

State of New York
Office of the State Comptroller
Division of Management Audit
and State Financial Services

**DEPARTMENT
OF
TRANSPORTATION**

USE OF CONSULTANT ENGINEERS

REPORT 97-S-12



H. Carl McCall
Comptroller



State of New York Office of the State Comptroller

Division of Management Audit and State Financial Services

Report 97-S-12

Mr. Joseph H. Boardman
Commissioner
New York State Department of Transportation
State Office Building Campus - Building #5
Albany, NY 12232

Dear Mr. Boardman:

The following is our report on the New York State Department of Transportation's use of engineering resources during the period April 1, 1990 through November 7, 1997.

We did this audit according to the State Comptroller's authority as set forth in Section 1, Article V, of the State Constitution and Section 8, Article 2, of the State Finance Law. We list major contributors to this report in Appendix A.

*Office of the State Comptroller
Division of Management Audit
and State Financial Services*

April 9, 1998

Executive Summary

Department Of Transportation Use Of Consultant Engineers

Scope of Audit

The Department of Transportation (Department) is responsible for providing an adequate transportation network, at reasonable cost, to the citizens of New York. A major Department responsibility is implementing the Governor's five-year \$12.7 billion highway and bridge program that continues through State fiscal year 1999-2000. The Department uses both in-house and private consultant engineering resources to carry out capital program projects. The current capital program represents an investment increase of more than \$1 billion over previous levels. Despite this increase, the total number of in-house engineering positions is declining. The Department increasingly depends on consultant engineers to work on capital program projects. Department officials state they retain consultants to supplement in-house resources and to perform tasks which require unique expertise.

Our prior audit of the Department's use of consultant engineers (Report 89-S-45, issued March 20, 1990) recommended the Department reexamine its heavy reliance on consultant engineers. Department officials stated they planned to add 672 engineering positions by March 31, 1998 in order to handle more design and construction projects with in-house staff. However, Department engineering staff has decreased ten percent since January 1, 1995.

Our audit addressed the following questions about the Department's use of engineering resources for the period April 1, 1990 through November 7, 1997:

- Has Department management justified its use of more consultant engineers rather than hire additional in-house engineers?
- Has the use of consultant engineers provided cost effective engineering services?

Audit Observations and Conclusions

We found that the Department has not justified its decision to contract out more of its capital program projects to consultant engineers rather than hire additional Department staff, as it had agreed to do in 1990. Further, the Department has not demonstrated that its use of consultant engineers has provided services in a cost effective manner. We recommend that the Department perform cost analyses of the comparative costs of using in-house or consultant engineering resources to ensure State taxpayers receive the best value for their capital program dollars.

The Department has historically had, and will continue to have, some need for consultant engineering services. The Department's policy of using consultants to meet work load peaks or for special requirements is a reasonable one. However, we found the Department is using consultant engineers to carry out

many projects which Department officials acknowledge are routine in nature. Officials also told us they are not convinced that in-house engineers are less expensive than consultant engineers. However, the Department's 1994-98 Workforce Management Plan indicated that engineers in private practice have higher salaries than Department engineers. In addition, our comparison of the top end of the State's pay structure to the highest paid consultants, from a sample of 125 agreements with consultants and subcontractors, showed that consultant salaries were from \$1,500 to over \$20,000 higher than those of comparable Department engineers. (See pp. 5-9)

A set amount of State and Federal funding is available to help pay for both direct and indirect costs of capital program projects. Both the Department, in using in-house staff, and the consultants incur indirect costs. Consultants also include a component for profit. Federal dollars may be used to fund 100 percent of consultants' total indirect costs, but only a much smaller proportion of the Department's indirect costs. We estimate the Department will pay consultants \$85 million in indirect costs for contracts awarded during the 1996-97 year. Since funds are limited, the more the Department spends on indirect costs, the less it will have available for capital projects, such as roads and bridges. Further, most of the Department's indirect cost components are fixed. Thus, if the Department increased its capacity to do more engineering work in-house, its indirect costs would increase only slightly. (See pp. 9-12, 13)

The Department has not determined, through cost analysis or other means, that using consultants rather than in-house engineers is cost effective and produces improved services for taxpayers. Although Department officials claim such analyses would take too long, we recommend the Department justify its increasing use of consultants by following Federal government standards for determining the cost effectiveness of obtaining service from outside contractors. The Department now has the results of a 1995 pilot program, conducted in two regions of the State, which provided indications that it is more economical to use in-house rather than consultant engineers to inspect bridges that were previously inspected by consultants. We recommend the Department thoroughly evaluate these results and, if warranted, expand the program to other regions in the State. (See pp. 12, 13-14)

Response of Department Officials

Department officials did not specifically comment on the report's findings and conclusions. They only addressed the recommendations by indicating that steps were being taken to implement Activity Based Costing as a mechanism to compare alternative ways to complete engineering work. This effort will also include a comprehensive analysis of the Department's overhead costs.

