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A Report on Engineering Costs at the Texas Department of Transportation

August 1997

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Key Points of Report

A Report on Engineering Costs at the Texas Department of Transportation

August 1997

Overall Conclusion

The Texas Department of Transportation primarily uses factors other than cost in deciding to contract for preliminary engineering, construction engineering, and engineering design services. Although the Department has significantly increased the use of consultants for preliminary engineering services, the Department rarely contracts for construction engineering services and has no plans to increase contracting for those services. In addition, the Department's method of costing in-house and consultant preliminary engineering projects has flaws that prevent valid cost comparisons and affect data accuracy and reliability. This report and the applicable appendices serve as a guide to determine relevant costs for this purpose.

Although the Department disagrees with most of our findings and recommendations, it is our position that the information in this report on the usefulness and accuracy of the cost data and the cost allocation methodology is entirely consistent with our previous reports. (The State Auditor's follow-up comment can be found on page 19; management's response is on page 14.)

Key Facts and Findings

- Although current state law provides that cost is to be the determinant factor in decisions to contract for engineering services, in practice, cost is not the primary factor in such decisions.
- Current state law clearly provides that construction engineering should be considered for outsourcing, however, the Department continues to perform virtually all construction engineering in-house.
- The Department's cost data has limited usefulness for determining whether the costs of in-house and consultant preliminary engineering are equivalent. The cost data also contains various types of inaccuracies.
- The Department's method of allocating indirect costs is not appropriate for comparing the cost of in-house and consultant preliminary engineering services.
- Effective September 1, 1997, the Department will be required by statute to achieve a specified level of expenditures to private sector providers for engineering-related services. Cost remains an important factor in outsourcing decisions made in compliance with the new requirement, and the Department is still responsible for ensuring that funds are used in the most cost-effective manner.

Contact

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Office of the State Auditor

Lawrence F. Alwin, CPA

This audit was conducted in accordance with Transportation Code, Section 223.041.

Executive Summary

The Texas Department of Transportation primarily uses factors other than cost in deciding to contract for preliminary engineering, construction engineering, and engineering design services. The current statute requires the Department to achieve a balance in the use of Department employees and private contractors for preliminary and construction engineering and design engineering services when costs are equivalent. Since fiscal year 1994, management has significantly increased the use of consultants for preliminary engineering but continues to perform virtually all construction engineering in-house and has no current plans to start outsourcing this activity.

The Department's method of costing in-house and consultant preliminary engineering projects has flaws that prevent valid cost comparisons and affect data accuracy and reliability. The relevant costs to be considered in determining if the costs of in-house and consultant preliminary and construction engineering services are equivalent depends on the level of Department-wide outsourcing of the particular function under review. This report and the applicable appendices serve as a guide to the determine relevant costs for this purpose.

Decisions to Contract for Engineering Services Are Based on Factors Other Than Cost

Although current state law provides that cost is to be the determinant factor in decisions to contract for engineering services, cost is not a primary factor in such decisions. Instead, the Department decides whether to outsource this work based on factors such as workload, staff availability, expertise, and time constraints.

Since 1994, the Department has used consultant preliminary engineering services more extensively even though its cost records indicate that consultant costs are higher than in-house costs. The Department's increased use of consultants for preliminary engineering reflects recent changes in its operating environment including a significant decline in internal preliminary engineering capacity and rising needs for preliminary engineering due to increased funding.

Preliminary Engineering is any activity needed to develop a project for construction.

Construction Engineering is the direct oversight of construction projects.

The Department maintains that the most appropriate use of consultants is for preliminary engineering. There are no current plans to start outsourcing construction engineering, although the time charged annually to construction engineering has decreased by 2.2 million hours since 1991 and two task forces have studied the issue.

The Department's Cost Data Has Limited Usefulness for Cost Comparison Purposes and Contains Inaccuracies

We found that the Department's cost data contained in the *Preliminary Engineering Efficiency Report (PEER)* has limited usefulness for comparing the cost of in-house and consultant preliminary engineering services and contains inaccuracies. Although users both inside and outside the Department have expressed concerns about the usefulness and accuracy of cost data for preliminary engineering activities, the administration

Executive Summary

asserts that the PEER cost data is accurate enough for their purposes.

Inappropriate Allocation of Indirect Costs for Cost Comparison Purposes

The Department's method of allocating indirect costs is not appropriate for comparing the cost of in-house and consultant preliminary engineering services because the amount of indirect costs allocated to a

function does not reasonably approximate the proportion of benefits the function received from indirect activities. For example, although construction contractor payments comprised 65 percent of total direct costs of \$3.4 billion in

fiscal year 1996 and were allocated 65 percent of total indirect costs, it is unlikely that they received 65 percent of the benefit of indirect activities.

Examples of Indirect Activities

- Budgeting
- Accounting
- Purchasing
- Human Resources

Identification of Costs to Be Considered in Cost Analysis

In accordance with the Transportation Code, Title 6, Section 223.041(b), we identified the costs to be used in determining whether the costs of Department and consultant preliminary engineering services are equivalent. This report and the applicable appendices provide a guide to the determination of relevant costs for this purpose.

Recent Changes to State Law Regarding Use of Consultants

Effective September 1, 1997, the Department will be required to achieve a specified level of expenditures to private sector providers for engineering-related services. Cost remains an important factor in outsourcing decisions and the Department is still responsible for ensuring that funds are used in the most cost-effective manner.

