiation and project management, as the role of TxDOT's employees evolves. One particular example of a specific effort in this area is the task force that developed the *Consultant Project Delivery Guide* mentioned on page 2 of our response.

If you need further information, please contact Owen Whitworth at 463-8637.

Sincerely,



David M. Laney  
Commissioner of Transportation



## State Auditor's Follow-Up Comments

The State Auditor's Office appreciates the cooperation and assistance provided by the Department of Transportation's (Department) management and staff throughout the audit. We believe it is necessary to provide follow-up comments to the Department's responses to clarify our position on certain issues raised in the report.

### General Comments

The Department cited numerous actions and initiatives throughout its response to demonstrate how it has mitigated the identified risks and concerns associated with increased workloads. We wish to clarify that the majority of these actions and initiatives were in existence at the time of our audit. The overall concerns raised in the report and those identified at the districts exist in spite of these efforts. The Department acknowledges these concerns in its responses. The recommendations in this report are intended to encourage the Department to look beyond the existing processes and procedures to address these concerns.

The statistics cited in this report are not intended to draw overall conclusive determinations. We believe that no single statistic can be used for this purpose. Any use of a single statistic to draw overall conclusions, either positive or negative, would not be appropriate. The statistics in the report are intended to support the concerns we identified and those raised by the districts. The Department acknowledged that these concerns are valid in its responses.

### Specific Comments

The following comments clarify specific statements in the Department's responses:

- The Department states that the Unified Transportation Plan (UTP) is its action plan. We wish to clarify that an action plan would be a plan of how the Department would execute the work to successfully complete the UTP. We acknowledge that the Department has several processes in place for communication with the districts. However, we wish to emphasize that during our audit, the districts expressed a need for additional guidance on coping with increased workloads. We encourage the Department to enhance its existing open, two-way communication by considering additional guidance and avenues for communication with the districts to more directly address their concerns raised during the audit. Furthermore, the Department should develop a structured approach to solicit, analyze, and distribute best practice strategies from all 25 districts and a quarterly, semi-annual, or annual review to determine statewide adoption of districts' best practices.
- The Department states that there is an implication in the report that tremendous increased workloads may be imminent. We wish to clarify that no such implication was intended. Although we suggested increased funding was possible, we did not intend that it was imminent. By stating that the amount of lettings in the last month of the fiscal year were almost two and a

quarter times the average amount contracted for any month during fiscal year 1999, we intended to (1) illustrate how increased workloads raise the risk for design plan errors and omissions, and (2) support our observation that the design and construction inspection functions may be functioning at capacity. The Department states that its goal is to maintain a steady amount of contracted construction in each month. However, this “bubble” of increased contracting has historically taken place at the end of the fiscal year. On average over the last four years, the volume of contracting during the last month of the fiscal year represented 160 percent of the monthly average for the preceding 11 months of the year.

- In its response, the Department minimizes the importance of its internal measures of the design function by stating that these goals are something to strive for, but are not formal goals which the districts are expected to achieve. Performance measures, whether formal or informal, are tools for monitoring districts’ performance, identifying trends, and developing corrective action as necessary. With the high volume of design plans and the relatively small number of reviewers, timeliness of submission and completeness of the plans is critical. Failure to meet these goals could lead to increased contractor bidding errors that may result in increased cost to the State. In addition, these measures are indicators of how the districts are coping with the increased workloads. These measures, in addition to the Construction Industry Institute’s design effectiveness criteria, help provide a complete evaluation of overall design effectiveness.
- The Department stated that it has conducted a staffing review and adjusted allocations where judged appropriate. Through this effort it believes the most critical staffing needs have already been addressed. Based on the concerns raised by the districts during and after our audit, the staff adjustments and the outsourcing of design work have not fully addressed this issue. In addition, by not considering the outsourcing of construction inspection services, additional pressure is placed on the districts to adequately meet the inspection requirements.
- The Department states that it has instituted policies to enable the use of regional pools of consultant firms to do design work. We wish to clarify that the use of pools only increased to a significant level beginning in December 1999. Additionally, this increase only applies to large metropolitan and border districts. Prior to this increase, districts were only able to use pools for smaller design projects, which did not significantly address the workload issues.

