

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
SYNTHESIS OF HIGHWAY PRACTICE

137

NEGOTIATING AND CONTRACTING
FOR PROFESSIONAL ENGINEERING
SERVICES

TRANSPORTATION RESEARCH BOARD
National Research Council

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM **137**
SYNTHESIS OF HIGHWAY PRACTICE

NEGOTIATING AND CONTRACTING FOR PROFESSIONAL ENGINEERING SERVICES

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TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C.

JULY 1988

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an assurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and its Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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NOTICE

The project that is the subject of this report was a part of the National Cooperative Highway Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council. Such approval reflects the Governing Board's judgment that the program concerned is of national importance and appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the Federal Highway Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

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The Transportation Research Board evolved in 1974 from the Highway Research Board, which was established in 1920. The TRB incorporates all former HRB activities and also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society.

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PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire highway community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

*By Staff
Transportation
Research Board*

This synthesis will be of interest to designers, highway administrators, and others concerned with hiring consultants to prepare designs or perform construction inspection. Information is presented on the procedures and processes used by the states in negotiating and contracting for professional engineering services.

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated, and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project, carried out by the Transportation Research Board as the research agency, has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.

In recent years there has been a sharp increase in the use of consultants by the states for design and for the inspection of construction. This report of the Transportation Research Board describes the processes used by the states in negotiating and contracting for professional engineering services, including determining needs, listing

qualified firms, evaluating qualifications, negotiating terms and prices, and evaluating performance.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the Board analyzed available information assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the researcher in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

CONTENTS

1	SUMMARY
3	CHAPTER ONE INTRODUCTION
6	CHAPTER TWO PRICE COMPETITION Historical Summary, 6 Arguments Pro and Con, 9 Evaluation, 10
11	CHAPTER THREE PRE-SELECTION POSITION Regulations and Policies, 11 State Practices, 13
21	CHAPTER FOUR CONSULTANT-SELECTION PROCESS Fields of A/E Firms, 21 Evaluation Factors, 22 General Selection Methods, 23
29	CHAPTER FIVE THE NEGOTIATION PROCESS Scope Meeting, 29 Consultant's Cost Proposal, 29 Pre-agreement Audit and Technical Review, 30 Negotiation, 33 Consultant's Agreement, 34
37	CHAPTER SIX SELECTED CONTRACT FEATURES Risk Assignment, 37 Time and Performance Schedules, 41 Change Orders/Supplementals, 45 Termination, 47 Deliverables, 49
50	CHAPTER SEVEN ADMINISTRATION Documentation, 50 Performance Measures, 50 Qualifications and Training, 54
57	CHAPTER EIGHT FINDINGS AND RECOMMENDATIONS Price Competition, 57 Pre-selection Position, 57 Consultant-Selection Process, 58 The Negotiation Process, 58 Selected Contract Features, 59 Administration, 59
61	REFERENCES
63	FURTHER READING
64	APPENDIX A PUBLIC LAW 92-582, 1972 (BROOKS LAW)
66	APPENDIX B SURFACE TRANSPORTATION AND UNIFORM RELOCATION ASSISTANCE ACT OF 1987
69	APPENDIX C NEW JERSEY'S LIABILITY AND INSURANCE PROVISIONS
73	APPENDIX D NEW YORK'S PROGRESS AND COST-CONTROL SYSTEM

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Kenneth E. Cook, Transportation Economist, Transportation Research Board, assisted the NCHRP Project 20-5 Staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance were most helpful.

NEGOTIATING AND CONTRACTING FOR PROFESSIONAL ENGINEERING SERVICES

SUMMARY

With the increase in the federal-aid program in recent years and the concurrent emphasis on reducing the size of state bureaucracies, there has been a sharp increase in the use of consultants by the states for design and for the inspection of construction. This synthesis addresses the processes and related considerations involved with contracting for the use of engineering firms by the states.

A controversy has continued for more than a decade concerning the use of price in the selection of consultants. The synthesis recommends that price be used as a nondominant selection factor for lump-sum agreements that require clearly definable scopes of services.

States determine the need for consultant services using methods that range from simple district work plans to centrally managed broad-based systems. The states generally prepare comprehensive scopes of work at the time they request consultant services to avoid delay, to ensure a common understanding of the work required, and to provide a basis for estimating costs and for negotiations.

Most states use a project-specific field of consultants rather than a general file as a basis for preparing a short list of qualified consultants. The evaluation factors and ways that they are ranked and grouped vary widely, ranging from simple subjective assessments to multi-stage systems. The most important widely used evaluation factor is the experience and qualifications of the key personnel to be assigned to the project relative to the work to be done. Although competitive negotiation is the predominant method of selecting consultants, a number of states evaluate the consultants' price proposals as a nondominant final selection factor from a short list of the highest-qualified firms.

The negotiation process includes a scope meeting to ensure that both the agency and the consultant understand the scope and nature of the work, the responsibilities of each, the methods of payment, any critical mileposts, and content of cost proposals. A pre-agreement audit may be performed to verify the capabilities of the consultant's accounting system to segregate costs and to ascertain that estimated costs are reasonable. Negotiation is necessary to adjust any differences in perception of the work.

Risk management by the states has been seriously affected by the dramatic surge in the potential number and degree of liability claims and in the cost of insurance for errors and omissions or professional liability. The synthesis recommends relieving consultants of a portion of the burden, which is more equitable and should reduce the related costs that are at least partially reimbursed indirectly by the states. In addition, the caveats in current insurance specifications that allow insurance to expire when it is needed the most require attention.

The primary objective of performance ratings is to evaluate the consultant's capability to perform work of a similar nature and complexity. This information can be used in the selection of consultants for other projects of a similar nature. It is recommended that the factors used for performance ratings be selected and evaluated accordingly.

The key to an adequate consultant management process is a capable agency staff. The importance of a continual upgrading of in-house capability through internal and external training methods cannot be overemphasized.

CHAPTER ONE

INTRODUCTION

The enactment of the Surface Transportation Assistance Act of 1982 sharply increased the size of the federally aided highway program at a time when national concern centered on reducing the size of governmental bureaucracy. In the face of strong budgetary resistance to the hiring of additional permanent personnel and the insufficiency of experienced personnel to handle the additional work load, state transportation departments generally had to seek alternatives for the management of their escalated programs. Such alternatives included improvements in engineering productivity and contracting with engineering firms (consultants) for all phases or selected phases of their design and construction inspection work load. Thus, the use of consultants became an important personnel resource for many states, even for those that had little or no prior experience with such use in their design and construction programs.

An informal study (*J*) by the Federal Highway Administration (FHWA), despite its disclaimer of potential inaccuracies in statistical reporting by the states, indicates some interesting relationships between the national growth of the highway program and the use of consultants. The national federal-aid highway program increased by 30 percent after the 1982 Act, while the average annual dollar amounts obligated for preliminary engineering consultant contracts rose by 45 percent. Although three fourths of the expenditure for consultant preliminary engineering contracts was generated by 15 states, it will be seen subsequently that most states significantly increased their use of such contracts. The study cited that more than one third of the national expenditure of federal-aid funds for preliminary engineering was through consultant contracts, reflecting the growing importance of this resource in the national highway program.

This report covers in varying detail the selection, negotiation, and contracting procedures for consultant engineering services. A literature search was made of pertinent studies, reports, journal articles, and publications, and a survey was sent to states and a sample of federal and municipal agencies to ascertain current practices and viewpoints. A general survey was sent to all states, and a second, more detailed and comprehensive one was forwarded to selected states deemed to be major users of consultant services and to be utilizing unique or relatively efficient systems. Wherever necessary, follow-up communications were initiated to clarify responses.

Thirty-nine states responded to the survey, including nine states that received the more comprehensive questionnaire. These are listed in Table 1 along with data regarding the magnitudes of their annual construction letting programs and their annual expenditures on consultant contracts for design and for construction inspection. Not all of the states responded to each

of the questions with the same degree of completeness. Nevertheless, the response was remarkably good and provided more than an adequate amount of data for comparison.

To avoid redundancy in the definition of terms, reference in this report to "the national survey" means the responses by the

TABLE 1
STATES PARTICIPATING IN SURVEY

State	Annual Construction Letting Program (\$ millions) ^a	Annual Payments to Consultants (\$ millions) ^a		E/I
		Design	Constr.	
Alabama	280	3	0	
Alaska	97 ✓	3	0	
Arkansas	200	1	0	
Colorado	144	n.a.	n.a.	
Connecticut ^b	350	43	22	
Delaware	85 ✓	4	1	
Florida ^b	750	50	25	
Georgia	500	21	0	
Hawaii	50 ✓	n.a.	0	
Idaho	96 ✓	3	0	
Illinois ^b	875	45	11	
Indiana ^b	393	14	0	
Iowa	200	4	0	
Kansas	260	3	6	
Kentucky	323	n.a.	n.a.	
Maine	60 ✓	1	0	
Maryland ^b	450	18	12	
Michigan	400	2	0	
Mississippi	175	3	2	
Missouri	392	0	0	
Montana	140	1	0	
Nevada	120	n.a.	0	
New Hampshire	80 ✓	n.a.	0	
New Jersey	450	30	6	
New York ^b	850	66	44	
North Carolina	350	3	1	
Ohio	675	24	7	
Oklahoma	180	5	0	
Oregon	225	1	0	
Pennsylvania ^b	1000	33	43	
South Carolina	280	10	2	
South Dakota	120	1	1	
Tennessee ^b	450	8	7	
Texas	1900	36	1	
Utah	150	n.a.	n.a.	
Virginia	900	40	5	
Washington ^b	362	n.a.	n.a.	
West Virginia	250	10	0	
Wisconsin	250	12	2	

^aThe dollar amounts shown represent the total of state and federal-aid matching funds.

^bState responded to comprehensive survey.

39 states, regardless of the percentage of them that responded to the question discussed. The term "survey of selected states" applies to the responses by the nine selected states, provided that a majority furnished specific input to the subject being cited. Also note that the terms "A/E firms," "engineering firms," and "consultants," appear frequently throughout this report. There is no distinction intended in the use of such terminology.

If the results of the survey shown in Table 1 are linearly expanded to encompass national use, an annual expenditure for consultant contracts for design and for construction inspection of approximately one billion federal and state dollars may be estimated. Although only a dozen states account for 60 percent of such an expenditure, most of the states participate to some degree. Table 2 shows that all states responding to the national survey currently have design contracts with engineering firms and that such use has increased in the past five years. For example, the table shows that 21 states used consultants to design more than 5 percent of their program 5 years ago, versus 27 states currently. Table 2 shows similar data for construction inspection by consultants, with 30 states retaining all construction inspection for in-house staff 5 years ago, versus only 15 states currently.

The actual use of consultants by the states shows little correlation with the size of their programs. For example, the annual letting programs for Connecticut and North Carolina are identical in magnitude, but their relative expenditures for consultant contracts bear a ratio of 16:1. Figure 1 shows a plot of each of the responding state's annual letting program versus its annual expenditures on consultant contracts. It can be seen that the correlation is poor, with only a general relationship between the program size and consultant expenditures.

TABLE 2

USE OF CONSULTANTS

Percentage of Program to Consultants	Design Phases (Number of States)		Construction E/I (Number of States)	
	Now	5 Yrs. Ago	Now	5 Yrs. Ago
0	0	3	15	30
0-5	12	15	13	5
5-10	6	3	2	2
10-20	4	3	4	0
20-30	2	2	1	0
30-40	3	4	1	1
40-50	5	5	3	1
>50	7	4	0	0
Total Sample:	39	39	39	39

The national survey showed that the use of consultants is of major importance, that most of the states are involved in some degree regardless of the size of their programs, and that such use has increased over the past five years.

The subject of this report may therefore be expected to be of national concern, with a widespread interest in the improvement of related procedures. Accordingly, the report centers on discussions of issues, illustrative procedures that are deemed to be

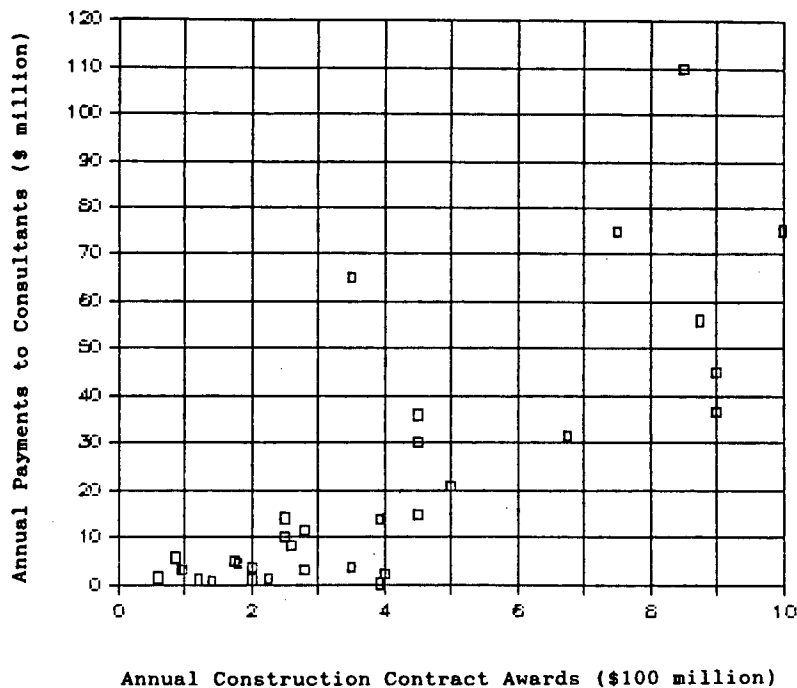


FIGURE 1 Use of consultants by program size.

unique or effective, and references to federal requirements, which tend to shape both the federal-aid and 100-percent-state-financed programs.

The various subjects discussed in this report are in the order in which they are generally addressed in the consultant-procurement process, with the exception of Chapter 2. The next

chapter presents a discussion of the sharply differing viewpoints by the various professional groups and the general public concerning the consideration of price in the selection of consultants. Such a discussion up front is intended to provide an overall perspective to the discussions of the various states' procedures in subsequent chapters.

CHAPTER TWO

PRICE COMPETITION

Competition has long been widely accepted as fundamental to public procurement. However, competition in the broad sense may actually encompass three distinctly different procedures:

- Competitive bidding, where sealed bids are publicly solicited and a contract award is made to the lowest bidder.
- Price competition, where prices are solicited from selected qualified firms and considered as a factor along with other considerations in the selection process.
- Competitive negotiation (qualifications-based ranking), where a number of the highest-qualified firms are selected, and negotiation of a reasonable price is conducted with them in priority order until successful.

Each of these selection methods are applicable to different types of situations. In some instances, such as when competition is inadequate or only a single source is available, noncompetitive negotiation becomes acceptable. The applicability of the appropriate form of competition in the procurement of architect-engineer (A/E) services has been the subject of widespread controversy for more than a decade.

The controversy generated from the specific procedure for the federal procurement of A/E services set forth by Brooks Law (2), which departed from the customary requirements for price competition or competitive bidding in other types of public procurement contracts. The viewpoint by factions of the public and procurement officials is that such departure from the principles of price competition increases the risk of political abuse and higher costs to the public. The professional community, on the other hand, argues that the procurement of specialized professional services based on comparisons of proposed prices by competitors is not in the public interest because it would stress price at the expense of quality and increase the life-cycle costs of the total project.

This chapter examines the history of the controversy and the arguments presented by various opposing factions and recommends a course of action for consideration by governmental agencies subject to their individual environment and capabilities.

HISTORICAL SUMMARY

The brief history of the price competition controversy presented here is largely based on a report by the American Bar Association on its Model Procurement Code project (3), a paper by Bower (4), and a journal article by Zemansky (5).

The Federal View

Two decades ago, difficulties in obtaining professional services for complex research and development projects within the statutory six percent limitation of the total project cost led to a general government-wide review of such limitation and other aspects of A/E contracting. This resulted in a 1967 report to Congress by the United States General Accounting Office (GAO), recommending repeal of the six percent limitation and implementation of a competitive pricing procedure for the procurement of architects and engineers.

Brooks Law (1972)

The response by Congress came five years later, on October 27, 1972, in the form of Public Law 92-582, which has become known as Brooks Law (after Rep. Jack Brooks who sponsored the bill) (Appendix A). Congress determined that consideration of price in the selection process was not in the public interest and, in its Senate Report, stated that selection criteria should under no circumstances reflect the fee to be paid, either directly or indirectly.

Instead, a system of competitive negotiation was set forth where at least three firms were selected in order of preference based on qualification criteria, and negotiations to secure a fair and reasonable price were initiated with these firms in the order of preference until successful. The documented rationale for this approach reflects the legislators' viewpoints that this system allows A/E's to avoid compromise of the quality of their designs or level of effort required, to suggest higher cost design approaches that could lower total construction costs or increase quality, and to still be subject to approval by the federal government of a reasonable negotiated cost in order to secure a contract.

Although Brooks Law set forth the basic federal A/E selection policy, it amended only the Federal Property and Administrative Services Act of 1949 and, thereby, did not apply to the Defense Department or to the federal-aid transportation programs administered by the states.

Commission on Government Procurement Study (1972)

A Commission on Government Procurement was established in 1969 to study, among other issues, the procurement of A/E services. The Commission established a special study group of

government procurement officers and lawyers, as well as private architects and engineers, to review the A/E procurement issue. It is interesting to note that, although the study group unanimously endorsed the traditional selection approach essentially delineated in Brooks Law and rejected any form of price competition, the Procurement Commission's report recommended that the government base procurement of A/E services on competitive negotiations, including technical competence, proposed concept of end product, and the estimated cost of the project as well as the fee. This recommendation was based on the premise, however, that the fee to be charged will not be the dominant factor. The diversity of opinion on this subject is further reflected by the dissension of three commissioners who supported the traditional approach.

General Services Administration Study (1974)

As a result of notoriety in the press implying that political influence was a major factor in the award of A/E contracts by the General Services Administration (GSA), the latter appointed a Special Study Committee to analyze its procurement process and its potential for abuse. The Committee supported the basic concept of the GSA selection process and concluded that neither competitive bidding, competitive negotiation, nor any other form of price competition would reduce the potential for impropriety, provide for the selection of the most qualified A/Es, or give new firms a better opportunity for securing federal work.

Deficit Reduction Act of 1984

Title VII of the subject legislation, cited as the "Competition in Contracting Act of 1984" (6), provided that the Office of Federal Procurement Policy study alternatives and recommend a plan to achieve full and open competition in the procurement of professional, technical, and management services by January 31, 1985. The study, in response to this mandate, proposed the testing of an alternative based on three general types of source selection, subject to congressional approval:

- Price, with selection primarily based on price but limited to a field of qualified firms.
- Technical Merit and Price, with selection by a combined consideration of both factors.
- Technical Merit, with selection based on qualifications alone for complex or highly important projects.

United States General Accounting Office (1986)

In response to a request by the House Subcommittee on Surface Transportation to evaluate the merits of requiring the states to use the qualifications-based method for A/E selection, the General Accounting Office (GAO) prepared a briefing report (7) in June, 1986 based on its analysis of four relevant studies and on interviews with Maryland and Pennsylvania transportation officials. Maryland was selected because it had recently changed to a qualifications-based system from one that considered price. Conversely, Pennsylvania was selected because it had

changed to a system considering price from a qualifications-based system.

Four principal concerns of the A/E community about using price as a selection factor were identified by discussions with the American Consulting Engineers Council; namely, that price competition:

- Extends the selection process, and inflation increases capital costs during the extended period.
- Increases administrative costs.
- Adversely affects design quality by its emphasis on low price.
- Adversely affects design quality because of the potential selection of less-qualified firms.

The GAO found sufficient weaknesses in the four studies reviewed to preclude any generalized conclusion. This is not a significant finding because the studies were not prepared to support the specific concerns cited above. However, the interviews by GAO with Maryland and Pennsylvania provide some insight into the states' viewpoints.

Briefly, Maryland disagreed that price competition increases selection time but, conversely, expected that its recent implementation of a qualifications-based selection system would incur greater delays. Maryland also disagreed with the premise that price competition places too great an emphasis on price at the expense of quality. It provided supporting evidence that its weighting methods resulted in 80 percent of the funds going to firms with the highest technical scores and 56 percent to those with the lowest prices. Apparently, a large percentage of the firms selected had both the highest technical scores and the lowest prices.

Similar interviews with Pennsylvania elicited the viewpoint that consideration of price did not affect the total time to award a consultant contract, nor did it have any adverse effect on design quality or on the selection of the highest technically qualified firms. Statistics that were presented to support the latter statements are discussed subsequently in this report.

The briefing report did not go beyond presentation of the results of review and provided no conclusions or recommendations.

Surface Transportation and Uniform Relocation Assistance Act of 1987

Section 111(b) of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (STURAA) (Public Law No. 100-17) has extended the provisions of Brooks Law or equivalent qualifications-based state requirements to the procurement of all consultant contracts for engineering and design services for the federal-aid transportation program, except as modified by the applicability provisions specified therein. An abstract of Section 111 and an explanatory FHWA Memorandum relative to the Act, dated May 13, 1987, is included in Appendix B.

The guidance provided by the FHWA Memorandum relative to the applicability provisions is particularly important to those states that are using or are seeking to adopt a procurement procedure other than that prescribed by Brooks Law. Briefly, the states are required to utilize the qualifications-based procurement procedures unless they have or choose to establish a

formal procurement procedure by state statute, which may deviate from Brooks Law provided it is consistent with federal requirements. In the absence of a formal procedure established by state statute, the states' procedures must conform with the qualifications-based method after a specified transition period to allow for legislative action.

The State and Local Government View

Florida Study (1971)

In 1971, Florida Governor Reuben Askew (amidst public charges of political favoritism, corruption, and misuse of funds) appointed an Engineering Advisory Committee to explore selection methods, including performance standards, professional ethics, and other considerations. The Committee's recommendations included competitive negotiation and a truth-in-negotiation provision (see Chapter 4), among others (most of which were enacted into law).

Maryland Study (1973)

In 1973, because of adverse publicity in the award of design contracts, Maryland Governor Marvin Mandel appointed a Task Force to review A/E selection procedures. The Task Force recommendations included selecting consultants on the basis of competitive bidding or on competitive negotiation depending on the nature of the project. Although the Task Force recommended competitive bidding only for unique situations and discouraged its use beyond such bounds, three members dissented and objected to any use of competitive bidding in the selection process.

The implementing legislation provided for the award of A/E contracts on a competitive basis that included the evaluation of both technical and price proposals with neither the price nor the technical proposal becoming the sole criterion. Maryland thus became the first state to use price competition in its A/E selection process.

However, more than ten years later, the Maryland statute was amended effective April 1, 1986, requiring that A/E contract awards be based on a competitive negotiation procedure and made to the most-qualified firm at a fair, competitive, and reasonable price.

Model Procurement Code Project (1979)

In 1979, the American Bar Association approved the final draft of its Model Procurement Code for State and Local Governments (3), a project financed by a grant from the Law Enforcement Assistance Administration (LEAA). Zemansky (5) states that the LEAA evolved from federal attempts to address public concern about crime, including white collar crime such as corrupt activities related to public procurement. A number of committees were set up to study different subjects, among which was the procurement of construction and A/E contracts. A Subcommittee on Architect-Engineer Contracts analyzed various studies on A/E procurement, including those by the GAO, the Commission on Government Procurement, and the states

of Florida and Maryland, as well as federal, state, and local statutes and case law.

A preliminary draft of the Subcommittee's report proposed two alternative methods of A/E selection and supporting statements for each, which will be discussed subsequently. Alternative A provided for competitive negotiations similar to the approach by Brooks Law. Alternative B provided for competitive negotiations considering price along with qualifications and technical factors. However, the final draft did not include either Alternative B or its supporting comments.

The Subcommittee noted that most jurisdictions agree that price competition should not be a factor during the selection process, and found that "none of the A/E selection procedures studied will solve the problem of corruption and illegal conduct by professionals and politicians" (3). Accordingly, it determined that the likelihood of such occurrences would be minimized by a selection process including:

- Public announcement to allow an opportunity for all professionals to compete.
- Selection on the basis of skill and ability.
- Negotiation with the most-qualified firms in the order of preference until a fair and reasonable price is agreed on.
- Documentation of each step in the process with opportunities for public scrutiny to ensure proper behavior.

The Professional View

The professional community has consistently supported the consideration of qualifications and competence as the principal factors in the A/E selection process, along with competitive negotiation of a reasonable price with the highest-qualified firm. The American Society of Civil Engineers (ASCE) advocates selection in general accordance with Brooks Law, and is on record (8) as supporting legislation and regulations at all government levels that prohibit the selection of engineering services on the basis of competitive bidding. The American Road and Transportation Builders Association (ARTBA) endorses a similar selection procedure and recommends (9) that compensation be addressed only after selection of the engineer and definition of the scope of services.

Similarly, consultant engineers are opposed to any form of price competition. The *Engineering News-Record* (10) cited, in 1981, a report by the Consultant Engineers Council (CEC) of Metropolitan Washington urging that Maryland's A/E procurement law be changed from fee bidding to competitive negotiations. The article reports CEC as saying that although the Maryland law was designed to curb corruption, "the fee-bidding aspect has no anti-corruptive effect, discourages numerous firms from participating in state work, and also results in lower quality design." These conclusions were based on a survey of 125 member firms who reported that they avoid the state as a potential market because:

- The average cost of submitting proposals is about \$2,300, and 64 percent of those were unsuccessful.
- Only a third of the projects were profitable.
- They needed to develop the scope of work to propose the fee bid without input from the client.
- Fee bidding encourages the selection of the least costly design approach, which tends to increase the cost of construction

and life-cycle ownership, contrary to the ethics of design professionals.

The National Society of Professional Engineers (NSPE) had, before 1978, prescribed in Section 11(c) of its Code of Ethics that an engineer will not compete unfairly with another engineer to secure employment by competitive bidding. Competitive bidding was defined as the formal or informal submission of verbal or written estimates of costs or proposals in terms of dollars, man-days, percentage of construction cost, or other measures before being selected for negotiations. Thus, any form of price competition was specifically excluded. The Section further prescribed that if engineers are requested to submit such costs or proposals before selection, they shall attempt to have the procedure changed or withdraw from consideration for the proposed work.