Contents

Introduction	Background	1
	Audit Scope, Objectives and Methodology	3
	Response of Department Officials	4

Department Use of Consultant Engineers	Management Needs to Ensure that Resources are used Cost Effectively	5
	Salary Costs of In-house Engineers versus Consultant Engineers	7
	Indirect Cost Comparisons	9
	Criteria for Assessing Use of Engineering Resources	12
	Recommendations	14

Exhibit A	Graph of Salary Comparisons for In-House Versus Consultant Engineers
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Exhibit A-1	Legend: Legend for Graph (Exhibit A) State Grade Levels and National Institute for Certification of Engineering Technicians (NICET)/American Society of Civil Engineers (ASCE) Equivalen- cies
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Appendix A	Major Contributors to This Report
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Appendix B	Response of Department Officials
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Introduction

Background

The Department of Transportation (Department) is responsible for providing an adequate, safe, efficient and balanced transportation network, at reasonable cost, to the citizens of New York. A major Department responsibility is the implementation of the Governor's five-year \$12.7 billion highway and bridge capital program that continues through state fiscal year 1999-2000. The Department's goal is to maintain the transportation system at an acceptable level of repair and in a condition that reduces lifetime maintenance and user costs. The Department administers its programs through a central office in Albany and 11 regional offices located throughout the State.

New York's transportation infrastructure includes 110,000 miles of highways and approximately 20,000 bridges. State law defines a bridge as a structure that is greater than 20 feet in length which is used to carry traffic or other moving loads over a depression or an obstruction. Bridges include overpasses and other elevated roadways. Since the early 1980s, the State and the Department have devoted extensive effort and resources to restore highways. In 1995, 57 percent of state-owned highway pavement was rated good or excellent; the portion rated as poor was 12 percent, which represents a slight decline from prior years. In addition, since 1990, the proportion of deficient bridges has dropped steadily, reflecting the impact of increased investment and an extensive preventive maintenance program. Between 1989 and 1995, the percentage of State bridges rated as deficient dropped from nearly 40 percent to 31 percent.

The Governor's 1995-2000 local highway and bridge improvement capital program which was enacted in 1996, represents an increase in the investment in State and local infrastructure of more than \$1 billion over previous levels. However, despite this increase in capital program funding, there has been a ten percent decrease in Department engineering staff levels at both the central and regional offices since the Governor imposed a hiring freeze in January 1995. During the two-year period ending April 1, 1997, Department engineering staffing levels were reduced by 587 positions, representing a reduction in personal services costs of about \$23.5 million (excluding fringe benefits). The majority of this staff reduction was achieved through retirements, but there were some layoffs. Therefore, although the capital program is at a record-high level, Department engineering staff levels are now approaching the 1988-89 levels (3,708 engineering positions) we found during our prior audit (Report 89-S-45, issued March 20, 1990).

This trend reverses steps the Department took following the issuance of our previous audit on the use of consultant engineers. In this prior audit, we reported that the Department could lower its costs by reducing its overall reliance on consultant engineers, increasing its engineering staff so more of

the Department's routine engineering work could be handled by Department personnel and using consultants only where they have proven to be most efficient. Department administration agreed with many of our audit recommendations. Management established a six-year plan that would add 672 engineer positions by March 31, 1998, and enable the Department to handle more of its design and construction projects with in-house staff. However, the Department has not acted to increase its in-house engineering staff levels since 1995.

Internal Department studies, as well as documentation the Department has submitted to the Division of Budget, clearly show that it is more costly to complete projects with consultant engineers. For example, in its 1993-94 budget request, the Department indicated that it is more costly to have designs done by consultants, and that the Department's long-range goal at that time was to do more jobs in-house. According to Department officials, annual appropriations for funding of consultant engineers decreased from \$232.7 million for FY 1994-95 to \$181 million for FY 1997-98. Nevertheless, the proportion of work performed by consultant engineers has grown more recently. A review of 1997-98 appropriations indicates that, while personal service appropriations were increased from fiscal year 1996-97 levels, the increase was only enough to cover negotiated wage increases. In contrast, the increase in funding for contract services was \$11 million, or 6.5 percent more than 1996-97 funding levels. The Department contends that overall funding for consultants had been reduced under the current administration, but acknowledges that this trend may be reversing now.