## Additional Information on Recommendations

### Adapt and Implement Effective Strategies and Proposed Solutions From Districts

Each of the seven districts we visited has developed or is planning to develop various strategies to cope with the tremendous additional workload. Some of these coping strategies could be applied to any district. Other strategies may be more appropriate for a group of districts with similar characteristics. A coordinated effort by the Department to solicit strategies from all 25 districts, analyze them, and then make recommendations for pilot testing could greatly benefit all districts. Below is a detailed list of some of the best practices districts shared with us, followed by their suggestions for coping with the increased workloads.

#### Districts' Best Practices

- Establish a consultant contract management office to coordinate district-wide contracts with design consultants. In some districts, the area offices are responsible for most of the design efforts, for both in-house and consultant designed projects. Some consultants have multiple design contracts with multiple area offices within the same district. In districts experiencing tremendous spikes in workload where multiple staff members are responsible for managing the design function, the risk increases that coordination, consistency, communication, and efficiency will suffer and costly mistakes may result. Centralizing consultant contract management improves consistency of planning and design efforts when multiple consultants are contracted to design multiple projects throughout the district.

The San Antonio District just began this initiative, which is based on the Houston District's consultant management office. The El Paso District is planning to centralize its design function and anticipates basing the new structure on San Antonio's program. Depending upon how districts are organized and their workloads are spread, some may not benefit from this structure. Assessments should be made on a district-by-district basis.

- Restructure and combine advanced planning and environmental functions. Because of lost expertise, the San Antonio District's advanced planning functions have been restructured. More specifically, the Environmental Section (environmental studies and reports) and the Planning Section (roadway geometry) were combined for more efficient planning as required by the National Environmental Protection Agency's guidelines. The advanced planner can now focus on getting projects "environmentally cleared" so that the projects can move toward design plan development.
- Use the Critical Path Method (CPM) to help schedule and manage multiple complex project schedules, human resources, and budgets. The Fort Worth District developed a design project management system (Project Wizard) that integrates the five phases of design project management: initiating, planning,

implementing, controlling, and closing out. This system is being used for all in-house design and limited consultant-designed projects. This district reports that several design projects were brought back on schedule as a direct result of its CPM initiative. Plans are to eventually incorporate Project Wizard into the construction project management function at the district.

- Cross-train maintenance inspectors to perform construction inspections. Some districts are training their maintenance inspectors to do construction inspections to help offset staffing shortages. The Department should encourage districts to continue to assess where this is appropriate.
- Use standard designs. Establish a systematic approach to develop standard plan formats, concepts, and pre-designed details that have been “field tested” to be clear, accurate, constructable, and easy to review. The Laredo District is finalizing a standardized plan format that all districts could benefit from.
- Perform post-construction evaluations. Evaluate the design effort after construction in addition to the evaluations performed at the end of the design phase. The actual constructability of a project is a more complete measure of the effectiveness of the design than a post-design review alone.

#### Districts’ Recommendations for Coping With Increased Workloads

- Hire and train bookkeepers to do the paperwork the construction inspectors have to do on the job site. This function could possibly be contracted out. The result would be more time devoted to inspection activities without increasing the number of inspectors.
- Move administrative technical positions into contract manager positions and move support staff to the technical positions. This would make more efficient use of experienced district staff.
- Automate all of the inspection reports and functions. This will enable the Department to maximize the time technical staff members spend in their assigned areas and minimize the time necessary for paperwork.
- Pay inspectors overtime in lieu of compensatory time on projects’ critical work items. Consider paid overtime for design staff during “crunch” time.
- Assign staff members from the design section as assistant inspectors on projects to gain experience with the construction phase and how the design plans are used during this phase. They will gain a greater understanding of design when they can see what works and what does not. It gives them a new perspective that will help them develop better and more complete designs that may experience fewer problems during construction.
- Have monthly meetings with construction, inspection, and design staff to evaluate the plan and the progress and quality of the design. These meetings provide feedback, which can be incorporated into the design plans.