Following earlier unsuccessful efforts by the Federal Trade Commission and the Justice Department to force professional societies to remove their ethical restraints upon their members against competitive bidding, the Justice Department filed suit against the NSPE for violation of the Sherman Antitrust Act. The United States District Court for the District of Columbia ruled against the NSPE in 1974, and its judgment was reaffirmed in 1975 on the basis that the ethical restraint was price fixing and, consequently, was illegal. On appeal, the Supreme Court (11) prohibited the Society from adopting any official opinion, policy statement, or guideline implying that competitive bidding is unethical.

As a result of this decision, the NSPE revised its Code of Ethics, rescinding previous Section 11(c) and permitting price negotiations for A/E services. However, this specific case does not set any precedent for the federal and state governments that precludes the use of competitive bidding or price competition, either by procurement statutes or licensing rules of practice, because previous antitrust decisions recognize the authority of government to regulate its professions. Thus, the Brooks Law and its state equivalents are not considered to be contradictory to the Sherman Antitrust Act.

The Public View

The general public views the selection of consultants without some form of price competition as politically corrupt and wasteful of public funds.

Andrews (12) strongly attacks Brooks Law, asserting that the absence of price comparison results in a 600 to 700 percent spread in the cost of A/E services. He cites a survey of the largest construction firms in the east that indicated a definite trend towards price comparison for A/E services in order to reduce the costs of design work and continue to obtain highly qualified A/Es. An August, 1983 report by the Inspector General of the United States Department of Transportation is also cited which, based on a review of 102 grant-funded contracts, concluded that there had been a loss of tens of millions of dollars to the American taxpayer, with price spreads of 7 to 733 percent for the same services. Andrews appears primarily concerned with using price comparison as one of the selection factors, although not necessarily as the dominant one.

Zemansky, in his review (5) of the Model Procurement Code (MPC) by the American Bar Association, urges all procurement personnel to go on record as strongly urging that the MPC be

modified to require price competition among those firms judged to be qualified and equal in professional competence and stature. He states that if the scope of work can be sufficiently defined, competitive acquisition of professional services is a practical procedure. The problem that remains is whether the client has the capability to adequately define the scope of work. Zemansky asserts that the professions have already lost much of the respect of the public and need to promptly adjust to achieve the moral, ethical, and intellectual standards of their professions. The adoption of the concept of price competition as a nondominant selection factor is viewed by Zemansky as one answer.

ARGUMENTS PRO AND CON

Previous sections have cited specific reasons by various factions in favor of and in opposition to the use of price comparison or competition in the selection of A/E firms. An excellent summary of such concerns was included in the original draft of the Model Procurement Code (MPC) project and are cited in a report by Bower (4), on which the following summations are based.

In Support of Qualifications-Based Selection

The essential elements of this process, which was Alternative A in the MPC report, include public announcement of A/E contract opportunities, submission of qualifications by interested firms, discussions with three or more firms, selection in order of preference of those most qualified, and negotiation to arrive at a fair and reasonable price. It is argued by its proponents that:

- This system favors selection of the most-qualified firms.
- It encourages production of designs that are economical to construct and to maintain.
- There is no compulsion to compromise the quality of design or level of effort required for quality design to meet lower price quotations by other A/Es.
- Designers are free to suggest higher-cost designs that may result in lower overall project costs or higher quality.
- Price competition requires clearly defined specifications of what is to be purchased for what price; these specifications usually are not available in quantitative terms at the time of selection. The scope of work is not sufficiently clear until after agreement by the A/E and the client on various other matters affecting cost.
- Processing time to reach agreement with several firms before actual selection could seriously delay projects.
- The actual cost of A/E services is a relatively small amount in comparison with the total project cost, and particularly relative to the total life-cycle cost.
- Price competition, even if restricted to the most-qualified firms, will force even the most-ethical firms into compromising the quality of their work in favor of lower cost to secure a contract.
- If price is a factor, procurement officers will find it exceedingly difficult to select other than the lowest cost proposal. Price, thereby, becomes the dominant factor even if it was not intended as such.

In Support of Price Competition as a Nondominant Factor

Alternative B in the MPC project involved negotiations with the highest-qualified firms for A/E services contracts at fair and reasonable prices. The selection factors, in the order of importance, included professional competence, technical merits of the proposals, and the price for which the services are to be rendered. The statement supporting Alternative B included the following reasons:

- There are qualified firms that can perform high quality work for lower cost than others through advanced methodology, experience, specialization, and/or modern techniques.
- The process permits the selection of the best-qualified firm and avoids the perceived disadvantages of competitive bidding, while still permitting competitive price comparisons where practical or required by policy or by law.
- The most important factor in selection is obtaining the best-qualified firm in order to ensure the best end product, the best design concept, and the lowest life-cycle cost. Price competition at the beginning of the selection process, such as by competitive bidding, would defeat such a purpose by discouraging the best-qualified firms from bidding. However, after determination of the best-qualified firms, price becomes an appropriate factor to consider. Because any one of the final firms under consideration should be acceptable, and the parameters of the design concept have been thoroughly explored along with life-cycle costs, consideration of estimated costs would not at this point jeopardize the primary consideration of "best qualified."
- Without price comparison, the state cannot ensure a fair and reasonable price except by its subjective judgment. This Alternative not only provides for such a comparison but also does not preclude continued negotiation with the finalists and explorations regarding differences in estimates by the firms and by the state's staff.

EVALUATION

The foregoing arguments, which reflect the differing viewpoints by the various professional groups involved, present elements of truth and reasonableness on both sides of the controversy. Both sides generally recognize that qualifications and technical approach should be the dominant selection factors and that competitive bidding has no place in the selection of professional services. The principal difference is whether price competition in any form has a place among the final selection factors.

There is an important perspective that is required for the proper evaluation of the applicability of these opposing arguments to any specific situation. The key is the ability and experience of the client to judge the qualifications of the consultants under consideration, to prepare an adequate scope of services, to estimate a reasonable cost thereof, and to assess the quality of the technical approach and the design concept.

Selection of A/E services for isolated projects by relatively inexperienced clients cannot be reasonably equated with selections by highly capable state agency staffs for continuing and varied programs of significant magnitudes. In the latter situation, price competition as a nondominant selection factor should

not have significant effect (for projects whose scopes of services can be accurately predefined) on the selection of the highest-qualified firms or on design quality or degree of innovation. Although there may be occasional misjudgments in favor of cost, the consequence of these misjudgments would be limited to the selection of the second or third best firm rather than the best.

Furthermore, from the perspective of a governmental agency with a continuum of work, the selection of "the best" consultant for any specific project may not be as important as selecting the highest-qualified firms for its program of projects. The best firm for one project may be even more valuable for another one to be considered shortly thereafter. Because a firm's ability is primarily a reflection of its staff, it is important that such staff be assigned optimally within the entire program.

Thus, not only is there is a dimension of time that must be considered in the optimum assignment of the highest-qualified consultants to a program, but the program objectives differ from those relating to a single project. With a continuing program, there is a need to upgrade the capabilities of the available field of consultants and to maintain a highly qualified field in sufficient numbers to match the needs of the program. The use of cost as one of the factors to be considered in the final selection among a short-list of the highest-qualified firms should not diminish program quality but might encourage consultants to seek the highest-qualified personnel and optimum techniques and equipment.

However, it is important that agencies that avail themselves of the right to evaluate cost proposals by the highest-qualified firms in the final selection procedure exercise sufficient responsibility to avoid its misuse. If the process results in a firm being frequently requested for cost proposals on numerous projects with very infrequent success, the situation should be carefully reviewed and promptly corrected to the extent feasible.

The national survey indicated that a major portion of consultant agreements (more than one third of the total annual payments for them) are based on the lump-sum method of payment. Because this payment method requires an accurately defined scope of services, it satisfies one of the basic requirements for reasonable price comparison.

It is, therefore, recommended that the use of price comparison as a nondominant selection factor be considered by governmental agencies with highly capable and experienced staffs for their lump-sum types of consultant contracts in order to:

- Provide a measure of cost containment.
- Provide, by enhancing the image of the selection and negotiation processes in the public eye, a valid reason for the removal of numerous restrictive and time-consuming controls that incur inordinately long delays and serious operational inefficiencies, as discussed at the ends of Chapters 4 and 5.
- Provide opportunities for upgrading the capabilities of agency staff in cost estimating through evaluations of concurrent and independent consultant estimates on a variety of types of work.

The implementation of this recommendation, however, is limited by the actions that are taken by the states relative to the applicability provisions of the STURAA of 1987, as previously discussed.

CHAPTER THREE

PRE-SELECTION POSITION

This chapter discusses a variety of considerations that are encompassed by the overall process for the selection and negotiation of contracts with consultants but that precede the selection procedure.

Pertinent federal regulations and policies are cited because they are not only prescribed for the states' federal-aid programs but tend to shape their non-federal programs as well. A sampling of state policies is presented for general interest. A summary of state practices is also included that relates to concerns addressed before the consultant selection process; for example, determining the need for consultants, types of contracts, preparing the scope of services, and estimating the cost of the work. Generally, the scope of the proposed work and its estimated cost are included with the request for consultant services for a specific project both for management reasons and to preclude related delays in the selection process.

REGULATIONS AND POLICIES**Federal Regulations and Policies**

The selection, negotiation, and contracting with engineering firms for the design or the inspection of construction of any federal-aid project must meet the conditions prescribed in numerous federal regulations and policy documents. Only a few of the requirements considered to be most pertinent to this report are briefly summarized below.

Methods of Procurement

Federal requirements (13) governing the federal-aid program provide four different selection procedures depending on the nature of procurement: small purchase procedures, competitive sealed bids, competitive negotiations, and noncompetitive negotiations. Competitive negotiation is defined in a manner that includes the evaluation of "price or cost where required and their relative importance." A contract may be awarded to "the responsible offerer whose proposal will be most advantageous to the procuring party, price and other factors considered."

It is specifically provided that competitive negotiation procedures may be utilized for the "procurement of architectural/engineering professional services, whereby competitors' qualifications are evaluated and the most qualified competitor is selected, subject to negotiation of fair and reasonable compensation." This is essentially the same as Brooks Law, which is not applicable to the federal-aid program. Although the federal

provisions have not mandated a qualifications-based ranking system similar to that provided by Brooks Law until passage of the STURAA of 1987, but have accepted it among alternatives, most of the states have elected to adopt such a procedure or variations of it.

Cost Principles—Indirect Costs

The Federal Acquisition Regulations (14) delineate in detail the contract cost principles and procedures that are prescribed by policy reference (13) for federal-aid projects, including A/E contracts. The eligibility of a variety of direct and indirect costs are specifically described. These provisions do not prescribe any limit on the amount of eligible indirect costs (overhead) that may be reimbursed.

However, another federal provision, which is discussed in the next section, places limitations on the total amount reimbursable for engineering costs on any specific project. Thus, although all eligible costs are reimbursable, they are subject to an overall limitation by project. Because of this, states must either absorb a certain amount of excess costs or place controls on them through the imposition of their own limitations or the use of cost-containment measures.

This perspective is presented to clarify the variations in specific limits on overhead and other costs imposed by the states, which are discussed separately.

Limits on Engineering Costs

The Code of Federal Regulations (15) refers to the statutory limitation on reimbursement of construction engineering costs to 10 percent of construction costs and delineates the conditions and procedure for requesting authorization to increase such a limitation to 15 percent. Limitations on reimbursement of preliminary engineering costs are also imposed as a matter of federal policy, based on a reasonability test rather than on a percentage limit. Such limits are applied on a project basis rather than on a program basis, which has raised considerable concern among the states with program averages less than the prescribed limit but with a significant frequency of higher percentage engineering costs on individual projects.

Limits on Fixed/Net Fee

The terminology used by the states for the consultant's fee varies from fixed fee to a net fee concept which generally allows

for fee reductions with deletions in the originally specified work. Federal policy states that the fee should be a negotiated dollar amount to cover the consultant's profit, miscellaneous expenses, and other eligible factors, with due consideration given to the degree of risk, consultant investment, project duration, and overhead. The expression of fee as a percentage of consultant costs should be used only as a test of the reasonableness of the proposed fee. A Federal Memorandum (15) provided guidance for a top limit on such a fee of 15 percent of consultant costs as a test of the prudence of the fee proposal. Such a limit is justified by reference to a 1974 publication (16), which recommended a profit curve varying from 15 percent of all eligible state and federal-aid costs, including overhead, for small A/E contracts to 10 percent for consultant contracts of \$2 million or more.

Actual state practices, as discussed subsequently, vary from such recommendations, particularly relevant to the composition of the denominator on which the percentage test of reasonableness is based.

Methods of Contract Payment

A federal memorandum (17) provides for four distinct contract payment methods: lump sum, cost per unit of work, cost plus a fixed/net fee amount, and specific rates of compensation. However, the lump sum method of contract payment is specifically excluded as an acceptable method of compensation in connection with construction inspection contracts. Furthermore, other federal requirements (13) also bar the use of the cost plus a percentage of cost and the percentage of construction cost methods of contracting with consultants.

These requirements are followed by the states, with few exceptions, for both their federal-aid and non-federal programs.

Miscellaneous State Policies

The national survey indicates uniformity by the states in their treatment of some of the concerns relative to the use of consultants, and high variability in their treatment of other considerations. These are presented for general interest.

Work Phases Retained In-House

Approximately 40 percent of the states do not contract the inspection of construction to consultants. Other exclusions, although the percentages reported are relatively small, include environmental impact studies, design of bridge repair and improvement contracts, and the design of roadway rehabilitation and preservation projects.

Preliminary and Final Design by Same Firm

Because of the desirability of continuity throughout the design process, most of the states use the same consultant for both the preliminary engineering and for the final design of any one project. However, approximately half of them add the final design by supplemental agreement. The advantages of the latter approach include not tying up limited funds that could be used

to initiate other important projects pending the completion of the sometimes lengthy preliminary engineering phase and securing related approvals, as well as the deferral of negotiations of cost and fees that are dependent on the nature and extent of final design until their requirements are more clearly defined.

However, somewhat more than half the states contract the final designs to the firms doing the preliminary engineering regardless of whether or not they are also doing the location and environmental impact studies for the project. Of these, half add the final design by supplemental agreement and the other half include it in the original consultant contract.

The potential drawbacks to contracting the final design to the consultant involved with the environmental impact study of alternative locations relate to the great strain placed on the professional ethics and integrity of the professional engineer by such apparent conflicts of interest. This is so because the study could be slanted by less ethical individuals to either avoid the null alternative or toward a more costly design in order to secure a profitable contract. Although it may be feasible for states with highly capable staffs who have sufficient time for extensive reviews to preclude such occurrences, there would nevertheless remain the need for careful controls in order to avoid a poor public image.

Construction Inspection by Design Firm

Of the states that use consultants for construction inspection, one third report no hesitancy in contracting such work with the firm that designed the project. The large majority either disallows such practice completely or limits it to construction inspection of highly specialized designs, where the designer's expertise is considered to be critical, or to very complex bridges or facilities.

The benefits perceived by some to be gained by using the designer of a project to inspect its construction include a better interpretation of the design intent and a more ready capability to adjust it to unanticipated field conditions. Some maintain this position even though the firm's personnel assigned to construction inspection are not usually its valued designers but, rather, key construction supervisors supplemented with personnel hired for the specific project. There is no question regarding the value of the designer's input into construction problems, but such input could also be provided by retaining the designer by a separate or supplemental contract to provide supportive services during construction. On the other hand, for highly complex or specialized projects, a separate supportive services contract in addition to a construction inspection contract might not only exceed the cost if both responsibilities were assigned to the designer but might create redundancies and management problems.

Those opposed to using the designer for construction inspection are concerned about the frailty of human nature. In the event of a serious design error, or allegation of such, involving claims by the public or disputes by the contractor, the desirable professional-client relationship may become distorted, with the firm giving way to self-preservation as its prime objective. This objection similarly applies to the correction of design errors that should not be charged to the client. In addition, states concerned with their image and with an objective of distributing the work

load among a larger number of consultants view such combinations of work to a single firm as unwarranted.

STATE PRACTICES

Determining the Need for Consultant Services

This section briefly discusses the manner in which manpower resources are managed by the states, providing a basis for securing approval of supplementation with consultant forces when deemed necessary.

Manpower Management

The management of manpower is one of the most important responsibilities of supervision for the efficient utilization of available resources. Such management by the states varies from simple periodic assessments to extensive computerized systems.

Among the respondents to the survey of selected states, Florida uses a manpower management information system based on a five-year work plan. New York requires its regional offices to submit periodically work plans that show the staff required by month for each construction project and for supervisory and support services. Such staffing needs are compared with the staff available to highlight when and the extent to which additional supplementation is needed.

NCHRP Synthesis 51 (18), although intended primarily for construction contract staffing, contains discussions of manpower management information systems (MMIS) applicable to both design and construction. The Washington MMIS, for example, is viewed as a total system approach to manpower planning that considers each of the project development phases from preliminary engineering to construction engineering. One of the critical elements of such manpower planning systems is considered to be a comprehensive data file that provides realistic productivity standards for each of the various activities. Staffing for construction projects is further discussed in NCHRP Project 20-5, Topic 17-13.

No preference is intended to be implied by the foregoing regarding the type of manpower management system to be used. Such a discussion is beyond the scope of this synthesis.

Methods of Supplementing Program Staff

There are two ways to increase the availability of staff for any specific program other than by contracting with consultants. These are to assign staff to the program from other activities that are in an off-peak stage or to hire additional temporary personnel during the peak period. The use of such practices in staffing the design and construction programs is examined below based on a survey of selected states.

Interchangeability of Design and Construction Personnel Of the nine responding selected states, only Washington and New York assign their design and construction personnel during the construction season interchangeably, although such cross-assign-

ments are limited to within their regional or district boundaries. Illinois limits such cross-assignments to off-season periods. The advantages to such interchangeability include the ability to round out peak work loads, to fully utilize the capacity of existing staffs, and to upgrade the capabilities of both the design and the construction staffs so that they are better able to do either function.

In this way, construction staff can be more productively utilized during the off-peak and winter months to assist in the design of small projects to be let the following season. Similarly, design staff can assist for short periods during the construction season pending the release of construction personnel from other projects. Such interchangeability provides both design and construction personnel with better perspectives of the overall problems and needs in the project development process and improves their capability and usefulness to the agency.

New York successfully utilizes prescribed rotational assignments of personnel to design and construction projects in several of its regions for durations of a year or two. This has not been effectuated on a statewide basis because of operational difficulties with limited personnel. Managers who are understaffed for the assigned work load are resistant to assigning productive personnel to others, regardless of the ultimate benefits to the agency. To be successful, such a system should be designed and controlled centrally.

Use of Temporary or Seasonal Personnel The majority of the selected states utilize temporary personnel to a degree to supplement their permanent staff during peak conditions. New York, in addition, has maintained a program of hiring seasonal technicians for three to nine months for construction and related services. The experience gained by this staff has been largely retained by the state because a major percentage return every year and some have subsequently become permanent employees. However, the suitability of this process should be weighed within the overall goals of proper staffing for all of the agency's programs.

Certifying Need for Consultants When it is determined that the existing staff, or supplement of it, cannot adequately manage the projected work load, the remaining solution is the utilization of consultants. Indiana, New York, and Washington have relatively simple requirements for the justification of the need for a consultant contract. Florida provides guidelines that consultant services should not be requested unless a project's work load exceeds the capacity of existing staff or its technical skills, or there are economic advantages to such requests. Maryland requires the submission of the documentation for such a need to the Secretary of Transportation for contracts exceeding \$100,000. Pennsylvania also requires the submission of an analysis of work load and skills available and required.

However, none of the six states cited requires the approval of the need for consultant services from sources external to the transportation department. Although a requirement for the requestor of consultant services to fully evaluate in-house capabilities is desirable from a management perspective, approval of a department's professional determinations in such regard by external sources would be counterproductive.

Contract Methods of Payment

Federal policy provides for four types of contract payment methods which are discussed below.

Contract Types

For all of the following types of contract payment methods, except the lump-sum method, all agreements must specify an upper limit of compensation, a maximum amount payable. However, because such methods, except for the lump-sum method, were selected because of the difficulty in accurately estimating the final costs, provisions are required to permit an adjustment beyond such an upper limit when warranted and approved.

Lump Sum With this method of payment, the consultant undertakes to perform the services prescribed in the agreement for an agreed amount as prime compensation. This method is appropriate only when the extent, scope, complexity, character, and duration of the work can be predetermined to the degree that permits the evaluation of just compensation at the time of negotiations. The lump-sum amount must be arrived at through estimates of direct and indirect costs for each of the elements of the work, as well as evaluations of overhead and net fee. Such agreements need to contain provisions for the adjustment of the lump-sum amount in the event of a scope change, which should be rare.

This method may be applicable to the design of small bridges or other designs with well-defined scopes, although some states use it for most of their projects regardless of the nature of work. The advantage of this method is the ease of administration; progress payments may be made through estimates of the percentage of work completed without reviewing payrolls or other expenditures, and auditing procedures are simplified. The disadvantage of this method is that the contract payment is generally fixed, regardless of any overly liberal initial estimate of the cost of the work.

Cost per Unit of Work With this method, the consultant is paid on the basis of a preset price for each unit of work performed. This method is appropriate when the cost of the work per unit can be determined in advance with reasonable accuracy but the extent of work is indefinite. The prices must be supported by cost analyses similar to those required for the lump-sum method. This method is applicable to soils investigations, where costs can be based on linear feet of drilling, and to the installation of observation wells. The advantages and disadvantages of this method are similar to those for the lump-sum method; namely, simplified administration, but with a potential drawback of possible differences in unit costs because of variations in subsurface conditions.

Cost Plus Net Fee By this method, the consultant is reimbursed for all eligible direct and indirect costs within defined limits plus a predetermined amount as a net fee. This method is appropriate when the extent, scope, complexity, character, or duration of the work cannot be reasonably predetermined at the

time of negotiations. It is also appropriate where the state or other client lacks the experience or knowledge to evaluate and support a consultant's proposal for a lump-sum amount. Although such contracts prescribe a maximum amount payable based on an agreed estimate, there is flexibility to increase the amount by supplemental agreement where extra work beyond that anticipated in the scope is required.

Specific Rates of Compensation In this type of contract, the consultant is paid at an agreed and supported specific hourly or daily rate for each class of employee directly engaged in the work. Such rates include the consultant's estimated direct and indirect costs and net fee. This method is considered only for relatively minor items of work of indeterminable extent and only when the state maintains control over the class of employee to be used and the extent of such use. It is applicable to some types of soils investigations, to term agreements for plant inspection, or for the supplementation of state staff for the inspection of construction projects, or supplementing small design projects.

National Use

A projection of the national survey indicates an annual expenditure of consultant contracts for various phases of design and construction inspection of approximately one billion dollars. This amount is expended on the different types of consultant contracts in the following percentages:

lump sum: 35 percent,
specific rates of compensation: 10 percent, and
cost plus net fee: 55 percent.

The survey did not yield the extent of use of the cost per unit of work method, which is apparently limited to subconsultants on any of the three other types of contracts or for small soils exploration contracts.

To illustrate, a sample lump-sum contract in Indiana for survey, road and bridge design, and environmental services included separate payment, in addition to the lump-sum amount, for geotechnical services by the cost per unit of work method. Such services included various kinds of borings, samples, soils tests, and structure foundation analyses. Similarly, Pennsylvania's specifications provide that contracts combining the lump-sum method of payment with payments for cost per unit of work are permissible. However, the specifications prohibit using the cost-plus-net-fee method or the specific-rates-of-compensation method in combination with any other method of payment.

Table 3 indicates that 20 of the 37 states responding to the specific question in the national survey expend more than 50 percent of their annual consultant expenditures of the cost-plus-net-fee type of contract, only one state expends such a high percentage on the specific-rates-of-compensation method, and 12 states expend such a percentage on the lump-sum method.

Thus, it is seen that the most popular method of consultant contract payment is the cost plus net fee, with the lump-sum method a distant second. However, there is no correlation between the method preferred and the extent of consultant use. Of the 10 states with the highest use of consultant contracts,

TABLE 3
NATIONAL USE OF CONSULTANT PAYMENT METHOD

Percentage of Annual Consultant Payments	Number of States Using Each Method Within Listed Percentile Range		
	Cost Plus Net Fee	Specific Rate of Compensation	Lump Sum
0	2	17	6
1 - 25	11	18	13
26 - 50	4	1	6
51 - 75	2	0	6
76 - 99	13	1	5
100	5	0	1
Number of States	37	37	37

Virginia uses the cost plus net fee exclusively, and New York, Texas, New Jersey, and Maryland use this method for more than half of their consultant expenditures. On the other hand, Indiana, Ohio, and Florida expend 60 to 80 percent of their consultant expenditures on the lump-sum method of payment, whereas Connecticut and Pennsylvania expend 45 percent on this method.

Indiana reports that it finds the lump-sum method particularly suitable because it defines the scope of work in considerable detail. It also asserts that most of the lump-sum contracts are completed within the original contract amount except when supplemented to upgrade designs to current AASHTO standards.

Florida similarly reports that its use of lump-sum contracts for 75 percent of its program is primarily attributable to its preference for this form of contract. When the quantity of some work tasks in an agreement cannot be reasonably estimated, such as for soils investigations and field surveys, Florida separates them from the lump-sum portion of the contract and provides compensation for them on the basis of approved costs per unit of work. Florida also states that increases in the lump-sum amounts are limited to those situations when there are changes in the scope of work.

This supports its claim of adequately defined scopes for its lump-sum contracts. However, because many other states appear to have equally comprehensive scopes and do not favor the lump-sum method, it appears that the selection of contract type is more a matter of individual preference or predisposition by the states than attributable to procedure or nature of program.

Scope of Services

The preparation by the agency of an accurate and comprehensive scope of services is critical to a common understanding by the consultant and agency alike of the work, effort, and the related costs required. Failure to provide such clarity will result in disputes and costly change orders. Because typical scopes of

services are very lengthy, the following sections are limited to a brief description of the essential elements of them.