In its January 1997 publication *Transportation Needs Revenue Assessment*, the Department reported that current funding levels will enable it to meet only 33 percent of its transportation needs. It also reported that the Department will have to postpone some approved and programmed projects and has postponed or not performed some maintenance work at current funding levels. Given the severe limitations on funding available to meet the demands of an aging transportation system, growing traffic volumes and vehicle weights, cost must be a key factor in the Department's contracting decisions.

Summary of Management's Response

Management disagrees with most of our findings and recommendations, particularly those dealing with the usefulness and accuracy of the cost data and the cost allocation methodology. Management believes that its method of cost accounting and the degree of accuracy meet their needs. In addition, management states that the methodology it uses exactly follows standard outsourcing analyses as described in authoritative sources and as recommended in previous State Auditor reports. (See pages 14 through 18 for the full text of Management's Response.)

Executive Summary

Summary of State Auditor's Follow-Up Comment

Our position is that the information in this report is entirely consistent with previous State Auditor reports and that the preliminary

engineering cost data has limited usefulness, contains inaccuracies, and includes allocations of indirect costs that are not appropriate for comparing the costs of in-house and consultant services. (See pages 19 through 20 for the full text of the State Auditor's Follow-Up Comment.)

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Decisions to Contract for Engineering Services Are Based on Factors Other Than Cost

Currently, state law provides that cost is to be the determinant factor in decisions to contract for preliminary and construction engineering services in attempting to achieve a balance between the use of Texas Department of Transportation (Department) employees and outside contractors for these services (see Appendix 2). However, in practice, cost is not a primary factor in such decisions. Instead, the Department decides whether to outsource projects based on other business factors such as workload, staff availability, expertise, and time constraints.

Preliminary Engineering Services - Since 1994, the Department has significantly increased the use of consultants for preliminary engineering (PE). The Department's increased use of consultants is primarily attributable to the following changes in its operating environment:

- A significant decrease in the Department's internal design capacity
- A substantial increase in funding for construction projects
- An increase in pressure to privatize and meet full-time equivalent employee (FTE) targets

The Department's design capacity has declined significantly since 1990 due to early retirements and other attrition. This affected not only the number of staff members available to do the work but also the experience level of staff members. In 1990, there were 1,563 FTEs in preliminary engineering; this number declined to 1,124 FTEs in 1996. The average experience of all engineering staff members declined from 16 years in 1985 to 11 years as of January 1997.

Preliminary Engineering is any activity needed to develop a project for construction, for example:

- Feasibility and route studies
- Environmental studies
- Right of way and utility determinations
- Field surveys and hydraulics studies
- Preparation of plans, specifications, and estimates

In addition, funding for projects increased significantly following the \$0.05 increase in the state motor fuels tax, which became effective September 1, 1991. Increases in funding are evident in the planned levels of construction contracts, which went from \$1.4 billion in 1990 to \$2.0 billion in 1995.

The Department started to use consultants more extensively to address these changes in the operating environment even though its cost records indicated that consultant costs are higher than in-house costs.

Given increasing pressures to privatize and to meet FTE targets, the Department did not view restaffing as a viable alternative.

Construction Engineering Services - The Department still performs virtually all construction engineering (CE) work in-house despite the fact that current state law clearly provides that construction engineering should be considered for outsourcing. The Department continues to study the issue of outsourcing construction engineering, although there has been little actual progress toward that objective.

Construction Engineering is the direct oversight of construction projects including:

- Monitoring the construction contractor's performance to ensure compliance with contract terms
- Testing and conducting quality control of materials

In 1995, a Department task force reported that it is feasible, from an engineering and management perspective, to use consultants for construction

engineering. A second task force is currently developing a proposed implementation plan to outsource some construction engineering and expects to issue its report to the Executive Director in September 1997.

Despite the work of the task forces, the Department continues to maintain that the most appropriate use of consultants is for preliminary engineering and that by contracting out a substantial portion of that work, it has complied with the intent of state law. There are no current plans to start outsourcing construction engineering despite a decline of approximately 2.2 million hours charged annually to this activity since 1991. The Department has compensated for this decline by assigning engineering staff to multiple projects and delegating some construction engineering functions to the construction contractor, rather than outsource these services to consultants.

The Department has not yet performed a cost study to determine whether outsourcing construction engineering is feasible from a cost perspective. There are indications, however, that using consultants for construction engineering can cost more. For example, the task force on feasibility reported that other states have experienced an apparent increase in costs when construction engineering is outsourced, and that the cost increase is difficult to quantify. This higher cost of consultant CE in other states was attributed to staffing consultant projects with registered engineers rather than technicians as would typically be the practice for projects performed in-house.

Cost must be a key factor in the Department's contracting decisions, given the demands of an aging transportation system, growing traffic volumes and vehicle weights, and the need to reduce congestion and pollution. It is critically important for the Department to consider cost in outsourcing decisions to ensure that its limited funds are used to provide maximum benefit for the least cost.

Recommendation:

The Department should review its contracting procedures to ensure that cost is properly considered in outsourcing decisions. The need for a cost analysis is still

important in light of recent legislative changes governing the Department's contracting activities (see Section 5).

(See pages 14 through 18 for Management's Response and pages 19 through 20 for State Auditor's Follow-Up Comment.)