The Department has historically used more consultants in its New York City region, and currently uses consultants to inspect all local bridges in all the regions, with the exception of Syracuse and Watertown. As part of a pilot program, these two regions are using in-house engineers to inspect all local bridges. The Department's New York City region uses consultants to inspect all state and local bridges, a practice which Department officials attribute to a lack of in-house inspection staff in New York City. Designs for construction projects statewide over the past five years have been split between in-house staff and consultants, with consultants designing the larger projects. Although consultants have inspected fewer construction projects than in-house staff, they have generally inspected the larger construction projects.

Section 136-A of the State Finance Law requires the Department to negotiate for engineering services on the basis of demonstrated competence and qualifications for the services being rendered at a fair and reasonable cost. The Department is not permitted to award contracts for engineering services based on price competition. It must instead identify the most qualified consultant engineer and then negotiate a contract with that firm for engineering services at compensation rates determined to be fair and reasonable. Typically, each contract is written to procure specific engineering services for an identified construction project. In State fiscal years 1994-95, 1995-96 and

1996-97, the Department awarded \$186.6 million, \$219.3 million and \$160.0 million, respectively in consultant contracts for engineering services. (Note: Generally, significant amounts of an awarded contact will be paid during the years subsequent to the year in which the award was originally made. Consequently, a reduction in the value of awards made during a particular year does not mean that the proportion of engineering work performed by consultants will decrease during that year.) The majority of consultant services contracts were awarded for projects in the New York City and Long Island regions. Over the three-year period, newly awarded contracts in these two regions comprised 58.9 percent, 55.3 percent and 63.2 percent, respectively, of the total dollars awarded.

Other states have previously analyzed the cost and benefit of contracting with private consulting firms, as opposed to using civil service engineers in state highway departments. A study completed in 1994 by a former legislative analyst in the state of California entitled *Cost Effectiveness of Using Consultants for Highway Engineering*, commented on the cost effectiveness of using consultants for highway engineers. According to this study, reports from other states concluded that, with few exceptions, highway project development services - including design and related engineering functions - are significantly less costly when they are performed by state transportation department civil service employees than when they are performed by private consultant services. Higher overhead, higher salaries and a profit margin for consulting services are the primary reasons California and the other states included in this study found consulting services to be more costly.

Audit Scope, Objectives and Methodology

We audited the Department's use of engineering resources during the period of April 1, 1990, through November 7, 1997. The objectives of our performance audit were to determine whether Department management can justify its use of more consultant engineers rather than hire additional in-house engineers, and to determine whether this decision resulted in the Department's providing engineering services in a cost effective manner. To accomplish our objectives, we evaluated the Department's internal control framework, interviewed Department management and reviewed and analyzed pertinent records and reports. We did not audit the comparative quality of the work performed by Department and consultant engineers. Rather, we conclude that the Department has adequate controls in place to ensure that the capital programs it carries out, whether completed by in-house or consultant engineering staff, meet a consistent quality standard.

We did our audit according to generally accepted government auditing standards. Such standards require that we plan and do our audit to adequately assess those Department operations included in our audit scope. Further, these standards require that we review and report on the Department's internal control structure and its compliance with those laws, rules and regulations that are relevant to the operations included in our audit scope. An

audit includes examining, on a test basis, evidence supporting transactions recorded in the accounting records and applying such other auditing procedures as we consider necessary in the circumstances. An audit also includes assessing the estimates, judgments and decisions made by management. We believe that our audit provides a reasonable basis for our findings, conclusions and recommendations.

We use a risk-based approach to select the activities for audit. This approach focused our audit efforts on those operations we identified as having the greatest probability for needing improvement. Consequently, by design, we used finite audit resources to identify where and how improvement can be made. Thus, we devoted little audit effort to reviewing operations that may have been relatively efficient or effective. As a result, we prepare our reports on an “exception basis.” This report, therefore, highlights those areas needing improvement and does not address activities that may be functioning properly.

Response of Department Officials

We provided draft copies of this report to Department officials for their review and comment. Their comments have been considered in preparing this report and are included as Appendix B.

In their response, Department officials did not specifically comment on the report’s findings and conclusions. They only commented on the recommendations by indicating that they were taking steps to implement Activity Based Costing as a mechanism to compare alternative ways to complete engineering work. This effort will also include a comprehensive analysis of the Department’s overhead costs.

Within 90 days after final release of this report, as required by Section 170 of the Executive Law, the Commissioner of the Department of Transportation shall report to the Governor, the State Comptroller, and the leaders of the Legislature and fiscal committees, advising what steps were taken to implement the recommendations contained herein, and where recommendations were not implemented, the reasons therefor.

Department Use of Consultant Engineers

The Department is increasing its use of consultant engineers. However, we found that current Department management has not determined whether spending funds on consultants is cost effective and produces improved services for taxpayers. Management has not produced a cost analysis or other demonstrable proof that shows the economic advantages of using consultant engineers rather than in-house engineers. Department officials assert that such an analysis would take years to complete. However, as described later in this report, the Federal government has established a methodology to do such an analysis. In addition, California, for example, has completed a study on this issue. As the Department's capital program continues to grow, without increasing the number of in-house engineers, the Department may have no choice but to continue to increase its use of consultants for many of its future projects.