Nature and Degree of Coverage

Typical scope statements describe in detail the work to be done; how, where, and when it is to be done; and the manner in which it is to be coordinated with related work by the state agency or by others. The scope of services bears the same force as the contractual agreement of which it is a part and, therefore, all terms should be spelled out very carefully.

Each section of a typical scope of design services, for example, includes details regarding numbers and scales and types of drawings and maps required; the number and types of meetings and hearings to be held and the kinds of materials to be furnished or presented in connection with it; the number and description of alternative designs or locations to be evaluated; the kinds and level of detail of environmental studies required; a listing of references, standards, policies, guidelines, and procedures to be followed; and a delineation of which work is to be done and provided by the state or by others and which by the consultant.

Some of these details are provided by references to specific standards or documents rather than delineated within the scope of services or contract documents. A typical scope of services for a complex project consumes a score or more pages, although the scope for the usual project is generally more manageable.

Pennsylvania expands its scopes with references to standardized specifications, design and procedure manuals, and other documents that provide comprehensive details relating to all aspects of the design process. New York provides a high degree of detail directly in the scope of services for each project, supplemented by references to design standards and procedure manuals, environmental study procedures, and others. Washington provides generalized requirements in the project scope of services, with references to various documents listed therein for further details. Connecticut's typical agreement contains an extensive list of references for general requirements plus additional specific references at various points within the scope of services for details. Florida uses a highly detailed scope of services that includes a responsibility chart showing which work is to be performed by the state or others and which by the consultant.

The manner in which the states provide the level of detail, whether directly in the scope of services or through references to other documents, does not appear to materially affect the comprehensiveness of the result. This should not be surprising because a high degree of detail and clarity is essential for an adequate negotiation process.

Adequacy for Price Competition

The survey of selected states included a question as to whether the state considered its scope of services to be adequate for competitive bidding and the level of effort required to bring it to such a level.

Florida and Pennsylvania, whose selection procedures include competitive cost proposals, reported that their scopes were adequate for such a purpose. Of the states that do not use competitive cost proposals, Maryland considered its proposal suitable for bidding, Indiana and Washington believed that only

minor improvements would be needed for such a purpose, while Connecticut, Illinois, and New York believed that major alterations at considerable expense in time and effort would be required.

Although competitive bidding is generally recognized as an inappropriate approach to the selection of professional services, the feasibility of cost competition for some portion of the program in at least some of the states is apparent from the response.

Cost Estimate

Federal policy (13) relative to the federal-aid program requires the contracting agency to subject a consultant's proposal to cost or price evaluations. The Federal Acquisition Regulations (FAR) prescribe for direct federal projects that an independent government cost estimate of the cost of the work be prepared before commencing negotiations through a detailed analysis as though the government were submitting a proposal. The FAR further require the confidentiality of this estimate except where disclosure of the estimated costs for specialized situations is deemed necessary to arrive at a fair and reasonable price.

The national survey indicates that all the states prepare estimates of costs and/or man-hours required to do the work before commencing negotiations. The degree to which the states retain the confidentiality of such estimates is discussed in conjunction with the negotiation process in Chapter 5.

Components of Estimate

The basic components of all federal-aid consultant contracts include all eligible direct and indirect costs as defined in the Federal Acquisition Regulations (14). These basic components, regardless of the varying terminology and groupings used by different states, translate into the following cost elements:

- *Direct Technical Salaries* These include actual regular time plus the straight-time portion of overtime compensation for all employees assigned to the project either full or part time.
- *Premium Portion of Overtime* This is the premium portion of the overtime payment referenced above for direct technical salaries.
- *Direct Non-salary Costs* These are all eligible costs assignable to the specific project, such as travel, reproduction, telephone, computer time, and other special equipment needed specifically for the project. Subconsultants, although their costs are estimated in the same manner as for the prime consultant, are included in the prime's direct non-salary costs, if not shown separately in a specific category.
- *Payroll Burden of Salary Additives* These include vacation, sick leave, payroll taxes, fringe benefits and related eligible costs. Some states keep this as a separate category, while others include it within the general overhead. Regardless of which method is used, any maximum limits applied to overhead are equally applied to this category.
- *Overhead* This includes all indirect costs that cannot be charged directly to the project, except where payroll burden is delineated separately. Some states provide reimbursement for all eligible costs, whereas others impose various maximum limits on them, as discussed in subsequent sections.

- *Fixed or Net Fee* This negotiated allowance for profit and other considerations was previously discussed under federal policies.

The variations in actual state practices are illustrated in the following paragraphs.

Pennsylvania groups its costs into direct payroll, indirect payroll, direct costs other than payroll, and lump sum for net fee. Virginia's groupings are equivalent to the foregoing except that subconsultant's costs are in a separate category. New York places subconsultant costs in the direct non-salary grouping and payroll burden in general overhead. Such variations suit each state's particular procedures and methods of limiting overhead and net fee, and standardization does not appear necessary.

The components of an agency's cost estimate are designed to address these payment categories through detailed task breakdowns. Such detailed work classifications in New York are common to both the state's cost estimate and the consultant's subsequent cost proposal. In this way, the comparison of estimated costs by the state and the consultant are simplified, discrepancies become readily apparent for clarifying any misconceptions by either the state or the consultant regarding the extent of work required in any classification, and discussions during the negotiation stage can be centered on any level of detail desired.

The agency personnel responsible for the cost estimates of the different payment categories vary by state. The general procedure is for the designers to estimate the man-hours or man-days required, by grade level of personnel, to complete each of the work classifications. Such man-hours are converted by either the designers or other personnel into dollar amounts through historical records or surveys of consultant wage rates or by the application of factors to the state's pay schedules for its own employees. The direct non-salary costs are computed as if the agency were to perform the work. Overhead and net fee are subjected to maximum limits in most states and can be estimated from historical records. Washington, for example, uses historical records of direct salary, overhead, and other costs for some hundred consultants, as well as published surveys by professional organizations of consultant salary rates.

The breakdown of the scope of services into detailed work classifications or activities varies by state in terms of both method and level of detail. New York uses the format of its scope of services. It references its man-day estimates to each of the detailed activities prescribed and in the order shown in the scope. The estimated man-days for each activity are broken down by the grade levels of personnel needed within its design division as if the department were going to do the work, based on its varied experience. The consultants are required to submit their cost proposals in the same format, yielding the benefits previously cited.

Colorado also prescribes that the department's estimates be prepared in the same fashion as required of its consultants. The state's procedures provide for two estimate approaches, as shown in Figures 2 and 3, which may be used to supplement or check each other. The method shown in Figure 3 has the objective of defining the subtasks involved in the actual flow of work in logical sequence. The state maintains a computerized system with an ultimate goal of being able to generate its man-hour estimates from historical data.

Maryland issues a detailed package of standard man-hour

D.O.H. Form No. 852
Sheet No. 1 of 3

OCT. 1975

PROJECT NO. _____
NAME _____
MILES _____

MAN HOUR ESTIMATE

WORK ITEM	NO. OF SHEETS	ENGINEER MAN HOURS		TECHNICIAN MAN HOURS	
		PER SHEET	TOTAL	PER SHEET	TOTAL
NO. 1 PLAN SHEETS					
TITLE SHEET					
TYPICAL SECTIONS					
SUMMARY OF APPROXIMATE QUANTITIES					
TABULATIONS					
DETAIL SHEETS					
PIT SHEET					
LIST OF STRUCTURES					
PLAN AND PROFILE					
EARTHWORK SUMMARY					
CROSS SECTIONS (STR.)					
SUB-TOTAL					
NO. 2 DESIGN					
INTERCHANGES					
STRUCTURE REQUIREMENTS					
DRAINAGE STUDIES					
FIELD AND OFFICE REVIEW					
REVIEWS					
EARTHWORK					
COST ESTIMATES					
COMPUTER INPUT					
ENVIRONMENTAL DIVISION					
PUBLIC HEARINGS					
OTHER					
SUB-TOTAL					
NO. 3 UPDATING + REVISIONS					
FIELD AND OFFICE REVISIONS					
POLICY CHANGES					
UTILITIES, R.O.W., ETC.					
SUB-TOTAL					
TOTAL THIS SHEET					

FIGURE 2 Colorado's general method of cost estimating.

forms to its consultants for the submission of cost proposals for design services. These pre-printed forms contain columns of standardized tasks for appropriate estimates of man-hours by various levels of personnel, to the extent such tasks apply to the specific project. Virginia provides a guide booklet to consultants for the preparation of their cost proposals that lists all tasks and subtasks within major work elements. These are used in the estimates by both the state and its consultants to achieve a common frame of reference. Florida and Washington also provide common forms for use by both the state and consultant personnel for the preparation of both man-hour and cost estimates by level of staff.

There are two basic methods used to compute the man-hours of effort required for each work classification. One is based on historical records of the effort required to produce a sheet of plans, tables, drainage details, and numerous other categories.

The other involves the detailed estimating of the actual effort required for each task and requires experienced and capable design personnel.

As noted above, Colorado uses both methods as a check against each other. New York uses both methods, depending on the nature of work, and provides guidelines regarding the typical distribution of types and levels of personnel for the overall work and for certain activities. Florida provides guidelines of the ranges of man-hours usually required to produce units of work in terms of a sheet of plans, per mile, per intersection, lump sum, or other types of units. However, there is reason to believe that the accuracy of such estimating by most of the states could generally bear significant improvement, as discussed in Chapter 5.

From an overview, it appears desirable that the scope of work be developed in a manner that would simplify and help stand-

Sample

	Principal	Project Mgr.	Environmental	Traffic Engineer	Landscape Arch.	Drainage Eng.	Utility Eng.	Structural Eng.	Highway Eng.	RDW Engineer	Design Technician	Draftsperson	Secretary	Chief of Surveys	3-Man Survey Crew	Photogrammetrist	Total Manhours	Total Phase Manhours
Proj. Management and Documentation	70	150	100	20	20				100			40	50					550
2.1 Project Coordination	50	100	60						60				30					300
2.2 Documentation of Work Elements	20	50	40	20	20				40			40	20					240
Design Coordination and Data Collection	20	60	40	20	40	20	10	80	240	140	150	300	100	140	460	600		2,420
3.1 Design Criteria	10	20	20	10	40	10	5	20	100	20			20					275
3.2 Data Base	10	40	20	10		10	5	60	140	120	150	300	80	140	460	600		2145
Preliminary Engineering	60	210	240	100	300	230	150	670	2040	270	500	1020	170					5,960
4.1 Concept Layout	10	20		40					40			20						130
4.2 Horizontal and Vertical Control	10	20				60	40	100	400									630
4.3 Hiker/Biker Trails and Landscape Concepts		20	20		60													100
4.4 Storm Drainage and Utility Adjustments		10				60	40											110
4.5 Prelim. Layout of Const. Data	10	20		40	60	60	40	500	1100		350	700	50					2930
4.6 Noise Attenuation Measures		20	120		120			40	120									420
4.7 Prelim. Cost Estimates	5	20			20	20	10	10	160				20					265
4.8 Prelim. ROW Plans and Descriptions		20	20							270	100	200	50					660
4.9 Field Inspection Reviews	20	40		10	20	20	10	10	60									190
4.10 Prelim. Design Reports	5	20	80	10	20	10	10	10	160		50	100	50					525
Final Engineering	80	220	110	60	460	270	150	490	1080	400	650	1300	320					5,590
5.1 Final Design Const. Plans	10	40	20	40	180	80	30	100	200		200	400	50					1350
5.2 PS&E #1-G, D&P-Mine	10	20				50	20	100	200		100	200	20					720
5.2 PS&E #2-G, D&P-	10	20				100	80	200	400		200	400	20					1430
5.3 Landscaping Plans		20	60		200													280
5.4 Specifications	5	20			40	20	10	40	100				100					335
5.5 Estimates	5	20		10	20	10	5	20	50				50					190
5.6 Final ROW Plans	10	20	20							400	150	300	50					950
5.7 Design Office Reviews	20	40	10	10	20	10	5	20	100				20					255
5.8 Final Office Reviews	10	20						10	30				10					80
	230	640	490	200	820	520	310	1240	3460	810	1300	2660	640	140	460	600		14,520
Supplemental Agreement #1 Additional Work																		
Interface	2	20							60		20	60		2	6			170
Supplemental Agreement #2 Additional Work																		
1. ROW Delineation	4	14	14							300	150	225	20		14			741
2. Cross-Street Improvement		6			20				40		30	30	6	2	6			140
3. Interface Redesign	1	4							20			30						55
4. Major Street Intersection Redesign	2	8		10					60			40						130
5. Increased Drainage Design	8	20			340			170	340		170	340						1388
6. Access Redesign	1	3		50					50			50						154
TOTAL SUPL. ACMT. 2	16	55	14	60	370		170	510	300	350	715	26	2	20				2,608

FIGURE 3 Colorado's detailed method of cost estimating.

ardize estimates of its costs by both the state and its consultants. The scope of work, therefore, should be delineated to the extent feasible in accordance with the flow of work into detailed work classifications and subtasks in measurable increments. This kind of scope detail would provide an excellent and common base for estimating, thereby providing administrative benefits in ensuring a common understanding of the work, simplifying negotiations, and potentially causing a reduction in subsequent claims and costly change orders. The computerization of an historical data base of consultants' costs by work classification, nature of project, and other parameters should provide useful information for analysis by experienced estimators.

Cost Limits

Limits on otherwise eligible costs are imposed by many of the states as a measure of cost containment and an incentive for consultants to reduce their indirect project costs.

Overhead Although federal policy allows reimbursement of all eligible costs, the national survey indicates that half of the states impose no limits on allowable overhead, and the other half imposes limits of various amounts. One third of the states had annual expenditures for consultant services of at least \$10 million. All of these states imposed limits on overhead for design or construction inspection, or both, varying from 100 to 185 percent of direct labor or other base. Unfortunately, these per-

centages are not directly comparable because the delineation of the costs that are included in overhead and the costs that serve as the denominator of such percentages vary by state.

Many states include payroll burden in overhead and base the overhead percentage on direct labor. However, others include payroll burden with direct payroll and base their overhead percentage on the total payroll and burden. Still others keep the payroll burden as a separate category, with its separate limiting percentage. Isolated other variations exist.

Nevertheless, it is interesting to observe that limits are imposed even by those states which use competitive cost proposals in the selection process.

Fixed/Net Fee Previous discussions of federal policies referred to a recommended maximum limit on fixed or net fee of 15 percent of total consultant costs. No uniformity was found in the survey of selected states in either the imposition of limits or in the composition of their percentages. Some states do not recognize any percentage because the fee is intended to be a negotiated amount. Those that do refer to percentages as a guide to their negotiations use ranges that vary within an envelope of 8 to 35 percent.

However, these percentages are not comparable because they are based on different combinations of direct labor alone or in addition to payroll burden, administrative overhead, and portions of direct non-salary costs.

Virginia's negotiated net fee is checked through guidelines (Figure 4) that relates the percentage fee to dollar ranges of the

<u>Loaded Labor Range</u>		<u>Recommended Net Fee Percentage Range</u>
		<u>% of Loaded Labor (DL + PB & OH)</u>
\$ 00	\$ 200,000	15%
200,000	400,000	13½%
400,000	600,000	13%
600,000	800,000	12½%
800,000	1,000,000	12%
1,000,000	1,500,000	11½%
1,500,000	2,000,000	11%

Note: Loaded Labor is defined as Direct Labor plus Payroll Burden and Overheads. Non-salary Direct Costs are excluded.

The Net Fee (Profit) is intended to be a negotiable Contract Cost Item.

The above Net Fee Schedule was developed from past experience and input from other sources and is recommended for use as a Guide by VDH&T's Contracting Officers to negotiate a Net Fee.

Circumstances may warrant higher Net Fees which should have the prior approval of VDH&T's Deputy Commissioner and Chief Engineer.

FIGURE 4 Virginia Department of Highways & Transportation schedule for evaluation of consultant's net fee (profit).

total of direct labor, payroll burden, and overhead. Because direct non-salary costs are not included in the base, the percentage limits are less than the limit recommended in the federal guidelines. New York uses similar percentage ranges but includes half of the direct non-salary costs in the base.

Washington, in its negotiations of fixed fee, considers a range of 25 to 33 percent of direct salary costs to be reasonable. Although the state uses the federal guidelines as a check for projects that are federally funded, it does not believe that fixed fee should be related to total costs, even as a verification of negotiated amounts, because it might tend to reward firms with high overhead and penalize firms with low overhead. This con-

cern is apparently based on the concept that, regardless of negotiations, percentage guidelines have a tendency of becoming the rule rather than a guide, particularly in a hurried environment.

It would be well for a state to maintain a record of negotiated fees, the basis and rationale for the amounts negotiated for each aspect of them, and the related contract types and magnitudes, with the objective of eventually determining a method for relatively uniform application under similar conditions. National guidelines are useful for reference, but it is preferable that each state determine for itself the factors that best reflect the environment in which its consultants must work in a viable manner.

CHAPTER FOUR

CONSULTANT-SELECTION PROCESS

Federal policies permit the states to select consultants for the federal-aid program in the same manner as prescribed by Brooks Law for direct-federal projects. Although price competition has also been permissible, except as recently modified by the STURAA of 1987, most of the states have elected to use selection procedures based on qualifications subject to the negotiation of a fair and reasonable compensation. Only about seven states reported the use of cost proposals in their consultant selection evaluations, while relatively few others limit their consideration of costs to the consultants' overhead and general wage rates. This chapter will explore the variations in procedures used by the states, not only relative to the qualifications versus cost-based methods, but also in the methods of arriving at a field of firms from which selections are made, evaluation factors and methods, and related considerations.

FIELDS OF A/E FIRMS

There are two classes of files from which fields of consultants may be selected for any specific project; a general file and a project-specific file.

The general file may be categorized into one of two types, based on whether or not it contains only firms that have been formally certified or prequalified for work of specific types and magnitudes. The general file is usually developed from annual or periodic advertisements for consultants interested in the general types of services needed by the agency. The project-specific file is obtained from expressions of interest received from consultants in response to advertisements or notices of the delineated consultant services needed for specific projects. Some states use both file classifications, supplementing their project-specific files with qualified firms screened from their general files.

Most of the states maintain general files, but only a small number use them exclusively for selecting a project field. The majority of the states obtain project-specific fields through advertisements of the services required for specific projects. About one third of the states require formal prequalification as a prerequisite to consideration for selection.

General Field

The nature of information kept in the general file generally includes federal Standard Forms 254 and 255, work load and experience, performance ratings, and other data related to the qualifications of a firm. However, the number of firms covered

by such files varies by state from a few score to eight hundred. Most of the states report that a minor percentage of these firms have received state contracts within the past five years. Such small utilization of firms in the general file bears no relationship with whether the file is or is not the primary source of selecting a field of consultants for a specific project.

A large, relatively inactive file as a sole source of selecting consultants for specific projects presents several serious problems that limit its usefulness. Without continual time-consuming verification of the continued availability of the firms and updating of their qualifications, one cannot be certain of a firm's interest in a specific project or whether it has available capacity to progress the project adequately and timely. It also poses undue pressure on the manager and selection committee as well as delays in considering an unreasonable number of firms relative to the total program.

For these reasons, a general file appears to be primarily useful as a repository of information to supplement that gathered for project-specific fields.

Project-Specific Field

A variety of ways are utilized by the states to obtain project-specific fields. The most common is by advertising in widely circulated newspapers and journals requesting letters of interest in work of a defined nature on a specifically described project and location. Such letters of interest are required to be accompanied by various materials that are delineated in the advertisement. Such materials vary from a simple statement of interest for prequalified firms to descriptions of qualifications and data relative to specific evaluation factors.

Prequalification

This process is best described by illustrative examples of the prequalification procedures in a sampling of states.

Alaska maintains a professional services contractors' register according to categories of professional services. Those listed must update their qualifications annually to be retained on the register. Information required for prequalification include licenses, qualifications, resumés of key personnel, specialty of firm, and other details such as those provided in Standard Form 254. The register is used to solicit letters of interest for specific projects in addition to the solicitation of such interest through project-specific public notices in local and general newspapers.

Colorado is required by law to limit the selection of consul-

tants to prequalified firms, which must update their status annually. Although a project-specific field is obtained by advertising in general and local newspapers, such advertisements specifically prescribe prequalified status. A special architect-engineer questionnaire requires information regarding the key personnel in the firm, numbers of personnel by classification, identification of subconsultants usually employed, resumé of project supervisors, and descriptions of present or completed projects.

Similarly, Illinois is required by its laws to utilize only prequalified firms, which must renew and update their status annually. However, firms that are already prequalified may submit applications and justification for extending their eligibility to other types of projects being advertised provided the supporting material is received a specified time before the selection committee meeting. Data required for prequalification include general personnel, experience, and financial information. The financial information is required to ensure an acceptable accounting system and must include the overhead rate and payroll burden in a prescribed form, subject to department audit.

Indiana requires updated prequalification information annually from all consultants desiring to provide services to the state similar to the information on Standard Forms 254 and 255. In addition, each consultant must complete a questionnaire indicating the types of projects on which the firm desires to receive the Department's Professional Services Bulletin. Statements of interest are solicited by direct mailing of the Bulletin to prequalified firms and through notices published in newspapers. However, statements of interest are accepted only within a prescribed date and only from firms that either have prequalification data on file or submit these data with their statement of interest.

Delaware limits its consultant selections to a list of consultants who are certified based on a review of their brochures, Standard Form 254, and satisfactory performance ratings; this certification must be renewed annually.

Florida's statutes and procedures had previously required annual prequalification, but these requirements were repealed in October, 1985 and replaced with reviews of qualifications on a project basis. However, information received during the preparation of this report indicates that Florida has recently returned to an annual prequalification system. Kentucky considers only prequalified firms or those submitting required information for prequalification with their letter of interest. Kansas limits consideration to prequalified firms, and Tennessee selects from a prequalified list plus responses to project-specific advertisements.

The national survey indicates that the states' preferences lean heavily toward the use of project-specific fields for selection purposes, even when prequalification requirements are utilized. A project-specific field ensures consideration of only those firms that are interested in the project, believe that they are qualified for it, and have the necessary personnel, financial resources, and capacity to progress the work efficiently and in a timely manner. The use of such a field helps reduce complaints and public and political pressures regarding why any specific firms were not considered, and precludes unnecessary evaluations by relying on the self-limitation by the consultants to their work capacity. The system, however, should retain the capability to invite letters of interest from firms that have demonstrated unique qualifications or experience in the nature of the project.

Prequalification procedures appear to have some beneficial aspects relative to the establishment of project-specific fields through more efficient evaluations of the qualifications of firms being considered.

EVALUATION FACTORS

There is a wide variation among the states in their use of evaluation factors, in terms of the number of factors, the level and nature of considerations that are measured, their relative importance within the overall rating, and in the manner in which the evaluations are utilized. Some states make subjective evaluations of general factors, which simultaneously result in both the short-listing of firms and in their priority array. Others use multi-stage systems with general factors for short-listing and additional, more detailed factors for priority array and selection.

The ARTBA Guide (9) lists a number of guidelines for the selection of the most-qualified engineer, including:

- The reputation and character of the engineer.
- Experience in the specific services required.
- Qualifications and experience of the principals of the firm and the key project personnel.
- Size and experience of the professional and technical staff relative to the project type and size.
- Quality of previous performance.
- Understanding of the project requirements.
- Current work load, to ensure timely progression of work.
- The proximity of the engineer to the project location.
- Familiarity with federal, state, and local requirements, standards, and procedures.
- Financial condition.
- Firm's Disadvantaged and Women Business Enterprise program.

The factors utilized by the states generally include the foregoing, although terminology may vary, with some using additional considerations, such as cost proposals, or general cost indicators in the form of overhead percentages and labor rates.

The information is obtained from a variety of sources, including standard forms, brochures, letters of interest, historical records of work experience with the agency, project-specific technical and cost proposals, and oral interviews. The manner in which the various factors are weighed or evaluated varies from simple subjective determinations to complex point systems within groupings, which are further weighted within an overall rating. The following illustrative examples indicate typical variations in the process utilized by the states.

Indiana requires consultants to address in their statements of interest the evaluation factors listed in their project-specific notices. These include the proposed project and managerial staffing, proposed subcontracts, and their estimated time to complete the work. The responses are summarized along with other general information regarding work load and previous performance evaluations. The selection committee considers these factors subjectively at open public meetings for both short-listing and selection.

Pennsylvania subjectively evaluates (for short-listing) letters of interest and each firm's data on Standard Forms 254 and 255, performance evaluations, and other data similar to the

general factors cited above. Each short-listed firm is required to submit complete technical and binding cost evaluation reports, which are evaluated for priority array and for selection. The factors in this evaluation include the understanding by the firm of the problems of the project, its application of techniques to achieve cost-effective construction, its proposed time schedule, proposed cost, and other project-specific factors.

Florida utilizes a comprehensive system that governs the short-listing, priority array, and selection procedures, each with separate evaluation factors, groupings, and relative weights. Short-listing is based on factors similar to the general factors previously cited, but each factor is weighted within general groupings, which in turn are weighted relative to each other. Priority array and selection are based on evaluations of technical and cost proposals through weighted project-specific factors, and oral interviews are held for complex projects and also rated through weighted factors.

The most important factors to evaluate in determining the best-qualified consultant for a specific project are the capabilities and experience of the specific individuals who will be assigned to the project relative to the nature of the work and specialties required. The previous performance rating of the firm is also important to the extent that these same individuals were involved in such previous projects. The general experience and financial condition of the firm are also significant because they bear on the degree of backup that can be provided to the project staff. However, although the merger of these factors with others unrelated to the capability of the firm into a single rating through complex weighting systems may give the appearance of objectivity, it must be recognized that no system can be more or less objective than the individuals who manage it.