Section 2:

The Department's Cost Data Has Limited Usefulness for Cost Comparison Purposes and Contains Inaccuracies

Section 2-A:

Cost Data Has Limited Usefulness for Cost Comparison Purposes

We found that the Department's cost data contained in the *Preliminary Engineering Efficiency Report (PEER)* has limited usefulness for comparing the cost of in-house and consultant preliminary engineering services. The Sunset Commission came to the same conclusion in its 1996 report and stated that "[i]nformation on the cost-effectiveness of providing engineering services by outside contracts is inconclusive".¹

"Management isn't about guessing, it's about knowing. Those in positions of responsibility must have the information they need to make good decisions. Good managers have the right information at their fingertips."

--From *Red Tape to Results: Creating a Government That Works Better and Costs Less*, Report of the National Performance Review

Users both inside and outside the Department have expressed concerns about the usefulness and accuracy of cost data for preliminary engineering activities. Some employees involved in the contracting decision process and who manage preliminary engineering projects find the PEER difficult to understand and use, or discontinued using it after finding errors. However, the Department's administration maintains that the cost data is accurate enough for their purposes since it is not the only tool they use in decision-making.

Good management decisions require accurate cost data not only for outsourcing decisions but also for understanding and controlling costs. For outsourcing decisions, the Department should know the actual cost of its engineering services and products so that they can be compared to the cost of contracting with consultants. To improve efficiency and control preliminary engineering costs, the Department should know and understand the activities and factors that drive the costs.

Aside from issues of data accuracy, PEER data is inconclusive because most "consultant projects" have included a significant portion of work performed by in-house staff. The extent of Department work included in "consultant projects" can be seen in the information presented in Table 1.

¹ *Texas Department of Transportation Sunset Commission Staff Report*, April 1996, p. 55

Table 1

Preliminary Engineering Costs for Projects with Consultants for Selected Types of Highway Projects Let During the 36 Months Ended September 30, 1996						
Type of Highway Project	1996 Preliminary Engineering (Total PE Costs ÷ Construction Bid)	Department Preliminary Engineering Costs	Consultant Preliminary Engineering Costs	Total Preliminary Engineering Costs	Percentage Department Costs	Percentage Consultant Costs
Bridge Replacement	15.7%	\$538,173	\$292,327	\$830,500	65%	35%
Bridge Widening/ Rehabilitation	6.2%	\$78,408	\$38,751	\$117,159	67%	33%
Convert Non-Freeway to Freeway	6.9%	\$5,159,182	\$6,630,715	\$11,789,897	44%	56%
Interchanges New or Reconstructed	8.9%	\$7,484,628	\$7,361,467	\$14,846,095	50%	50%

* Source: PEER for the 36 months ended September 30, 1996

For example, the information about bridge replacement projects in Table 1 does not provide separate efficiency or productivity ratings for the in-house and consultant portions of the project. PEER information only provides a combined efficiency rating for the internal and consultant portions of the work. Furthermore, the user cannot determine whether the PE percentage is within the expected range for the type of project. Additionally, there is no standard against which to determine whether or not 15.7 percent of preliminary engineering for bridge replacement projects is within the expected range of preliminary engineering percentages for such projects. It is not possible to determine whether higher or lower costs for “consultant projects” are attributable to the consultant portion of the work, the Department portion, or greater complexity of the projects.

Section 2-B:

Cost Data Contains Inaccuracies

We found that the PEER contains inaccurate cost data, which increases the risk of incorrect cost comparisons that may lead to invalid conclusions. The types of inaccurate cost data included the following:

Indirect Costs are costs that are not readily identifiable to a service but support that service.

Source: Council on Competitive Government Cost Methodology, June 1994

- Incorrect allocation of costs between the segments of a project
- Improper inclusion of projects paid for by third parties
- Inaccurate calculations of indirect cost rates

Incorrect Allocation of Costs Between Segments of a Project - We noted that 30 percent of project segments had unreasonably low preliminary engineering percentages—less than 5 percent. These projects with low PE percentages do not include those that would normally have low PE percentages such as sealcoat and overlay projects.

Generally, these very low PE percentages occurred when preliminary engineering costs were charged to only one segment of a project rather than being distributed across all project segments. When this happens, the cost of designing one of the segments is overstated and costs of the other segments are understated.

External users cannot easily identify the segments that comprise a project to ensure that they are using complete cost data. Moreover, some users may not even be aware that costs may not have been allocated to all project segments.

Improper Inclusion of Projects Paid by Third Parties - We found that unreasonably low preliminary engineering percentages also occurred when a third party paid for the preliminary engineering services and the Department's role was limited to reviewing and accepting the plans. In such cases, the Department incurs costs only for review and related administrative activities.

The Department recognized that the costs of preliminary engineering projects it funds and those funded by third parties are not comparable and established procedures to exclude the latter from the PEER. However, we noted that in some instances, those projects were not excluded from the report. For example, numerous segments of the Beltway 8 project were improperly included in the PEER since they were funded by Harris County Toll Road Authority.

It is apparent from this type of obvious error that procedures to ensure that PEER data is reliable need to be improved. Inclusion of projects funded by third parties distorts cost data by lowering PE percentages for in-house work below what they would otherwise have been. As a result, this type of error can lead to invalid conclusions when comparing the cost of in-house and consultant engineering services.

Inaccurate Calculation of Indirect Cost Rates - The rates for allocating indirect costs were incorrectly calculated for fiscal years 1996 and 1997. The allocation rates should have been calculated as the percentage of indirect costs to direct costs rather than indirect costs to total cost.

