

Final Committee Report, Vol. 8, No. 1
Nebraska Department of Roads:
Use of Consultants for Preconstruction Engineering

June 2001

**Program
Evaluation
Unit**

*Legislative Research Division
Nebraska Legislature*

Legislative Program Evaluation

As a result of the passage, during the 1992 regular legislative session, of the Legislative Program Evaluation Act (LB 988), the Legislative Research Division (LRD) has been assigned the responsibility of doing program evaluation. Program evaluation is defined as a systematic review of any aspect of a given state agency and any programs it administers for the purpose of assessing 1) compliance with legislative intent and 2) the overall effectiveness and/or efficiency of the program(s).

Program evaluation is carried out under the general supervision of the Legislative Program Evaluation Committee, a special committee of the Legislature. Day-to-day supervision of the program evaluation staff is provided by the Director of LRD.

Membership on the Legislative Program Evaluation Committee includes the chairpersons of the Executive Board and the Appropriations Committee and three other members of the Legislature chosen by the Executive Board. The committee's responsibilities include selecting state agency programs for evaluation, approving evaluation plans, reviewing and releasing completed evaluation reports, and monitoring agency compliance with evaluation report recommendations.

For a more detailed description of the concept of program evaluation, see LRD Report #91-10 (November 1991) entitled *Legislative Program Evaluation*. Statutes governing the program evaluation process in Nebraska are found in Chapter 50, article 12, of the Nebraska Revised Statutes.

Program Evaluation Committee

Senator Pat Engel, Chairperson
Senator Chris Beutler, Vice Chairperson
Senator George Coordsen
Senator Marian Price
Senator Roger Wehrbein

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PREFACE TO THE FINAL COMMITTEE REPORT

Between the adoption of this evaluation's scope statement and work plan and the adoption of the recommendations contained in this report, the composition of the Legislative Program Evaluation Committee changed. The committee that adopted the scope statement and work plan included Senators Pat Engel, Ron Raikes, George Coordsen, Doug Kristensen, and Roger Wehrbein. As reconstituted at the beginning of the 2001 legislative session, the committee includes new members, Senators Chris Beutler and Marian Price, who replaced Senators Raikes and Kristensen.

Part I

*Program Evaluation Unit
Final Report
and
Executive Summary*

Unit Final Report

**Nebraska Department of Roads:
Use of Consultants for Preconstruction Engineering**

**Program
Evaluation
Unit**

*Legislative Research Division
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ACKNOWLEDGEMENTS

The Department of Roads cooperated fully in providing access to information necessary for this evaluation and in making its staff and resources readily available. The unit would like to particularly acknowledge and thank for their time and assistance: the director—Mr. John Craig; from the Office of Engineering—Mr. Monty Fredrickson, Mr. Roger Winkelhake and the staff of Project Programming and Scheduling, Mr. Eldon Poppe, Mr. Randy ElDorado and the staff of Agreement Coordination, and Mr. Khalil Jaber; from the Controller Division—Ms. Marilyn Hayes, Mr. James Dietsch, and Ms. Teresa Berhends.

The unit also acknowledges and thanks Ms. Carolyn Gigstad and representatives of the Transportation Committee of the American Consulting Engineers Council of Nebraska for their input.

EXECUTIVE SUMMARY

Introduction

The program evaluation described in this report was undertaken by the Legislative Program Evaluation Unit (unit) on behalf of the Legislative Program Evaluation Committee (committee). The unit evaluated the Nebraska Department of Roads' (department's) use of consultants for preconstruction engineering—the planning and design work that goes into a road project before construction bidding begins. Specifically, we addressed when, why, and how often the department uses consultants; whether the use of consultants is cost effective; whether the use of consultants is justified; and how the department monitors consultant work.

The department is a very large state agency with 2,200 employees and a budget that has exceeded \$500 million in recent fiscal years. It is responsible for designing, constructing, and maintaining the state highway system in Nebraska—approximately 10,000 miles of highways. To complete these tasks, the department relies, in part, on outside help: consultants, who help design roads, and contractors, who build them. This evaluation focused only on consultants and did not address how the department uses contractors. This is significant because consultant costs (approximately \$8 million in FY1999-00) pale in comparison to construction costs (approximately \$380 million in FY1999-00).

The Department's Use of Consultants

Approximately one-third of the department's design work is contracted out to consultants. The department uses consultants when it does not have adequate staff to meet its design goals, it needs design work completed quickly,

or a project requires expertise that the department does not have.

We found that the department's level of and reasons for consultant use were reasonable. According to the department, consultants can be an effective tool for managing its workload. Consultants enable the department to cope with peak demand without having to hire and fire employees as the workload ebbs and flows. Consultants can also be used effectively in emergency situations, allowing the department's routine work to continue uninterrupted. Finally, consultants can provide expertise in areas that the department deals with infrequently.

The department expects consultants to provide an independent professional service and it monitors their work accordingly. The department tracks progress on the designs, but provides little technical oversight. If a consultant design is flawed, the consultant can be held liable under the contract it negotiates with the department.

Comparing Costs

One of the central issues in this evaluation was how expensive consultant designs are compared to department designs. To analyze this, we looked at a sample of 97 consultant projects from the past three fiscal years and estimated what the department's costs would have been had it designed each project in house. We then compared the actual consultant cost and the estimated in-house cost.

Estimating the department's costs was difficult and, we must note, allowed us to arrive at only an approximation of actual cost differences. Nevertheless, even the approximation allowed us to conclude that, on average, designs completed by consultants are more cost-

ly than designs completed by the department. Based on our analysis of FY1997-98 through FY1999-00, the department would have saved an average of 39, 32, and 25 percent per project per year (respectively), had it designed each project in house.

Conclusion

Despite the enhanced cost of consultant designs, we found that the department's use of consultants was justified. The department articulated reasons for consultant use that were sensible and consistent with the way consultants are used in other states. Furthermore, if the department did not use consultants, its own design costs would increase. The potential savings referenced above might not have been realized if the department had to increase staff and overhead to complete those designs. The most we can say is that the department must remain vigilant to ensure that preconstruction-engineering consultants continue to be used effectively.

The findings and recommendations made by the committee relative to this evaluation are found in Part III of this report.

SECTION I

INTRODUCTION

Pursuant to Neb. Rev. Stat. sec. 50-1205(1), the Legislative Program Evaluation Committee (committee) instructed the Legislative Program Evaluation Unit (unit) to evaluate the Nebraska Department of Roads' (department's) use of consultants. The evaluation focused on the department's use of consultants for preliminary, or preconstruction, engineering. (Preconstruction engineering is the planning and design work that goes into a project before construction bidding begins.)

The committee approved the topic for evaluation on 3 February 2000. A scope statement for the evaluation was adopted on 18 May 2000, followed by a work plan on 26 June 2000. The evaluation got underway with a 29 June 2000 letter from Senator Pat Engel, the committee chairperson, to Mr. John Craig, Director-State Engineer for the department.

The original scope statement was based on an assumption made by the unit about the cost of hiring consultants versus the cost of doing preconstruction engineering in house. The assumption—that consultants are more costly—was based on our review of the literature in the field. As the data-collection phase of the evaluation proceeded, however, we realized that simply making and reporting the assumption without any cost data specific to Nebraska would be unsatisfactory. We therefore saw a need to examine consultant versus in-house costs more carefully, and asked the committee to change the scope of the evaluation to include more detailed cost information. A revised scope statement was approved on 15 November 2000.

Scope of the Evaluation

The final scope statement adopted by the committee instructed the unit to assess the

department's use of consultants for preconstruction engineering to determine (1) when, why, and how often the department uses consultants; (2) whether the cost of work produced by consultants exceeds the cost of that produced in house and, if so, by how much; (3) whether the use of consultants is justified; and (4) how the department monitors consultant work and whether these efforts ensure cost-effective, efficient, and quality performance.

Contents of the Report

Section II of this report provides background information about the department and its responsibilities. Section III describes the extent to which the department uses consultants, factors that influence consultant use, and how the department determines when to hire consultants. Section IV contains our comparison of consultant and in-house costs. Sections V and VI address, first, the question of whether the department's use of consultants is justified, and, second, how consultants are supervised. Our findings and recommendations are found in Section VII.

Methodology

In doing this evaluation, the unit used a combined qualitative/quantitative research methodology. We reviewed studies from other states and examined relevant Nebraska statutes and departmental regulations. We interviewed numerous members of the department's staff and also spoke with consultants. In addition, using a sample of design projects completed by consultants, we estimated what it would have cost the department to design those projects in house.

SECTION II

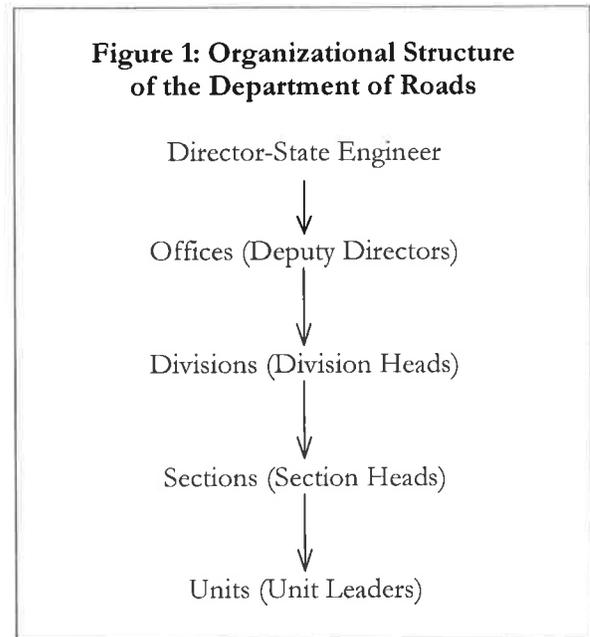
OVERVIEW OF THE DEPARTMENT OF ROADS

The Nebraska Department of Roads is responsible for the design, construction, and maintenance of the state highway system in Nebraska, which consists of approximately 10,000 miles of highways, including 482 miles of interstate highway.¹ These are costly tasks. The department spent more than \$424 million in FY1997-98, more than \$502 million in FY1998-99, and nearly \$570 million in FY1999-00. The lion's share of its approximately half-billion dollar budget is spent on construction.