The prime objective of the evaluation process is the accurate determination of the firms most suited for the work being considered. This is best done subjectively by fair and reasonable managers by evaluating the factors that are the most important for the specific project. Although a standardized weighting of factors and groupings may be a convenient tool for general use, they may in certain situations obscure the most important considerations, particularly for complex or specialized projects. Therefore, if such a procedure is mandated, it is preferable that the results of this kind of factor weighting not be rigidly applied but should, rather, be subjected to subjective professional scrutiny. Where costs are also considered, these should be evaluated separately as a nondominant factor after the most-qualified firms have been determined.

GENERAL SELECTION METHODS

The most prevalent selection method utilized by the states is that prescribed by Brooks Law. This method requires the selection of at least three firms based on qualifications and the negotiation of a fair and reasonable price with such firms in the order of priority until successful. A small number of states consider either binding or nonbinding cost proposals in their selection systems.

The national survey indicates that the current selection procedures in 50 percent of the states have been in effect for only five years, reflecting either a relatively recent initiation of the use of consultants in such states or evolving improvements in procedures. Almost all of the states use selection committees or

boards for short-listing and priority array. These are usually management-level agency personnel, although there are some with representation from the general public or from agencies other than the transportation department. Final selection is generally made or at least approved by the head of the transportation department, with only few instances by the selection committee or by a commission.

Illustrative Examples

The following states were selected for the purpose of illustrating the use of costs or other unique characteristics in the selection process. Because of its prevalence, the use of competitive negotiation did not appear to warrant illustration.

Pennsylvania

- *Applicability* All acquisitions of engineering services except where exempted.

- *Consultant Field* Letters of interest are solicited by at least one advertisement in the Pennsylvania Bulletin, describing the location and scope of work, encouraging small, minority, and new firms, and listing the significant evaluation factors for selection. Interested firms are not considered until they have filed Standard Form 254, not more than one year old, and Form 255 applicable to the project. In its discretion, the selection committee may require financial information, credit status, or criminal record of the firm's employees.

- *Selection Committee* The five members include the Secretary, as chairman, and other high-level managers, including the District Engineer managing the project, or their delegates.

- *Short-listing* The District reviews all letters of interest, Standard Forms 254 and 255, performance ratings, and other information and furnishes a recommended short-list to the selection committee. The selection committee may add names to the short-list from among those responding to the public notice, and selects, by closed ballot, at least three firms based on experience, technical competence, past performance record, current work load, capacity to meet schedule, location of consultant, status as a D/WBE, and other special factors.

- *Priority Array* On receipt of the approved short-list, the District holds a single scope meeting with the nominated firms to ensure a common understanding of the work and any problems that may be anticipated. Each firm is requested to submit complete technical and cost proposals, in accordance with the latest Department Guide, including estimated man-hours by grade level for each of the work classifications and proposed direct and indirect costs and net fee. For unusual or complex projects or for those exceeding \$500,000, the District may also request oral presentations by the short-listed firms.

The District evaluates the technical proposals and oral presentations if held, ranks them in order of preference, and prepares an analysis for the selection committee justifying the recommended ranking of each firm. At the same time, the District also updates its cost estimate of the engineering work. The selection committee reviews the District's analysis and places the firms in priority order based on an evaluation of each firm's understanding of the project's problems, their proposed techniques for cost-effective construction, a record of each firm's

timeliness in completing previous projects, and other factors. The selection committee then assigns a percentage cost advantage for the firm ranked first technically for subsequent consideration.

- *Selection* The selection committee then opens the price proposals and selects a firm considering the price advantage previously assigned to the highest-qualified firm and the estimated cost. If none of the proposals are acceptable, the committee may either initiate negotiations with one or more of the nominated consultants or readvertise.

Florida

The following procedure has very recently been modified by Florida to include the utilization of an annual prequalification system. Three firms are initially short-listed from the prequalified list. However, because of the newness of the changes and the insufficiency of information related thereto, the previously prevailing system is described below.

- *Applicability* Professional services for projects whose basic construction costs are estimated to exceed \$100,000, or for planning or study activities when the fee exceeds \$5,000, except for certified public emergencies.

- *Consultant Field* Letters of interest are solicited through advertisements in the Florida Administrative Weekly that include the project description, scope of services, whether price proposals will be required, evaluation considerations and weights, project schedule, and an affirmative-action statement. The submittal package must include, if the firm is to be considered, all the information prescribed on eleven sheets of standard forms covering both general and project-specific details regarding the firm's organization, accounting system, employment data, qualifications, personnel, experience, current work load, and space for responses to the specific evaluation factors.

- *Selection Committee* The three members include the Secretary, Deputy Secretary, and the initiating Division Director, or their designees. This committee has recently been expanded to seven.

- *Short-listing* The District or other initiating office evaluates whether each responding firm meets prescribed qualifications before proceeding with evaluation. A total of 100 points are assigned to evaluation factors contained within three groupings. A technical evaluation (50 points) is made by the initiating office covering ability, experience, capability to meet the schedule, and factors based on general knowledge of the firm. A nontechnical evaluation (30 points) is made by the Bureau of Contractual Services (BCS), which measures the capacity of each firm to handle the project, past performance on similar work, and proximity of the firm's office to the project site. A management evaluation (20 points) is reserved for the selection committee considering the distribution of work, affirmative action goals, and other Department objectives. Such a procedure results in a short-list of three to six firms.

- *Priority Array* For the majority of projects, the short-listed firms are given a detailed scope of services and are required to submit technical and price proposals, usually after participation in a common scope of services meeting. The price proposals are only required for Class I projects, which are the lump-sum projects encompassing 75 percent of the state's consultant pro-

gram. The technical proposals are reviewed by a committee of district and central office personnel, and points are assigned to a number of standard weighted factors as well as to project-specific factors where deemed to be desirable. The price proposals are reviewed by the BCS and a summary of the pricing data is forwarded to the selection committee and to the technical review committee after all technical evaluations are completed. The technical committee then prepares a cost-benefit statement for each proposal and the BCS submits a combined selection package to the selection committee for its priority array.

- *Selection* When oral presentations, including questioning by the technical review committee, appear to be desirable, the selection committee is invited to attend. These presentations are evaluated by weighted factors relative to each firm's understanding of the project, its management ability, qualifications of the project team, responsiveness to the questions asked, and other factors. This evaluation is included with the previous technical evaluation, and the selection committee's deliberations result in both the priority array and selection by a consensus of its members.

Maine

- *Applicability* The acquisition of engineering services on all federal-aid contracts.

- *Consultant Field* Letters of interest are solicited through publication of project-specific notices that indicate where to obtain guidelines for the submittal of preliminary proposals. Each respondent is sent an information package that includes a summary of the scope of services, a guide for preparing the preliminary proposal that requires data per Standard Form 254, financial information, experience, work load, resumés of personnel to be assigned to the project, and responses to project-specific questions.

- *Selection Committee* The five members are all appointed by and at the option of the director of the bureau responsible for the work. The full responsibility for administering the selection and negotiation procedures is delegated to the selection committee.

- *Short-listing* Each member of the selection committee evaluates and ranks each preliminary proposal received in accordance with weighted selection factors that consider qualifications, personnel, project approach, and performance on previous work for the department. These ratings by all members are combined into a preliminary ranking order, and from three to five highest-rated firms are selected for interview.

- *Priority Array* The short-listed firms receive an invitation for interview with a copy of the interview questionnaire containing project-specific questions. These cover the qualifications of the personnel proposed to be assigned to the project, experience, proposed subcontracts, time schedule, and affirmative action, and comments on the scope of services. Combined post-interview ratings by the committee members pursuant to specified factors and weights determine the priority array.

This procedure is extended to include the evaluation of cost proposals when deemed desirable by the selection committee to break a tie between firms, and also for the selection of firms for lump-sum agreements that comprise 9 percent of the state's program. In such instances, the short-listed firms are requested to submit formal cost proposals pursuant to prescribed guide-

lines. Lump-sum proposals are not subjected to further negotiation unless they do not conform with the scope or fee guidelines. The method of combining the technical and post-interview ratings with the relative costs is shown in Figure 5, with each percentage difference in cost counting as one point in the total rating.

- *Selection* The priority array by the selection committee determines the consultant selection, with concurrence by the Commissioner only after negotiations and audit result in the execution of an agreement.

Illinois

- *Applicability* The acquisition of all architectural and engineering services, except where exempted.

- *Consultant Field* All firms desiring to do business with the state must be annually prequalified through formal procedures. Poor performance may result in suspension of the firm from the prequalified list. Project-specific notices are published in its Professional Services Bulletin, copies of which are sent to all firms prequalified for the type of work represented by the project. All firms interested in the project must submit with their statement of interest the firm's work load, a staffing plan for the project and proposed subcontracts, and the location of the office where the work will be performed.

- *Selection Committee* The six members are appointed by the Secretary and include the Deputy Secretary as chairperson, the responsible division director and district engineer, and the planning director, or their designees, plus two public members. One of the public members must be appointed by the Illinois Society of Professional Engineers. When local municipalities participate in the funding of the project, they may provide a

member on the selection committee and also designate one firm for inclusion on the short-list.

- *Short-listing* The Consultant Services Unit (CSU) confirms the eligibility and prequalification of each responding firm and, with the requesting division, reviews and ranks the firms considering their previous experience, performance ratings, qualifications of proposed project personnel, plan for accomplishing the work, location of the working office, extent of minority ownership, and the payroll additives as a percentage of payroll. The resulting ranked list of firms, which is not binding on the selection committee, identifies all minority-owned firms for consideration. The committee reviews the rankings and other factors and selects three firms by voice vote.

- *Priority Array* The short-listed firms are ranked by a written ballot by a plurality vote of the committee members in attendance, giving due consideration to the previous rankings by the CSU.

- *Selection* No single firm may be selected as first choice for more than one contract published in any single Professional Services Bulletin, except in justified circumstances that must be approved by the committee and documented.

New Jersey

- *Applicability* All acquisitions of engineering services financed with federal-aid, excluding Federal Aviation Administration (FAA) or Urban Mass Transportation Administration (UMTA) programs.

- *Consultant Field* The field is obtained by one of two methods, depending on whether the work is classified as complex work or routine work. Complex work includes environmental and other multi-disciplined studies, specialized road, bridge, or

<u>FIRM</u>	<u>LUMP SUM FEE</u>	<u>DIFFERENCE FROM HIGH FEE</u>	<u>PERCENT DIFFERENCE IN FEE</u>	
ABC	180,000	0	0	
DEF	173,000	7,000	4	
JKL	150,000	30,000	17	

<u>FIRM</u>	<u>AVG. POST-INTERVIEW RATING</u>	<u>AVG. FORMAL PROPOSAL RATING</u>	<u>PERCENT DIFF. IN FEE</u>	<u>TOTAL POINTS</u>
ABC	88	91	0	179
DEF	91	90	4	185
JKL	85	72	17	174

FINAL RANKING

First - Firm DEF
Second - Firm ABC
Third - Firm JKL

NOTE: Candidates whose proposed fees vary greatly from the other candidates may be eliminated if they are found to have misunderstood the RFP.

FIGURE 5 Maine's method of rating lump-sum proposals.

traffic-surveillance designs, designs with estimated road construction costs exceeding \$25 million or bridges exceeding \$10 million, and others. Routine work is everything else. For routine work, the initiator simply selects three qualified firms from a review of listings in the Consultant Information System. These are ranked for direct review and selection by the selection committee. The remainder of this state's selection procedure synopsis deals with complex work, for which a field is selected as described above and the firms are requested to send an expression of interest, or advertising the project may be substituted when deemed desirable.

- *Technical Evaluation Committee* The three members, when the work is under the responsibility of Engineering and Operations, consist of the appropriate Assistant Chief Engineer, Executive Assistant, and Bureau Chief. Similar levels are involved for Planning and Research.

- *Selection Committee* The three members include the State Highway Engineer, Director of Planning and Research, and the Director or Chief Engineer having general responsibility for the project.

- *Short-listing* The expressions of interest are evaluated by the Technical Evaluation Committee, and at least three firms are short-listed based on weighted factors considering location and size of each firm's office, its key personnel and disciplines, experience, previous performance ratings, familiarity with the project site, timeliness, and proposed affirmative action. This short-list requires concurrence by the Selection Committee and the Commissioner.

- *Priority Array* On approval of the short-list, the initiator forwards a detailed project scope to those selected, requesting technical proposals. The Technical Evaluation Committee ranks these firms based on weighted factors covering presentation, understanding of the scope, innovation, experience on similar projects, key project personnel, capability to meet the schedule, and proposed affirmative action. Such rankings are reviewed by the Selection Committee, which arrays the firms in priority order.

- *Selection* Selection is automatic on approval by the Commissioner of the recommended priority order.

Alternative Selection Procedures

Federal-aid requirements (13) permit noncompetitive negotiation when competitive procedures are not feasible; such as when services are available from only a single source, instances of public emergency when urgency will not permit any delay, and when competition is determined to be inadequate after solicitation of a number of sources.

The national survey indicates that, with few exceptions, selection procedures remain the same regardless of whether federal funding is involved in the project. This may be attributable to two reasons; one, many state selection procedures are legislated, and, two, once a routine is established, it becomes difficult or confusing to deviate from it. Pennsylvania's specifications, for example, contain a statement that the state has adopted specified federal provisions for use on all contracts for engineering services, regardless of federal participation therein, in order to obtain uniformity in contract procedures.

Some states, such as New Jersey and Hawaii, use more elaborate procedures for complex projects than for routine projects.

Overall, most states have simplified procedures for small projects (less than an average of about \$10,000), emergency projects, and those with a sole source or insufficient competition. The simplifications vary by the type of general procedure used. Generally, they consist of delegation of selection to a lower level, deletion of advertising requirements, deletion of the need for technical or cost proposals, or the utilization of noncompetitive negotiation procedures.

Related Considerations

The competitive negotiation requirements for federal-aid projects include solicitation from an adequate number of qualified sources, identification of all significant evaluation factors in requests for proposals, including cost when required, providing mechanisms for technical evaluation of proposals, written or oral discussions, and selections for award. Awards need to be made to the responsible firm whose proposal is most advantageous to the public, considering price and other factors. All of the states' procedures that were reviewed fall into these general requirements except for isolated deviations permitted for other than federal-aid contracts. The following paragraphs contain several analyses of responses to the national survey that may be of general interest.

Price Proposals

Several interesting questions relative to the use of price proposals in the evaluation and selection of consultants were addressed in the national survey, as follows:

- Whether the frequency in which the firm with the lowest-cost proposal is selected rather than the most-qualified firm demonstrates an undesirable bias in favor of cost at the expense of quality.
- Whether the spread in cost among cost proposals for the same project is significantly large.
- Whether the disparity between the frequency of submitting price proposals and the frequency of success in being selected is too great to justify the cost of preparing such proposals.

The following discussions are limited by the sparsity of such data available from the states.

Price as a Factor in Selection Frequency Table 4 summarizes for Pennsylvania the frequency in which selections were made of firms with the highest technical rankings versus those with the lowest price proposals. The information presented is based on a 1985 analysis by Pennsylvania of 540 consultant contracts totalling to \$186 million in value. The table shows that more than 87 percent of the selections were the firms with the lowest price, and 65 percent of the selections were the firms with the highest technical ranking. It can also be observed that the top three among a field of six most-qualified firms provided the lowest price proposals more than 99 percent of the time. On only three occasions the firms were selected because of their low price, although they were ranked 4, 5, or 6.

TABLE 4
CONSULTANT SELECTIONS IN PENNSYLVANIA

Technical Ranking	Selection Frequency		Frequency with Lowest Price	
	Number	Percent	Number	Percent
1	350	64.81	288	53.33
2	110	20.37	107	19.81
3	77	14.26	74	13.70
4	1	0.19	1	0.19
5	1	0.19	1	0.19
6	1	0.19	1	0.19
Totals:	540	100.00	472	87.41

Table 5 presents similar data reported by Florida. Selections, based on a total of 416 consultant contracts, were made to firms with the lowest cost proposals 78 percent of the time, and to the firms with the highest technical rankings more than 58 percent of the time. The two highest technically ranked firms were awarded contracts with an 85 percent frequency.

These two examples appear to indicate that there is some bias in favor of cost in the final selection. However, it should also be noted that both states awarded contracts to one of the top two or three of the most technically qualified firms from 85 to 99 percent of the time. Thus, the effect of cost as a selection factor on quality in these examples does not appear to be significant.

Variation in Cost Proposals The objective of this inquiry was to ascertain whether the concurrent evaluations by consultants of the cost of performing the same adequately defined work varied significantly. If they did, there may be valid concern about such cost variations in the absence of price competition. The ability of an agency to negotiate a fair and reasonable price in such an instance may be limited when its staff lacks a sufficiently varied background to make independent estimates based on its own hands-on experience. Unfortunately, the data available for such an analysis are very sparse.

Three of the states that require competitive price proposals report that the ratios between the highest and lowest cost proposal on any single project average from 1.5 to 2. New York provided an additional illustration from its one-time experiment with the use of competitive cost proposals for the supplementation of its construction inspection forces with consultant technicians through a term agreement. The four highly qualified consultants who were selected to submit technical and cost proposals varied in their estimate of the cost of this relatively simple task up to 100 percent over the lowest price. Thus, since the sample is not sufficiently large for significant analysis, there is merit in further investigation of such variations.

Frequency of Selection The purpose of this analysis is to determine whether the expense and effort required for the submission of cost proposals is rewarded by a sufficient frequency of executed agreements.

The only data available were statistics that were maintained by Pennsylvania relative to the frequency of short-listing and selection of engineering firms during 1985. These involved 106 firms and 171 contracts for design and construction inspection, totalling to \$94 million. The data show that:

- On the average, a firm was selected for execution of an agreement within three times in which it appeared on a short-list for a project.
- Eight of the 106 firms were never selected even after being short-listed four or more times.
- Only one firm was never selected even after being on a short-list 10 times.

In this example, the preparation of price proposals was greater than an average burden to 8 percent of the consultant firms. It would be interesting and beneficial for each state requiring comprehensive technical or price proposals for final selection to undertake similar studies with the objective of determining whether the agency's management procedures are reasonably responsive to the concerns of the professional community and the corrective action needed. It appears reasonable for a consultant to expect success in securing a contract with some moderate degree of frequency after being continually placed on short-lists and requested to bear the burden of submitting additional proposals. Where this does not happen, the agency should investigate with a view toward initiating mitigating measures.

Time for Selection

This section attempts to find some correlation between procedure and the duration of time required for the selection of a consultant. Although cause-and-effect relationships would need to be studied in detail by a sample of the states to reach representative conclusions, it appears that the most effective way of reducing time in the selection process is to have its importance recognized by top management in the agency, along with a streamlining of the procedures, and central monitoring and en-

TABLE 5
CONSULTANT SELECTIONS IN FLORIDA

Technical Ranking	Cost Ranking			Selection Frequency	
	Lowest	2nd	3rd	Number	Percentage
Highest	172	64	8	244	58.65
2nd	94	16	0	110	26.44
3rd	61	1	0	62	14.90
Total	327	81	8	416	100.00
Frequency	78.61	19.47	1.92		

forcement of prescribed time schedules for each step in the process.

The importance of time warrants top-level attention. Time is important to coordinate transportation improvements in a timely manner with urban development, to expedite needed traffic, safety, and other critical transportation improvements, as well as for in-house efficiency by precluding the necessity for wasteful updating of scopes and estimates.

Although some states can select a consultant for routine projects within a month or two following initiation of a request, the average time reported in the national survey is three months, with some requiring six months or longer. The average time required by states using cost proposals in their selection procedure is also three months, indicating that the use of the cost factor neither expedites nor delays the selection process. Similarly, there is no reduction in the average of three months for

selection of a consultant in those states that delegate final selection authority to lower-level managers or selection committees.

Virginia requires only one month to select a consultant, probably because of its relatively simplified procedure with little need for external approvals. Kentucky also requires one month but its consultant program is relatively small.

New Jersey requires two months to select a consultant for "complex" projects and less than one month for all others. Such short time durations are attributable to its use of prescribed accelerated time periods for each step in its "fast-track" procedures. This indicates an emphasis by top management on the value of time, and the message is apparently being heard.

A further discussion of the time required by the states for the total procurement process through the execution of an agreement will be found at the end of Chapter 5.

CHAPTER FIVE

THE NEGOTIATION PROCESS

This chapter examines the negotiation processes and requirements through illustrative examples of procedures in a sample of states and general responses to the national survey.

Federal-aid requirements (13) mandate that consultant's proposals be subjected to technical and cost or price evaluations, including audits, before negotiation of agreements exceeding \$50,000. The FHWA has proposed raising this limit for the reasons cited in the subsequent section on Pre-agreement Audit and Technical Review. Federal policy (17) further requires that the consultant's organization and associated consultants be identified during the negotiation process, preferably at the time of submitting a proposal. This is important because the selection of the firm is largely based on its qualifications and any modifications affecting those qualifications should receive prior approval.

As previously discussed, relatively few states require the submission of cost proposals before the selection of a consultant. The general procedure for the evaluation of costs in most of the states is to furnish the selected firm with a detailed scope of services, discuss it at a scope meeting with the firm, and request a detailed cost proposal in a prescribed format. The cost proposal is evaluated by comparing it with the agency's independent cost estimate. Certain cost items in the firm's proposal are audited or otherwise subjected to some degree of verification before the initiation of the negotiation process. States that use binding or nonbinding cost proposals as a basis for selection use modified procedures.

The negotiation process considers and attempts to resolve the cost differences between the agency's estimates or audit and those by the consultant. The agency's confidential estimates provide a basis for ensuring a mutual understanding of the scope of the work in addition to the objective of arriving at a reasonable price.

SCOPE MEETING

On approval of the selection of a specific consultant for a project, the firm is generally notified, provided with a copy of the agency's detailed scope of services for the proposed work, and requested to attend a meeting to discuss the scope.

The scope meeting is also attended by the agency's staff from the central and district offices as needed to properly discuss the subjects on the agenda. A typical agenda includes detailed coverage of the scope of services, the inter-relationships and respective responsibilities of the agency and the consultant, methods of payment and limitations thereon, and related procedural and contractual matters.

Other special requirements and considerations related to the project may also be discussed at the scope meeting. For example, Washington requires for some projects the utilization by the consultant of a computer-aided drafting and design system compatible with the state's system in developing the project alignment, profile, intersection, and right-of-way plans. Coordination and the delineation of items to be provided by the state may be discussed.

New York provides the consultant with the critical dates that must be met, such as for the public hearing and the completion of the plans, specifications and estimates. The consultant is required to include in his or her proposal a simple bar chart that shows a proposed schedule for each of the major activities in the scope of services and how such critical dates will be met. The agenda also includes advising the firm of the lengths of time required for various reviews by the department and by outside agencies so that sufficient time is allowed for these reviews in the consultant's schedule. The method of payment is established after discussion with the consultant at this time so that the proposal may be prepared in the proper format.

Other factors affecting the format of the proposal are also discussed. New York requires the cost proposal to be patterned after the specific activities of work delineated in the scope of services. Virginia and other states provide other ways of ensuring that there is a common basis for both the estimates by the agency and those by its consultants. This common basis provides the ability to quickly discern any significant variations between the state's and the consultant's estimates and, thereby, identify the need for further discussion regarding the work required. The cost proposal must also include the costs by the firm's forces and by approved associated consultants separately identified, and must follow other guidelines regarding the uniform identification of levels of employees, projected wage rates, the eligibility of specific direct non-salary costs and other requirements, all of which are included in the agenda.

After a common understanding of the scope and other requirements is reached, the firm is requested to prepare and submit its cost proposal based on such an understanding and any visits to the project site.

CONSULTANT'S COST PROPOSAL

Typical consultant cost proposals include the following general features:

- Detailed scope of services reflecting any modifications agreed on during the scope meeting.

- Listing of all personnel to be working on the project by their job titles and standardized equivalent grade levels.
- Average hourly wage rate for each job title listed.
- Maximum hourly wage rates projected for each job title for each of the fiscal years during which the work is scheduled.
- Estimated hours by job title and equivalent grade levels that are projected to be assigned to rational work segments within the project scope in accordance with the breakdowns in the agency's cost estimate.
- Estimated direct technical labor.
- Estimated direct non-salary costs.
- Estimated costs by associated or subconsultants in the same manner as for the prime consultant.
- Proposed overhead rate and dollar amount.
- Proposed fixed/net fee.
- Amount for contingencies.
- Summary of total costs, maximum amount payable, lump sum, or various breakdowns depending on contact type.
- Proposed progress schedule indicating critical dates and mileposts.

Modifications to these typical features are needed to conform with the method of payment selected for the agreement. Several illustrative examples follow.

Pennsylvania

Pennsylvania uses the consultants' cost proposals both as a basis for selection from a short-list and for any subsequent negotiations to the extent they are deemed necessary.

The proposals must include summaries and computations of all direct payroll and other direct costs, overhead, and net fee for work by the consultant and by each of the associated consultants, as well as all remunerations of any form that are paid to principals of the firm, including bonuses and commissions.

The computations of direct payroll costs must include the names of all employees to be used on the project, their classifications, and their current and anticipated wage rates. The use of such classifications of employees must be presented by a breakdown of man-hour requirements by the divisions, subdivisions, and units of work required to accomplish the project. Each unit of work must be accompanied by the classifications of employees to be used and the average hourly rate for each classification, extended and costed progressively to arrive at the total estimated payroll cost. Such breakdowns of work must be identical to those used in the consultant's cost accounting records for the work performed under the agreement.

The direct, non-payroll costs must be documented by estimates in accordance with prescribed guidelines. Overhead must be supported by a financial statement and is subject to an audit after the completion of the work. Pennsylvania establishes a provisional overhead percentage based on the latest audit and a maximum overhead percentage not to exceed either 5 percent over such rate or the maximum state limit. The fixed fee requested in the proposal is also subject to negotiation if it exceeds internal guidelines.

A certified financial statement must be submitted promptly on receipt of a request for proposal, covering all expenses incurred and revenues received in the consultant's operations during the firm's previous fiscal year. The accounting must include

all eligible direct costs, direct labor and other, and all indirect costs, such as payroll burden and general and administrative expenses. This accounting is subject to a pre-agreement audit.