Management Needs to Ensure That Resources Are Used Cost Effectively

New Yorkers have the right to expect their State government and its agencies, such as the Department, to regularly review its operations to determine whether there are better ways to deliver services and value to taxpayers. The public has a right to hold government agencies accountable for handling government funds properly and for managing government programs cost effectively. Therefore, the Department is responsible for reviewing its business and operating practices and for exploring all existing options for delivering services. After conducting a thorough and open review, management can make an informed and supportable decision about how best to go about delivering services in the most cost effective way.

Cost analysis provides an opportunity to understand how a service is delivered or how a selected operation functions. It documents the total cost of providing the function or service and helps identify opportunities to improve services and operations or add to their value. Although cost analysis of engineering services would encompass many complex issues, it can aid management in making decisions. Cost analysis is the focal point for determining whether to continue providing service in house, or to obtain services from outside contractors. The objective of cost analysis is to measure direct and indirect costs to establish the total cost of providing a service.

The Office of Management Budget (OMB) issued OMB Circular A-76 to help ensure that senior Federal managers adequately analyze the costs of similar in-house and contracted services. A-76 provides standards to guide government agencies in deciding whether activities should be contracted out or performed in-house. According to A-76, there are only four conditions where the government activity should be performed in-house. One of these conditions exists when a cost comparison indicates that government operation

of an activity would be more cost effective than contracting out. However, senior Department managers have not prepared a formal analysis to support the decision-making process they used to determine whether to hire additional in-house engineers or to retain consultants.

In its transportation plan, *The Next Generation: Transportation Choices for the 21st Century*, the Department indicated that in developing appropriate long range financing strategies, the State must continually seek to evaluate the cost effectiveness of transportation improvements across all modes, and rank resource investments accordingly. The plan also indicates that the current State fiscal constraints require program planning efforts to be sensitive to the limits on State and local resources facing New York in the future. However, Department management has not taken the steps necessary to ensure that funds allocated for infrastructure design, inspection and repair are being spent in the most cost effective manner.

The Department contracts with consultant engineers for a variety of engineering services. Consultants are retained by the Department to supplement in-house resources and they generally perform tasks for which there is insufficient Department staff or which require certain unique expertise that is not available in-house. Each year, regional office managers determine which projects will be completed by in-house staff and which projects will be completed by consultants. Issues such as job complexity, project length, the necessity for specialized expertise and travel concerns factor into this decision. Department officials indicated that the primary reason for using consultant engineers is a lack of in-house staff to complete planned projects.

We acknowledge there will always be a need for consultant services, for special projects or for those assignments for which the Department does not have the necessary in-house expertise. However, Department management has not prepared an economic analysis to demonstrate that engineering services performed by outside consultants are less costly or better performed than the services performed by in-house engineering staff. Department officials maintain such an analysis would take an extensive amount of time to complete. They also stated they were not convinced that in-house engineers were less expensive than consultant engineers. However, in its 1994-98 Workforce Management Plan (Plan), the Department indicated that engineers in private practice and in State Authorities have higher salaries than Department engineers. The Plan further indicated that project design and inspection work was performed more economically when in-house engineers (rather than consultants) were used.

Department officials stated that the primary reason for using consultant engineers is a lack of sufficient in-house engineering staff to complete the planned projects. Department management attributed the downsizing of its engineering staff, in part, to a reduction in the capital program. Capital

program contract awards peaked in fiscal year 1993-94 at \$1.3 billion, and then decreased by \$149 million in fiscal year 1994-95. However, the capital program has grown each year since 1994-95 with no corresponding increase in Department staff. Without an increase in staff consistent with increases in the capital program, more planned projects will have to be completed by consultant engineers.

Using consultants during work load peaks, when recruitment of additional in-house staff is impractical (or when a project has special requirements), is a reasonable public policy. However, such management decisions should be the result of an objective assessment of the comparative cost effectiveness of in-house and consultant engineering services. We also believe that Department decisions related to project implementation should not be based solely on policy goals that are not balanced by considerations for cost-effectiveness.

In response to the draft report, Department officials indicated that they did not have a current strategy to expand the use of consultant engineers in comparison to the use of in-house engineering staff. They added that changes in the ratio of in-house staff to consultants occurs as the nature of the Department's construction program changes. Nevertheless, our report shows that the Department's reduction in the number of in-house engineers has resulted in an increased need for consultant services, as the capital program has grown since the 1994-95 contraction, whether or not the Department had a formal strategy to proportionally increase the use of consultants.