The department is managed by John Craig, the Director-State Engineer (director),² and three deputy directors who are responsible for managing the Office of Planning and Administration, the Office of Engineering, and the Office of Operations.³ The Office of Planning and Administration handles issues related to personnel, computer systems, purchasing and supplies, and strategic transportation planning. The Office of Engineering plans construction projects, designs roads and bridges, and acquires the property on which to build them.⁴ Overseeing the construction and maintenance of roads is the responsibility of the Office of Operations.

The major organizational layers of the department are shown in Figure 1.⁵ Each of the

Figure 1: Organizational Structure of the Department of Roads



three offices contains several divisions that each focus on one broad facet of the office's responsibilities. The divisions are further divided into sections that handle a specific aspect of the division's mission. Sections are, in turn, composed of units. At the unit level, employees engage in their specialties, and tasks are very specific. The unit level is the "nuts and bolts" layer of the department's organizational structure—everything above that is essentially management.

The department's central office is located in Lincoln, but it also has eight field-district offices and many maintenance facilities located throughout the state. Dividing the state into eight districts allows the department to better coordinate maintenance functions. Statewide management of the field offices is the responsibility of the Office of Operations.

In its entirety, the department employs 2,200 people.

¹ Municipalities and counties are responsible for maintaining the remaining public roads in the state (approximately 86,000 miles).

² Mr. Craig directly supervises the department's legal, communication, and controller divisions, and serves as a member of the State Highway Commission and the Nebraska Highway Bond Commission.

³ Recent changes in the department's organizational structure are not represented here. Please see Addendum B.

⁴ As explained in Section III, this evaluation focuses on the Office of Engineering because the task of hiring consultants to perform preconstruction engineering falls to the office's Project Development Division.

⁵ A more detailed organizational chart focusing on the Office of Engineering is found in Appendix A.

SECTION III

THE DEPARTMENT'S USE OF CONSULTANTS

The department designs, constructs, and maintains the state highway system using both its own staff and external personnel, such as contractors and consultants. Contractors perform all of the department's construction work (the department builds nothing itself). Consultants, on the other hand, perform tasks—such as preconstruction engineering, architectural design, technology development, and computer training—as needed.

Preconstruction Engineering

Pursuant to its scope statement, this evaluation deals only with the department's use of consultants for preconstruction engineering, especially as it relates to designing roads and bridges. Among the consultants hired by the department, those used for preconstruction engineering are the largest group.

In the last three fiscal years, the department has spent approximately \$30 million annually on engineering services, which represents five to seven percent of its total annual expenditure, depending on the year. Currently, approximately one-third of the department's engineering costs—approximately ten million dollars—is tied to preconstruction engineering work performed by consultants.⁶ In terms of contract dollars—the amount of money the department has committed to preconstruction engineering consultants—the department's use of consultants is currently at its lowest level since 1992.

The department's use of consultants peaked in the mid-1990s as a result of several factors,

⁶ More specifically, payments to consultants made up 37 percent, 35 percent, and 26 percent of total engineering costs in FY1997-98, FY1998-99, and FY1999-00, respectively.

both external and internal to the department.⁷ Externally, the department's workload increased when the Legislature required it to place more emphasis on upgrading the state's highways and to develop a system of new intrastate expressways (four-lane highways) throughout the state.⁸ The original schedule for construction of the expressways was quite tight, and the department relied heavily on consultants to help design them. However, budget constraints have slowed construction of the expressways, thereby alleviating pressure on the design phase and decreasing the need for consultants. The construction phase of the expressways project is scheduled for completion in 2012.⁹

Internal factors compounded the impact of the department's increased workload. Previous directors made extensive use of a practice known as "overprogramming," or designing highway projects that were unlikely to be built immediately because of funding limitations.¹⁰ This practice was seen as a way to ensure that

⁷ While the actual contracting out of work peaked in the mid-1990s, many of the designs were produced and paid for in the late-1990s, so that payments to contractors were higher than usual between FY1996-97 and FY1998-99.

⁸ I.B. 632, passed in 1988, authorized the issuance of bonds to finance the construction and improvement of state highways. The bill required the department to put together a specific long-range plan for the state highway system, which, in practice, resulted in the creation of a 20-year plan that the department updates annually. The bill also required the plan to contemplate "the development of a system of expressways, which shall include, but not be limited to, a north-south expressway."

⁹ Telephone conversation with Eldon Poppe, head of the Office of Engineering's Roadway Design Division, 12 January 2001. The original completion date for construction of the expressway project was 2004, but expected funding from a motor vehicle fuel tax did not materialize.

¹⁰ According to the department, only highway and expressway projects are overprogrammed, not interstate projects. (Telephone conversation with Monty Fredrickson, Deputy Director for the Office of Engineering, and Roger Winkelhake, head of the Project Programming and Scheduling Section in the Office of Engineering, 4 January 2001.)

the department would be ready to start construction on highway projects if additional state or federal funds became available.¹¹ The downside of the practice is that, if additional funds do not become available, the "shelved" projects may get stale, and the designs may need to be revised, thereby increasing overall design costs.¹²

The current director has reduced overprogramming as much as possible, though the department believes that some overprogramming is necessary to ensure the continuity of the construction budget.¹³ For example, if a highway project slated for construction must be postponed, the department tries to have other projects ready that can be built in the meantime with the available funds. For the most part, however, the department now develops plans to be ready at the time it expects to undertake construction.

The department also experienced staffing problems in the mid-1990s that both affected and were caused by its increased reliance on consultants. A troublesome cycle ensued as consultants were given more work: they needed additional staff and, because they offered better pay, they were able to hire employees away from the department. As a result, the department's need for consultants increased further. Thus, in addition to losses due to promotion and retirement, the department lost numerous employees to the private sector.¹⁴

¹¹ Conversation with John Craig, Director-State Engineer, 28 July 2000.

¹² There are a number of issues that can arise relative to the design of a road or bridge with the passage of time. For example, other construction in the area may affect the placement of access roads, or changes in standards may need to be incorporated into the project design.

¹³ Telephone conversation with Monty Fredrickson and Roger Winkelhake, 4 January 2001. Delving into the practice of overprogramming is beyond the scope of the evaluation, but the unit notes that, since the practice is largely at the director's discretion, there is the possibility of abuse. Although the current director discourages the practice, past directors have not.

¹⁴ Conversation with Eldon Poppe, 3 April 2000.

As noted previously, the department does not use consultants as much today as it did during the middle of the last decade. Preconstruction engineering for the expressway project has slowed to avoid outpacing construction, and the department is not overprogramming for highways as much as it did in the past. In addition, a pay study conducted by the department, and a subsequent change in its pay plan, have led to a more stable workforce within the department.¹⁵ Moreover, improvements in technology, especially in the area of computer-aided drafting, have allowed the department to produce designs more quickly.

Nevertheless, consultants still play an important role in the department's preconstruction engineering process.

Workload, Timing, and Expertise

Generally speaking, the department uses consultants in three situations: (1) when it does not have enough staff to meet its design goals (which are contingent on available funds), (2) when time considerations necessitate speed, and (3) when a project requires special expertise.¹⁶

The primary reason the department uses consultants is to manage its workload, which ebbs and flows. The director's goal is to maintain the necessary staff to handle the usual workload and to rely on consultants for help during "peak" times. In other words, consultants are used as an extension of the department's workforce.¹⁷

¹⁵ Conversation with Randy ElDorado, Agreements Engineer in the Office of Engineering's Project Development Division, 20 March 2000. The pay study, part of the department's "Engineering Reclassification Project," was completed in 1998.

¹⁶ Neb. Rev. Stat. Sec. 81-701.02 authorizes the Director-State Engineer to contract for consulting services. Additionally, the department's regulation 001.03 permits the use of consultants to ensure the "timely completion" of projects or to provide special expertise.

¹⁷ Conversation with John Craig, 28 July 2000.

It is easier and, the department would argue, more cost-effective to contract with a consultant for a limited period of time than to hire permanent employees—who must be provided with work space, computer access, and benefits, and who, practically speaking, cannot be laid off and rehired as the workload changes.¹⁸

Consultants are also used if circumstances make timing especially important. The department generally has a lot of irons in the fire, and diverting personnel to handle unexpected needs can put other projects in jeopardy. Therefore, the department uses consultants when situations exist that require an especially fast response time.¹⁹

For example, if the department knows it will eventually have to improve a road to support a developing area, it may need to act quickly to file designs with a county to put a hold on building permits, reserving its right to property in the area.²⁰ Likewise, to handle emergencies such as storm-damaged bridges, the department keeps some consultants on a "continuing contract" basis so the department does not have to go through the entire consultant-selection process when time is of the essence.²¹ In contexts such as these, consultants provide the department with a level of flexibility it would not otherwise have.