Virginia

Virginia has similar requirements for the breakdown of all costs for direct labor, direct non-salary costs, payroll burden, general administrative overhead, net fee, and subconsultant fees. Costs are broken down, in accordance with a published guide, into classifications of detailed tasks and subtasks that are common to both the consultants' and the agency's estimates. A proposed progress schedule is also required, as shown in Figure 6.

New York

New York, as previously cited, also requires the inclusion in the consultants' cost proposals of the firm's proposed progress to ensure that critical dates or mileposts will be met. Such a schedule is based on an estimated date of final approval of the contract agreement, subject to later modification in the event of delay. The consultants' estimates are required to be based on the same task breakdowns delineated in the scope of services.

To simplify review and negotiation procedures, consultants' listings of job titles and related wage rates must be associated with their equivalent grade levels as published by the American Society for Civil Engineers and by the National Institute for Certification of Engineering Technicians. To ensure a mutual understanding before and during the contract work, a description of the scope of services as modified by any revisions agreed on during the scope meeting, with an executive summary, must be included in the proposal.

PRE-AGREEMENT AUDIT AND TECHNICAL REVIEW

Pre-agreement Audit

The principal objectives of pre-agreement audits are (a) to ascertain the capability of the consultant's accounting system to identify, segregate, and accumulate contract costs to support the method of reimbursement in the proposed contract, and (b) to ascertain the reasonableness of all direct and indirect costs estimated in the consultant's proposal.

Because of the length of time required for such audits, which are directly on the critical path to the execution of an agreement, different ways are utilized by the states to reduce the time and effort involved at this stage. Some states, like New York and New Jersey, utilize a two-step approach where a general audit is performed as soon as the consultant is selected, and the evaluation of proposed costs is initiated on receipt of the consultant's cost proposal. Other states place greater reliance on previous state or federal audits or on audits by certified public accountants engaged by either the consultant or the state. A major portion of the states conduct pre-agreement audits of the consultant's accounting system, overhead, wage rates, and payroll additives. Some states determine the reasonableness of the

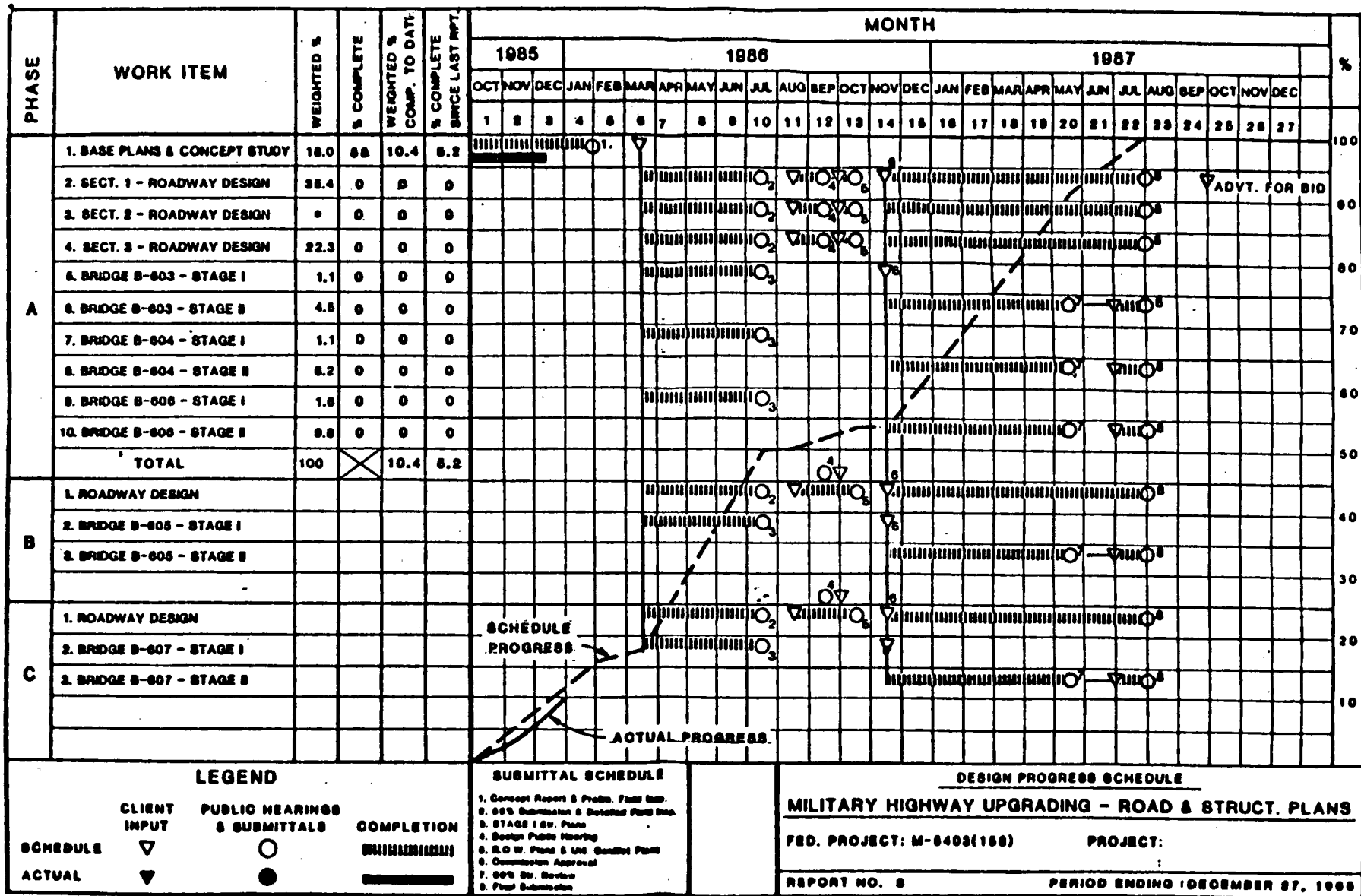


FIGURE 6 Virginia's design progress schedule.

wage rates and additives, and sometimes even of overhead, without resorting to pre-agreement audit.

The reviews of wage rates and additives are made by the agency's audit staff in many states and by consultant services personnel in others, depending on the availability of the related information or of recent audits and the degree of use of private accounting firms for such a purpose. There is a strong motivation for time saving in this step because negotiations cannot begin until the pre-agreement audit report is completed.

The foregoing variations in emphasis on pre-agreement audit may be partially attributable to variations in the size and type of contracts and to specific contract provisions used by some states that allow for subsequent adjustments to previous payments. With cost-plus-net-fee contracts, payments for overhead are based on actual audited costs and any overpayments may be adjusted on subsequent audit. However, lack of a pre-agreement audit may result in a problem with the net fee portion of such contracts because, although the fee is subject to negotiation, the total estimated costs of the contract are usually considered as a guide. Although a number of states have moved away from the concept of fixed fee toward one of net fee, adjustments in the net fee are permissible only for increases or decreases in the scope of work, not because of differences between actual versus estimated costs.

For contracts with lump-sum methods of payment, the lump-sum price is generally fixed, except for the general inclusion of provisions to allow for the adjustment of the lump-sum amount by supplemental agreement for extra work. However, for this type of contract, any inaccuracies in the original cost estimates generally become embedded in the agreed-on lump-sum amount unless uncovered by pre-agreement audit.

These problems are overcome in some states by certifications, such as those prescribed in all consultant agreements by Connecticut and Florida, that provide that, "the original contract price and any additions thereto shall be adjusted to exclude any significant sums by which the Commissioner determines the contract price was increased due to inaccurate, incomplete, or noncurrent wage rates and other factual unit costs." A provision in Pennsylvania's consultant-engineering agreements prescribes a similar intent, placing the burden of proof on the consultant for the life of the Agreement.

Technical Review

A technical review of the consultant's cost proposal is necessary before negotiation to (a) determine whether all the prescribed items of work are adequately covered therein, (b) uncover any significant discrepancies between the consultant's and the agency's estimates of personnel and man-hours required for each of the specific work classifications and estimates of other direct costs, (c) ensure the reasonableness of the consultant's proposal and an adequate understanding by the firm of the work required, and (d) evaluate the proposed work schedule relative to critical dates, including the coordination required with related work by the agency or any of its other consultants.

On complex projects, the consultant's potential use of innovative and/or computer-aided design methods may also be reviewed for discussion during negotiation.

The technical review needs to be made by personnel most

familiar with the requirements, and, depending on the nature of the project, may include representation from several specialties in both the central and district offices. However, it is best that the technical review be coordinated by a central coordinator or expeditor to ensure completeness and timeliness.

Variations

Washington's primary pre-agreement audit objective is to evaluate the acceptability of the firm's accounting system. A provisional overhead rate is established within the state's maximum limits subject to an annual audit. The annually audited rate for overhead is used during each following year and for retroactive adjustments to payments made therefor during the period covered by the audit. New York's pre-agreement audits verify both the acceptability of the accounting system and the overhead rate, subject to similar verification by annual audit. Proposed wage rates and other costs are verified by New York's Contracts Bureau via the consideration of historical records to ensure reasonableness of preliminary payments pending audit. Maryland utilizes provisional rates for payroll burden and overhead in a similar manner.

Florida does not do pre-agreement audits for Class I projects, which are major projects with clear, definable scopes appropriate for the lump-sum payment method. The potential problems cited previously relative to potential inaccuracies in the cost estimates for lump-sum projects are offset in Florida by a "truth-in-negotiation certificate" required for all professional service contracts over \$50,000, as well as by the use of price competition for the selection of consultants for such projects. With Class II projects, which are all major projects other than lump sum, pre-agreement audits are conducted to determine the reasonableness of all proposed costs.

Idaho, which has a relatively small consultant program, requires each consultant to submit a recent acceptable audit report of the firm's accounting system, and an audit of its costs by an independent accounting firm before negotiation. If the proposed costs are deemed to be reasonable, no state pre-agreement audits are scheduled.

Pre-agreement audits can be very time-consuming and, as previously noted, are in the direct path toward negotiations and contract agreements. New Jersey, even with its fast-track system of monitoring, requires 30 days on the critical path for pre-agreement audit after it has initially reviewed the firm's accounting and estimating system during periods of float pending the receipt of the consultant's proposal. For these reasons, the FHWA has proposed raising the \$50,000 limit beyond which pre-agreement audits are prescribed.

In view of the controls over costs that are available by payment methods and provisions and by periodic audits during the progression of the work, and the potential capability to assess the acceptability of a firm's accounting system through other recent audits, the audit procedures should be considered in any evaluations of procedural efficiency by an agency. However, the effectiveness of audit expertise in providing pertinent information to the negotiators before negotiation should not be diminished thereby.

NEGOTIATION

Objectives

Negotiation is necessary when there is a need to adjust any significant differences in the perspective of the scope of work and the estimates of the cost of the work by the agency and by the consultant. Such differences include discrepancies in the estimates of man-hours by grade levels for each of the work classifications, the proposed wage rates, other direct and indirect costs, and the proposed fixed fee; discrepancies in the understanding of the scope of work required in any of the work classifications or of the work to be done by the state or other consultants; or in the event of any need to explore the use of innovative methods.

The end result of the negotiation process is a better mutual understanding of what is to be done and by whom, when it is to be done, and the amount and method of reimbursement, all of which are documented by the submission of a revised proposal by the consultant reflecting this understanding. This is the basic procedure used by most of the states, with some minor variations as illustrated below.

Pennsylvania, although it evaluates technical and cost proposals from short-listed firms as a basis for selection, requires negotiation with the selected firm when adjustments are needed to conform with federal guidelines, state policies, and any necessary adjustments deemed necessary by the technical review, as well as when the proposal exceeds by more than ten percent the state's estimates of man-hours, or contains excessive discrepancies in proposed wage rates, overhead, or net fee.

Florida's negotiation procedures are similar to those described above for all of its projects except Class I, or lump-sum, projects. For its Class I projects, those with clearly definable scopes, the Contractual Services Office, on selection of the firm, "assembles an agreement in accordance with the terms and conditions of the request for proposal and at the price submitted by the selected firm or individual."

Maine, which also requires cost proposals for lump-sum projects, does not subject the lump-sum amount "to further negotiations unless (a) it is not in compliance with accepted fee guidelines, or (b) the scope of services is modified. Every effort must be made to avoid unessential changes in the scope of services in these instances."

New Jersey negotiates all of its projects, including lump-sum projects, through procedures similar to those used by most states. Its classification of projects into Routine and Complex categories affects only its selection procedures.

Survey of States

Responses to questions in the national survey relating to the negotiation process are summarized below.

Confidentiality of Agency Estimates

All of the states report that they maintain the confidentiality of their independent estimates of costs or man-hours until at least after the submission of the consultant's cost proposal. The

predominant practice is to retain this confidentiality forever, with a handful of states releasing the estimate either during or after the completion of negotiation or after the completion of the contract.

Negotiation Procedures

Very few of the states, in their negotiation processes, limit their concerns to the total cost of a proposed consultant agreement. Most of the states are almost evenly split into those that negotiate the cost of each classification of work and those that negotiate only major work groupings, with the latter in a slight majority. There is no correlation between the negotiation levels adopted by the states and the relative number of consultants utilized in their programs.

Regardless of the degree of confidentiality of the states' independent cost estimates, half of the states notify the consultant during negotiations in the event the proposed costs for a work classification or major work grouping are significantly lower than estimated by the state. The other half review the work requirements with the consultant in such instances to ensure that there is no misunderstanding regarding its scope without divulging the estimate.

Retaining the confidentiality of the estimate at least until completion of the negotiation process provides a better negotiating environment. A common understanding of the work required can be adequately ensured by discussing all work items whose proposed costs are either significantly higher or lower than estimated. However, because the state's estimates can have at least an equal potential for inaccuracy or error, they should not be held up as a standard and thereby bias the results of negotiation. By not divulging such estimates, it is more likely that the negotiated amounts will more accurately reflect the actual costs.

A majority of states report that their designers or estimators are also the negotiators, rather than a separate classification of personnel with greater training or experience in negotiation. In others, negotiation is handled by negotiating committees or by coordinators, either directly or with the assistance of designers from the initiating office.

For example, Connecticut utilizes a three-person negotiating committee to enhance its negotiating ability. However, the designers instruct the committee in their estimates of the cost of each work classification, thus providing the capability to evaluate discrepancies with the consultant. In New York, negotiation of man-hours by level of staff for each work classification, as well as the review of direct non-salary requirements, is accomplished by the designers or their supervisors. The various wage rates, direct and indirect costs, and net fee are negotiated by the Contracts Bureau. Such splitting of responsibility in accordance with experience and responsibility levels appears to provide for a more efficient utilization of staff.

Negotiation Failures

Eighty percent of the states report that they are able to successfully negotiate a fair and reasonable price with the first firm

selected for each of their projects. Most of the remaining states report negotiation failures with the first firm selected on about one percent of their projects, or less. Of these, negotiations are usually successful with the second priority firm. The recourse in the unlikely event of negotiation failure is universally patterned after the method used for direct federal contracts (i.e., negotiations proceed with short-listed firms in their order of priority until successful; otherwise, the project is readvertised).

These results are not surprising in view of the state's motivation to secure the best-qualified firm, and the consultant's desire to secure a contract after having invested a considerable amount of effort, time, and money.

Negotiated vs. Estimated Costs

Although most of the states' responses in this regard appear to be highly subjective, without the benefit of historical data, they indicate that the amounts negotiated are, on the average, five to ten percent higher than the costs initially estimated by the states for the work. One state reported that the negotiated amounts exceeded those estimated by more than 15 percent, whereas Pennsylvania and South Dakota reported that their negotiated amounts were generally less than their initial estimates.

Washington reported an average increase of less than one percent and provided specific data to support such an amount based on all federal-aid consultant agreements under way. This information is summarized in Table 6 with the contracts sorted in the order of increasing ratios of negotiated to estimated costs. It is observed that, although the ratio of the total negotiated amounts to the total estimated is only 1.005, such ratios by project vary from 0.74 to 1.18. About a third of the projects have ratios less than unity. These projects have an average project size of \$894,000 and represent about one third of the total number of projects and one fourth of the total dollar value of the sample. Most, although not all, of the larger projects are in the group with negotiated costs exceeding those estimated.

Although specific conclusions cannot reasonably be drawn from this one sample, it does show a significant larger variation than represented by averages. It appears that there may be greater differences between the estimated and negotiated costs than generally believed. These should be studied to determine the reasons for them and whether greater emphasis is required on more accurate estimating or on better negotiations. Indiana is in the process of accumulating such statistics but greater representation is needed.

It is, therefore, recommended that studies of such variations and analyses of the contributing reasons, categorized by project types and magnitudes, be undertaken by the states. Such analyses would provide an excellent basis for ascertaining the caliber of an agency's estimating and negotiation capabilities and could monitor the effectiveness of any state's training programs in such areas. An eventual national summary of such state studies, when related to the specific nature of procedures used, should be of considerable general interest as a datum against which each agency could evaluate their estimating and/or negotiation capabilities.

TABLE 6

CONSULTANT CONTRACTS IN THE STATE OF WASHINGTON

State's Estimate (\$ Thousand)	Negotiated Amount (\$ Thousand)	Ratio of Negotiated to Estimated Amount
287.8	212.1	0.74
230.0	182.5	0.79
4183.8	3349.4	0.80
55.3	47.2	0.85
86.2	77.6	0.90
393.0	360.7	0.92
78.7	73.4	0.93
13.6	13.0	0.96
4329.1	4184.9	0.97
692.4	674.4	0.97
25.6	25.0	0.98
356.0	351.0	0.99
642.6	650.5	1.01
6765.4	6904.1	1.02
6454.2	6587.9	1.02
4150.0	4262.7	1.03
6278.8	6458.1	1.03
62.7	65.0	1.04
350.0	366.0	1.05
2215.0	2326.4	1.05
700.8	738.6	1.05
786.7	831.6	1.06
1273.7	1367.6	1.07
859.1	927.5	1.08
404.9	437.9	1.08
320.7	348.8	1.09
1437.4	1566.2	1.09
655.7	717.6	1.09
330.3	364.2	1.10
445.1	491.7	1.10
278.2	316.3	1.14
89.4	103.2	1.15
509.3	599.8	1.18
45741.5	45982.9	1.005

CONSULTANT'S AGREEMENT

The end product of the negotiation process is the preparation and approval of the consultant's agreement.

All states use a standard form for the agreement that wraps up, by reference or direct inclusion, the scope of services and proposed payments with a number of standard and special contract provisions and forms for final certifications and approval signatures by the consultant and various levels of state government.

The principal issue discussed in this section is the exorbitant amount of time required in many of the states for the attainment of this objective from the initiation of a request for consultant services.

The total time required by the states for the selection of a consultant, the negotiation of an agreement, and for execution and approval of a final contract varies from three to twelve months, with an average of seven months. A little more than

one fourth of the states require only four months or less. Table 7 shows the times reported by each of the responding states, adjusted to the extent necessary to correct conflicts within the data submitted.

Virginia, which has an annual construction letting program of \$900 million and annual expenditures on consultant contracts for design and construction inspection of \$45 million, requires only four months to obtain consultant services, as shown in Figure 7. This is probably due to a less time-consuming interference by others with the established process. Although a number of states have shorter processing times, their consultant programs are relatively much smaller, which may allow these states to more easily devote their attention to the processing.

The relatively quick time of six months in Illinois may be attributable to a minimization of the number of internal and external approvals required because of its high-powered, broad-based selection committee.

Pennsylvania's small amount of time for negotiations and

contract approval is attributable to its use of cost proposals as a basis for selection. However, its total processing time is also less than average. On the other hand, Florida, which also uses cost proposals for selection, seriously overshadows its time savings in negotiations with delays in other procedures. These procedures are being studied by a department task force, which has made procedural recommendations with the objective of cutting the processing time in half.

New York's lengthy processing time may be attributed to insufficient delegation and to the need for numerous successive approvals along the chain of command. These procedures are being studied by a special multi-disciplined task force, but no recommendations have as yet been released.

New Jersey's accelerated "fast-track" procedures, although expeditious for the selection process, cannot seem to shorten the negotiation/contract approval time. The two months shown in Table 7 for the selection process is required only for complex projects; less than one month is required for routine projects.

TABLE 7
DURATION OF SELECTION/NEGOTIATION PROCESSES (MONTHS)

State	From Request through Designation	Designation through Final Contract			
		Agreement on Cost	Contract Approvals	Sub-Total	Total
Alabama	2	8	1	9	11
Alaska	-	-	-	-	4
Arkansas	2	-	-	1	3
Colorado	2	5	4	9	11
Connecticut ^a	2.5	2	2.5	4.5	7
Delaware	6	3	2	5	11
Florida ^a	9	1	2	3	12
Georgia	3	1	2	3	6
Hawaii	2	3	3	6	8
Idaho	2	1	0.5	1.5	3.5
Illinois ^a	2	3	1	4	6
Indiana ^a	2.5	4	2	6	8.5
Iowa	2	2-9	1	3-10	5-12
Kansas	3	3	3	6	9
Kentucky	1	-	-	1.5	2.5
Maine	3	3	3	6	9
Maryland ^a	-	-	-	-	12
Michigan	3	1	2	3	6
Mississippi	3	-	-	1	4
Missouri	4	1	1	2	6
Montana	4	0.5	0.5	1	5
Nevada	2	1	0.5	1.5	3.5
New Hampshire	3	3	2	5	8
New Jersey	2	5	2	7	9
New York ^a	3	3	5	8	11
North Carolina	3	2	0.5	2.5	5.5
Ohio	3	3	3	6	9
Oklahoma	6	2	2	4	10
Oregon	3	1.5	0.5	2	5
Pennsylvania ^a	3	0.5	2	2.5	5.5
South Carolina	3	3	-	3	6
South Dakota	2	0.5	0.5	1	3
Tennessee ^a	2.5	-	-	2.5	5
Texas	4	3	1	4	8
Utah	1.5	1	1	2	3.5
Virginia	1.25	1.75	1	2.75	4
Washington ^a	5	1	0.5	1.5	6.5
West Virginia	3	3	2	5	8
Wisconsin	1.5	2	0.3	2.3	3.8

^aState responded to comprehensive survey.

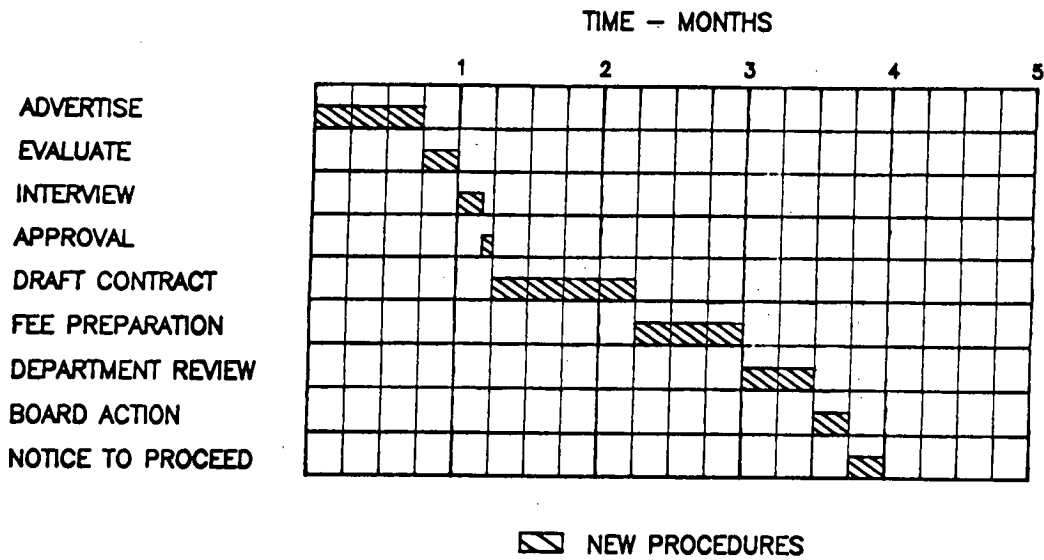


FIGURE 7 Virginia Department of Transportation consultant-procurement process.

The remaining seven months for negotiation and contract execution do not include delays that periodically occur in the availability of funding, which raises another issue discussed below.

Delays in the availability of federal funding or matching shares from local government could significantly delay the total contract processing time. Of a sample of nine states, four report problems of this nature. The others have either legislated programs or procedurally reserve the funds necessary for their projects as soon as scheduled.

Reserving funds for specific projects, while avoiding the delays cited above, has the disadvantage of limiting the size of the agency's active program. Funds could lay dormant for long periods of time because of various sources of delays to the related

projects, such as design problems or serious objections by community or environmental groups. Therefore, some states find it preferable to advance more projects than could be financed by the funds available to account for those projects that either are delayed to later fiscal years or are ultimately terminated.

On the other hand, obligating funds only as needed for specific rather than for all phases of a project could result in significant delays to the subsequent phases at a point in time when the completion of the project may become perceived by public groups or officials to be critically needed.

The relative importance of these considerations is best weighed by the states within their perspective of their specific administrative, legal, and political environments.

SELECTED CONTRACT FEATURES

This chapter addresses several important provisions included in all consultant contracts that are of general interest. The inclusion of these provisions is not intended to imply their greater importance relative to other general contract requirements.

RISK ASSIGNMENT

There are a number of risks associated with either the design of a transportation facility or with the inspection of its construction, the liability for which generally rests on both the state and on its consultant to whom the work was contracted, and, in some instances, to specific individuals within either organization. Personal liability is a serious potential risk in circumstances under which negligence may be charged, regardless of the presumption of such risks by the state or by the engineering firm on behalf of its employees.

All states attempt to protect themselves against all or some of these risks in varying degrees, generally by requiring their consultants to maintain property damage and injury liability insurance in prescribed limits and coverage, including provisions that are intended to protect the state against all claims. There is a lesser degree of agreement among the states regarding requirements for their consultants to carry professional liability or "errors and omissions" insurance to protect both the consultant and the state against design errors or omissions and claims of faulty construction inspection.

This section examines the degree of risk, the trend in the cost of protective insurance, the extent of liability insurance requirements by the states and other agencies, and addresses the overall risk management problem.