Moreover, officials stated that the Department has begun to implement Activity Based Costing to compare alternative ways of completing engineering work. Officials added that, as Activity Based Costing data becomes available, the Department will use it to assess the most cost effective manner to accomplish its engineering responsibilities.

Salary Costs of In-house Engineers Versus Consultant Engineers

There are significant direct and indirect cost components for engineering services. The main component of direct cost is salaries paid to professional engineers. Salary differentials between in-house staff and consultants has been previously studied. In 1994, former Commissioner Egan authorized an interregional labor management team to study the issue of downstate engineering salaries. This study, which was requested by the Public Employees Federation (PEF), sought to analyze Department salaries for downstate engineering titles and their impact on the recruitment and retention of engineers, as compared to the rest of the Department.

The study found that the salaries paid to Department employees were not comparable to the salaries paid by other employers. The level of disparity varied, but the study noted that in some cases, the job rate (the top end of the

salary scale) of the State salary structure did not reach the median salary paid by other employers. The study concluded that consultants were paid higher hourly rates than State employees, and that consultant salaries in downstate regions were higher than consultant salaries in upstate regions for comparable work.

We also reviewed the salary differential between consultant engineers and State engineers. For comparison purposes, we used the American Society of Civil Engineers (ASCE) professional grade descriptions and the National Institute for Certification of Engineering Technicians (NICET) grade equivalents. These grade descriptions are compatible with those tracked by the U.S. Department of Labor, Bureau of Labor Statistics. For every consultant engineering services agreement, the Department requires that the consultant classify each position funded pursuant to the contract into one of the ASCE/NICET grade equivalents. We recognize that these equivalencies were intended to cover a wide range of typical engineering organizations, and that they cannot possibly match every organizations' title and salary structures. However, they do provide a basis for comparison that is free from subjective judgments. These equivalents were also used by the state labor management team in the PEF study of engineering salaries.

For our analysis, we compared the actual and negotiated salaries for Department engineers over the five fiscal years 1992-93 through 1996-97 to the allowable direct salary costs in a judgmental sample of consultants whose contracts with the Department exceeded \$3.4 million. (Note: During the 1996-97 year, for example, the Department had 1,147 active contracts with engineering consultants. 114 of these contracts exceeded \$3.4 million.) Our sample consisted of 34 separate agreements with larger primary consultants and 91 agreements with sub-consultants, for a total value over \$200 million. Our analysis shows that there can be significant differences between the salaries allowed under a consultant contract and the salaries paid to comparable Department engineers. A closer look at some of the consultant salaries shows this variability.

Exhibit A includes a graph that shows the hiring and job rates for Department design engineers during 1996-97 and the salary ranges for consultant design engineers the Department used during the same period. As the graph (Exhibit A) indicates, the entry level salary for Department engineers is comparable to the salary level for the lowest-paid consultant in our sample; in several instances, Department engineer salaries were higher than comparable consultant engineers at the entry level. However, when comparing the top end of the State's pay structure to the highest paid consultant in our sample, consultant salaries were generally higher than those of comparable Department engineers. The difference ranged from \$1,500 to over \$20,000, depending on the position.

One of management's contentions is that consultants are used for work that is specialized or beyond the technical expertise of Department engineers. However, further analysis of the type of work performed by consultant engineers indicates that, in many instances, consultants are handling projects that are fairly routine in nature. Such projects could be completed adequately by Department engineers if the staff resources were available. For example, in fiscal year 1995-96, there were 55 contracts, totaling \$54.2 million, awarded to consultants for construction inspection projects. Of the 55 contracts, only one was awarded to a consultant because of the need for special expertise.

We found similar results when we inquired about design contracts. In fiscal year 1995-96, the Department's Consultant Management Bureau awarded 18 design contracts totaling \$30.3 million. (Note: These 18 contracts were administered by the Department's central office, and consequently, records for these contracts were readily available for our review. Department regional offices awarded and administered many other design contracts.) Department officials acknowledged that 10 of the 18 projects were routine in nature and could have been completed by in-house staff. For the other eight projects, only certain aspects required specialized skills. The remaining components of these projects were standard designs that could have been completed by in-house staff.

In response to the draft report, Department officials again emphasized that Federal and State Law prohibit the Department from using cost factors to select the most qualified consultants for engineering work. Cost factors include the salary schedules of individual firms. Officials added, however, that the Department uses a negotiation process to align a consultant's total cost with industry norms after the consultant has been selected.