Finally, there are some projects that require expertise the department does not have. Because the need for special skills arises infrequently, the department relies on consultants

to provide them.²² For example, the department may hire a consultant to do geographic information processing, traffic analysis, aerial photomapping, specialized cost studies, or underwater inspections. The department believes it is more cost-effective to rely on consultants in these areas than to keep specialists on staff who might not be fully utilized.²³

The department also believes it has an interest in providing enough work to consultants to keep them up-to-date on design requirements and the department's needs. Although the department does not use consultants merely for training purposes, it is beneficial to the department to have a pool of knowledgeable and experienced consultants to draw from. The director believes that consultants are more effective if they have skills and experience similar to that of the department's staff.²⁴

Determining the Need for Preconstruction-Engineering Consultants

The department uses consultants to regulate its workload, to respond to unexpected needs, and to provide expertise. But how does it decide when these situations exist? As one might expect, communication is crucial.

As noted in Section II, the department's division of the state into eight field districts is critical to providing coordinated maintenance. It is also important in terms of planning construction projects. Each district is headed by an engineer who oversees the state highways within the district. Based on the district's needs and budget, the district engineer makes recommendations for necessary highway construction (or reconstruction). The formal

¹⁸ *Id.*

¹⁹ Conversation with Eldon Poppe, 13 September 2000.

²⁰ *Id.* This process, known as "corridor protection," is spelled out in Neb. Rev. Stat. sec. 39-1311. Its purpose is to save the state money. It is cheaper for the state to buy land early, in anticipation of growth, than to wait until growth begins and land prices become inflated, or until improvements are made on the property.

²¹ These continuing contracts are subject to spending limits and usually last for one year. The department commonly reserves the right to utilize the selected firm for up to three additional years on an annual renewal basis.

²² By the same token, there are some tasks that are rarely given to consultants because it is difficult to keep them current on frequently changing design specifications. For example, the department generally designs all of its guardrails, most of its lighting, and a lot of its bridges.

²³ Conversation with John Craig, 28 July 2000.

²⁴ Conversation with John Craig, 29 November 2000.

planning process begins when a district engineer submits a project proposal to the central office in Lincoln.²⁵

If approved, the project is entered into the department's Project Scheduling System (PSS), a computer system used to track and project the time needed for preconstruction-engineering activities. Managers throughout the department access the PSS to review the status of projects, and division and section heads rely on workload estimates from the PSS to determine whether relevant design and support units have the personnel necessary to design a given project.

The department holds regular meetings to discuss project scheduling, as well as annual meetings to discuss each district's projects.²⁶ If the department determines it does not have the requisite staff to complete all priority projects, it requests proposals from consultants to perform the extra work. In practice, consultants are most often used to complete the majority of a design project but not necessarily the entire project.

Consultants submit proposals to the department, which then selects the best qualified consultant for the job.²⁷ After a consulting firm has been selected, the department enters into negotiations with it to determine the scope, time frame, and cost of designing the project. Following the negotiations, a contract for services is signed. The negotiations

are important because once they are finished, the consultant is held to the terms of the contract regardless of any problems which arise. Contracts are amended only when the department changes its expectations or requests additional work.

²⁵ More specifically, he or she submits a request form to the Project Scheduling and Program Management Section, a special section within the Office of Engineering. The form is reviewed extensively and, if approved by designated agency administrators, the project is scheduled.

²⁶ A typical annual meeting involves the Deputy Director of Engineering, the head of the Project Programming and Scheduling group, the division heads within the Office of Engineering, and the district engineer.

²⁷ The Nebraska Consultants' Competitive Negotiations Act, Neb. Rev. Stat. secs. 81-7011 to 81-1721, requires firms to be selected on the basis of qualifications rather than the lowest bid (compensation must be "fair and reasonable"). Qualification-based selection is very common in the professional-services area.

SECTION IV

COST COMPARISON

In addition to directing the unit to describe the department's use of consultants, the committee asked the unit to determine whether preconstruction engineering done by consultants costs more than comparable work performed in house and, if so, how much more. Before delving into the unit's cost analysis, which follows, a few cautionary notes are in order.

The difficulty inherent in comparing the cost of work done by state transportation departments with work done by private consultants is well documented.²⁸ The difficulty arises because the same project is never done by both a consultant and a transportation department. Therefore, head-to-head cost comparisons are impossible, and analysts must rely either on comparing similar projects (one done by a transportation department, one by a consultant) or comparing the *actual cost* of a project completed by a consultant with *estimates* of what it would have cost if the transportation department had done the project.

Despite these difficulties, we believe that a cost comparison is worth undertaking, primarily because its results can be used to inform the debate over whether the use of consultants is justified. However, it should be understood that the results provide only an *approximation* of actual cost differences.

²⁸ A good review of the literature on this subject is found in H. Schneider, D. R. Deis, C. H. Coates, & C. G. Wilmot, *Louisiana Department of Transportation and Development: In-House Versus Consultant Design Cost Study* (October 1998). The authors conclude that "the studies reveal several inherent problems with comparing in-house versus consultant design cost. . . . [M]ost of these factors are very difficult, if not impossible, to assess." *Id.* at 19-21. The unit's own review of studies from California, Missouri, New York, and Texas confirmed this conclusion.

Methodology and Assumptions

As just noted, since a project is never designed by both the department and a consultant, doing an actual comparison of costs is impossible. We also rejected the option of comparing costs for *similar* projects because it is difficult to find enough of them to allow for viable conclusions. Instead, we compared the actual costs of designs prepared by consultants to our *estimates* of what it would have cost the department to prepare the designs in house. The weakness inherent in this option is that the estimates of the department's costs are rough. On the other hand, the strength is that we were able to assess a reasonably large sample of projects.

The Sample

The Office of Engineering performs all of the department's in-house preconstruction engineering and manages consultants hired to produce designs. As a result, our analysis focused solely on that office.

Within the office, three divisions engage in preconstruction engineering—the Roadway Design, Bridge, and Right of Way divisions.²⁹ For purposes of our analysis, we reviewed contracts for major designs completed by consultants for these divisions over the last three fiscal years.³⁰ This resulted in a sample

²⁹ As the names imply, the Roadway Design and Bridge divisions design roadways and bridges. Designs produced by the Right of Way division plot and compute the amount of land needed to accommodate road and bridge designs, and are used to determine whether adjustments could reduce disturbance to surrounding areas.

³⁰ Specifically, we looked at all contracts for "preliminary" and "final" design plans. A "preliminary" plan is prepared prior to any public hearing on a project. Public hearings are held if required by federal rule or at the department's discretion. The "final" plan is completed following the hearing and may take cognizance of concerns raised at the hearing.

of 97 contracts, representing the work of 21 consulting firms. The contracts in our sample involved roadway, bridge, and right-of-way designs, and combinations thereof.

A contract between the department and a consulting firm contains detailed and mutually agreeable terms regarding the project's scope, the hours and personnel needed to complete the design, and the total cost of the service. The terms of these contracts formed the basis for our estimates of what the department's in-house costs would have been if the projects had not been contracted out.

The Theory Behind the Analysis

Calculating the cost of preconstruction engineering is no different than calculating the cost of any service. There are three cost factors in any such calculation: direct labor, direct materials, and overhead.³¹ As shown in Figure 2, the sum of these costs equals the total cost of the service.

Figure 2: Calculating the Total Cost of a Service

$$\begin{array}{r} \text{Total} \\ \text{Cost} \end{array} = \begin{array}{r} \text{Direct} \\ \text{Labor} \end{array} + \begin{array}{r} \text{Direct} \\ \text{Materials} \end{array} + \begin{array}{r} \text{Overhead} \\ \text{Costs} \end{array}$$

Direct labor and direct material costs are considered "direct" because they are associated with a specific project. Direct labor costs include the salaries and overtime of personnel assigned to the project. Direct material costs are those for materials used in producing the final product. In other words, they are purchased for the project and are completely consumed during its course. In building a

³¹ The U.S. Small Business Administration has published a short paper entitled "Pricing Your Products" that contains a good discussion of these topics, including their role in consulting services. While the department is by no means a small business, the discussion provides some very helpful examples. The document can be accessed on the web at <http://www.sba.gov/library/pubs/fm-13.pdf>.

house, for example, direct material costs would include items like lumber, shingles, and nails.

Overhead costs are considered "indirect" because they consist of labor and material costs that cannot be billed to a specific project. For example, the salaries of managerial staff, who oversee many projects, are overhead. Benefits provided for employees are overhead as well.³² Materials that cannot be specifically billed to a project are also overhead. Again, in building a house, shovels, saws, and hammers represent overhead costs because the items can be used again. Overhead also includes costs for renting office space, storing equipment, and such things as utilities and computers.

We assumed that the cost of direct materials used for preconstruction engineering would not vary significantly with the entity using them (in this case, the department or a consultant). In addition, there are few direct material costs incurred in conjunction with preconstruction engineering. For these reasons, direct material costs drop out of the equation, and our cost comparison focuses only on direct labor and overhead costs.

Consultant costs for direct labor and overhead were found in the project contracts. A description of how we estimated what these costs would have been for the department follows.

Estimating Direct Labor Costs

Three types of information are needed to estimate direct labor costs: (1) which staff members will be assigned to the project, (2) the hourly wage for each, and (3) the number of hours each will spend on the project ("man-hours"). As shown in Figure 3, the labor cost for each employee is calculated by

³² Although an employee's time may be billed to a specific project, benefits such as holiday pay, vacation leave, and sick time generally are not and are thus considered an indirect labor cost.

multiplying his or her hourly wage by the man-hours he or she will spend on the project.