Potential Liability

Holland (19) notes that the issue of malpractice, which has seriously disturbed the medical profession, is becoming a matter of concern for every engineer. He cites, as one graphic example, the collapse on July 17, 1981 of two 32-ton suspended walkways within the atrium of the Kansas City Hyatt Regency Hotel, leaving 114 people dead and 185 injured. The potential enormity of the professional liability problem to a design engineer is dramatically exemplified by this instance, which involved more than \$90 million in damage awards.

The following citations illustrate the varied nature and extent of the potential risk of professional liability in both design and construction inspection activities.

During the erection of a steel superstructure in Syracuse, New York in 1982, a girder collapsed and fell 40 feet to the ground. Seven of the contractor's employees were injured, two of them fatally. Inspection of the construction work was contracted by the New York State Department of Transportation to a highly qualified engineering firm. Seven lawsuits were filed against the State of New York (20) and against the engineering firm; the latter are still pending. The court found that the state had a nondelegable duty as owner of the work site to provide a reasonably safe work place. The suits against the state resulted in an aggregate of court awards and settlements in the amount of \$2.6 million. The consultant is now liable not only to separate actions by the employees involved in the accident or by their estates but also to the contractor's insurance company and to the state for an apportionment of the aforementioned amount.

A similar principle was involved in the case of a sewer contractor's employee in Pennsylvania who was killed when a trench in which he was working collapsed. The court found that the trench was not adequately braced or shored, in violation of state and federal laws. The court awarded a total of \$205,000 against the contractor, the sewer authority, and the engineering firm inspecting the work. The last was found "clearly negligent under the evidence for failure to properly supervise the job and inspect the work pursuant to its contract" (21). The sewer authority's liability was predicated upon laws that impose "liability upon an employer regardless of control, the theory being that an employer hiring an independent contractor to do particularly dangerous work ought not to be allowed to insulate himself from liability."

The following situations are involved in pending court actions, and specific facts and names need to be withheld; nevertheless, the principles involved are pertinent. In one instance, the contractor on a bridge construction project sued the state for delays caused by the necessity for the state to redesign many elements of the structure, which had been designed by contract with an engineering firm. This suit was settled for \$850,000, and the state is now seeking recovery from the consultant.

Another instance of faulty bridge design by a consultant for the rehabilitation of a major river crossing incurred a chain of successive claims. The problem stemmed from the inadequate design of the hanging system for travelling maintenance platforms beneath the structure. The hangars as designed were too rigid to accommodate the flexural and temperature movements of the structure, and structural cracks developed that required redesign and replacement of the system. The construction of the travelling maintenance platforms had been included in a preliminary bridge repair contract, following which a \$44 million rehabilitation contract was awarded to another contractor.

Because of the time needed for extensive redesign of the traveller system, the preliminary repair contract was terminated. That contractor entered a claim for \$5 million for extra costs and loss of anticipated profits. The next contractor on the subsequent overall rehabilitation contract entered a \$10 million claim because the travellers were not available as anticipated in his contract for access and progression of the rehabilitation work. The state will be expecting recovery from the design consultant for reimbursement of potentially \$15 million in court awards.

The question is what is the best way to protect the state and its consultant community against the myriad of risks and their associated costs relative to work with which they are mutually involved. Some of these risks have the potential for costly claims that can put even the most financially solvent firms out of business. In certain situations, the personal assets of those responsible may be in jeopardy.

Lunch (22) cites the serious concerns regarding personal liability by describing the effects of the expiration of liability insurance coverage for Sykesville, Maryland on September 11, 1985. The elected and appointed town officials resigned, terminating all town services, asserting their fear of being held individually liable for claims arising from street repair, traffic control, and other town operations. Lunch cites similar concerns for personal liability by engineering employees of industry and government, among others, as well as by those employed by consulting firms that do not carry professional liability insurance.

Some engineering firms have limited their professional liability insurance because of its prohibitive cost, because of the inability to obtain insurance at any cost, or on the theory that, without coverage, they may become less likely targets for lawsuits. However, if the state or other owner were to willingly contract with a consultant who does not carry protective insurance, which is hardly likely, it places itself and the consultant in greater jeopardy. On the one hand, the owner could face even more serious charges for failure to responsibly prescribe proper protection for the public. On the other hand, the consultant places not only all of his or her own assets at risk but also the personal assets of those responsible for the work.

Liability Insurance

A survey in 1986 by the American Consulting Engineers Council (23) of 1,608 firms revealed a 43 percent increase in insurance premiums, which, in total, represent an average of 4.11 percent of their billings. Despite the increase in cost, the insurance purchased in such an increased amount had lower coverage and higher deductibles. The number of firms operating without insurance increased sharply to 19.1 percent. Engineering firms that were hit the hardest were structural firms with an insurance cost of 7.11 percent of gross billings and small firms of five or fewer employees with a 5.67 percent insurance cost. The Council estimated from its survey that its 4,700 members paid approximately \$200 million for liability insurance in 1986.

Ross (24) asserts that "the professional liability crisis strikes not only at the continued profitability of large firms but also at the ability of many small firms even to continue in business." He reports that, despite excellent claims experience, many individuals cannot afford the premiums and many others cannot

obtain insurance at any cost. Thus, the small practitioner is becoming even more marginal.

Steinbach (25) reports that insurers have found their reserves to be inadequate to meet the increasing liability claims, forcing them into financial reorganization or even bankruptcy. The resulting shock waves through the industry have included absolute exclusions for pollution and asbestos in liability policies, "astronomical premium increases, erosion of limits, increased deductibles, and restrictions on coverage terms and conditions. For some firms, insurance coverage is almost impossible to find despite cost."

Steinbach suggests that, conceivably, a firm might pay high premiums for insurance for a number of years, have the good fortune of never having a claim against it, and begin to wonder whether it might better assume the risk and save the premium. Nevertheless, although some businesses have adopted such a position, engineering firms have generally shied away from it because of client considerations and the need to protect assets.

A comprehensive article in *Better Roads* (26) asserts that "many states, counties, and cities have turned to self-insurance, rather than pay out huge premiums. A key part of self-insurance, however, is reinsurance for amounts over a set maximum, such as \$500,000, and that market has also dried up in the past year or two." As Lunch points out (22), there has been a substantial reduction in the number of insurance underwriters for A/E professional liability insurance so that only a handful of insurance companies are willing to offer such policies.

Thus, as *Better Roads* states (26), liability insurance, which is expected to increase another 80 to 300 percent in cost this year depending on the location of the purchaser, may no longer be the answer to law suits that it used to be.

Problem Areas

The following problem areas are examined briefly to provide a better perspective of the risk management problem.

Joint and Several Liability

With the exception of a few states, the doctrine of joint and several liability exacerbates "the deep-pocket syndrome." As a result, where judgment is rendered against multiple defendants in a liability suit, one of the defendants may bear the major, if not full, burden of the judgment in certain conditions, even if the defendant were judged to have only a minor degree of contributory negligence. Lunch (22) sets forth the example of an engineering firm that is deemed to be only five percent negligent, and the other liable parties are either no longer in business, or are bankrupt, or have insufficient assets to pay their share. In such an instance, the engineering firm becomes liable for the entire amount of the judgment.

Better Roads (27) states that, under most current laws, a government agency that is one percent to blame for an accident can end up paying the full cost. It cites a recent Rand Corporation study that found that government defendants pay 50 percent more than individual defendants in similar cases.

If a government agency wishes to avoid the effects of the deep-pocket syndrome by assigning all the risks of design and construction inspection to the engineer contracted for such

work, it must be sure that the insurance coverage and/or the firm's assets are sufficient to provide the desired protection and are available for the full length of time during which liability claims may be generated. However, there is no unanimity of opinion regarding the desirability of such an objective, and it is rarely attained in common practice.

Insurance Coverage

In certain instances, reliance by a state on the presumed protection of a consultant's professional liability coverage may be illusory for a number of reasons:

- Insurance policies for design engineers are generally effective only during the period during which the contracts are in force. Because most claims for faulty design are generated during and for many years after the construction of the facility designed, there is no insurance protection at the time when it is needed the most. Therefore, unless the engineering firm has sufficient assets to cover the adjudicated amounts, the state may find that it has compensated the consultant for protection with little or no benefit.

- Insurance policies cover the specific firms or organizations delineated therein. If the consultant changes its name subsequent to its design of a facility, the original policy on which the state relied lapses, regardless of whether there are any changes in the principals of the firm.

- Similarly, if an engineering firm changes carriers or reduces its coverage, the state no longer has the protection it expected.

Clark (28) refers to these problems and states that coverage under an insurance policy is usually applicable to claims made during the policy period. Even if a professional error were made during the policy period, any claim related to it that was not made until after the expiration of the policy period might not be covered. The effect is particularly important when the insurance coverage, the deductible amounts, or the insurance carriers have been changed during the period of the applicable statute of limitations.

Limitation of Liability

Kennedy (29) discusses the current attempts by design professionals to share the liability risks of a project with the owner on the basis that the owner is in a better position to spread the costs of such risk over the life of the project, and that it is unreasonable to expect the design professional to assume a greater liability exposure than is commensurate with the fee received for the work. Such sharing of the risk has merit and may be generally acceptable to the owners and to the courts.

Many designers would prefer from their clients a complete indemnification and hold harmless agreement. Such clauses have already taken hold in professional service contracts involving hazardous waste and asbestos because of the tremendous liability exposure involved with such work, the unavailability of insurance, and the need to secure qualified firms to remedy the related acute public health problems.

Kennedy also cites the following concerns relative to such indemnification clauses in consultant design contracts:

- The client's resistance to such limitations on his or her protection.
- The risk of unenforceability in court in view of the anti-indemnification statutes in many of the states.
- The professional engineers are not unanimous in their view as to whether it is ethical to attempt to be relieved from liability in the event of negligence in their performance of work for which they have been trained and licensed.

Furthermore, Kennedy points out that a limitation of liability provision in a consultant contract will not protect the consultant from direct third-party claims because the parties never agreed to such a limitation in the contract.

The Drive for Tort Reform

The ultimate solution of the liability crisis is perceived to be the correction of a number of inequities through tort reform. The American Consulting Engineers Council is reported (30) to have organized a coalition called the American Tort Reform Association (ATRA) to seek solutions to the problem. Among the solutions to be sought by the Association are the reform of lawyers' contingency fees, a limitation on awards for punitive damages and noneconomic losses such as pain and suffering, and restrictions on the use of joint and several liability.

Better Roads (31) reports the call by ATRA for a return to the primary concern for genuine fault, rather than penalizing those with the deepest pockets regardless of the degree of fault, structuring damage awards to bear a reasonable relationship to economic injury, deterrents for frivolous litigation, and caps on lawyer contingency fees. The state rather than the federal level is perceived in the article to be the better source of reform legislation. Some state actions, such as Proposition 51 in California, are already beginning to limit and modify joint and several liability.

Lunch (22) states that a variety of tort reform coalitions are developing across the country that are either authorized by state legislation or action by the governors, as well as by manufacturers and state chambers of commerce. A federal Tort Policy Working Group has been appointed by the U.S. Attorney General and may be a key factor in bringing the need for action to the attention of the general public.

With continuing and increasing attention to the liability crisis at various levels, the problem may be expected to at least reach a plateau in the not too distant future.

National Practices

There are three basic ways in which governmental agencies protect themselves against liability for claims resulting from the work of their design and construction/inspection consultants:

1. An indemnification clause in the contract requiring the consultant to protect the agency from all claims and liability resulting from the work in the agreement.
2. Prescribed comprehensive general liability insurance, including property damage, bodily injury, and workers' compensation and employers' liability, all with specified limits of coverage.

3. Professional liability and errors and omissions insurance to protect the consultant against liability associated with the work under the contract. Such a contract requirement may or may not be associated with limits of coverage, depending on the individual state's viewpoint.

Federal-aid requirements (17) prescribe that the consultant "be required to save harmless the State or other agency of government from all claims and liability due to his negligent acts or the negligent acts of his subcontractors, agents, or employees." This is the basis for the uniform use of indemnification clauses nationally. Similarly, all states require their consultants to carry workers' compensation insurance in accordance with the requirements of their state laws.

Although all the states prescribe general liability insurance, they vary in the specified dollar limits of coverage. More than 40 percent of the responding states prescribe such insurance without specifying any dollar limits. All except one of the remaining majority of states prescribe minimum limits for their bodily injury and property damage coverage varying from \$50,000 to \$300,000 for each occurrence and from \$100,000 to \$500,000 in aggregate. New Jersey, which prescribes minimum limits of \$1 million for each occurrence and \$2 million in aggregate for such insurance coverage, is the singular exception.

There are even greater differences in the states' requirements for professional liability and errors and omissions insurance. Approximately half of the responding states require their consultants to carry professional liability insurance and specify varying minimum limits with a median amount of \$1 million. The remaining states either prescribe professional liability insurance in an amount appropriate for the project, without specifying any minimum limits, or simply rely solely on their indemnification clause. It is interesting to note that New York supplements its indemnification clause with a requirement that indemnity shall not be limited by reason of the enumeration of any insurance coverage prescribed by the contract.

The requirements for direct federal contracts (32), which are not applicable to the federal-aid program, make the consultants responsible for the extra costs of construction changes required because of errors or omissions in design, as well as for correcting faulty designs at no cost to the government. Forty percent of the states maintained a similar position: that they had no hesitancy in holding their design consultants responsible for the extra costs of construction caused by faulty design. An equal percentage reported a definite reluctance to imposing such responsibility, whereas the remaining 20 percent were ambivalent, indicating a reluctance to imposing such responsibility as a general practice but applying it only to specific situations.

It was not feasible to determine the extent of state claims against consultants for design errors because of the apparent limited availability of records in most of the states. To provide an insight into the reasons for the variations in attitude toward responsibility for faulty design, inquiries of the selected states indicated a variation in the level of state supervision over their consultants' activities. Although most reported strong controls over the consultants' field decisions in the inspection of construction contracts, their control over consultant design varied from a thorough, detailed review by half of the sample of states, a review of major computations and standards by 40 percent, and little or no review by the remainder. However, there was

no correlation between the states' attitude toward imposing responsibility for faulty design and the extent of their control over the consultants' work.

The following paragraphs cite several liability and insurance provisions in a sample of states to illustrate the variations in approach.

Washington

Washington includes an indemnification clause in its contract provisions for the consultant to hold the state harmless and to process and defend at its own expense all claims and suits arising from work under the agreement. The consultant is also required to secure public liability and property damage insurance coverage in the amount of \$50,000 for death or injury to any one person and \$200,000 for death or injury to two or more persons in any one occurrence, and property damage coverage of \$100,000 for each occurrence. Professional liability and errors and omissions insurance is not prescribed, and there are no provisions for coverage beyond the term of the agreement.

New York

New York, in addition to the usual indemnification clause, utilizes a general contract provision requiring the consultant to carry professional liability and errors and omissions insurance without specifying any minimum limits. However, as previously cited, the state's indemnification clause holds the consultant responsible for all claims regardless of any insurance limits or lack thereof prescribed in the contract. The minimum limits for bodily injury liability insurance are \$100,000/\$300,000, with the same limits for property damage. The state also requires and reimburses the consultant for protective liability insurance for the benefit of the state and department employees. None of the insurance coverage extends beyond the terms of the agreement.

Connecticut

In addition to the usual indemnification clause, the state prescribes insurance coverage with minimum limits of \$500,000 for bodily injury, \$100,000/\$200,000 for property damage, and \$100,000/\$300,000/\$50,000 for automobile liability. It also prescribes a professional services liability policy for errors and omissions in the minimum amount of \$100,000 for the protection of the consultant and to indemnify and save harmless the state and its employees from negligent acts, errors, and omissions. This policy may contain a \$50,000 deductible clause with the understanding that the consultant is held responsible for the deductible amount. This is a relatively small amount of coverage when compared with the \$25 million in claims caused by a major structural failure in the state in recent years.

New Jersey

New Jersey's agreements contain an indemnification clause and require comprehensive general liability insurance with min-

imum limits of \$1 million for each occurrence and \$2 million in aggregate for both bodily injury and property damage liability. They also include requirements for comprehensive automobile liability insurance with limits of \$500,000/\$1,000,000 for bodily injury and \$250,000 for each occurrence of property damage. These requirements differ from many of the states, not only in the amount of coverage, but also in the requirement for the insurance to be maintained in effect until at least one year after the completion of all work under the agreement. New Jersey has specifically verified that, as of the date of this report, its insurance requirements remain in effect and that no complaints were received from its consultants regarding any difficulties in securing the one-year extended coverage.

New Jersey also requires errors and omissions, professional liability insurance and/or professional malpractice insurance in an amount to adequately protect against any liability from the work but with a minimum limit of \$1 million. A copy of the related state's provisions is included in Appendix C for further information.

Evaluation

It appears best for each state to evaluate for itself the degree of protection it wishes to have and to pay for through the indirect costs in the consultant agreements. In this way, it can consider its own claims experience, the cost of insurance of various kinds in its geographic area, and its judicial and legal environment affecting claims decisions and awards.

However, in making such determinations, there are additional considerations including the following:

- It does not appear to be economically feasible to try to protect against the occasional claims of nearly catastrophic proportions by prescribing high minimum limits for each project in the state's program. The potential for such claims is not accurately predictable by project, and the associated insurance premiums for extensive coverage on all or a significant portion of a state's program could aggregate into an awesome amount, probably far greater than the state's exposure. However, the limit is best determined by each state because a million-dollar award might be unusual in one and quite low in another.

- In view of the high and increasing cost of professional liability insurance, and the controls that the states generally impose on the work by their consultants, it appears reasonable for the states to limit their consultants' liability to amounts that vary with the size of the contract. Such limits should be set in coordination with historical records of the size and frequency of claims suggested for consideration in the previous paragraph.

- If insurance is not prescribed at all, or if the minimum limits are unreasonably low, the potential danger of personal liability as well as serious jeopardy to the consultant firm's assets is increased. There is an inequity in such situations in that large firms may bear a greater penalty than small firms on projects of the same size because of the relative differences in the amount of assets that become jeopardized.

- It is not in the state's interest to have consultants, on whom it must rely, go out of business. However, requiring a reasonable degree of responsibility by consultants for faulty work is good management. It encourages greater care by consultants and the

ultimate weeding out from the state's program those who either cannot or do not produce quality work.

- There is little value to insurance that is not available when it is needed the most. Therefore, the state should prescribe and monitor insurance in a manner that precludes expiration of coverage during the specified term because of changes in the consultant firm or the insurance carrier. The term of coverage should reflect the time of occurrence of most of the claims. Design errors generally surface during construction, but some appear long after the facility has been placed in operation.

TIME AND PERFORMANCE SCHEDULES

Federal-aid guidelines (17) recommend specifying in the consultant agreement the time for start and completion of the work based on a reasonable estimate of the time required for the kind and amounts of services contemplated. They further recommend the use of critical-path method (CPM) networks as project schedules for incorporation into the contract by reference. Consequently, all states prescribe start and completion times as well as work schedules, although not necessarily in the form of CPM networks.

The requirement for proposed work schedules was previously discussed in connection with the submission of consultant cost proposals before negotiations. This requirement is to ensure that the consultant understands the work and then schedules it in accordance with the mileposts to be met, recognizing the constraints and delays in the coordination of the work with others involved in various aspects of the project.

After negotiations are completed and the final agreement is approved, mileposts can be more accurately set for each of the work phases. At such time, the consultant is generally required to submit a progress schedule and some form of cost-control report to serve two objectives:

1. To provide a basis for monitoring the consultant's progress in the performance of the work to ensure meeting critical mileposts, and
2. To provide a basis for evaluating and controlling the consultant's payment requests within the amounts estimated in the contract for each work phase and within the maximum amount payable for the contract.

Where significant delays are noted in the consultant's progress without any acceptable reason, payment may be withheld or reduced pending corrective action, which may include the termination of the contract if sufficiently serious. On the other hand, there are delays that may be considered to be reasonably beyond the control of the consultant and that warrant an appropriate extension of time with or without additional payment.

Additional or extra work required of the consultant beyond the scope of the agreement, which is a warrant for both extra payment and a reasonable extension of time, is discussed in a subsequent section. Other warrants for time extensions include delays caused by failures of the agency or its other consultants to provide their coordinated phases of the work in accordance with the agreed-upon mileposts, or objections by environmental or community groups that require unanticipated additional time for consideration and approvals.

General Survey Results

Two thirds of the states responding to the national survey control the monthly billings by their consultants by comparing such amounts with the original amounts estimated for each phase of the work. The remaining states become concerned only when the consultant's projections indicate that the maximum amount payable for the contract may be exceeded. The latter may result in overpayments that require later correction and does not appear as desirable a system as is practiced by the majority.

All nine of the states responding to the survey of selected states require their consultants to submit work schedules by specific work phases and monitor the progress of their work against the preset mileposts. The majority of these states consider delays by environmental or community groups to be a frequent occurrence and delays by the state transportation agency or by other consultants on coordinated phases of the work to be rare or infrequent.

Illustrative Examples

A sampling of state provisions and procedures are briefly presented below to provide a better understanding of prevailing practice.

New York

New York prescribes in its consultant agreements that work may be started no later than ten days after receiving notice by the state to proceed. It indicates the duration of the agreement as being a specified number of months after approval thereof by the State Comptroller, or such extended periods as are deemed necessary by the state.

During the negotiation phase, the consultant's proposal is required to include a simple bar chart identifying the major activities required by the scope of services and a schedule for completing such work by the critical dates established by the state. After approval of the consultant agreement, the consultant is instructed to provide a detailed schedule of the work in a format that allows easy comparison of actual progress to scheduled progress on both a percent-complete basis and a calendar basis. Figure 8 illustrates the format for a progress schedule recommended by the state. The schedule submitted by the consultant is reviewed by affected organizations to verify whether they can adequately coordinate the work with the schedule.

On a monthly basis, the consultant is required to submit a progress report, a cost-control report, and an updated progress schedule. The state's recommended cost-control report is illustrated in Figure 9, and the related instructions are included in Appendix D for general information. The thrust of these reports is to promptly determine the adequacy of the consultant's progress and to control expenditures within the contract amount. Although the reports and schedules are prepared by the consultant, New York verifies both the actual progress and the consultant's projections of cost to complete through periodic monitoring of the work.

The consultant's monthly billings are reviewed and, if the

expenditures claimed are not deemed to be reasonable for the work accomplished, the vouchers are returned to the firm for revision. In this manner, costs are controlled by work phase, although small overruns are tentatively permitted when projections of total cost are within the maximum amount payable.

Virginia

Virginia requires that work be started within five days of its notice to proceed and specifies the number of days or weeks within which certain aspects of the work must be completed. No work is allowed to start until the consultant's schedule is approved in writing. The schedule must indicate the starting and completion dates of each significant work task for each major element of the project and must have the capability of indicating the proposed percentage of completion at any point for each element.

Consultants are required to submit monthly a progress report on forms furnished by the Department and a design and construction progress schedule, previously shown in Figure 6. These documents permit the state to compare the status of expenditures with the original estimated amounts for each work phase and to monitor the consultant's performance. Extensions of time, with or without additional compensation, may be granted for delays beyond the consultant's control upon application with substantiating data. The Commissioner's determination on extensions is final.

Connecticut

Connecticut requires work to commence on the date stipulated in the notice to proceed and specifies numbers of calendar days for the completion of each major element of the work. Monthly progress reports are required with the consultant's billings and are to show the percentage of each phase of the required services based on the negotiated monetary value for each phase. The percentages agreed on by the consultant and the state are binding on the consultant unless adjusted at the discretion of the state.

Hawaii

Hawaii specifies the starting date in its notice to proceed after contacting the consultant upon execution of the contract. On receiving the notice, the consultant must submit for approval "a critical path method (CPM) diagram, bar chart, or other work flow chart for use in graphically portraying progress of the work with respect to nodes in the State Action Plan." Control is maintained by way of running accounts of current expenditures and remaining funds in the contract, monthly progress reports, visits by the state's project manager to the consultant's working office, and by formal monthly review meetings. The monthly billings are paid as estimated by the consultant provided that progress and expenditures remain as originally estimated.

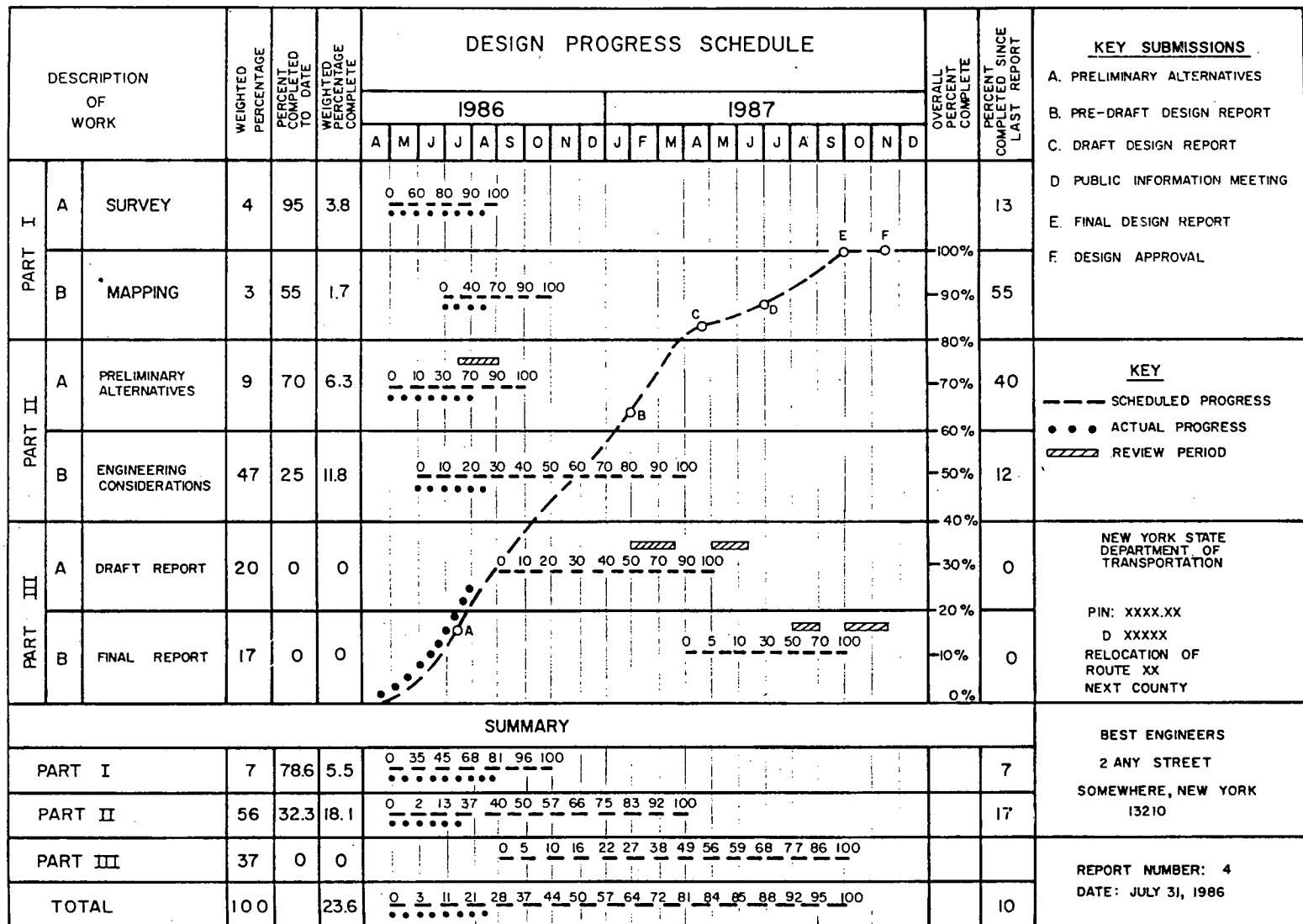


FIGURE 8 New York's design progress schedule.