## Adapt and Implement Other States' Best Practices and Innovative Contracting Methods

The Department should evaluate and consider testing or implementing other states' processes to help districts cope with their increasing workloads. The Federal Highway Administration (FHWA), as well as the American Association of State Highway and Transportation Officials (AASHTO), of which the Department is a member, encourages states to share best practices and test innovative contracting methods. Under the Special Experimental Projects No. 14 provision (SEP-14), the FHWA encourages states to use non-traditional, or innovative, contracting practices. These practices, according to FHWA, have the potential to enhance the quality of the nation's highways and minimize the impact of construction on road users.

AASHTO and FHWA have an extensive list of best practices and innovative contracting methods. Included in these practices and methods is feedback from other states concerning their results and experiences. Table 2 shows a partial list of best practices, innovative contracting, and alternative project delivery methods other states are using.

Table 2

AASHTO and FHWA Examples of Best Practices and Innovative Contracting Methods of Other States		
Practice	What is it?	Which states use it?
Construction Engineering	The use of consultant firms for construction project administration to supplement in-house staff.	Alaska, Arizona, Colorado, Connecticut, Florida, Georgia, Kansas, Louisiana, Maine, Mississippi, Nevada, New Mexico, North Carolina, Washington

AASHTO and FHWA Examples of Best Practices and Innovative Contracting Methods of Other States		
Practice	What is it?	Which states use it?
<b>Construction Inspection</b>	<p>The use of consultant firms for highway construction inspection assignments to supplement in-house staff. This allows the transportation agency to meet short-term staffing needs while maintaining an experienced core staff to perform the construction monitoring functions.</p> <p>The Department studied outsourcing the construction inspection function. A task force was assembled in 1995 to determine if this was a feasible alternative for addressing increasing workloads. The report concluded that outsourcing construction inspections was feasible and a pilot project was proposed to test this concept. However, the pilot project was not started and the Department dropped outsourcing construction inspections as an alternative contracting method. The Department does have a limited form of outsourcing construction inspections, referred to as "rent-a-tech." Commercial labs, or rent-a-techs, perform many of the material testing needs of the districts during construction. Considering the increase in funding and no corresponding increase in staff, the Department should reconsider outsourcing construction inspections.</p>	Alaska, Arizona, Colorado, Connecticut, Florida, Georgia, Kansas, Louisiana, Maine, Maryland, Mississippi, Nevada, New Mexico, New York, North Carolina, Ohio, Oregon, Virginia, Washington
<b>Constructability Reviews by Contractors</b>	<p>A constructability review program uses people with construction knowledge and experience to review each stage of the planning and design processes.</p> <p>The Department performs in-house constructability reviews on most projects in the design stage. While the Department has vast construction experience and knowledge, staffing limitations and increased workloads make it more difficult for thorough design reviews to occur before projects are let for construction. Outsourcing constructability reviews with experienced highway contractors on large and complex projects may help catch and correct plan errors and omissions before they show up as costly change orders during the construction phase. This could be another way to stretch district resources.</p> <p>According to the Construction Industry Institute (CII), formal constructability programs can have paybacks of up to 15 times the cost of the review. The North Carolina Department of Transportation cites reports showing a 10 to 25 percent savings on construction costs and an average 25:1 payback ratio on the savings verses the cost of a constructability review. North Carolina experienced as much as a six- to eight-month time reduction on a four-year project, while Colorado reports fewer cost increases on reviewed projects. Similarly, other states report cost and time savings resulting from constructability reviews performed by highway contractors.</p>	Arizona, California, Florida, Maine, North Carolina, Colorado, Kentucky