Figure 3: Calculating the Labor Cost for Each Employee

$$\text{Labor Cost} = \text{Hourly Wage} \times \text{Number of Man-hours}$$

To determine which departmental position(s) would have been enlisted to work on a given design, we assumed that the department would use staff with qualifications similar to the qualifications of personnel used by the consultant. Thus, we obtained the consultant's personnel specifications from the contract and attempted to locate analogous positions within the department.³³ To determine the approximate hourly wage associated with each of these positions, we averaged the wages of all personnel in that position within the Roadway Design, Bridge, and Right of Way Divisions.^{34, 35}

To arrive at an estimate of what the department's man-hours would have been had it designed the project in house, we again turned to the consultant contract. When a consulting firm is selected for a project, it negotiates with the department to determine the number of

³³ This was difficult because consultants and the department use their personnel differently. In addition, the extent to which personnel matched up on a given project depended on which consultant was used. We worked closely with the department to assess the staff of each consulting firm so as to determine which positions within the department would be most comparable. See Appendix B for an example of how positions might match up.

³⁴ Individual staff members in the same position may receive different salaries depending on their experience or educational background. Using an average was the most logical way to represent all employees in a given position. In some cases, we combined certain positions, such as Design Technician I and II, because there is not a significant difference in the average salaries for those positions.

³⁵ The average salaries for positions in the Right of Way division were calculated separately before being incorporated into the analysis because designers in that division tend to make less than those in the other two divisions.

hours that will be required for completion of the design. These hours are divided up among the various staff positions that will be assigned to the project by the consultant. We assumed these negotiated hours provided a fair representation of the number of man-hours that were required from each position.³⁶

Estimating Overhead Costs

We estimated the department's overhead for each of the three fiscal years covered in our sample. Overhead is calculated by dividing total overhead expenses by total direct labor costs (less fringe benefits)³⁷ and multiplying by 100, as shown in Figure 4.

Figure 4: Calculating an Overhead Rate

$$\text{Overhead Rate} = \frac{\text{Total Overhead Costs}}{\text{Total Direct Labor Costs (less fringe benefits)}} \times 100$$

We used a department-wide overhead rate because it is not possible to calculate an overhead rate specific to the area of preconstruction engineering.³⁸ Our calculations revealed an agency-wide overhead rate of approximately 126 percent, 136 percent, and 148 percent,

³⁶ Both department and consultant representatives believed that using these hours in this way was fair. (Conversation with Khalil Jaber, consultant coordinator in the Office of Engineering's Roadway Design Division, 28 July 2000; conversation with members of the Transportation Committee of the American Consulting Engineers Council of Nebraska [consultant representatives], 19 October 2000.)

³⁷ See *supra* note 31. Fringe benefits are considered an overhead expenditure so they are not included as a labor cost.

³⁸ An overhead rate specific to preconstruction engineering might differ from the agency-wide overhead rate, but the department's accounting system is not conducive to making such an estimate. Numerous and varied attempts to estimate the overhead costs at the division level failed to yield consistent results. Instead, in conjunction with the department's controller division, we decided to use an overhead rate calculated for the entire department. Each agency expense was categorized as either a direct labor cost, a direct nonlabor cost (material costs, broadly defined), or an overhead cost.

for FY1997-98, FY1998-99, and FY1999-00, respectively.³⁹

Results

For the 97 contracts in our sample, we added the department's estimated in-house labor costs and the estimated overhead costs⁴⁰ to arrive at the total estimated design cost.⁴¹ We then calculated the difference between that estimate and the actual cost of the consultant's design.

For every contract in our sample, our analysis showed that the department could have prepared the design in house for less than the consultant was paid.⁴² However, we found a tremendous variation in the extent of the potential savings. We estimated that, in FY1997-98, the average savings would have been approximately 39 percent had the department designed the targeted projects in house. However, the amount of savings *per project* would have ranged from approximately 23 percent to 52 percent.⁴³

The same pattern would have held true for FY1998-99 and FY1999-00. We estimate

that, on average in FY1998-99, the department could have designed the projects using approximately 32 percent less money than did the consultants. However, the range of potential savings would have been very large for that year, from approximately 3 percent to 80 percent per project.⁴⁴

We estimate that, on average in FY1999-00, the department could have designed projects using approximately 25 percent less money than did the consultants.⁴⁵ The per-project savings would have ranged from approximately 9 percent to 36 percent.

Conclusion

The results of our cost comparisons, even with their inherent shortcomings, are not surprising. Our conclusion that consultant designs are generally more expensive than in-house designs is consistent with the findings of studies done in other states. Almost invariably, studies in this area have shown that consultant designs are more expensive than in-house designs.⁴⁶ Furthermore, while many studies do not report the extent of the savings that would have been realized if designs had been done in house, when they do, the project-by-project range is often quite large.⁴⁷ This reflects what we found in Nebraska.

We were unable to arrive at any supportable conclusions concerning which types of projects are most costly to contract out to consultants. There are many variables that can influence the extent of the savings that will be realized if projects are done in house, includ-

³⁹ The increase observed in these three years is primarily due to equipment purchases—computers and vehicles—and training, mostly related to the new computers.

⁴⁰ From the overhead rate, one can estimate overhead costs by multiplying the rate by the labor costs. For example, if the labor costs of a project totaled \$10,000, and the overhead rate was 126 percent, the total overhead cost of that project would be \$12,600. Thus, excluding material costs, the total cost of the project would be \$22,600.

⁴¹ As previously noted, the "total project cost" in this analysis does not include direct materials. Additionally, this analysis does not include estimates for the department's contract oversight costs—those costs the department incurs in planning the project to be contracted, negotiating with the consultant, and overseeing the consultant's work. See Appendix C for additional discussion of this point.

⁴² To arrive at this conclusion, we divided the difference between the consultant's cost and the estimate of what the department's cost would have been by the consultant's cost and multiplying by 100, so that we ended up with a "percent savings."

⁴³ We believed it was important to report the range as well as the average because of how large the range is. The average is not as representative as it would be if there were less variation.

⁴⁴ Note that only one contract showed at or near an 80 percent savings, so this figure is particularly unrepresentative of the savings from the contracts that year. If that figure was discarded, the upper end of the range would be approximately 47 percent, which is much more consistent with the other years.

⁴⁵ For the years we reviewed, the savings realized from in-house designs declined each year. The fact that the department's overhead has increased in recent years is a factor in that decline.

⁴⁶ See Schneider et al., *supra* note 27.

⁴⁷ *Id.*

ing the type of project, choice of consultant, and time frame. Many of these variables could not be analyzed by the unit given the structure and content of the data we collected.

SECTION V

IS THE USE OF CONSULTANTS JUSTIFIED?

Previous sections have described the department's use of consultants and the associated cost to the department. Our analysis shows that consultant designs are more expensive than the department's in-house designs, though how much more varies greatly from one design to another. This section examines whether the use of consultants by the department is justified in light of the increased cost.

When the Department Uses Consultants

As discussed in Section III, the department uses consultants to regulate its workload and cope with peak demand, to respond to emergencies and unexpected needs, and to provide special expertise when necessary. The department also believes it is important to keep consultants "up to speed" by giving them enough work to enable them to keep current on departmental procedures.

All of the foregoing reasons are common justifications for the use of consultants in many other states. A recent survey of state transportation departments and consultants conducted as part of the National Cooperative Highway Research Program (NCHRP) found that the prevailing view is to regard consultants as extensions of staff.⁴⁸ Reasons cited for using consultants included designing overflow projects after in-house staff are fully occupied, dealing with pressures arising from changes in schedules or emergencies, and handling projects demanding special skills.⁴⁹

Another recent study, commissioned by the Louisiana Transportation Research Center (LTRC), found similar reasons for consultant

use.⁵⁰ In their review of the literature, the authors found that consultants give state transportation departments the ability to: accommodate peak demand without training and managing additional staff; meet deadlines when in-house resources are insufficient to ensure the completion of work within a specified time frame; and access specialized expertise which departments cannot afford to maintain on a permanent basis.⁵¹ The study also found it common for transportation departments to be concerned about maintaining consultants' level of experience with departmental procedures.⁵²

Both the NCHRP and LTRC studies also reported that most state transportation departments do not use cost as a determining factor when deciding whether to use consultants.⁵³ There are two reasons for this. First, as noted in Section IV, cost-comparison studies have not been able to determine with any degree of reliability how great or how consistent savings are when projects are done in house. (This evaluation is a case in point: Despite extensive efforts to arrive at sound cost comparisons, we continue to have strong reservations about treating the results of our cost comparison as anything more than a rough approximation.)

The second reason cost is not often a factor is that when state or federal funding is made available for construction, the design work must get done—period. Because the cost of preconstruction engineering—done in house or by a consultant—pales in comparison with construction costs, whether a state's transportation department can handle the work or not

⁴⁸ National Cooperative Highway Research Program, *Consultants for DOT Preconstruction Engineering Work* (1999), at 48.

⁴⁹ *Id.*

⁵⁰ See Schneider et al., *supra* note 27.

⁵¹ *Id.* at xvi-xvii. The authors further concluded that all of these factors influenced the Louisiana Department of Transportation and Development in its use of consultants.

⁵² *Id.* at xvi.

⁵³ *Id.*; NCHRP study, *supra* note 47.

is, in some sense, irrelevant. A multi-million dollar construction budget cannot be put on hold while a department saves \$10,000 here or there on design work.