New Jersey

New Jersey requires the start and completion of work within specified numbers of calendar days from the receipt by the consultant of the notice to proceed.

Before starting the work, the consultant must submit for approval a schedule setting forth its plan for completing the work in accordance with the critical mileposts in the agreement. Upon approval, the consultant must coordinate and advance all work items consonant with the scheduled completion date. The state further requires from the consultant monthly progress reports, monthly comparisons of actual progress with a bar chart schedule, and comparisons of costs incurred with the amounts budgeted in order to maintain control over performance and costs.

Pennsylvania

Pennsylvania's previous specifications, which were revised in 1985, required each consultant to submit his or her work schedules in accordance with the CPM network used by the department, including estimated times for securing various approvals from the department. Upon agreement by the state and the consultant with a revised CPM network reflecting the consultant's work, it became binding on the consultant and no additional payment was warranted for costs to correct any delays in the progress of work.

The current specifications deleted the CPM network requirements, but retained the requirements for the submission of schedules and progress reports with the monthly billings.

Indiana

Indiana prescribes that all work be completed within the number of days specified in the contract after receipt of the notification to proceed. This schedule does not include the time required for the State's reviews, apparently eliminating such delays by the state from consideration or dispute. In addition, the start of each specified time period for each work task is tied to the completion of prerequisite tasks or approvals by the state or by others. In this way, the consultant's schedule remains independent of actions by others.

Thus, where the consultants progress their own work in a satisfactory manner, the burden for meeting prescribed mileposts falls largely on the state. It becomes the state's responsibility to ensure that the time required for its own actions on reviews and related work, as well as coordinated work by others, are completed within the float time scheduled or available. This concept differs from the more prevailing one, which requires consultants to reflect in their schedules their estimates of the time required for review and for coordination with others.

Although the latter concept may provide a stronger club on the consultants to accelerate their work when delays by others are longer than anticipated, it appears less equitable than Indiana's approach and more prone to dispute and claims for extra costs for accelerating the work, even though delays beyond the consultant's control are favorably considered for time extensions in actual practice. On the other hand, although Indiana asserts that it generally completes its required actions in a timely man-

ner, any long delays by the state could also subject the consultant to extra costs, although to a lesser degree than acceleration costs.

CHANGE ORDERS/SUPPLEMENTALS

Federal-aid projects are required (17) to contain provisions that "would permit negotiation for and mutual acceptance of significant changes in the scope, character, or complexity of the work to be performed if such changes become desirable or necessary as the work progresses." Such changes require adjustments, either increases or decreases, in the bases of payment and in the time for performance of the work. The following paragraphs describe typical practices by the states based on survey responses and reviews of their standard contract clauses.

Extent of Changes

Change orders result in varying percentages of increases over the original amounts for design contracts, with a median amount of 10 percent reported by the states. Only 8 percent of the states report average increases greater than 20 percent. The reasons for such changes include the need to consider additional alternatives, the supplementation of initial preliminary engineering contracts with final design, as discussed in Chapter 3, and other reasons that are discussed subsequently. The variability is much greater for construction inspection contracts, with a median of 15 percent although the upper extreme extends to several hundred percent. Such extremes may be attributable to the greater incidence of extra work, unanticipated subsurface conditions, and the related increases in contract time required.

Therefore, contract changes represent a significant aspect of consultant contracts and merit evaluation. The remaining discussions in this section are based on responses by eight states to a selected states survey and a limited number of others that independently provided related information.

Special Services

The retention of the expertise of the design consultant for special services may be very important in certain instances, such as for review of shop drawings or the evaluation of unexpected conditions during construction, and providing expert testimony on behalf of the state in the event of public or contractor claims.

A majority of the responding states modify their original agreements with the design consultant when such services become necessary, provided the agreements are still open. Some include provisions in all agreements that bind the consultant to provide such services whenever needed by supplemental or by separate agreement.

New York, for example, includes the following clause in all of its consultant design agreements:

In the event of any claims being made or any actions being brought in connection with the PROJECT, or if construction support services are requested of the CONSULTANT by the STATE, the CONSULTANT agrees to render to the STATE all assistance required by the STATE. Compensation for work performed and costs incurred in connection with this requirement

shall be made in a fair and equitable manner. In all cases provided for in this Agreement for the additional services above described, the STATE'S directions shall be exercised by the issuance of a separate Agreement, if necessary.

Obviously, when such separate agreements become necessary, they are negotiated directly without any need to follow the selection procedures.

Virginia includes a clause in its standard agreements that binds its consultants to appear as technical expert witnesses and stipulates the specific rate to be paid and the manner of compensation.

Although most consultants who want to do business with the state may not refuse to provide such additional services, delineation of these in advance as a special contract requirement appears to be a preferable and more expeditious approach.

Adding New Projects

There are a number of advantages to utilizing a consultant already under contract, but with additional staff capacity, on another project of a similar nature or within the same general location. This applies to both design and to construction inspection agreements.

For example, a consultant inspecting construction of a bridge project could readily handle the inspection of other small bridge projects within a reasonable distance in location. The advantages to such an assignment include more efficient utilization of the consultant's experienced personnel and the resident engineer, as well as the state's supervisor, with corresponding economies in direct and indirect costs to the state. Although such an assignment may be achieved through the selection process, extending the scope of the original contract to such new projects by supplemental agreement provides the additional benefit of saving considerable time and effort.

However, none of the responding states except New York utilizes such a procedure. New York has found the use of its "assigned supplemental agreements," a term applied to such types of contract supplementation, very helpful in expediting its program. In addition to its use for the inspection of construction, the state found such a procedure beneficial in supplementing design agreements with projects requiring similar expertise, such as the design of movable bridges. The prescribed conditions limit the use of such supplemental agreements to work with similarity in scope, geographically proximate to the ongoing project, and with a dollar value that does not increase the maximum amount payable in the original agreement by more than 100 percent.

Although federal approval of such assigned supplemental agreements is tentative, subject to continual monitoring, the flexibility of this approach appears to have significant merit and to be in the public interest.

Extra Work

Although extra work is the most frequent reason for the initiation of a change order, it appears to be difficult to define and is, consequently, very prone to dispute. Many states define it simply as work beyond that contemplated in the original scope

of services and reserve the final decision about it for the head of the department. The following are some illustrative examples.

New York

New York defines extra work as "a change in the scope, complexity, or character of the work that was contemplated and provided for in the scope of services and cost estimate of the original agreement and any approved supplements thereto, resulting in an increase in contract costs." Thus, new tasks or changes in task quantities, such as numbers of public hearings, and work that is more difficult or that must be done in a different manner are all considered to be extra work. However, there are degrees to such changes which may alter such determination; these are not reflected in the definition and rely on a general understanding based on historical decisions by the state.

The agreement requires the consultant to promptly notify the state in writing before doing work it considers to be extra work, and prescribes that the state shall be the sole judge as to whether such work is in fact beyond the scope of the agreement and constitutes extra work.

Colorado

Colorado provides that any changes in the scope, character, or complexity of the work that cause either an increase or a decrease in cost shall be negotiated for an equitable adjustment in fees and in completion time. If the work proceeds without a prior supplemental contract, it shall be deemed covered in the compensation and time provisions of the contract. The major difference with New York's requirements is in considering the need to extend the contract completion time with each supplemental agreement.

Connecticut

The provisions in the state's agreements define extra work as "additional work as ordered by the State beyond the scope of this agreement." The consultant is also required to identify extra work before its performance or forfeit the right to consideration of the work as extra work. The state's decision concerning extra work is specified to be final and binding.

Hawaii

Hawaii considers extra work to be any additional work beyond that required in the contract. The state assumes no liability for extra costs without prior written order for such work by the Director. Should the original scope of work be reduced, reductions in both cost and in time may be considered.

New Jersey

New Jersey attempts to clarify the distinction between additional or decreased work within the original scope of services and extra work beyond the original scope.

Additional work is defined as "more work on studies, services or designs provided for in this Agreement or on studies, services or designs provided for in a previous Consultant Contract Modification for Extra Work." Decreased work is similarly defined as less work on, or the elimination of, the studies, services, or designs cited above. Extra work is defined as work outside of the scope or limits of the project work but connected with the project. The provisions state that "Consultant Contract Modifications for Extra Work provide funding for new services, studies or designs, not for more work on existing studies, services or designs."

The agreement provisions preclude performance of any additional work or extra work without written notice from the state authorizing it and the general conditions under which additional or reduced fixed fee may be applicable, at the state's sole discretion.

From an overall perspective, it appears desirable to carefully define extra work in a more comprehensive manner than is apparent in general practice. This definition should include a delineation of general conditions under which additional or decreased payment for costs and for fixed/net fee would be considered. The definition could either include or be supplemented by reference to a procedural guide that contains a delineation of typical categories of situations and the manner in which the definition is to be applied. Such detailed descriptions would provide for more uniform understanding and application of the contract provision, would simplify administration, and the citation of the state as the final authority would appear less arbitrary.

Fixed/Net Fee

Extra work that increases the total compensation under an agreement universally generates an increase in the original amount provided for fixed or net fee. Federal recommendations (33) prefer the approach of determining the fee for extra work on the basis of the revised overall contract amount, rather than applying to the amount of extra work the percentage relationship between the original negotiated fee and contract amount. Because historical relationships demonstrate a decreasing fee percentage with increasing cost of services, it is believed that a lower percentage should be applied to extra work than was negotiated for the original contract. However, such a preference is not mandatory and the FHWA has not insisted on its application for federal approval.

Half of the states responding to the selected states survey report that they renegotiate the fee based on the revised total agreement amount, whereas the other half apply a percentage equivalent to the original fee/total contract relationship. In response to the question as to whether the fee is reduced when portions of the work originally required by the agreement are deleted, they report a similar split. Half retain the original negotiated fee regardless of work reductions other than termination of the contract, and the other half make appropriate modifications, as illustrated below.

New York

New York has only recently changed from a policy of a constant fixed fee regardless of decreases in work to a net fee

provision that specifies a general guideline for the reduction in fee. In effect, when contract expenditures are less than the original contract amount, the net fee shall be based on the revised total amount multiplied by a revised percentage. The latter shall not exceed the original percentage of fee/contract amount by more than 2 percent, and shall result in a decrease in the original fee.

Connecticut

Connecticut provides for decreases in the fixed fee in the event that the work is decreased, or terminated, or allowed to expire owing to the exhaustion of available state funds.

Virginia

Virginia's provisions state that the net fee remains fixed regardless of differences between the estimated and actual costs to the consultant except as otherwise stipulated in the agreement. Its Changes of Work section provides for equitable adjustment of costs and of time in the event of increases or decreases in the work.

New Jersey

As previously cited, New Jersey's provisions include increased work, decreased work, and extra work. The state, in its sole discretion, may provide for additional or reduced fee where there are material increases or decreases in the magnitude of work provided under the agreement.

It appears to be sound and equitable to both the consultant and to the state agency to provide for reductions in fee and contract time when the scope of work is reduced significantly, particularly because increases in the scope are compensated by both additional time and fee. However, because the fee is presumably negotiated on the basis of a number of factors unrelated to project costs, a simple reduction in actual cost without a change in scope should not generally incur a reduction in fee. It appears better for states to seek other ways to prevent overpayments in fee because of potential inaccuracies in their cost estimates than to diminish any motivation by consultants for efficiency and overall cost reductions in their performance of the work.

TERMINATION

Termination of a consultant agreement may become necessary either for cause or for reasons beyond the consultant's control. Termination for cause may be due to poor or unacceptably slow performance by the consultant, whether or not this is due to financial or other incapability, to the point where completion of the work by the state or by another consultant is deemed to be in the public interest. Other reasons for termination include unavailability of federal or state funding, major delays in conceptual agreement on the project with environmental or community groups, and removal of the project from the state's action program.

The national survey indicates that terminations of consultant

agreements either for cause or for other reasons are rare or very infrequent in all of the states. Nevertheless, there is a significant potential for such actions during cyclical incidences of federal or state fiscal emergencies or crises, when programs must be suddenly and sharply reduced, and for state programs containing a large proportion of complex, urban projects involving significant acquirement of developed land or other environmental concerns. The subject is, therefore, of considerable importance.

Terminations for cause are generally treated by the states differently than those for reasons beyond the consultant's control, as they should be. In this respect, there needs to be a clear delineation in the agreement of the basis for final payment in the event of termination. Several illustrative examples of state provisions follow.

New Jersey

The state may terminate a contract after giving seven days written notice. Its consultant agreements delineate the methods of payment in such an event, depending on the reasons for termination and the type of contract payment method.

If the consultant's work was satisfactory, payment is made as follows. For cost-plus-fixed-fee agreements, payment is made for all allowable direct and indirect costs in performing the work and for closing out the project as required, plus a percentage of the fixed fee based on the percentage of the project completed. For fixed-price agreements, payment is made for a percentage of the fixed price based on the percentage of the project, plus a negotiated amount for close-out costs.

If the state terminates the agreement for cause, the following applies to all agreements in addition to special provisions depending on the contract method of payment. No payment is made for any close-out costs, and the state retains the right to recover all costs and damages resulting from the consultant's failure to perform satisfactorily. In addition, for cost-plus-fixed-fee agreements, no further payment is made of the fixed fee, and the consultant may be required to repay all or a portion of the fixed fee already paid. Similarly, for fixed-price agreements, no further payment on the fixed price is made, and the consultant may be required to repay all or a portion of the fixed price already paid.

In either case (termination for cause or in the public interest), the provisions state that the consultant has no right to make any claim for damages or additional compensation regardless of fault. In this way, the state precludes claims for anticipated profits on the work deleted from the contract or on other projects the consultant may have secured had it not been involved with a project which was terminated without the consultant's fault.

New York

New York also asserts its absolute right to terminate an agreement without it being considered a breach of contract. If the termination is for the convenience of the state, rather than because of unsatisfactory performance, final payment is based on the actual eligible and audited costs incurred plus an equivalent percentage of the net fee. The provisions specifically exclude consideration of the profit the consultant might have made on the uncompleted portion of the work.

If the termination is for cause, the value of the work is based on a determination by the state of the percentage of acceptable work completed, not to exceed the audited costs incurred by the consultant. In addition, a portion of the net fee is paid as determined by the state.

Hawaii

Terminations without fault on the part of the consultant are paid at actual audited costs incurred, plus an equivalent percentage of the fixed fee. Terminations with cause are also paid at actual audited costs incurred plus a fixed fee based on the reasonable value of the work completed.

Although the latter provision appears to be less stringent than in the previous two examples, the state does hold the consultant liable for any additional costs incurred by the state to complete the work under the contract and may withhold any sums payable to the consultant to cover such costs. For lump-sum contracts, the state estimates the value of the work performed or completed, and similar provisions apply to it.

Virginia

The state reserves the right to terminate without its prescribed 15 days advance notice in the event that the consultant files for bankruptcy or merges with or spins off from another entity. Such terminations and others that are not caused by unsatisfactory performance are paid on the basis of actual costs incurred, plus an equivalent percentage of the net fee. For terminations with cause, the state proceeds with the work and holds the consultant liable for any damage caused by the termination, without specifying the method of final payment in such instances.

Colorado

Colorado's final-payment provisions for all terminated contracts are identical, regardless of whether they are terminated because of the state's convenience or because of unsatisfactory performance by the consultant. For either reason, the state's provisions contain separate but similar language for each of the different contract payment methods utilized. In all cases, the state pays for the value of the work completed before to termination plus an equivalent fee.

Conclusion

The provisions in those states that utilize more than a nominal termination clause may be partially representative of the degree of claims consciousness by the consultants within those states. Although some states may be able to resolve serious differences with a handshake rather than by court action, it appears best to detail the agency's intent within the contract provisions. It is also recommended that, for terminations with cause, final payment be based on the value of the completed work rather than on the costs incurred, and that a portion of this payment be withheld in sufficient amount to cover the extra costs to the

state to complete the work beyond the costs estimated for it in the contract.

DELIVERABLES

Federal-aid program requirements (13, 17) provide that tracings, plans, specifications, and maps prepared under the terms of consultant agreements shall be delivered to and become the property of the state, and that basic survey notes and sketches, charts, computations, and other data prepared or obtained under the agreement shall be available to the state without restrictions on their use. The state may permit copyrighting of reports or other contract products, provided that the FHWA shall have a royalty-free, non-exclusive, and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use the work for government purposes.

Although these requirements differ from those recommended by professional groups, they are not in direct conflict with them. For example, the ASCE (8) recommends that the documents remain the property of the Engineer and that use of them for extensions of the original project or for new projects should require permission of the Engineer and entitle him or her to additional compensation. However, the provisions also state that such recommendations become invalid if provisions to the contrary are included in the contract.

The Engineers Joint Documents Committee (EJDC) (28)

takes the position that the state, having paid for the preparation of such documents, should be permitted to use them for its own purposes as long as such use does not prejudice the Engineer's rights in those documents or expose the Engineer to liability. Thus, the EJDC expresses the view that it is more important to protect the design professional against unauthorized reuse than to preserve an exclusive proprietary right.

In practice, all of the states include the equivalent of the federal provisions cited above in their consultant agreements. For example, New York requires that all documents and data pertaining to the work or project shall be the property of the state at all times and shall be delivered to the state upon completion of the work, or within ten days of termination of the project, regardless of the reason for the termination. The state's provisions also require that, if patentable discoveries or inventions should result from the work, all rights to them shall become the sole property of the consultant, except that the consultant agrees to grant the United States Government and the state a non-exclusive, non-transferable, paid-up license to make, use, and sell them throughout the world.

New Jersey has an additional provision that states that "the consultant will not be responsible for another party's application of the information contained in such documents other than that for which the information was intended."

A combination of the provisions cited above should adequately address federal and state interests as well as the concerns of the professional groups.

ADMINISTRATION

This chapter addresses only three of the various administrative matters relative to the use of engineering firms: the documentation of the state's actions in selecting and negotiating with consultants, the procedures and measures used in evaluating their performance, and the need for training agency staff to improve their capabilities in the consultant selection and negotiation processes.

DOCUMENTATION

Federal-aid requirements not only prescribe the documentation of the consultant selection and negotiation processes for each contract but indirectly encourage comprehensive documentation through the requirements for federal approval at various points in the procedure. In addition, there is a deep concern by state agencies regarding future federal and state audits of the procedures and the need to respond to potential complaints by political and public groups or other consultants. In view of such an environment, there should be strong motivation for the states to maintain nothing less than complete documentation of all aspects of the process from initiation of a request for consultant services through selection, negotiation, and contract execution. Nevertheless, federal reviewers find that, although procedures are being followed, documentation of some aspects of the procedures need to be strengthened.

In its procedures, Colorado refers to the federal requirements (13), which prescribe the determination and related documentation (before a contract is awarded) that the consultant's proposal has been subjected to technical and cost or price evaluations and how the results of such evaluations were considered in the contract negotiations.

Hawaii requires its project managers to maintain complete files for each project, including but not limited to documentation of the use and selection of the consultant, negotiations, execution of the contract, correspondence, and progress and payments during the course of the work.

Washington requires its Consultant Liaison Engineer to maintain complete, current files on all consultant agreements to include scope of work, independent Department estimate, recommendation and approval of consultant, executed agreement and supplements, written authorizations and approvals, and related correspondence.

In addition, Virginia retains in its files all rejected proposals, and New York requires the central retention in its Contracts Bureau of all files by various work groups relative to the rationale of the method of procurement, selection of contract type,

consultant selection or rejection, and the basis for the cost or price.

PERFORMANCE MEASURES

The primary purpose of the consultant performance rating is to provide an important evaluation factor in the selection of consultants for other projects. It is not intended as a tool for the monitoring and control of the consultant's performance during the life of the agreement, although it may be associated with a concurrent procedure that is intended for such a purpose. This latter procedure requires continual monitoring and notification to the consultant of less-than-adequate or desirable performance and cannot be served through formal performance ratings on an annual or periodic basis. The following paragraphs address various considerations involved with formal performance ratings, with illustrative examples of state procedures.

Confidentiality

The apparent use of performance ratings by many of the states to serve both of the foregoing objectives simultaneously may partially explain the variances in the responses to the national survey relative to whether the ratings are kept confidential and not released to the affected consultant. Obviously, administrative ratings for the purpose of controlling the consultant's performance require notification of the consultant to be effective, whereas formal ratings at the completion of the project or at interim stages for use in future selections do not. The remainder of the discussion of ratings in this section relates to formal ratings only.

Forty percent of the states retain the confidentiality of satisfactory performance ratings, but disclose unsatisfactory ratings to give the consultant an opportunity to comment. Thirty percent of the states send all ratings to the affected consultants for comment, with some requiring acknowledging signatures. Twenty percent of the states consider all formal ratings, whether satisfactory or unsatisfactory, strictly confidential, whereas the remainder either make the ratings available on request or have no formal rating procedure.

There is no question that consultants should be continually advised of the quality of their performance and provided with an opportunity to rectify their performance or to explain any contributing factors beyond their control. Such a procedure would aid in monitoring the effectiveness of coordination by others and provide a fair and equitable appeal process against

arbitrary or biased actions or determinations by individual agency personnel. However, if the consultants' responses to such interim ratings were continually considered and answered, and such correspondence were retained for subsequent further consideration at the completion of the project, there should be no need for further comment on the final rating from the consultant.

As noted above, some states consider the final rating to be strictly confidential and for agency use only. This reduces political or other pressures on the individual raters and is intended to provide freedom for honesty in reporting. On the other hand, some may view it as greater freedom for bias, and, therefore, it places greater responsibility on the agency's reviewers to carefully consider the consultant's responses to progress ratings during the course of the project.

Consistency

Responses to the survey of selected states indicate consistency in the performance ratings of the same firm by different program managers. Nevertheless, there is a potential for considerable variance. For example, it is noted in New York that some consultants receive highly variable ratings by the different regions in which they inspect construction projects. Such variance may be attributable not only to the differences in the project requirements and expectations of the different program or project managers, but also to the general practice by consultants to hire their inspection staff largely from the local market within the influence area of the project. Greater consistency in the rating of design consultants may be expected because of a more stable consultant staff composition for such work.

Nevertheless, the states attempt to ensure consistency in ratings through the use of rating teams, the averaging of ratings of the same firm by different managers, and the review of all ratings and background material by managers at a higher level than the raters.

Frequency of Ratings

Formal performance ratings are desirable on at least an annual basis to ensure that up-to-date measures of each consultant's performance are available for continual reference in the selection process. Such interim ratings are useful because not all consultants have continual employment with the agency and because of the variations in the type and complexity of work performed.

New York requires interim ratings as soon as feasible for all consultants currently employed who have not had ratings in the files within the previous two years. Interim ratings are also required when consultants are performing different work than that for which they had been previously rated, or if their current performance is markedly different from that reflected in their previous ratings, particularly if the rating indicates superior or poor work.

Rating Period

Although most states prepare final performance ratings after completion of the project work, some states (such as Colorado, Indiana, Michigan, and New Jersey) have follow-up procedures

that reconsider the quality of the design during the construction phase. The number and nature of change orders required on the construction project, as well as cost increases, may provide good indicators to a careful reviewer of the quality of the design. However, Indiana reports that such evaluations by construction have a minimal effect in the selection process. If a pattern of low evaluations by construction personnel develops, the related information is investigated and reviewed by the selection committee.

Furthermore, the usefulness of such follow-up ratings depends on the construction of the project within a few years following its design. Where there are extended delays, changes in the design firm's principal and key personnel and in the capability of its design staff may make the firm sufficiently different so as to negate the applicability of such follow-up ratings.

Measures of Performance

Although the measures used by the states for rating performance are similar, they vary greatly in the level and nature of detail and in the weighting assigned to each category. The general categories considered include accuracy, quality, completeness of work, cooperation, coordination, caliber of management and staff, timeliness, and other factors, including the firm's affirmative action posture, its record of cost control, and previous claims actions. Some states use complex weighting systems involving weights assigned to each individual category and relative weights of groupings of categories in order to arrive at a single overall rating.