AASHTO and FHWA Examples of Best Practices and Innovative Contracting Methods of Other States		
Practice	What is it?	Which states use it?
<b>Pavement and Bridge Warranty</b>	Contractors provide warranties for various periods as specified in the construction documents. Warranty periods, depending upon the type of product installed, can range from one to ten or more years. Some items, however, such as routine maintenance items, are not eligible according to FHWA requirements.	California, Colorado, Florida, Indiana, Maine, Michigan, Missouri, Ohio, Wisconsin, Washington, New Hampshire, Virginia, North Carolina, Nevada, Montana, Oregon, Pennsylvania, Utah, West Virginia
<b>Manpower Forecasting</b>	States use a table of projected projects and predict the inspection manpower needed throughout the state. States develop standard staffing patterns to ensure uniform, efficient use of inspection staff resources.	Arkansas, New York
<b>Design-Build</b>	<p>The contracting agency (the Department) identifies the end result parameters and establishes the design criteria. The prospective bidders then develop design proposals that optimize their construction abilities. The contracting agency may rate the proposals on factors such as design quality, timeliness, management capability, and cost. These factors then may be used to adjust the bids submitted for the purpose of determining to whom to award the contract. This concept allows the contractor maximum flexibility for innovation in the selection of design, materials, and construction methods.</p> <p>Under current Texas law, the Department cannot contract for design-build services. However, design-build and other innovative financing and project delivery methods are allowed under TEA-21 funding guidelines. For example, states may use TEA-21 funds for design-build projects over \$50 million. The Department would need to ask the Texas Legislature to change the procurement requirements.</p>	Alabama, Alaska, Arizona, California, Colorado, District of Columbia, Florida, Hawaii, Indiana, Maryland, Maine, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Utah
<b>Lane Rental</b>	Lane rental encourages contractors to minimize the effects of construction on road users. Contractors are assessed a rental fee in the construction contract. The fee is based on the estimated cost of delay or inconvenience to the traveling public during the rental period. This fee is assessed to the contractor for the time the lanes under construction or repair are occupied or obstructed. Deductions are made from the contract and charged against the monthly progress payments to the contractor.	Colorado, Indiana, Maine, Oklahoma, Oregon

AASHTO and FHWA Examples of Best Practices and Innovative Contracting Methods of Other States		
Practice	What is it?	Which states use it?
Lump-Sum Bidding	Contractors calculate the quantities and submit bids for the total lump-sum amount instead of the transportation agency calculating all plan quantities for unit price bidding. Any costs associated with changed or unforeseen conditions, as well as added or deleted work, are negotiated using the agency's standard practices or procedures.	Florida

### Determine the Feasibility of Reallocating Staff

The Department should perform a comprehensive staffing assessment of all districts for construction administration, construction inspection, and design staff to determine where the most critical needs are. Staff should then be reallocated, if only on a temporary basis as appropriate. This would allow the Department to assist those districts experiencing the greatest increase in construction workload.

In the last legislative session, the Department requested 400 additional staff members for its construction administration function, primarily for construction inspectors, but later withdrew this request. If hiring additional staff is not possible, the Department should explore other alternatives, such as reallocating staff, for ensuring that design and construction administration functions have adequate project management.

### Expand Use of General Engineering Consultant (GEC) Concept to Leverage Design Management Resources

The Department should consider using a GEC to help leverage district design staff in districts where resources are stretched to the breaking point. Under the GEC concept, an engineering consultant is hired to manage a group of engineering consultants. A GEC could manage multiple consultant design contracts, relieving overextended district design functions.

The Houston District is using the GEC concept in its \$700 million I-10 West Corridor Improvements project. The district divided the project into ten segments, which will be contracted out to ten different design firms. A GEC was recently hired to manage the ten design firms because the district did not have the staff to manage the design efforts in house. The Department should monitor and analyze the results of this project closely, and it should encourage districts to consider pilot projects using the GEC concept where appropriate.