In addition, departments are constrained by budgetary staffing limits. Even if a department wanted to increase staff to meet peak demands, adding permanent employees is usually not feasible. Furthermore, if permanent employees cannot be added within existing budgetary constraints, timing becomes an issue: By the time an additional staffing appropriation can be made, the need for the extra staff may have evaporated. Therefore, many departments design what they can in house, with staffs capable of handling a moderate workload, and use consultants during times of peak demand, regardless of cost.⁵⁴

A pragmatic analysis of the Nebraska department's policy yields the same conclusion: Using consultants as an extension of the department's staff to cope with peak demand is reasonable. Quality full-time employees are hard to find, especially under time pressure, and equally hard to get rid of or find work for when the pressure subsides. Consultants, on the other hand, come and go as needed with no strings attached.

Similarly, the department has little control over when emergencies and situations requiring expertise arise. To expect it to remain staffed for every contingency is simply unreasonable, from both a cost and a management standpoint.

Based on cited studies of consultant use in other states, and on our own analysis of the department's use of consultants, we conclude that the department is justified in using consultants for the reasons stated.

⁵⁴ The authors of the NCHRP study put it rather well: "The lack of consistent findings on the cost issue does not appear to cause great concern, in any case, given the fact that the need for consultants is overridingly created by staff constraints with the DOTs." NCHRP study, *supra* note 47, at 12.

How Often the Department Uses Consultants

The remaining issue relative to the department's use of consultants is whether the frequency of consultant use is justified. Using consultants when workload exceeds in-house capacity is acceptable, but only if that capacity is at an optimum level to begin with. How to determine the optimum level of in-house capacity is a significant issue for the department. It is based on an assessment of typical workload, personnel and budget constraints, and the state's future transportation needs.

As discussed in Section II, the department uses consultants to perform approximately one-third of its preconstruction engineering. There is no absolute standard for the optimum level of in-house capacity and the corollary level of consultant use, but at least two studies have concluded that contracting out up to, or even more than, one-half of a state transportation department's preconstruction engineering work is not out-of-line.

The NCHRP study, mentioned above, indicated that "half the states are now contracting out half or more of their design activities."⁵⁵ The study further found that, while there is significant variation among the states, the frequency of consultant use is generally increasing. The reasons cited for this trend, which is expected to continue, are that states are (1) tending to downsize and privatize, (2) continuing to have trouble retaining the technical staff necessary to keep pace with workload, and (3) finding additional funding sources that are expected to further increase workload.

Another study, sponsored by the American Consulting Engineers Council (ACEC), found that levels of consultant use in the range of 50-70 percent are optimum.⁵⁶ The results of

⁵⁵ NCHRP study, *supra* note 47, at 48.

⁵⁶ W. F. Panning, *The Effect of Contracting Out on Engineering Costs*, Professional Services Management Journal (September, 1991).

this study must be interpreted with caution however.⁵⁷ First, the study relies on data collected by the Federal Highway Administration (FHWA), and it is unclear how accurately states report costs to the FHWA.⁵⁸ Second, since it was based on data collected between 1979 and 1989, the study is dated.

When seen in light of the NCHRP and ACEC studies, the department's level of consultant use is slightly below that of many states, and is therefore probably reasonable.⁵⁹ Of course, the optimum level of consultant use is going to differ from state to state; so the most that can be said is that the department should remain cognizant of where the optimum level of consultant use is for Nebraska. The department must analyze its overall staffing needs in an effort to determine what the optimum level of consultant use is in Nebraska.

From our vantage point, the department's level of consultant use seems reasonable. Even though it appears to cost more to use consultants on a per-design basis, it is not necessarily true that the department could do all of its preconstruction engineering work in house for less. To do so, the department would have to add more staff,⁶⁰ which is not politically feasible or even necessarily cost efficient.

If staff were added, the department would see an increase not only in salaries, but also in its overhead. More employees means more benefits costs, more computers, more administration, and perhaps even a need for more space. Adding staff and overhead would reduce, and perhaps eliminate, any savings that would be realized by bringing all preconstruction engineering work in house.

⁵⁷ Both the NCHRP and LTRC studies are critical of the study, primarily because the levels of use cited in the study are higher than those reported by the states themselves.

⁵⁸ See discussion and accompanying citations, Schneider et al., *supra* note 27, at 13.

⁵⁹ Consultants, not surprisingly, would like it to be higher. In a conversation with unit staff, representatives of the Transportation Committee of the American Consulting Engineers Council of Nebraska indicated that they wished the department would send more work to consultants. Interestingly though, they did not suggest complete privatization of design work. The consultant representatives believe that the best designs are produced through a partnership with the department, and that the department needs to keep a core of competent engineers on staff that can coordinate consultant work. (Conversation with consultant representatives, 19 October 2000.)

⁶⁰ In fact, the opposite is being discussed. In a memo to employees released in September 2000, the director stated that, in order to reduce costs, the department would consider eliminating up to 133 positions through attrition and relocation.

SECTION VI

MONITORING CONSULTANT WORK

The last issue the committee requested the unit to address was how the department monitors consultant work to ensure cost-effective, efficient, and quality performance. This section deals with that question.

The department's primary method of ensuring quality performance by a consultant is to participate in extensive planning with the consultant before design begins. Much of that work falls to the Agreements and Consultant Services Section within the Project Development Division. That section is responsible for selecting the consultant, negotiating the project's scope and man-hours, making payments, and maintaining the contracts and records that result.

Both the department and consultant representatives indicated that, on consultant projects, the department does a lot of work up front.⁶¹ In fact, the consultants argued that an advantage to consulting arrangements is that the department is forced to plan more carefully so that it can negotiate effectively.⁶²

Once the contract is signed, the department engages in some ongoing supervision, though not an extensive amount. As discussed in Appendix C, on average, supervision costs amount to an additional five percent on top of what the department pays to the consultant. According to the department, part of what it is paying for when it hires a consultant is a professional service that it should not have to worry about.⁶³ The department expects consultants, as professionals, to com-

plete the work agreed to more or less independently.

The oversight that does go on occurs in two consultant coordination units within the Roadway Design Division of the Office of Engineering.⁶⁴ These units work closely with the consultant's project managers to make sure that the project stays on schedule. The oversight emphasis, then, is not on double-checking the consultant's designs, but on ensuring that the project will be completed on time. Additionally, consultants must report regularly to the department in order to receive periodic payments for work completed.

If the initial negotiations and ongoing oversight do not prevent or catch problems, the consultant is held liable for fixing them. As noted in Section III, that is why the negotiations phase of the relationship is so important to both sides. The consultant needs to negotiate a contract that it can fulfill while still earning a profit. From the department's standpoint, the contract needs to spell out departmental expectations clearly so that, if they are not met, there is a clear standard to which the consultant can be held in court.

⁶¹ Conversation with Khalil Jaber, 28 July 2001; conversation with consultant representatives, 19 October 2000.

⁶² Conversation with consultant representatives, 19 October 2000.

⁶³ Conversation with John Craig, 29 November 2000.

⁶⁴ There is one consultant coordination unit in each of the two expressway design sections.

SECTION VII

FINDINGS AND RECOMMENDATIONS

The final scope statement adopted by the committee instructed the unit to assess the department's use of consultants for preconstruction engineering to determine (1) when, why, and how often the department uses consultants; (2) whether the cost of work produced by consultants exceeds the cost of that produced in house and, if so, by how much; (3) whether the use of consultants is justified; and (4) how the department monitors consultant work and whether these efforts ensure cost-effective, efficient, and quality performance.

The unit makes the following findings and recommendations:

- 1) **Finding:** The department uses consultants for preconstruction engineering when (1) it does not have adequate staff to meet its design goals, (2) time considerations necessitate speed, and (3) a project requires special expertise. The unit finds these justifications for consultant use to be reasonable and consistent with the way consultants are used in many other states.
 - 2) **Finding:** The department's use of preconstruction-engineering consultants for about one-third of its design workload is reasonable and consistent with the actions of other states.
 - 3) **Finding:** The dollar amount dedicated to new consultant contracts for preconstruction engineering in Nebraska is down after peaking in the mid-1990s.
 - 4) **Finding:** The decline in consultant use is due, in part, to the reduced pace of the expressway projects and, in part, to the department's reduced use of overprogramming. (See Section III for a description of the term "overprogramming.")
- Recommendation:** While an analysis of the practice of overprogramming is beyond the scope of this evaluation, we believe that the practice could be subject to abuse and that the department should continue its policy of limiting it.
- 5) **Finding:** Cost comparisons of the kind undertaken in conjunction with this evaluation are notoriously difficult because a design project is done by either the department or a consultant, not by both. Therefore, it is impossible to determine with certainty what each project would have cost if it had been done by the other entity.
 - 6) **Finding:** An additional difficulty with this type of cost comparison is that state transportation departments (including Nebraska's) often do not track staff time or overhead in a manner that would facilitate comparisons with consultant costs.
- Recommendation:** The department should report back to the committee on ways it could adjust its record keeping to improve its ability to accurately track staff time and overhead at the division level.
- Comment:** We recognize that the department's accounting practices are driven by requirements of the Department of Administrative Services, and we are suggesting that the department examine potential improvements *within* that system.- 7) **Finding:** It is possible to compare the actual costs of designs prepared by consultants to *estimates* of what it would have

cost the department to prepare the designs in house. This is what the unit did. The weakness of this methodology is that the estimates of departmental costs are only *rough approximations*. Findings 8 and 9 should be read with this in mind.

- 8) **Finding:** Our analysis shows that, on a project-by-project basis, roadway, bridge, and right-of-way designs prepared by consultants in FY1997-98, FY1998-99, and FY1999-00, could have been done less expensively in house. However, because the results of our cost comparison are only approximations of cost differences, we cannot say with certainty that *every* project done by a consultant will be more costly than if it is done in house. We are confident that, *on average*, projects done by consultants are more costly than if they had been done in house.
- 9) **Finding:** Based on our analysis of the past three fiscal years, the average percent savings that would have resulted if preconstruction engineering projects that were contracted out to consultants had been done by the department in house are as follows:

FY1997-98	39%
FY1998-99	32%
FY1999-00	25%.