Indirect Cost Comparisons

A cost item is an indirect cost if it cannot be identified specifically with a single cost objective in an economically feasible manner. Indirect costs are incurred for the joint benefit of more than one department or activity. They can also be referred to as overhead or pooled costs and can include executive management, administration, rent and utilities. In general, a large and complex organization, such as the Department, must incur a certain amount of indirect costs to accomplish its various objectives. Indirect costs are usually determined, for a specific project, by applying a pre-determined indirect cost rate to the direct costs charged to the project.

Our analysis indicates that using Department, rather than contract personnel to do project work has significant advantages in the area of indirect costs. The Department incurs many expenses which are not direct charges to individual projects, but are necessary Department functions related to its responsibilities for the State's transportation systems. Our analysis further

indicated that a majority of the Department's indirect costs are essentially fixed. In other words, most indirect costs would remain if contracting out for engineering services were eliminated, or would not increase if additional in-house engineering staff were hired.

In addition to engineering services (the focus of this report), the Department has responsibility for many other functions; including the development of capital plans for building and maintaining highways and bridges, the distribution of operating assistance to public transit systems, commercial and general aviation, and commuter and freight rail systems. The Department also supports planning, promotion and construction activities related to all modes of transportation, operates two State-owned public airports and regulates passenger and freight carriers. To carry out these and other obligations, the Department is organized into a variety of different operating units which would exist even if engineering services were performed outside of the Department.

For projects that are subject to Federal reimbursement, the Department is reimbursed for a certain portion of its indirect costs. Federal reimbursement for the State's indirect costs is governed by the Federal Acquisition Regulations. According to officials at the Federal Highway Administration, the State incurs certain costs which the Federal government regards as the State's sole responsibility, and, therefore, these costs are ineligible for reimbursement. For example, from fiscal year 1993-94 through fiscal year 1996-97, the Department reported that its indirect costs ranged from 62 percent to 85 percent of direct labor charges, excluding employee fringe benefits. When fringe benefits are included to these rates, the Department's combined rate could approach or exceed 90 to 110 percent of direct salary costs. However, the Federal government reimbursement rate for indirect costs over this four-year period ranged from a low of 5 percent to a high of 28 percent.

Consultants also bill the State for their indirect costs. Until fiscal year 1995-96, these costs were limited to 125 percent of direct payroll costs. However, while Federal reimbursement is limited for most indirect costs the Department incurs, the Federal government reimburses 100 percent of consultant indirect costs incurred by the Department for eligible projects. Moreover, further review reveals that more than half of all consultant expenditures are not for projects' direct costs.

For example, our review of 11 consultant design contracts (which included 11 primary contractors and 48 subcontractors) indicated that only 47 percent of the related contract costs were for projects' direct costs. The remaining expenditures were for indirect costs (44 percent) and fixed fees (9 percent). "Fixed fees," which represent the consultant's profit for an individual contract, can constitute as much as 15 percent of contract amount. Projects completed

by in-house engineers do not incur any fixed fees. To illustrate the magnitude of payments that are being made to consultants for profit, we reviewed a sample of 42 open contracts over a five-year period. We found that fixed fee payments to contractors and subcontractors under these agreements amounted to \$16.9 million, or 8.4 percent of the total payments (\$201.2 million).

To put these figures in perspective, we applied these percentages to the \$160 million total for contracts let by the Department during fiscal year 1996-97. If 53 percent is representative of indirect costs and profit for all engineering services contracts, the Department will pay consultants, over the life of these contracts, roughly \$85 million for indirect costs and profit. The Department's indirect cost rate approximates the rates being paid to the consultants when employee leave and fringe benefits are included. However, our analysis of the Department's indirect costs indicates that most of the components are essentially fixed costs. If the Department increased its capacity to do more engineering work in-house, its indirect costs would increase only slightly as a result of the increased work. Consequently, if even a small percentage of indirect costs and profit paid to consultants was saved through increased use of in-house engineers, there is a potential for significant savings which the Department could use to fund additional direct project costs.

As previously indicated, consultant indirect costs were capped, until recently, at 125 percent of direct costs. The cap was removed for all engineering contracts beginning in 1997 as a result of action taken by Congress and the State Legislature. For current contracts, there is no cap on the amount of indirect cost that can be billed into an engineering contract, which raises the possibility that the State will pay higher indirect costs for consultant engineers. We did not see the full ramifications of this change since the contracts we reviewed were negotiated under the cap system. However, we did review the approved indirect cost rates for 69 contractors who entered into agreements with the Department after the elimination of the cap and found some firms have approved indirect cost rates as high as 134 percent.