Most of the districts we visited told us that third-party agreements consume a disproportionate amount of the districts' design staff time. Third-party agreements are mainly with local governments. If the circumstances are appropriate, and project parameters, requirements, and criteria are carefully communicated, districts could consider using the GEC contracting method to manage the design process of selected



third-party agreements. This could free design staff to work on other pressing district projects.

### **Consider Construction Industry Institute's (CII) Design Effectiveness Criteria to Complete Internal Measurement Initiatives**

The Department should consider using the CII's design effectiveness criteria to achieve a complete process to measure design effectiveness. CII reports that these criteria should be included for an overall evaluation of design effectiveness. These criteria could be added to the Department's current performance measures.

The Department developed two internal performance measures in 1997, and implemented them in 1998, to gauge the completeness and timeliness of plan submittals from the districts. After a review by the Department's Design Division staff, the plans must meet certain minimum requirements before the projects can be scheduled for construction bidding. Submitting incomplete plans may cause contractor bid errors that show up during the construction phase. These errors could be costly if additions to the scope of work are necessary.

The timeliness and completeness measures are a starting point in measuring design effectiveness. CII research indicates that there are seven essential criteria needed as a starting point for measuring design effectiveness:

- Accuracy of the design documents – This criterion evaluates design effectiveness by measuring the frequency and impact of errors in the design drawings and specifications. (This is similar to one of the Department's measures.)
- Usability of the design documents – This criterion determines the efficiency and ease of use of the design documents, including usability, completeness, and clarity.
- Cost of the design effort – In the design phase, cost-effectiveness is determined by comparing the original budgeted amounts for the design effort and overall project costs with actual costs.
- Constructability of the design – Implementation of a formal constructability program optimizes project costs by incorporating construction knowledge into the engineering design. (See the discussion on constructability in Table 2 above.)
- Economy of the design – This criterion considers whether the final design includes over-designed or over-specified components, which would unnecessarily increase project costs.
- Performance against schedule – Late design documents negatively impact a project. This criterion evaluates the timeliness of design document delivery. (The Department measures a part of this criterion.)

- Ease of start-up operations – In the case of highway design, this criterion would measure budgeted start-up time with actual start-up time. Start-up time could be the time between completion of construction and the planned opening of the highway improvement project to the public.

Complete measurement occurs after a project is completed and in use for a period of time. This is when the true effectiveness of the original design product can be fully assessed. If the aforementioned criteria are measured, problem areas in a design can be identified and incorporated into future designs to maximize improvements.

### **Consider PricewaterhouseCoopers' Recommendations for Improving the Design Process**

PricewaterhouseCoopers noted in its *Highway Design Cost Comparison* report (February 1999) that the Department's project design schedules could be improved by the following:

- Hiring multiple design firms to create a "pool" of consultants so districts will not have to go through the lengthy procurement process for each project
- Evaluating the in-house staffing and training implications of the increased use of design consultants, specifically the development of project management capabilities

## Objectives, Scope, and Methodology

### Objectives

Our objectives were to determine if the management of design and preliminary engineering produces design plans that minimize cost overruns and delays. Specifically, we analyzed the design function to determine the following:

- Does the Department have a process for tracking the cause of change orders? Do the design plans contain errors or omissions? Does the Department sufficiently review design plans before bidding out the contract to minimize the amount of change orders necessary during construction?
- What process is used to ensure that contracted design and preliminary engineering work meets the Department's standards and contract provisions before the end of the contract? Are contract terms and enforcement aligned to ensure that the Department is receiving the design and preliminary engineering services it contracted for?

### Scope

The scope of this audit included the Department's management over the highway design function. We visited seven district offices to review and analyze the management of the design function at the district level.

### Methodology

We collected and analyzed information and performed selected audit tests and procedures.