These percentages would have translated into total cost savings of:

FY1997-98	\$1,692,322
FY1998-99	\$1,598,765
FY1999-00	\$ 636,841.

- 10) **Finding:** In order to prepare all designs in house, the department would have to make expenditures for additional staff and overhead. These expenditures could reduce if not eliminate the cost differential between in-house and consultant-designed projects.

- 11) **Finding:** The savings that the department would have realized by doing preconstruction engineering in house have declined over the past three years. The department's overhead costs have increased at the same time and are a factor in the decreased savings.
- 12) **Finding:** While, on average, it costs the department more to contract out preconstruction engineering to consultants than to do it in house, we find that the department's use of consultants is justified.

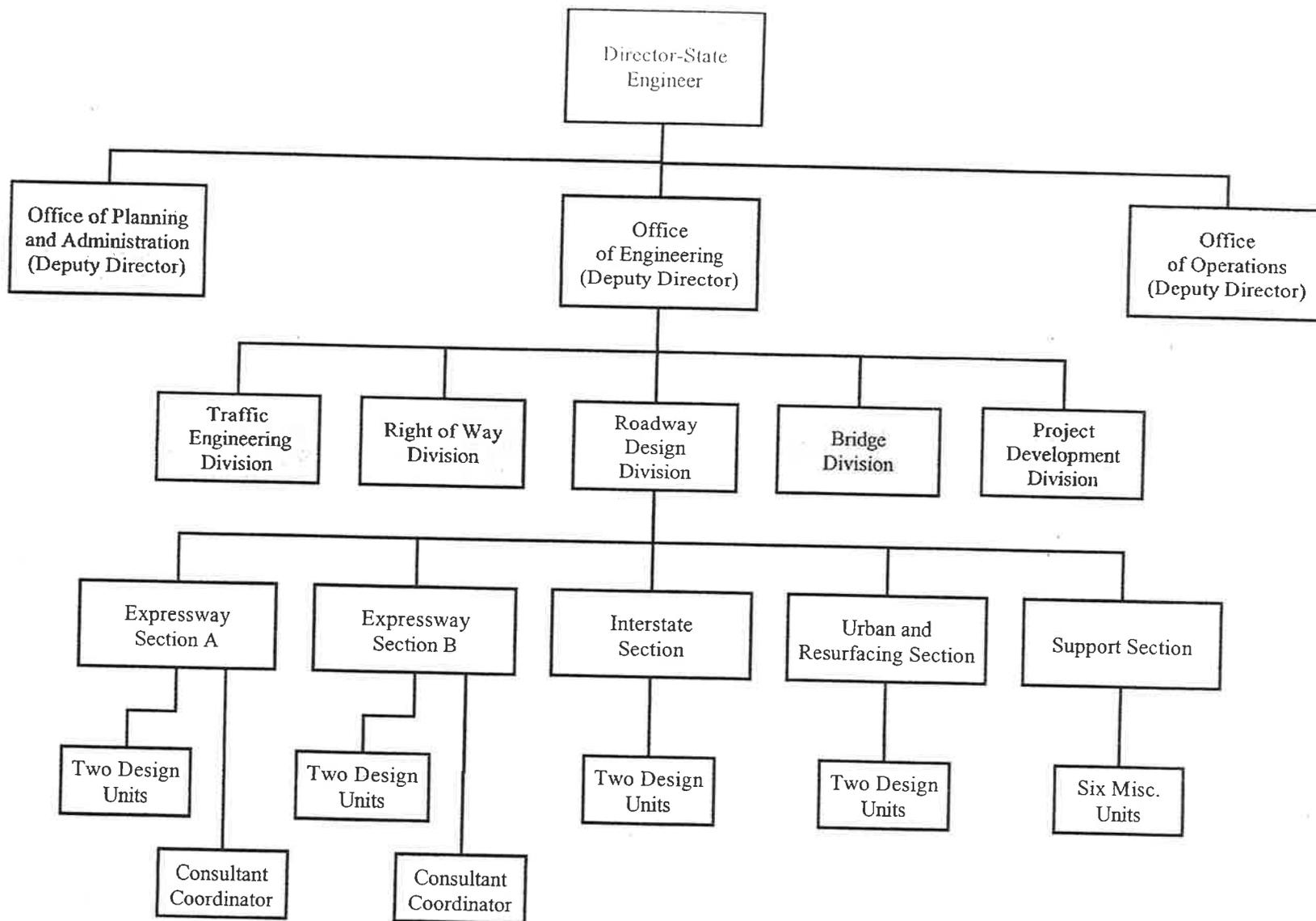
Comment: This conclusion is based on our earlier findings that (1) the justifications for consultant use advanced by the department, as well as the frequency of consultant use, are reasonable and consistent with the way consultants are used in many other states (Findings 1 and 2), and (2) doing all preconstruction engineering in house would not necessarily result in significant savings (Finding 10).

- 13) **Finding:** We find that the processes used by the department to direct and monitor consultant work are sufficient.

Comment: The department engages in minimal oversight of consultants, relying instead on its planning, the consultants' professionalism, and the legal requirements of consulting contracts to ensure quality performance.

Appendix A

A Sample of the Nebraska Department of Roads' Organizational Structure:
Office of Engineering - Roadway Design Division



Note: This chart does not include all members of the department's staff. Rather, it illustrates the department's organizational structure using the Roadway Design Division of the Office of Engineering as an example of how offices, divisions, sections and units fit together.
Source: Nebraska Department of Roads. Chart prepared by the Legislative Program Evaluation Unit.

Appendix B

The left column of Table A shows the typical personnel consulting firms use for preconstruction engineering designs, as indicated by their contracts with the department. The unit assumed that the department would use similar personnel if it designed the projects in house. The right column of Table A shows the unit's best determination of how the consultants' personnel would fit into the department's personnel structure.

One clarification should be made relative to the table. Consultants designate the highest level manager assigned to a project as a "principal," which signifies to the department that the person is authorized to represent the firm in negotiations and make final decisions. Depending on the size of the consulting firm, a principal could be similar to either a deputy director, a division head, or a section head. For each consulting firm we looked at, we surveyed departmental employees at different levels to determine which position would be equivalent. This method is clearly subjective, but eventually a consensus arose among departmental personnel for purposes of our comparison.

To estimate the department's labor costs based on these positions, the unit took the average salary for each position within the Roadway Design, Bridge, and Right of Way divisions. Where two positions are indicated on the right, there was so little difference in the average salaries for those positions that they were combined.

TABLE A: CONSULTANT PERSONNEL AND EQUIVALENT DEPARTMENT POSITIONS	
Consultant Personnel*	Equivalent Department Position
Principal	Deputy-Director, Engineer VII, or Engineer V
Project Manager/Senior Engineer	Engineer IV
Design Engineer/Professional Engineer	Engineer III
Technician	Engineer II/Designer III
Drafter/CADD Technician	Design Technician III
Junior Technician	Design Technician II/I
Stenographer/Clerical Staff	Office Clerk III
Registered Land Surveyor	Deputy State Surveyor
Party Chief	Construction Technician III
Instrument Man	Construction Technician II
Rodman	Construction Technician I

*In some cases, only a name was used in the contract—without a title—so, when necessary, the unit augmented the contract information with the consultant's organizational chart. If we could not do that, we asked people in the department who had close contact with the individual to indicate his or her position within the consulting firm.

Source: Nebraska Department of Roads, consultant contracts, and consultant proposals. Table prepared by the Legislative Program Evaluation Unit.

Appendix C

One limitation of the unit's cost-comparison methodology is that it did not account for costs the department incurs when overseeing consultant work. Even when a project is designed by a consultant, the department must still plan the project, negotiate with the consultant, and review the consultant's work. The unit was unable to estimate the cost of project planning and consultant negotiation because the relevant department staff members do not keep track of the time they spend on these activities.

We were, however, able to estimate the department's cost for reviewing consultants' work. But we were unable to build this estimate into our cost comparison because the cost comparison was based on individual contracts with consultants, whereas the cost estimate for staff reviews of consultants' work is based on projects, which may include more than one contract.

To approximate the cost of staff reviews, we analyzed 26 projects from the last three fiscal years—all the projects for which the preconstruction engineering work was complete—and had the department report detailed costs to us for those projects, distinguishing payments to consultants from departmental costs.¹ We totaled the two categories of costs. Then we divided the department's total review cost by its total payment to the consultant in order to express the relationship between the two costs as a percentage. Our calculations showed that, on average, the cost to the department for ongoing review is approximately five percent of payments made to consultants.²

This analysis suggests that the cost of the department's review of consultants' work is minimal.

¹ The accuracy of these figures depends on the level of diligence exercised by departmental staff in recording how they spent their time. While staff are encouraged to record their time relative to specific projects, this is, apparently, not always done. (Conversation with Marilyn Hayes, Budget and Finance Manager, 10 July 2000.)

² For example, if the total payment to the consultant was \$100,000, the departmental cost for review was approximately 5 percent of that, or \$5,000.

Part II

*Agency First Response
and
Unit Director's Review of
Agency Response*

STATE OF NEBRASKA

DEPARTMENT OF ROADS

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March 8, 2001

Mike Johanns
Governor

Ms. Cynthia Johnson
Director of Research
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LEGISLATIVE RESEARCH

Dear Ms. Johnson:

Thank you for the opportunity to comment on the recommendations and information contained in your draft report regarding the Department's use of consultants. Our comments to your draft report recommendations are as follows:

Finding #4 Recommendation – Disagree

Many factors beyond the control of the Department, such as environmental constraints, political influences, and public input, affect project schedule goals. When these goals are altered and the letting dates cannot be achieved, other projects must be substituted to ensure all yearly construction money is used to its fullest extent. Therefore, the Department believes overprogramming is an effective management tool.