Although the calculation errors produced only a small difference in rates, this type of error repeated two years in a row indicates a lack of adequate attention to ensuring the accuracy of cost data. We note that federal funds would not be affected by the calculation errors because the Department's indirect costs are ineligible for federal reimbursement under the Federal Highway Administration's current interpretation of federal law.

Recommendation:

We recommend that the Department improve the usefulness and accuracy of data used to compare the cost of in-house and consultant preliminary engineering projects. The Department should identify the information needed by both internal and external users and modify or replace the Preliminary Engineering Efficiency Report, depending on the extent of any changes required. The following types of information may be useful for decision-making purposes:

- PE costs with separate efficiency and productivity measures for the in-house and consultant portions of the work
- PE costs and efficiency measures for completed construction projects
- Cost of design rework during both the design and construction phases of the project, reported separately and as a component of total PE costs
- Graphs of PE cost data, PE percentages, and productivity measures

The Department should improve procedures for reviewing cost reports to detect and correct errors before releasing the reports to users. The review function should consider the use of benchmarks, budgets, and statistical analysis to identify costs outside anticipated ranges.

We also recommend that the Department implement procedures to ensure that indirect cost rates are properly calculated before the rates are approved for use.

(See pages 14 through 18 for Management's Response and pages 19 through 20 for State Auditor's Follow-Up Comment.)

Section 3:

Inappropriate Allocation of Indirect Costs for Cost Comparison Purposes

Examples of Indirect Activities:

- Budgeting
- Accounting
- Purchasing
- Human Resources

The Department's method of allocating indirect costs is not appropriate for cost comparison purposes because it undercharges some activities such as preliminary engineering and overcharges other activities such as construction. Given the level of interest in determining the cost of in-house preliminary engineering activities for comparison with the cost of consultant preliminary engineering services, it appears that the results achieved by improving cost allocation justify the additional accounting effort and cost.

Allocations can be misleading because they distribute indirect costs to activities at the same rate but the activities do not consume overhead at the same rate (see Appendix

4). Indirect cost are appropriately distributed for cost comparison purposes when the allocations reasonably approximate the proportion of benefits received from indirect activities. Inappropriate allocations may cause a wrong make/buy decision or an incorrect estimate of productivity, thereby disguising the fact that administrative and support expenses are exceeding the direct cost of providing services.²

Examples of Direct In-House Activities:

- Highway Construction
- Highway Maintenance
- Highway Design
- Vehicle Titles and Registration
- Aviation Services

The Department's allocation method allocates indirect costs to direct activities based on each activity's proportion of total direct costs. Using total direct costs as the basis for allocating indirect costs overcharges construction projects for indirect costs because construction contractor payments comprise the majority of total direct costs. For example, construction contractor payments comprised 65 percent of total direct costs of \$3.4 billion in fiscal year 1996. It is unlikely, however, that construction projects received 65 percent of the benefit of

indirect activities over and above the portion charged to construction engineering (see Appendix 3 for an example of the impact the selection of an allocation base can have on the allocation of indirect costs, and see Appendix 5 for examples of various allocation bases).

Recommendation:

We recommend that the Department improve its cost allocation method to provide better data for comparing the cost of in-house and consultant engineering as well as any other activities subject to outsourcing. Improved cost allocation would also provide better cost data for managing and controlling costs. The cost allocation system should better associate indirect costs with the benefitting activities by using multiple cost pools, activity-based costing, or a similar method for this purpose. To the extent possible, support activities and their related costs should be traced to preliminary engineering activities rather than allocating them on an arbitrary basis. Support activities that cannot be traced to preliminary engineering or other engineering-related activities should be allocated using an appropriate allocation base.

(See pages 14 through 18 for Management's Response and pages 19 through 20 for State Auditor's Follow-Up Comment.)

² Amos, Tracy G., Cynthia A. Paolillo, Denise A. Joseph, "Enhancing CFO, GMRA & GPRA Implementation with Activity Based Management." *The Government Accountants Journal*. Spring 1997: 30.

Identification of Costs to Be Included in Cost Analysis

In accordance with the Transportation Code, Title 6, Section 223.041(b), we identified the following costs to be used in determining whether the costs of Department and consultant preliminary engineering services are equivalent:

Table 2

Preliminary and Construction Engineering Costs	
Contract Out to Consultant	Perform In-House
<p>Direct Costs - examples:</p> <ul style="list-style-type: none"> • Consultant payments • Consultant monitoring • Contract administration • Internal costs such as salaries, fringe benefits, materials, equipment, supplies, and travel 	<p>Direct Costs - examples:</p> <ul style="list-style-type: none"> • Salaries and fringe benefits • Materials, equipment, and supplies • Travel
<p>Direct Overhead Costs - examples:</p> <ul style="list-style-type: none"> • Utilities • Phone and communications • Distributed service center costs 	<p>Direct Overhead Costs - examples:</p> <ul style="list-style-type: none"> • Utilities • Phone and communications • Distributed service center costs
<p>Indirect Administrative Costs - examples:</p> <ul style="list-style-type: none"> • Accounting • Human resources • Executive office • District administration 	<p>Indirect Administrative Costs - examples:</p> <ul style="list-style-type: none"> • Accounting • Human resources • Executive office • District administration

Table 2 reflects first those direct costs which are unique to the performance of services in-house or through an outside contractor. Next, direct overhead costs must be analyzed to determine the percentage of each cost category that relates directly to the particular project. Examples of these costs are reflected in Table 2. Finally, indirect administrative costs should be considered and allocated using an appropriate base. Examples of these costs are also included in Table 2.