Moreover, Department officials indicated that the indirect cost rates approved for consultants would increase over time, and may ultimately approach 200 percent of direct labor charges. Increases in consultants' indirect cost rates will likely occur, because many of the firms the Department currently uses assert that they are not fully recouping their indirect costs. A database maintained by the Department's Contract Audit Unit indicates that nearly one-half of the firms' actual indirect costs rates exceed 125 percent, with some firms claiming indirect rates as high as 192 percent of direct costs. Since State and Federal funds are limited, it is essential that funds be used as efficiently as possible. Department officials told us that current allocations from all sources would not be enough to pay for all the projects they would like to complete. Therefore, money spent to pay for high indirect costs is money that is unavailable for capital projects, such as roads and bridges.

The Department also incurs other costs that directly result from its use of consultants. For example, after the decision to use an outside contractor has been made, the Department's Contract Management Bureau provides support services during the contract process. This Bureau has the primary responsibility for negotiating contracts and supplemental agreements with consultant firms. In addition, the Department's Consultant Management Bureau is responsible for managing and monitoring most design consultants once they have been selected for a project. This includes preparing the scope and schedule of individual projects, negotiating staffing levels monitoring consultant progress against project schedules, monitoring costs and reviewing consultant performance. According to the Department's Integrated Accounting System, the Contract Management and Consultant Management Bureaus incurred costs of \$3.9 million and \$11.4 million, respectively, for their operation during the five-year period ended March 31, 1997.

In response to the draft report, Department officials stated that the Department has begun to develop the baseline data necessary to perform Activity Based Costing. Furthermore, this effort will include a comprehensive review of the Department's overhead costs.

Criteria for Assessing Use of Engineering Resources

Our audit suggests that a thorough analysis is needed to ensure that funds spent to build and rehabilitate the State's bridges and highways are being spent cost effectively. One way to accomplish this objective is prescribed in OMB Circular A-76. Although the Department is not bound to follow this particular guideline, it can be a useful tool for setting up a comprehensive cost comparison. Under this approach, the Department would prepare a document containing the number and the types of employees necessary to do the work described. From this data and other estimated costs, the Department would prepare the total estimated cost for in-house performance. Department management would then compare these costs to consultant estimates to determine which alternative is more cost effective. This approach would also distinguish between those Department indirect costs (such as the Contract Audit Unit) that would be reduced or eliminated if contracting out was reduced or eliminated, and those costs that would remain regardless of who did the work.

Department management has not performed this type of thorough analysis. We believe the Department's bridge inspection program represents an opportunity to conduct an analysis of this nature. The Department is responsible for inspecting all bridges in New York on a biennial basis. There are roughly 20,000 State and local bridges in the State. Historically, all State-owned bridges are inspected by Department engineers, and all local bridges are inspected by consultants. The one exception to this rule is New York City, which does not employ engineers for bridge inspections. In New York

City, consultants inspect approximately 1,600 bridges, overpasses and elevated roadways - regardless of who owns them - on a biennial basis.

In 1995, the Department piloted a bridge inspection program in the Syracuse and Watertown regions whereby all bridges were to be inspected by Department engineers only. Preliminary analyses conducted by regional personnel indicate that savings may result from using in-house engineering staff, rather than consultants, to do these inspections. Although Department management contends that the analyses prepared by regional personnel are not comprehensive, the analyses do provide enough evidence to compel the Department to undertake a thorough cost benefit analysis of inspection work, as performed by both in-house and consultant engineers. Absent a review of this nature, service and value issues will surface about any Department decision to convert this initiative into Department-wide policy.

The Department must also determine whether it would be fiscally prudent to extend this initiative to the New York City region, where all bridge inspection work is completed by consultants. During fiscal years 1995-96 and 1996-97, the Department paid consultants about \$41 million to inspect bridges in the New York City region. However, Department officials estimated that only 20 percent of all bridges within the New York City region would require inspection by a consultant because of complexities associated with these bridges.