Finding #6 Recommendation – Agree

Past practices of costing expenses to overhead activities has overstated the overhead charges while understating the direct expenses. This practice will be corrected. The Department will take action to ensure that detail costs (labor and expenses) are reported to specific projects when applicable, ensuring that only overhead expenses are costed to overhead. Additionally, the comment made for this finding is incorrect. The Department of Roads accounting practices are not driven by requirements of the Department of Administrative Services. Our problem is internal and, consequently, must be an internal correction.

In addition, several comments are made below to clarify or correct information contained in the body of the report.

- Section II – Overview of the Department of Roads

Since the preparation of this section of the report, several organizational changes have occurred. An organization chart is provided for your information.

- Section III – The Department's Use of Consultants

This section discusses the Department's use of overprogramming, and the Department's thoughts on this topic are stated above. Additional, specific comments within this section are as follow:

1. Page 5, last paragraph, 2nd sentence, should read "Past agency practices made extensive use of "overprogramming," or designing a certain number of highway projects that were beyond current funding projections."
2. Page 5, footnote 9 should read "According to the Department, only highway and expressway projects are overprogrammed, not interstate projects."
3. Page 6, 1st paragraph, 1st sentence, "The current practice has reduced overprogramming, though the Department..."
4. Page 6, footnote 12 should be deleted, as "abuse" does not seem to fit this situation. Also, it is the Department of Roads management that decides how many "extra" projects should be designed, not just the Director.
5. Page 7, footnote 19, add "or improvements are made on the property" to the end of the footnote.
6. Page 7, last paragraph, 4th sentence, change "preliminary plans" to "recommendations."
7. Page 8, 2nd paragraph, last sentence – In practice, consultants are most often used to complete the majority of a design project but not necessarily the entire project."

- Section IV – Cost Comparison

1. Page 9, footnote 28, 2nd sentence – Designs produced by the Right of Way Division plot, and compute, the amount...
2. Page 11, footnote 34, change "engineers" to "designers"

- Appendix A – Organization structure has changed (current organization chart attached to this letter)

This concludes our comments on the draft report. I would like to add that your staff has conducted their study in a very professional and efficient manner. We look forward to the committee's final recommendations.

Should you have questions regarding the comments made above, please call me or the appropriate Department staff for further clarification.

Sincerely,

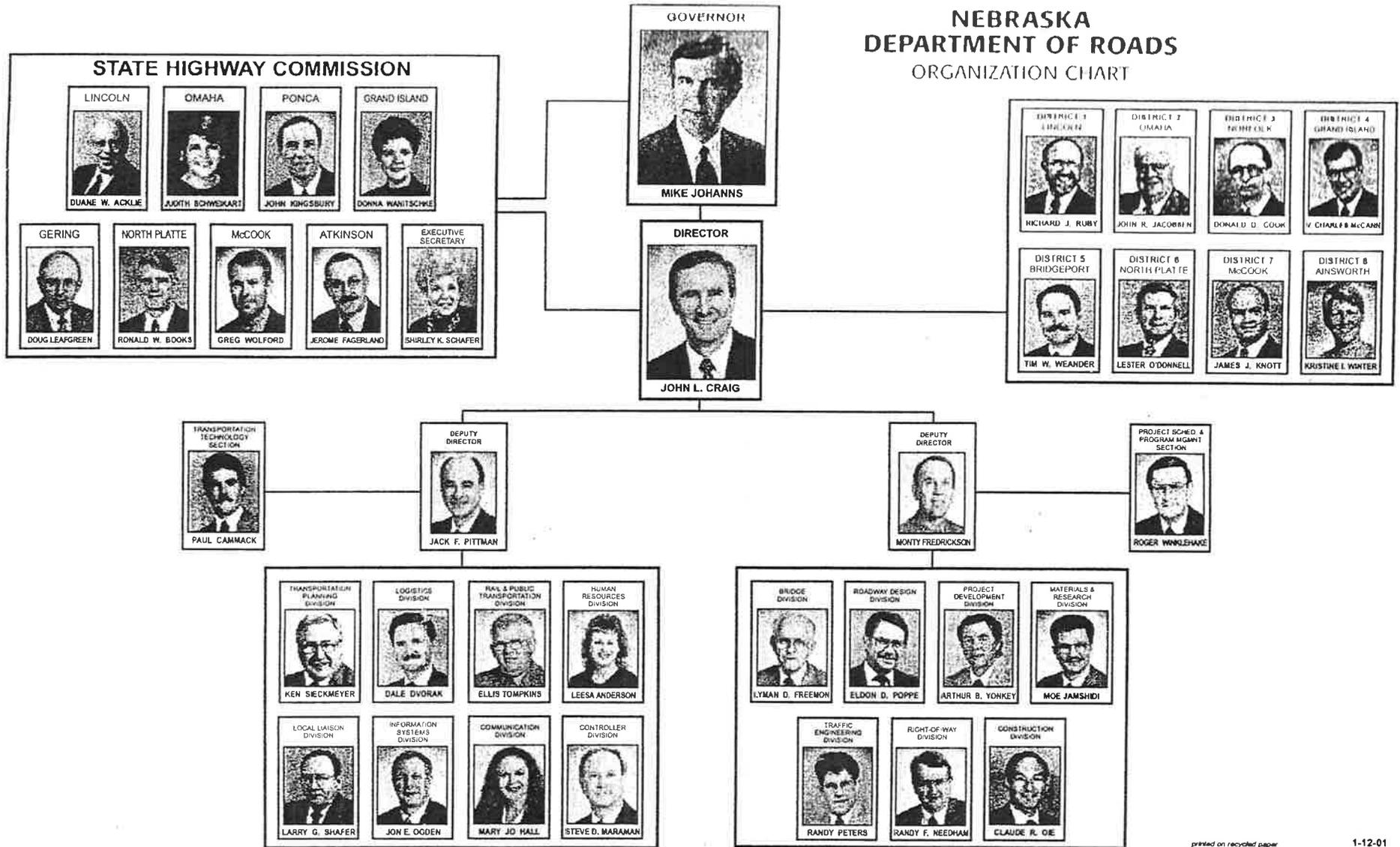


John L. Craig
Director

JLC:AY:z

Attachment

NEBRASKA DEPARTMENT OF ROADS ORGANIZATION CHART



UNIT DIRECTOR'S REVIEW OF AGENCY RESPONSE

On 8 March 2001, the director of the Department of Roads submitted a response to the Program Evaluation Unit's report prepared in conjunction with this evaluation. Neb. Rev. Stat. sec. 50-1210 of the Nebraska Legislative Program Evaluation Act requires the Program Evaluation Unit Director to "review the response, prepare a brief written evaluation of it, and forward the evaluation to the committee for review." The director's evaluation of the response follows.

The department's brief response to the unit's draft report takes issue with our discussion of several topics. Each of the department's concerns is addressed separately below.

Many of the department's criticisms are ill-founded in that they are based either on a misunderstanding of the text of the report or on contradictory information now being provided to us by the department for the first time. (The latter is addressed further in our concluding comments.)

The department begins its response by addressing the two recommendations contained in the unit's report. The department disagrees with our first recommendation relative to overprogramming, however, it is clear that the department has misunderstood our position. We did not recommend that the department entirely eliminate overprogramming.

Both the text of the report and the recommendation make clear that an evaluation of the practice of overprogramming was outside the scope of the evaluation. Therefore, we spent little time on the issue, noted the *possibility* of abuse, and recommended only that the department monitor its use of the practice and *continue its policy of limiting it*. (We were informed during data collection that the practice had been used rather extensively in the past, but that it is being used less now. This struck us as a positive trend, and we were simply encouraging that to continue.)

The department's response to the second recommendation, relative to its accounting practices, is baffling. Though it agrees that it could improve its record keeping to more accurately separate direct costs and overhead, it takes issue with our comment that whatever changes it might make would have to be consistent with the policies of the Department of Administrative Services (DAS). Instead, the department claims that its accounting practices are not driven by DAS requirements. This is clearly in error since all state agencies must conform with DAS requirements. Furthermore, the department's claim directly conflicts with what we were told during data collection.

During data collection, the department's accounting personnel told us there are some areas in which the department can improve the separation of labor and overhead costs, such as by enforcing its requirement that certain employees relate the work hours they record to the projects they have worked on. We were told that, in other areas, the department's hands are tied by DAS requirements; and that, because of these requirements, some expenses cannot be cleanly separated into labor and overhead.

Our recommendation and related comment were intended to encourage the department to improve in the areas in which it has full authority, but recognized that there are limits to its authority. Sur-

prisingly, the department now suggests there are no such limits. Be that as it may, we appreciate the department's willingness to take action relative to this recommendation and look forward to reading the details of these changes in its implementation plan.

After it addressed the unit's recommendations, the department made several comments that it believed clarified or corrected information in the report. The unit's evaluation of these comments follows.

Section II:

The department states that several organizational changes have occurred since the report was prepared.

Recent changes in the department's organizational structure are irrelevant to the report because they do not affect any of the unit's findings or recommendations. However, a footnote will be added to note the change in the structure that was in place at the time the report was written.