For more information about costs that are relevant to determining cost equivalency, see Appendix 6. The tables included in Appendix 6 can be used as a guide in determining relevant costs specifically for preliminary and construction engineering services. For more information regarding methodologies for analyzing the cost effectiveness of outsourcing a project, activity, or function, refer to the Texas Council on Competitive Government's cost methodology and the *Least Cost Review Program* (SAO Report No. 94-116, May 1994).

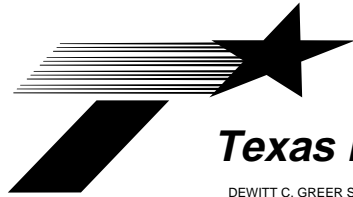
Recent Changes to State Law Regarding Use of Consultants

Legislation enacted in 1997 significantly altered state law governing the Department's contracting activities. Effective September 1, 1997, the Department is required to achieve a minimum level of expenditures for certain services provided by the private sector. The services addressed by this new requirement include engineering, land surveying, environmental, transportation feasibility/financial, architectural, real estate appraisal, and materials laboratory services.

In complying with this new requirement for contracting, it is critically important for the Department to consider cost in outsourcing decisions to ensure that its limited funds are used to provide maximum benefits for the least cost.

In its January 1997 publication, *Transportation Needs Revenue Assessment*, the Department reported that current funding sources will enable it to meet only 33 percent of transportation needs for which it is responsible. In the same study, the Department reported that under current funding levels, the Department will have to postpone some approved and programmed projects and that some maintenance is being postponed or not performed. Cost must be a key factor in the Department's contracting decisions, given the demands of an aging transportation system, growing traffic volumes and vehicle weights, and the limited resources available to address them.

Management's Response



Texas Department of Transportation

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August 22, 1997

Mr. Frank N. Vito, CPA, Manager
Office of the State Auditor
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206 East Ninth Street, Suite 1900
Austin, TX 78701

Dear Mr. Vito:

We have reviewed the report received on August 21, on Engineering Costs at the Texas Department of Transportation dated August 1997.

We have provided comments to the report content as well as responded to the recommendations.

Overall Conclusions:

The department has focused on contracting for preliminary engineering services. Our discussion with legislators has indicated that their intent was on the program not on individual aspects such as construction engineering. The department is left with the responsibility to decide best locations and types of outsourced work.

Cost is only one factor and is not the primary factor in the contracting decision process. The department believes our method of cost accounting and the degree of accuracy meets our needs.

The methodology we use exactly follows standard outsourcing analyses as described in authoritative sources and as recommended previously by the SAO in its three prior audit reports on the subject, The State Auditor's letter of April 22, 1992, and numerous discussion with SAO personnel during the past 11 years.

- a. The Executive Director of TxDOT requested that SAO examine our PE costing procedures and the PEER report for compliance with proper procedures to compare in-house jobs with contracted jobs. SAO Report 89-030, September 1988, reported that the procedures we use are proper and appropriate for comparing in-house PE with consultant PE. The SAO Report 91-037, dated December 20, 1990, to the Legislative Audit Committee confirmed these results, "The

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Preliminary Engineering Efficiency Reporting System (PEER) is a valuable management tool which is capable of providing the State Department of Highways and Public Transportation (Department) with data needed to analyze and control preliminary engineering costs.”

- b. SAO Report 95-130, April 1995, reported that the SAO had examined the PEER report and had no findings or recommendations regarding the PEER, the report that compares in-house and contracted PE.
- c. In 1992, TxDOT requested SAO to provide instructions for identifying and comparing relevant in-house and contracted out PE costs. The SAO letter to the Executive Director of April 22, 1992, responded and provided detailed instructions for identifying and allocating the relevant costs. We are still using these procedures, and they are completely consistent with authoritative sources including the August 1995 SAO Guide to Cost-Based Decision-Making, Report No. 95-139.

Most of our disagreement is a difference of opinion between the SAO and the department as to the best method to distribute costs. We agree that cost is important, however, the new law doesn't say to include cost considerations in the contracting decision process.

An additional factor, which was outside the scope of this audit, but is of considerable importance to the department and the consultant engineering community, is the Professional Procurement Statute that requires selection of the best qualified engineer then negotiation of a fair and reasonable price for the services to be provided. The method of allocating TxDOT's indirect costs has little relevance in negotiating the fair and reasonable price.

Section 1 - Preliminary Engineering Services

FTEs have been reduced in the department's internal design capacity.

We have had no funding increases, although we redirect the program to address transportation needs.

Increased use of consultants has been a goal of the Transportation Commission as well as a department commitment with the Legislature.

Section 1 - Construction Engineering

“...rather than outsource these services to consultants.” Construction contractors are also outsourcing these services to the same consultant community.

Management Response to Recommendation: As stated above, we agree that cost is important, however, the new law doesn't say anything about cost in the contract decision process. Senate Bill 370 and House Bill 1 has provided new direction for contracting these services in the department. The department does and will continue to consider cost in all our activities.

Section 2A

We do not believe the Sunset Commission's conclusion is the same thing as this SAO report.

We believe the department does know and understand the factors that drive cost.

We do not believe the auditor understands that there are no pure (100%) consultant engineering jobs. We come to this conclusion after many discussions with the auditor. We conclude that the PEER Report has the appropriate level of accuracy and meets our needs.