#### Information collected:

- Interviews with management and staff of the Department
- Policies and procedures relating to highway design and construction
- Internal Audit Office reports
- External reports relating to the design function
- Accounting records for highway design and construction
- Supporting documentation for construction cost increases caused by design errors and omissions
- Financial information about the Department from the Uniform Statewide Accounting System (USAS)
- Staffing level data
- Contracts with external design consultants

Procedures and tests conducted:

- Review of construction cost increases caused by design errors and omissions
- Financial analysis of expenditures related to inventory and equipment
- Analysis of USAS data
- Review of documentation relating to Department operations
- Review of internal performance measures
- Trend analysis of budgets, expenditures, bidding schedules, and performance statistics
- Control review
- Process flowcharting of Department operations
- Ratio analysis
- Risk-based analysis for selection of districts for testing
- Review of design consultant contract terms and provisions

**Other Information**

Fieldwork was conducted from April 1999 through September 1999. The audit was conducted according to applicable professional standards, including generally accepted government auditing standards.

There were no instances of noncompliance with these standards.

The following members of the State Auditor's staff performed the audit work:

- Ryan Simpson, MBA (Project Manager)
- Lucien Hughes (Assistant Project Manager)
- Vicki Durham, MBA
- Kevin Hannigan, MBA
- Ruben Juarez
- Amber Landry
- Julie Stringer, MAcc
- Jennifer Wiederhold
- Anna F. Zhang, MPAff
- Worth Ferguson, CPA (Quality Control Reviewer)
- Frank N. Vito, CPA (Audit Manager)
- Craig D. Kinton, CPA (Audit Director)

## How a Project Is Developed

Figure 5

<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Planning</div>	<ul style="list-style-type: none"> <li>• Identify need.</li> <li>• Receive Commission’s authorization.</li> <li>• Establish planning requirements.</li> <li>• Determine study requirements.</li> <li>• Identify funding sources.</li> </ul>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="text-align: center;">Long Range Planning (LRP) Projects</div> <div style="width: 20px; height: 100px; border-left: 2px solid gray; border-right: 2px solid gray; margin: 0 auto;"></div> </div>	Time Period
			.5 - 1 year
<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Preliminary Design</div>	<ul style="list-style-type: none"> <li>• Receive authorization for spending.</li> <li>• Collect data; prepare designs.</li> <li>• Hold public meetings.</li> <li>• Prepare schematic designs.</li> <li>• Determine value of engineering assessments.</li> <li>• Obtain and assess Right-Of-Way (ROW) and utility data.</li> </ul>		
<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Environmental Studies</div>	<ul style="list-style-type: none"> <li>• Address preliminary environmental issues.</li> <li>• Coordinate with other agencies and obtain permits.</li> <li>• Hold public hearings.</li> </ul>		.2 - 1 year
<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Right-Of-Way (ROW) and Utilities</div>	<ul style="list-style-type: none"> <li>• Receive authorization for ROW spending.</li> <li>• Obtain appraisals and begin acquisitions.</li> <li>• Coordinate necessary utility adjustments.</li> </ul>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="text-align: center;">Priority 2 Projects (P2)</div> <div style="width: 20px; height: 100px; border-left: 2px solid gray; border-right: 2px solid gray; margin: 0 auto;"></div> </div>	.5 - 2 years
<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Plan Preparation</div>	<ul style="list-style-type: none"> <li>• Hold design conference.</li> <li>• Begin detailed design work.</li> <li>• Conduct detailed district-level reviews at predetermined stages of plan development.</li> <li>• Review plan (conducted by Department’s Design Division).</li> <li>• Approve project for bidding (conducted by Department’s Design Division).</li> </ul>		.5 - 2 years
<div style="border: 1px solid black; padding: 5px; width: 100px; margin: 0 auto;">Construction</div>	<ul style="list-style-type: none"> <li>• Release plans for competitive bidding.</li> <li>• Received, process, and analyze bids.</li> <li>• Award project to contractor.</li> <li>• Begin construction upon notice to proceed.</li> </ul>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="text-align: center;">Priority 1 Projects (P1)</div> <div style="width: 20px; height: 100px; border-left: 2px solid gray; border-right: 2px solid gray; margin: 0 auto;"></div> </div>	.5 - 2 years

Source: Department’s Design Manual and Website

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