Section III:

1. In addressing the issue of overprogramming, the department wishes to place responsibility with "past agency practices" rather than with the director. The unit is unwilling to do this because the department simply cannot implement "practices" without the director's stated or tacit imprimatur—he or she has the final say in all departmental policies. Furthermore, as applied specifically to this policy, we were clearly told, by staff and the director himself, that the recent decline in overprogramming was the result of the current director's preference.
2. The department suggests that we misrepresented the kinds of projects that may be overprogrammed. We will make this change, but we note that it directly conflicts with information provided to us during a 4 January 2001 conversation with Monty Fredrickson and Roger Winkelhake. The report, as written, reflects what our documentation of that conversation *clearly* indicates. However, we will now assume that the information presented in the department's response is accurate.
3. This suggestion again encourages us to separate the director's policies from the department's policies, which, as stated above, we are unwilling to do.
4. The department would like us to delete a footnote that uses the word "abuse" in the context of overprogramming. However, the footnote does not say that the department *has* abused the practice. Instead, it says that there is the *possibility* of abuse. The intent of the footnote was to caution the department about the practice and, in fact, commended the current director's policy. We believe the footnote is appropriate.
5. The unit agrees with this suggestion.
6. The unit agrees with this suggestion.

7. The unit agrees with this suggestion.

Section IV:

1. We agree to insert "and compute" into the sentence where appropriate.

2. The unit agrees with this suggestion.

Appendix A:

Again, the unit feels that, because the report was accurate at the time it was written, and the change does not affect any of our conclusions, no change is necessary.

We would like to conclude by noting that we find portions of the department's response disturbing: At several points, the department has directly contradicted what we were told during data collection. If program evaluation is to benefit the Legislature and the agency, we need to be provided with clear and accurate information and not a moving target. Whether intentional or inadvertent, these inconsistencies are troubling.

Part III

*Program Evaluation Committee
Recommendations*

PART V

PART VI

PART VII

Part III

Part IV

Program Evaluation Committee Recommendations

Department of Road's Use of Consultants

On 20 March 2001, in accordance with Neb. Rev. Stat. sec. 50-1211(1) of the Legislative Program Evaluation Act, the Legislative Program Evaluation Committee (committee) convened to consider the findings and recommendations contained in the Program Evaluation Unit's (unit's) final draft report entitled, *Nebraska Department of Roads: Use of Consultants for Preconstruction Engineering*, and the Department of Road's response to that report. The committee discussed each of the findings and recommendations contained in Section V of the report.

Findings and Recommendations

Finding 1: The department uses consultants for preconstruction engineering when (1) it does not have adequate staff to meet its design goals, (2) time considerations necessitate speed, and (3) a project requires special expertise. The committee finds these justifications for consultant use to be reasonable and consistent with the way consultants are used in many other states.

Recommendation 1: The committee makes no recommendation relative to this finding.

Finding 2: The department's use of preconstruction-engineering consultants for about one-third of its design workload is reasonable and consistent with the actions of other states.

Recommendation 2: The committee makes no recommendation relative to this finding.

Finding 3: The dollar amount dedicated to new consultant contracts for preconstruction engineering in Nebraska is down after peaking in the mid-1990s.

Recommendation 3: The committee makes no recommendation relative to this finding.

Finding 4: The decline in consultant use is due, in part, to the reduced pace of the expressway projects and, in part, to the department's reduced use of overprogramming. (See Section III for a description of the term "overprogramming.")

Recommendation 4: While an analysis of the practice of overprogramming is beyond the scope of this evaluation, the committee believes that the practice could be subject to abuse and that the department should continue its policy of limiting it.

Finding 5: Cost comparisons of the kind undertaken in conjunction with this evaluation are notoriously difficult because a design project is done by either the department or a consultant, not by both. Therefore, it is impossible to determine with certainty what each project would have cost if it had been done by the other entity.

Recommendation 5: The committee makes no recommendation relative to this finding.

Finding 6: An additional difficulty with this type of cost comparison is that state transportation departments (including Nebraska's) often do not track staff time or overhead in a manner that would facilitate comparisons with consultant costs.

Recommendation 6: The department should report back to the committee on ways it could adjust its record keeping to improve its ability to accurately track staff time and overhead at the division level.

Comment: We recognize that the department's accounting practices are driven by requirements of the Department of Administrative Services, and we are suggesting that the department examine potential improvements *within* that system.

Finding 7: It is possible to compare the actual costs of designs prepared by consultants to *estimates* of what it would have cost the department to prepare the designs in house. This is what the unit did. The weakness of this methodology is that the estimates of departmental costs are only *rough approximations*. Findings 8 and 9 should be read with this in mind.

Recommendation 7: The committee makes no recommendation relative to this finding.

Finding 8: The analysis shows that, on a project-by-project basis, roadway, bridge, and right-of-way designs prepared by consultants in FY1997-98, FY1998-99, and FY1999-00, could have been done less expensively in house. However, because the results of the cost comparison are only approximations of cost differences, one cannot say with certainty that *every* project done by a consultant will be more costly than if it is done in house. The committee is confident that, *on average*, projects done by consultants are more costly than if they had been done in house.

Recommendation 8: The committee makes no recommendation relative to this finding.

Finding 9: Based on the analysis of the past three fiscal years, the average percent savings that would have resulted if preconstruction engineering projects that were contracted out to consultants had been done by the department in house are as follows:

FY1997-98	39%
FY1998-99	32%
FY1999-00	25%.

These percentages would have translated into total cost savings of:

FY1997-98	\$1,692,322
FY1998-99	\$1,598,765
FY1999-00	\$ 636,841.

Recommendation 9: The committee makes no recommendation relative to this finding.

Finding 10: In order to prepare all designs in house, the department would have to make expenditures for additional staff and overhead. These expenditures could reduce if not eliminate the cost differential between in-house and consultant-designed projects.

Recommendation 10: The committee makes no recommendation relative to this finding.

Finding 11: The savings that the department would have realized by doing preconstruction engineering in house have declined over the past three years. The department's overhead costs have increased at the same time and are a factor in the decreased savings.

Recommendation 11: The committee makes no recommendation relative to this finding.

Finding 12: While, on average, it costs the department more to contract out preconstruction engineering to consultants than to do it in house, the committee finds that the department's use of consultants is justified.

Comment: This conclusion is based on our earlier findings that (1) the justifications for consultant use advanced by the department, as well as the frequency of consultant use, are reasonable and con-

sistent with the way consultants are used in many other states (Findings 1 and 2), and (2) doing all preconstruction engineering in house would not necessarily result in significant savings (Finding 10).

Recommendation 12: The committee makes no recommendation relative to this finding.

Finding 13: The committee finds that the processes used by the department to direct and monitor consultant work are sufficient.

Comment: The department engages in minimal oversight of consultants, relying instead on its planning, the consultants' professionalism, and the legal requirements of consulting contracts to ensure quality performance.

Recommendation 13: The committee makes no recommendation relative to this finding.

Part IV

Opinion of the Fiscal Analyst

State of Nebraska

LEGISLATIVE COUNCIL



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MEMO

RECEIVED

MAR 29 2001

LEGISLATIVE RESEARCH

Memo: Cynthia Johnson
Legislative Research Division

From: Mike Lovelace *Mus*
Legislative Fiscal Office

Date: March 28, 2001

Subject: *Final Draft Report: Nebraska Department of Roads, Use of Consultants for Preconstruction Engineering*

In response to your March 20 letter, it is estimated that the recommendations of the Program Evaluation Committee contained in the *Final Draft Report: Nebraska Department of Roads, Use of Consultants for Preconstruction Engineering* can be implemented by the existing Department of Road's staff within the current appropriation level. Please contact me at 471-0050 if you have any questions.

03280944.ML

cc: Michael Calvert

Part V

Addendum A: Agency Second Response

STATE OF NEBRASKA

DEPARTMENT OF ROADS

John L. Craig, Director

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RECEIVED

APR 19 2001

LEGISLATIVE RESEARCH



Mike Johanns
Governor

April 13, 2001

Ms. Cynthia Johnson
Director
Legislative Research Division
P.O. Box 94945
Lincoln, NE 68509-4945

Dear Ms. Johnson:

The Department has reviewed, and is in agreement with, the Legislative Program Evaluation Committee's findings and recommendations.

The use of over-programming will continue to be limited to efficient levels that maintain our ability to produce our annual construction goals.

Additionally, we are in agreement with Finding 6 and Recommendation 6. However, we would like to provide the following information as additional clarification to our March 8, 2001 response to the Unit's draft report. The Department is in compliance with the Department of Administrative Services' accounting requirements and will continue to operate within that framework. However, due to federal highway financing policies and procedures and internal cost accounting procedures, the Department has additional coding requirements that exceed the Nebraska Accounting System (NAS) basic coding structure. With this in mind, our response was trying to convey that, with respect to the cited cost comparison weaknesses, we believe it would be more productive to examine potential improvements with our own accounting system rather than in the Department of Administrative Services' system.

As a result of the committee's Recommendation 6, the Department will begin to prepare an implementation plan to more accurately track staff time and overhead for the agency.

Sincerely,

A handwritten signature in black ink, appearing to read "John L. Craig", written over a circular stamp.

John L. Craig
Director

JLC:AY:z

Part VI

*Addendum B: Recent Changes in the
Department's Organizational Structure*

After the unit's draft report was prepared but prior to the release of this report, the Nebraska Department of Roads reorganized itself and eliminated one of the deputy director positions. The unit did not amend the report to reflect this change because it did not affect any of our conclusions.

The department's new organizational structure, as described in the department's response to the draft report, is illustrated on the following page.

NEBRASKA DEPARTMENT OF ROADS ORGANIZATION CHART