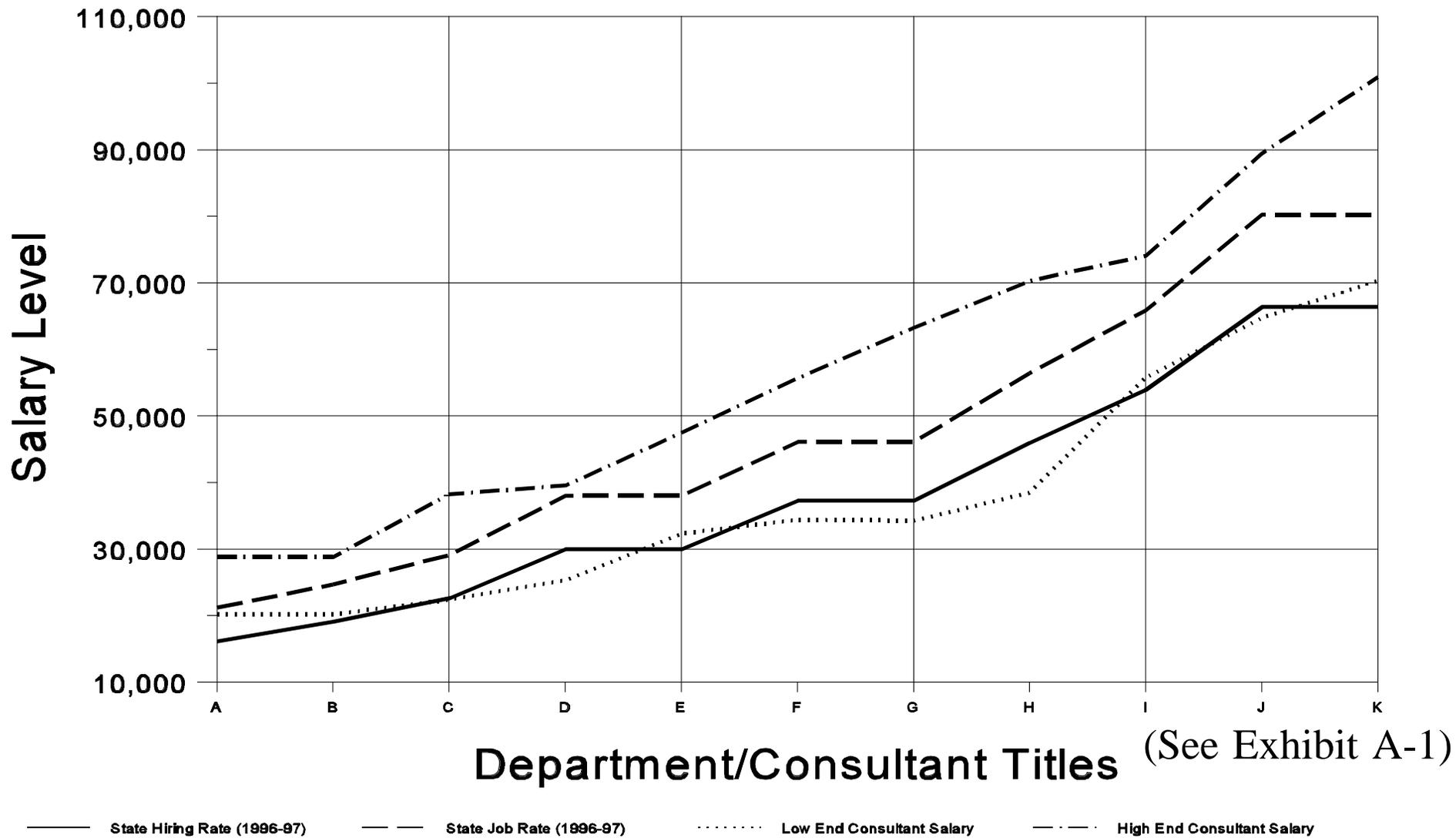
In response to the draft report, Department officials stated that the Department will subject the information gathered from the pilot project, for local bridge inspection by State forces, to an Activity Based Costing analysis as soon as the baseline data is available to make such an analysis possible. However, no information on the expected completion date of the pilot project was provided by Department officials.

Recommendations

1. Justify the Department's increased use of consultant engineers. At a minimum, this justification should include a process whereby Department decisions to use consultants are supported by cost analyses that demonstrate that engineering services obtained from outside sources are less costly or better performed than services available from in-house engineering resources.
2. Review the need for contracting with consultant firms whose salary structures clearly exceeds that of in-house engineers. Determine whether the demands of the project are such that they justify the expense of using high-salaried consultant firms, rather than in-house engineering staff, to do the work.
3. Conduct comprehensive analyses of overhead rates. These analyses should include a comparison of the costs of using in-house staff versus consultants and a determination of the effect on Department costs resulting from the elimination of the overhead cap on consultant contracts.
4. Evaluate regional office assessments to determine if it would be cost beneficial to complete all bridge inspections with in-house staff. If pilot program successes warrant expansion to other regions, take steps to expand the pilot program to all regions to the extent feasible.

Salary Comparisons

In-House vs Consultant Engineers



Legend for Graph (Exhibit A)
State Grade Levels and National Institute for Certification of Engineering Technicians (NICET)/
American Society of Civil Engineers (ASCE) Equivalencies

- A. State Grade 5/Level I NICET
- B. State Grade 8/Level I NICET
- C. State Grade 11/Level II NICET
- D. State Grade 16/Engineer I/II ASCE
- E. State Grade 16/Level III NICET
- F. State Grade 20/Level IV NICET
- G. State Grade 20/Engineer III ASCE
- H. State Grade 24/Engineer IV/V ASCE
- I. State Grade 27/Engineer VI ASCE
- J. State Grade 31/Engineer VII ASCE
- K. State Grade 31/Engineer VIII ASCE

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