Preliminary Engineering Costs for Projects with Consultants; Bridge Widening/Rehab Type (Table 1, Page 8) - The consultant engineer percentages will be increasing significantly because most of the data for these type projects were prior to our decision to contract more bridge design. This percent will also increase due to the Evergreen contracts managed by the Design Division for bridge design.

Section 2B

Incorrect Allocation of Costs Between Segments of a Project - The auditor appears to be using the term "segment" for "function codes" within the job. Since the PEER comparisons are made at the job and aggregated for various groups of jobs, the over or under use of individual function codes within one job will have zero effect on the relation between the two categories of in-house and consultant jobs.

Improper Inclusion of Projects Paid by Third Parties - The inclusion or exclusion of these jobs had no effect on the comparison of the statewide totals. We ran the PEER report with these jobs included and again with them excluded, and the statewide percentages of the two categories did not change because the group is such a small part of the total. Our procedures do call for them to be excluded, but their exclusion was overlooked by the district.

Page 4

Inaccurate Calculation of Indirect Cost Rates - This was a human error when the automated calculation procedures were programmed. The computer program has been corrected. However, based on the procedures as prescribed by the SAO in 1988 and 1992, the relative difference between the PE percents on the two categories was not affected at all because the same percent error was applied to both categories of projects.

Management Response to Recommendation: We plan to continue our PEER procedures and reports.

Section 3

“The Department’s method of allocating indirect costs is not appropriate for cost comparison...” Our method is exactly as prescribed by the SAO in its memo on April 22, 1992, to TxDOT. The methodology also has been examined by the SAO in its two prior audit reports 89-030 and 95-130. To distribute the costs otherwise would result incorrectly in making fixed administrative costs a relative cost in the outsourcing analysis and would mislead the users into incorrectly assuming that the total of fixed administrative costs would be changed by contracting out a portion of the jobs.

“The Department’s allocation method allocates indirect costs to direct activities based on each activity’s proportion of total direct costs...” Contrary to the assertion in the audit report, the procedure is correct for fixed administrative costs. It was prescribed in paragraph IIB of the SAO’s April 22, 1992, as follows: “Indirect costs can be allocated based upon total dollars charged to each direct cost account.” In any event, allocating different percentages to the various direct cost categories will not change the relative difference between the PE percents of the two categories: in-house and consultant. Therefore, the procedures we use are consistent with standard procedures in outsourcing analyses.

Management Response to Recommendation: Again, we plan to continue our PEER procedures and reports. The procedures we use came directly from the SAO April 22, 1992, letter, SAO Report No. 95-139, and other authoritative sources.

Section 4

No comments.

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Section 5

Senate Bill 370 and House Bill 1 has provided new direction for these services in the department. The department does and will continue to consider cost in all our activities.

Appendix 1 - Methodology

We note that the auditor included, "Review and analysis of documents obtained from... representatives of an engineering association..." We are unaware of these documents, the results of the review and analysis and how these are incorporated into the report.

Sincerely,

Wm. G. Burnett, P.E.
Executive Director

State Auditor's Follow-Up Comment

Our findings and recommendations regarding the usefulness and accuracy of the cost data and the cost allocation methodology are entirely consistent with the information in our previous reports. These reports do not direct the Department to use a particular methodology or allocation base. They recommend that the Department determine the appropriate allocation base for indirect costs and provide possible alternatives. The current allocation method may be acceptable for some purposes, but is not appropriate for cost-based decisions which require a more equitable distribution of indirect costs. Although prior State Auditor reports state that the PEER is a valuable management tool, they also contain recommendations for improving the usefulness and accuracy of the PEER data. We continue to maintain that the report could be a valuable management tool. However, that value would be dependent on the usefulness of the information included in the report.

Many organizations, including the Federal Government, have recognized the need for better information on the costs of their products and services. The Office of Management and Budget recently published standards for producing reliable, timely information on the full cost of federal programs, activities, and outputs. Additionally, Texas is piloting the use of activity-based costing as a method for obtaining better cost information. Our recommendation that the Department improve its cost allocation (assignment) process is aimed at providing decision-makers inside and outside the Department with more relevant, reliable information about the costs of its products and services.

We urge the Department to consider the concerns expressed by Department personnel regarding the usefulness of the PEER procedures and reports in its decision to continue these procedures and reports.

We recognize that the new law governing contracting for engineering services does not expressly require that cost be considered in such decisions. We believe that the Department should consider cost in carrying out its duties of prudent use and stewardship of state resources.

In addition, we understand that there are no pure (100 percent) consulting engineering jobs. Our concern is that the PEER compares the cost of work performed in-house to the combined cost of work performed by the consultant and in-house staff. This comparison is not a valid measure for evaluating the cost equivalency of in-house and consultant preliminary engineering services.

Incorrect Allocation of Costs Between Segments of a Project - We use the term segment to refer to the Control/Section/Job Number (CSJ), not function. The

Department has recognized that costs should be distributed to all project CSJs since there are established procedures to make such adjustments. The importance of redistributing costs to all project CSJs was also mentioned in our 1988 audit of the PEER system (*Report on the Audit of the Preliminary Engineering Efficiency Reporting System and Consultant Procurement Procedures*, SAO Report No. 89-030, September 1988).

Improper Inclusion of projects paid by third parties - The inclusion of projects paid by third parties may have no effect on statewide totals; however, it significantly affects the district totals for that category of work. As shown in the table below, the preliminary engineering percentages for Department-only projects increased from 2.65 percent to 4.10 percent when the third-party projects were excluded.

Table 3

Impact of Including Third-Party Control/Section/Job Numbers (CSJs) on District PE Percentages [*] for Convert Non-Freeway to Freeway Projects			
	PE percentage All CSJs	PE percentage Department Only	PE percentage Consultant
Third-party projects excluded	5.75	4.10	6.77
Third-party projects included	4.91	2.65	6.95
Difference	0.84	1.45	(0.18)
* "PE Percentage" is an efficiency measure calculated by dividing preliminary engineering costs by the amount of the low bid for the construction project.			

In its January 1997 publication *Transportation Needs Revenue Assessment*, the Department reported that current funding levels will enable it to meet only 33 percent of the transportation needs for which it is responsible. In the same document, the Department also reported that it will have to postpone some approved and programmed projects and has postponed or not performed some maintenance work at current funding levels. Given the severe limitations on funding available to meet the demands of an aging transportation system and growing traffic volumes and vehicle weights, cost must be a key factor in the Department's contracting decisions.

Objectives, Scope, and Methodology

Objectives

The objectives of this audit were to evaluate the Department's methodologies for ensuring compliance with Transportation Code, Section 223.041(a), and to identify costs the Department should use in determining whether the cost of in-house and consultant services for preliminary, construction, and design engineering are equivalent. Under state law, the Department is required to achieve a balance between the use of Department employees and private contractors if the costs for preliminary, construction, and design engineering services are equivalent.

Scope

The scope of the audit included the information systems used to comply with state contracting requirements, primarily those that produce the cost information in the *Preliminary Engineering Efficiency Report*.

Methodology

The methodology used for this audit consisted of collecting information, performing audit tests and procedures, and evaluating results against established criteria.

Information was collected from the following sources:

- Interviews with Department management and staff, representatives of engineering and construction contractor associations, legislative staff, and other sources
- Review and analysis of documents obtained from Department management and staff, representatives of an engineering association, legislative staff, and other sources
- Review and analysis of prior audit reports, management studies, and other related materials

The following criteria were used to evaluate compliance and appropriateness of the audit process:

- Statutory requirements
- Other standards and criteria developed from secondary research sources

Fieldwork was conducted from December 1996 through June 1997. The audit was conducted in accordance with generally accepted government auditing standards.

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

- Dorothy J. Turner, CPA (Project Manager)
- Ann K. Huebner, CGFM
- Norman J. Pipione, CGFM
- Thomas M. Tharp, CISA
- Eric D. Emmerich
- Mattye G. Keeling, CFE
- Frank N. Vito, CPA (Audit Manager)
- Craig D. Kinton, CPA (Audit Director)

Transportation Code, Section 223.041 Engineering and Design Contracts

- (a) The department's policy regarding the regular use of private sector professional services for preliminary and construction engineering and engineering design shall achieve a balance between the use of department employees and the use of private contractors if the costs are equivalent.
- (b) The office of the state auditor shall determine relevant costs to be considered under Subsection (a).
- (c) The commission may provide for hearings at which private sector complaints relating to the selection process are heard.

Example of Effect of Allocation Base on Allocation of Costs

The amount of indirect costs allocated to an activity can vary widely, depending on the choice of allocation base (see Appendix 5). The table below provides an example of the effect different allocation bases have on the allocation of indirect costs. It is not intended to advocate or suggest that the Department’s indirect costs should be allocated based on full-time equivalents. The Department should make the determination as to the appropriate allocation base to use for a particular purpose.

As illustrated in Table 4 below, the construction function incurred 69 percent of the total direct costs for the Department and none of the total full-time equivalent hours. Therefore, basing allocation of indirect cost on direct cost rather than full-time equivalents, for example, causes construction to carry 69 percent of the indirect costs rather than none of the indirect costs.

Table 4

Allocation Base	Percentage Allocated to Preliminary Engineering	Percentage Allocated to Construction Engineering	Percentage Allocated to Construction
Full-Time Equivalents	8%	31%	0%
Direct Costs	4%	3%	69%
Difference	4%	28%	69%

The above example demonstrates that the choice of the allocation base is important to ensuring that indirect costs are distributed equitably to the benefitting activities. Equitable distribution means that the proportion of costs charged to a function reasonably approximates the proportion of benefits received. If, for purposes of this example, the Department were to determine that preliminary engineering receives 10 percent of the benefit of indirect activities, full-time equivalents would be the more appropriate allocation base because the resulting cost allocation would more closely approximate the benefit received.

Examples of Inequitable Allocations

The following examples present additional indications that indirect costs are not equitably allocated to the benefitting activities:

- Training costs for district maintenance employees are tracked separately from other district training activities. However, maintenance training costs are allocated to all district activities rather than to only the benefitting maintenance activities.
- Design Division indirect costs are allocated to all direct Department activities, including those which received no benefit from Design Division activities such as Gulf Intercoastal Waterways and Motor Vehicle Registration.
- The cost of auditing preliminary engineering contracts are allocated to all direct Department activities, rather than only to the consultant preliminary engineering projects.

Examples of Allocation Bases

Table 5 presents examples of allocation bases that can be used to more closely associate the cost of services with the benefitting activities.

Table 5

Allocation Bases	
Type of Indirect Service	Suggested Allocation Base
Accounting	Number of transactions processed
Auditing	Direct audit hours
Data processing	System usage
Disbursing system	Number of checks or warrants issued
Legal services	Direct hours
Mail and messenger service	Number of documents handled or employees served
Motor pool costs	Miles driven and/or days used
Equipment maintenance and repairs	Direct hours
Office space use and related costs	Square feet of space occupied
Payroll services	Number of employees
Personnel administration	Number of employees
Printing and reproduction	Direct hours or number of pages printed
Procurement service	Number of transactions processed
Local telephone	Number of telephone instruments
Sources: <i>Least Cost Review Program</i> , SAO Report No. 94-116, May 1994 <i>Texas Council on Competitive Government Cost Methodology</i>	

Costs to Consider in Contracting Decisions

The costs to consider in deciding whether to contract out an individual project or a departmental function are those that would be different depending on whether the work was performed in-house or by a private sector provider. In order to determine those costs, it is critical to identify and understand all of the activities involved and the behavior of the associated costs.

Many processes of a project or function are fragmented into subprocesses and tasks carried out by several departmental levels—area office, district, and division—and in multiple functional areas. Given the fragmentation of processes, it is important to identify all the activities involved in the scope of work and understand their interrelationships so that none are inadvertently overlooked in the contracting decision. Once all of the project or function activities are identified and understood, the associated costs can be identified and analyzed to determine those that vary under each scenario and those that remain the same.

Tables 6 and 7 provide examples of the types of activities that would be performed for consultant and in-house preliminary and construction engineering services and the types of associated costs. These tables serve as a guide and starting point in analyzing costs for these contracting decisions, but they are not intended to provide a comprehensive framework for analysis. For more detailed information and guidance in determining relevant costs for contracting decisions, the reader may refer to the Texas Council on Competitive Government's cost methodology and the *Least Cost Review Program*, SAO Report No. 94-116, May 1994.

Table 6

Preliminary Engineering (PE) *				
		Consultant PE Activities	In-House PE Activities	Types of Costs
Direct and Direct Overhead Costs		Preliminary engineering performed by consultant		Payments to consultants
		Contract administration activities performed by Department staff		Costs such as those associated with selection of the consultant, contract negotiation, and contract closeout
			Preliminary engineering and direct support services performed by Department staff	Department costs: <ul style="list-style-type: none"> • Salaries • Fringe Benefits • Travel • Materials • Supplies • Facility usage charges or depreciation • Utilities • Phone • Maintenance and repair to buildings and equipment • Other direct project costs
		Department monitoring of consultant performance	Supervision and management of PE staff	
		Review of plans, specifications, estimates and other deliverables by Department staff	Review of plans, specifications, estimates, and other deliverables	
		Revisions and rework performed by Department staff including redesign done during construction	Revisions and rework including redesign done during construction	
		Training of Department staff who perform consultant-related PE activities	Training of Department staff who perform or support PE activities	
Indirect Costs		Automation services supporting PE project activities including those specific to consultant projects only	Automation services related to in-house PE activities excluding those specific to consultant projects only	Cost of services provided by the Design Division and the Information Services Division
			Audit services related to in-house PE activities	Cost of services provided by Audit Division
		Prerenegotiation and close-out audit services		Cost of services provided by External Audit Section of the Audit Division
		Design Division activities which support PE activities including those specific to consultant projects	Design Division activities which support PE activities	Share of Design Division overhead costs, such as those for general administration
		General support provided by Department central administration	General support provided by Department central administration	Share of cost of administrative divisions, such as budget and finance
		General support provided by District Office	General support provided by District Office	Share of cost of District Office of administrative activities, such as accounting and personnel
* See page 27 for explanatory information.				

Table 7

Construction Engineering (CE) *			
	Consultant CE Activity	In-House CE Activity	Types of Costs
Direct and Direct Overhead Costs	Construction engineering and direct support services performed by consultant		Payments to consultants
	Contract administration activities performed by in-house staff		Costs such as those associated with selection of the consultant, contract negotiation, and contract close out
		Construction engineering and direct support services performed by Department staff	Department costs: <ul style="list-style-type: none"> • Salaries • Fringe Benefits • Travel • Materials • Supplies • Facility usage charges or depreciation • Utilities • Phone • Maintenance and repair to buildings and equipment • Other direct project costs
	Consultant monitoring performed by in-house staff	Supervision and management of staff performing CE activities	
	Review of deliverables by Department staff	Review of deliverables	
	Consultant use of Department facilities, if applicable		
	Training of Department staff who perform or supervise consultant-related activities	Training of Department staff who perform or supervise in-house CE activities	
Indirect Costs	Automation services supporting CE activities including those specific to consultant projects only	Automation services supporting CE activities excluding those specific to consultant projects only	Cost of services provided by Construction and Maintenance Division and Information Services Division
		Audit services related to in-house CE activities	Cost of services provided by Audit Division
	Audit services related to pre-negotiation activities and consultant contracts		Cost of services provided by External Audit Section of the Audit Division
	Construction and Maintenance Division activities related to CE	Construction and Maintenance Division activities related to CE	Share of overhead cost of Construction and Maintenance Division
	General support provided by Department central administration	General support provided by Department central administration	Share of overhead costs of administrative divisions such as budget and finance
	General support provided by District Offices	General support provided by District Offices	Share of cost of District Office such as accounting and personnel
* See page 27 for explanatory information.			

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