Such exercises, if done routinely, may blind managers to the primary objective of formal performance ratings, which is to provide a significant evaluation of the capability of a firm to perform on a project of a specific type and complexity. Ratings for consultants on projects involving the design of roadway replacements at an existing location, for example, are of relatively little significance in the selection of consultants for projects involving complex bridges, specialized work, or environmental evaluations. Furthermore, some aspects such as the quality of affirmative action are better considered separately rather than diluted in a number of performance categories. The adequacy of affirmative action, for example, is an important management responsibility and should be uniformly administered and enforced. Any ineffectualness in this area by a consultant in responding to such requirements should bear directly on his or her selection rather than be counterbalanced by high marks in other categories.

Performance ratings, therefore, should be based on factors that are closely related to the type of project under consideration and to any specific, complex, or specialized aspects of it. It would also be pertinent to identify key consultant personnel on the project who contributed toward either superior or poor performance. A number of states provide such detail through comments on the rating sheets.

Illustrative Examples

This section contains illustrative examples of the rating procedures and factors utilized by a sample of agencies and how they address some of the foregoing considerations.

Direct Federal Contracts

The regulations for direct federal projects (32) require the preparation of performance reports for each contract of more than \$25,000 after final acceptance or termination of the work. The evaluating official is usually the person responsible for monitoring contract performance. Consultants are advised in writing of unsatisfactory performance reports and given an opportunity to comment on the cited basis for such an evaluation. Factual discrepancies are resolved and included in the report along with any necessary changes by the evaluator. The regulations further provide that the reviewing official should have knowledge of the consultant's performance and should be at an organizational level above that of the evaluator. The review is to ensure that each report is accurate and fair.

Figures 10 and 11 show both sides of Standard Form 1421 for the evaluation of A/E firms on direct federal contracts. Section 12 in the form covers changes and deficiencies noted during construction. The generalized categories considered in the performance evaluations are shown on the back of the form, Figure 11.

Colorado

Colorado's performance report on consultants, shown in Figure 12, requires ratings of each consultant on completion of each of three phases: ratings in column I by the contract administrator after the work has been accepted, ratings in column II by the District Engineer responsible for incorporating the consultant's work into the Department's plans or reports, after the consultant's work has been used, and ratings in column III by the District officer responsible for completing the project on which the consultant's work was used. However, the factors used are generalized rather than tailored to specific specialties or expertise.

New Jersey

New Jersey uses a computerized system that can merge files containing general information about projects assigned to consultants with those containing the evaluations and capabilities of the consultants. This enables the selection committee to readily select a field of engineering firms for tasks for which they were favorably rated in the past.

The system provides for evaluations at six-month intervals: during the design and bridge inspection phases, on completion of plans and construction documents, and after construction is 50 to 70 percent complete. The system produces standard and special reports on request. One such standard report is a quarterly listing of the overall evaluations by consultant, work type, and project.

Although generalized factors are utilized, the ability to merge them by computer with specifics regarding the type of work performed provides the desired details for selection of consultants for specific projects. For example, the types of work utilized by the system include specialties such as intersection improvements, dualization, bridge replacement or rehabilitation,

new alignment, and many others. In addition, ratings of the design consultant during construction cover the completeness of the plans, their accuracy in representing field conditions, and the feasibility of the maintenance and traffic schemes.

Pennsylvania

The state's performance report provides descriptive ratings of poor, satisfactory, or good in the general categories of organization and management, cooperation and coordination, and work performance. The last includes subclassifications of completeness, accuracy, quality, timeliness, claims, and cost control. The report requires the identification of any of the consultant's employees whose performance was outstanding and the nature of their contribution, as well as similar data for employees whose performance was substandard. Because the capabilities of an engineering firm are greatly dependent on its key personnel, such employee information is valuable in selection.

Indiana

Performance evaluations of consultants are made at the public hearing or 40 percent completion stage, on substantial completion of the project, when the consultant's performance or progress is unsatisfactory, and whenever the Department's section leader changes. In this way, updated ratings are continually available for selection purposes. Indiana also maintains a computerized system that stores the identification of the consultant, description of the project, type of work, performance evaluations by factor, ratings of the design by users during the construction stage, the dates of evaluation, and the identification of the raters. The benefits of such a system were previously discussed in connection with a similar one in New Jersey.

Michigan

Michigan also conducts a two-stage evaluation of each consultant; one immediately after receipt of the completed plans, and the other after completion of its construction. A copy of the evaluation report is sent to the consultant, and, in the event of an unsatisfactory rating, an opportunity for a meeting with the consultant is provided.

Hawaii

Evaluation reports of each consultant's performance are prepared by the project manager within one month after acceptance or termination of the contract. Descriptive factors of excellent, good, adequate, and poor are used in rating the caliber of the staff at various levels, the quality of the work, timeliness, cooperation, and supervision and administration. Additional comments are required, such as the specific skills or expertise required to perform the project and recommendations for the selection of the consultant for future work.

PERFORMANCE EVALUATION (ARCHITECT-ENGINEER)				1. PROJECT NUMBER																						
				2. CONTRACT NUMBER																						
IMPORTANT: Be sure to complete Performance section on reverse. If additional space is necessary for any item, use Remarks section on reverse.																										
3. TYPE OF REPORT (Check one)			4. REPORT NUMBER		5. DATE OF REPORT																					
<input type="checkbox"/> INTERIM <input type="checkbox"/> COMPLETION OF DESIGN OR STUDY <input type="checkbox"/> COMPLETION OF CONSTRUCTION <input type="checkbox"/> TERMINATION																										
6. NAME AND ADDRESS OF CONTRACTOR			7. PROJECT DESCRIPTION AND LOCATION																							
8. OFFICE RESPONSIBLE FOR:																										
A. SELECTION OF CONTRACTOR		B. NEGOTIATION/AWARD OF CONTRACT		C. ADMINISTRATION OF CONTRACT																						
9. CONTRACT DATA																										
A. TYPE OF WORK			B. TYPE OF CONTRACT																							
			<input type="checkbox"/> FIXED-PRICE <input type="checkbox"/> OTHER (Specify)																							
			<input type="checkbox"/> COST-REIMBURSEMENT																							
C. PROJECT COMPLEXITY			D. PROFESSIONAL SERVICES CONTRACT																							
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<input type="checkbox"/> EXCELLENT <input type="checkbox"/> AVERAGE <input type="checkbox"/> POOR				<input type="checkbox"/> YES <input type="checkbox"/> NO (If "NO," explain in REMARKS on reverse)																						
15A. NAME AND TITLE OF RATING OFFICIAL				16A. NAME AND TITLE OF REVIEWING OFFICIAL																						
15B. SIGNATURE		15C. DATE		16B. SIGNATURE		16C. DATE																				

FIGURE 10 Standard Form 1421 (obverse).

New York

Consultant ratings are completed for each consultant and each subconsultant upon acceptance of the work. Interim ratings are also prepared for consultants who are currently working but who have not had ratings within the past two years, or if a marked change in performance is noted.

Ratings are strictly confidential. Below average or poor performance during the course of the work result in formal communications to the consultant to allow an opportunity for correcting the situation. Although the project manager is re-

sponsible for preparing the rating sheets, their completion results from a joint main office and regional effort through consultations between the personnel involved. In this way, the perspective of the caliber of the consultant's work is broadened and individual bias is reduced.

Although the rating factors are similar to the generalized factors previously cited, the project manager is identified and rated, and comments are required to highlight the consultant's specific strengths and weaknesses concerning various aspects of the work. This provides a degree of desirable detail concerning the consultant's aptitude for different work categories.

STAGES OF SERVICES (As applicable)				PERFORMANCE								RATED BY	
				NOT APPLICABLE	RATING FACTORS/RATINGS								
					ACCURACY	COMPLETENESS	COOPERATION	COORDINATION	MANAGEMENT	MEETING SCHEDULE	PERSONNEL ABILITY	WORK QUALITY	
CONCEPTS	SCHEDULE (Mo., day, yr.)	FROM	TO	ARCH.									
				STRU.									
	ACTUAL (Mo., day, yr.)	FROM	TO	MECH.									
				ELEC.									
TENTATIVES	SCHEDULE (Mo., day, yr.)	FROM	TO	ARCH.									
				STRUC.									
	ACTUAL (Mo., day, yr.)	FROM	TO	MECH.									
				ELEC.									
WORKING DRAWINGS	SCHEDULE (Mo., day, yr.)	FROM	TO	ARCH.									
				STRU.									
	ACTUAL (Mo., day, yr.)	FROM	TO	MECH.									
				ELEC.									
ESTIMATES				A/S									
				M/E									
CRITICAL PATH METHOD				PRE-AWARD									
				POST-AWARD									
POST CONSTRUCTION CONTRACT SERVICES				SHOP DWGS.									
				MAN-VALS									
INSPECTION				FIELD									
				OFFICE									
SOLICITATION DOCUMENTS													
REMARKS													

FIGURE 11 Standard Form 1421 (reverse).

Files are maintained relative to the performance of consultants on each project including letters and responses to citations of less than satisfactory work. These are made available for the review of the final performance ratings.

In summary, the primary objective of the final performance rating is to measure the capability of each consultant to perform work of specific types, specialties, and degrees of complexity in order to aid in the selection of firms for future work. The factors that enter into such ratings should be selected accordingly. Data management systems that can relate performance to different types of projects and to different kinds and complexities of work, as well as to specific key project managers or staff, will best serve such an objective.

QUALIFICATIONS AND TRAINING

The preparation of the scope of services for each of the projects to be assigned to consultants, with their varied degrees of complexities and specialties, requires capable agency personnel thoroughly familiar with the design engineering processes, federal and state laws and policies, environmental and public concerns in the geographical area of each project, and experience with the procedures for advancing projects through numerous stages of hearings and approvals.

The computation of the number of man-hours required by each of various levels and types of professional and subprofessional personnel to complete each of the numerous classifications

of work delineated in the scope of services requires an even greater degree of knowledge, experience, and familiarity with the work of each of the numerous types and specialties of work contained within an agency's program.

The expertise required for these activities in the consultant selection and negotiation processes is well beyond that which can be gained simply from a formal engineering curriculum. It needs to be acquired by special training along with a sufficient depth of hands-on experience that provides direct and intimate involvement with such varied types of work and complexities. Furthermore, the negotiation skills necessary to properly resolve differences in estimates between the agency and the consultant, even if they are latent within the specific individuals assigned to such an activity, require that those individuals receive specialized training to be optimally effective.

Training may be accomplished in several ways, or preferably through combinations of ways, at a small cost relative to the potential benefits to the agency. Courses are available in recognized colleges or other educational institutions. Training materials may be secured for in-house training by special instructors either permanently employed by the agency or hired periodically for such purpose. Finally, training on the job requires the least immediate cash layout and is highly effective if properly scheduled, controlled, and administered to avoid the pitfalls of resistance by supervisors unwilling to divert the extensive amount of time and effort required from their other more pressing responsibilities.

The sample of selected states unanimously agree that training

PERFORMANCE REPORT ON CONSULTANTS

Project _____

Location _____

Date _____

TO: _____
Appropriate Division HeadFROM: _____
RaterSUBJECT: Evaluation of Consultants Performance
Name of Consultant _____
Type of Work _____

Factor	I	II	III
	Contract Completion	Review Completion	Project Completion
Knowledge of Department Needs			
Cooperation with Department, Public, Other Agencies, etc.		N.A.	N.A.
Adequacy of Personnel, Supervision and Management		N.A.	N.A.
Prosecution of Work		N.A.	N.A.
Submission of Work on Schedule			N.A.
Completeness of Work			N.A.
Clarity of Work			
Support Calculations, data, reports, etc.			
Completion of Work within Original Dollar Limits		N.A.	N.A.
Need for Excessive Change Orders		N.A.	N.A.
Accuracy of Consultant's Estimate Compared to Actual Project Cost	N.A.	N.A.	
Financial Records		N.A.	N.A.
Affirmative Action Program		N.A.	N.A.
Overall Quality, Accuracy and Competence			

Remarks: _____

(Write on back of sheet if more space is needed)

cc: _____
Agreements & Specifications Section_____
Signature (Rater)

FIGURE 12 Colorado's performance report on consultants.

of their staff in the consultant management process is highly desirable. New York, Connecticut, and Pennsylvania stress the need for training in negotiation skills. A Florida task force finds a critical need for training in the preparation of the scope of services and suggests an interim experiment in the use of consultants for preparing scope packages. Wisconsin is concerned with the need for training and guidelines for cost estimating.

However, despite general recognition by all the states responding to the national survey for the need for training, only eight percent report any expenditures for training in negotiation skills or in the preparation of the scopes of services and in estimating the related costs or man-hours required. None of the states report more than a nominal expenditure for such training.

All of the selected states indicate that their principal way of upgrading the capability of their staff is by retaining for in-house design a variety of projects by type, magnitude, specialty, and complexity to provide opportunities to their staff for varied experience. About half of these states assert that they supplement such on-the-job experience with internal courses, although no expenditures for them are reported. Florida has developed a consultant project management manual and provides three or more three-day training courses annually.

The importance and benefits attainable from training in the

preparation and estimating of scopes of services should be apparent. In-house training should be formally scheduled in conjunction with on-the-job performance on an adequate sampling of the full spectrum of the agency's program. Training in negotiation skills requires the use of specialized instruction through externally managed training courses.

The effectiveness of the foregoing training can be continually measured by comparing the agency's initial estimates of man-hours required for each work classification with those submitted by the consultants, followed by subsequent comparisons with the negotiated amounts and, ultimately, with the amounts of hours expended in each category as determined at the completion of the contract. Such continual comparisons will provide indicators of the accuracy of the agency's independent estimates and the effectiveness of its negotiations. With proper training, these indicators should demonstrate marked improvement.

The kinds of data described above, while currently not available in most of the states, should be readily obtainable and would be very helpful to the states for management, training and budgeting purposes. A summation of such statistics on a national basis would further assist the states by providing a frame of reference for improvement.

CHAPTER EIGHT

FINDINGS AND RECOMMENDATIONS

With the recent expansion of the federal-aid transportation program and the concurrent emphasis on reducing the size of governmental bureaucracies, the use of consultants by the states has increased sharply, reflecting an annual expenditure of approximately one billion dollars.

The consultant selection, negotiation, contracting, and administrative procedures addressed here should, therefore, be of considerable general interest. It should be noted, however, that a number of related major concerns, such as affirmative action requirements, are beyond the scope of this synthesis and need to be addressed separately.

The following sections summarize the findings of this report in the order in which they are presented.

PRICE COMPETITION

A controversy, which has continued for over a decade, centers around whether price comparison in any form has a place in the selection of consultants for public work. Some factions view the failure to consider price as increasing the risk of political abuse and higher costs to the public. Others feel strongly that stressing price would diminish the quality of work and increase the life-cycle costs of the total project, contrary to the public interest. Most of the states utilize competitive negotiation procedures, with only a handful using price as a factor in the selection process.

This synthesis recommends the use of price as a nondominant selection factor from a short-list of the highest-qualified firms and limited to lump-sum projects, which, by their nature, require clearly definable scopes. However, the viability of this recommendation to any specific state is dependent on the state's ability to conform with the applicability provisions in Section 111 of the Surface Transportation and Uniform Relocation Assistance Act of 1987.

PRE-SELECTION POSITION**Cost Limitations**

Regardless of the limited use by the states of cost comparison in the selection process, other cost-containment measures are universally used in varying degrees:

- The Federal Acquisition Regulations (FAR) limit the types of direct and indirect costs that are eligible for federal reimbursement.

- Although the FAR impose no limit on the amount of eligible costs that may be reimbursed, the Code of Federal Regulations places limits on engineering costs as a percentage of the estimated construction cost.

- Limits are imposed on the net fee through federal and variable state policies.

- Varying limits are imposed by most states on overhead.

It appears reasonable to reconsider some of the above limitations where cost comparisons are used in the selection process.

State Practices*Determining the Need for Consultant Services*

Methods used by the states vary from simple district work plans to centrally managed broad-based systems. Although a majority of the states supplement their staff with temporary personnel as needed, only a minor percentage interchange the assignments of design and construction personnel during their respective peak periods. Interchangeability is beneficial in upgrading the perspective and capability of such personnel and their usefulness to the agency.

Contract Method of Payment

Of the total amount expended nationally for consultant services for design and construction inspection, 55 percent is spent on cost-plus-fixed-fee contracts and 35 percent on lump-sum contracts. However, a number of states utilize the lump-sum method for a major portion of their programs because of its administrative simplicity. Apparently, to secure such advantages, they devote extra effort to define the related scopes of services with sufficient accuracy to arrive at a reasonable agreement with a fixed price.

Scope of Services

The states generally prepare comprehensive scopes at the time of requesting consultant services to avoid delays in the critical path. These are necessary to ensure a common understanding of the work required and to provide an adequate basis for the estimations of costs and for negotiations. Most states supplement their scopes with references to other documents for additional details.

Cost Estimate

An independent cost estimate of the scope of work is prepared to provide an adequate basis for negotiations and to ensure a mutual understanding of the work effort required. The different categories of costs and man-hours are computed for each of the detailed work classifications required for the project. These are preferably in accord with the work classes that are delineated in either the scope of services or in standard guidelines to provide a common basis for both the agency's and the consultant's estimates. However, there appears to be room for improvement in the actual estimating process performed by most of the states.

CONSULTANT-SELECTION PROCESS

Fields of Consultants

The majority of the states obtain project-specific fields rather than use general files of consultants for the purpose of short-listing, for a variety of reasons. General files tend to become cluttered with obsolete information, they cannot provide important details such as the proposed project personnel, and only a small percentage of the firms listed in them are actively selected for work. Even states which use prequalification procedures generally associate them with project-specific notices.

Evaluation Factors

Evaluation factors and the ways in which they are rated and grouped vary widely by state, from simple subjective assessments to multi-stage systems with separate methods for short-listing, priority array, and final selection. The sources of related information in some states include brochures, interviews, and standard forms. Others require the consultants to respond to the evaluation factors listed in project-specific notices. The most important information is the experience and qualifications of the key managers and personnel relative to the nature of work to which they are to be assigned.

General Selection Methods

Competitive negotiation is the most prevalent method used, with relatively few states considering cost proposals for final selection. Almost all the states use selection committees for short-listing and priority array, with final selection or approval generally by the department head. Alternative simplified selection procedures are used by most states for emergencies, for small projects, and when services are available only from a single source. Some states use more elaborate procedures for complex projects than for routine projects. With few exceptions, the procedures are the same with or without the use of federal funds. The time required for selection varies by state from one month to over six months, with an average of three months. There is no correlation between such time durations with the use of price as a selection factor or with the level of selection committee. It appears that such time may be reduced primarily by emphasis by top management in the agency.

THE NEGOTIATION PROCESS

Scope Meeting

The objectives of the scope meeting are to ensure a common understanding of the scope of work, the respective responsibilities of the agency and the consultant, the methods and limitations on payment, any critical mileposts, the nature of work or information to be done or provided by others, and the content and format of the cost proposal to be submitted by the consultant.

Consultant's Cost Proposal

This is best prepared in the same manner as the agency estimate to permit ready comparison and detection of discrepancies.

Pre-agreement Audit and Technical Review

The general objectives of pre-agreement audit include determining the capability of the firm's accounting system to segregate costs into desired categories and to ascertain whether the estimated costs are reasonable. Because these audits are on the critical path, some states conduct the general portion during available float periods, or place greater reliance on previous governmental audits, or on audits by certified public accountants. Adequate pre-agreement audits are particularly important for negotiated lump-sum projects because inaccuracies may otherwise become embedded in the fixed price. Some states overcome this problem with a certification that permits adjustments of prices that were based on incorrect information. In view of the considerable amount of time required on the critical path for a pre-agreement audit and technical review, these activities need to be considered in evaluations of procedural efficiency and of the potential for time reduction. Nevertheless, the usefulness of a pre-agreement audit to the negotiators in providing historical cost and other information should not be diminished.

Negotiation

Negotiation is necessary to adjust any differences in perspective of the work and related effort required. It results in a better mutual understanding, which is documented by the consultant through the submission of a revised proposal. All the states keep their estimates confidential at least until after the receipt of the consultant's cost proposal, with only a minority releasing it after completion of the negotiations or the contract. Such confidentiality is essential to a proper negotiating environment. The time required from the initiation of a request for consultant services through the execution of a contract varies by state from 3 to 12 months, with an average of 7 months.

It is recommended that top management evaluate methods to reduce these time durations in view of the importance of time for an efficient process. It is also recommended that the states maintain statistics for each consultant project, including the state's estimate, the consultant's proposed costs, the negotiated

amounts, and the final amounts upon contract completion. Such data would be invaluable for state and national management and training objectives.

SELECTED CONTRACT FEATURES

Risk Assignment

All states attempt to protect themselves against risk through an indemnification clause in their contracts with consultants and by requiring their consultants to maintain property damage insurance and injury liability insurance. There is a greater variance in their requirements for professional liability or errors and omissions insurance. The potential risk of liability has become enormous and has been associated with a surge in the cost of professional liability insurance, which is reflected in overhead and indirectly reimbursed at least partially by the agency. Furthermore, because such insurance protection may not be available when it is needed the most for a variety of reasons, agencies are questioning whether the degree of protection provided is worth the cost.

The ultimate solution of the liability crisis is perceived to be the correction of various inequities through tort reform. In the meantime, it is recommended that the consultants' liability be limited to reasonable amounts that vary with the size and risks of the contract, considering the frequency and size of claims experienced, and that the insurance should be prescribed in a manner to preclude its expiration on changes in carrier or in the name of the firm, or before the time of occurrence of the majority of claims. It is best that each state evaluate its needs and alternative solutions through a risk-management program.

Time and Performance Schedules

Various types of monthly schedules and reports are generally required from consultants so that the agency may evaluate the progress and billings against that reflected in the contract. The format of such schedules requires careful design to simplify monitoring against critical mileposts and to control expenditures.

Change Orders and Supplementals

Contract changes incur median increases of 10 and 15 percent of the total amounts for consultant design and construction inspection contracts, respectively, although the upper extreme may extend to several hundred percent in the latter. Change orders are used in varying degrees by the states for special services during construction and for expert testimony in claims actions. It is recommended that the potential requirement of such services be prescribed in the original agreement. It is also recommended that extra work be defined in a more comprehensive manner, possibly by a supplemental delineation of typical situations that are or are not considered to be extra work.

Termination

The method of final payment for termination of a contract in the public interest is generally far more liberal than for termination with cause, with the latter usually incurring liability by the consultant for damages and extra costs by the state to complete the work. It is recommended that such methods of final payment be fully delineated in the contract separately for each kind of termination. For such actions with cause, the final payment should be based on the value of the completed work rather than on the costs incurred, less an amount for extra completion costs.

Deliverables

Although the state should retain ownership over the project documents, its provisions should grant ownership to the consultant of patentable discoveries, subject to the rights of the state and federal governments, and should relieve the consultant from responsibility for any application of the information in the project documents by another party.

ADMINISTRATION

Documentation

Because of related federal requirements and the need perceived by the state agencies for such protection in the event of federal or state audits or public or political inquiries, the states report that they generally retain full documentation of all aspects of the consultant selection, negotiation, and contract processes. However, federal auditors perceive the need to strengthen some aspects of the documentation procedures in most of the states.

Performance Measures

The primary objective of the performance rating is to provide an important evaluation factor of the consultant's capability to perform the work of a specific nature and complexity for use in the selection of consultants for other projects of a similar nature. This objective is not served by the manipulation of factors irrelevant to it. Final performance ratings may be withheld from release provided the consultants are periodically notified of the adequacy of their work, are given an opportunity to respond to citations, and their files are made available to reviewers of the final ratings. Interim updating of ratings should be made in the event of any changes in performance. There is also merit to evaluations of design during the construction stage in certain conditions. Data management systems that can relate performance with different types, specialties, and complexities of work, as well as to specific key consultant personnel, will best serve the intended objective.

Agency Staff Qualifications and Training

The key to an adequate consultant management process is a capable agency staff. The importance of a continual upgrading

of in-house capability through internal and external training methods, as discussed in Chapter 7, cannot be overemphasized.

Despite the general recognition of the need for training in the preparation of scopes of services, in estimating the effort required for each work classification, and in negotiations, the expenditures for external courses are almost nonexistent. It is recommended that a sample of the full spectrum of projects in the

agency's program be retained for on-the-job performance by in-house staff, associated with formally scheduled training for them by qualified agency and external personnel. The effectiveness of such training should be continually evaluated through comparisons of the agency's independent cost estimates with the consultant's cost proposals, the negotiated amounts, and the final amounts at the completion of the contracts.

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APPENDIX A

PUBLIC LAW 92-582, 1972 (BROOKS LAW)



Public Law 92-582
92nd Congress, H. R. 12807
October 27, 1972

An Act

To amend the Federal Property and Administrative Services Act of 1949 in order to establish Federal policy concerning the selection of firms and individuals to perform architectural, engineering, and related services for the Federal Government.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471 et seq.) is amended by adding at the end thereof the following new title:

Architects and engineers.
Federal selection policy, establishment.
63 Stat. 377;
82 Stat. 1104.

"TITLE IX—SELECTION OF ARCHITECTS AND ENGINEERS

"DEFINITIONS

"Sec. 901. As used in this title—

"(1) The term 'firm' means any individual, firm, partnership, corporation, association, or other legal entity permitted by law to practice the professions of architecture or engineering.

"(2) The term 'agency head' means the Secretary, Administrator, or head of a department, agency, or bureau of the Federal Government.

"(3) The term 'architectural and engineering services' includes those professional services of an architectural or engineering nature as well as incidental services that members of these professions and those in their employ may logically or justifiably perform.

86 STAT. 1278
86 STAT. 1279

"POLICY

"Sec. 902. The Congress hereby declares it to be the policy of the Federal Government to publicly announce all requirements for architectural and engineering services, and to negotiate contracts for architectural and engineering services on the basis of demonstrated competence and qualification for the type of professional services required and at fair and reasonable prices.

"REQUESTS FOR DATA ON ARCHITECTURAL AND ENGINEERING SERVICES

"Sec. 903. In the procurement of architectural and engineering services, the agency head shall encourage firms engaged in the lawful practice of their profession to submit annually a statement of qualifications and performance data. The agency head, for each proposed project, shall evaluate current statements of qualifications and performance data on file with the agency, together with those that may be submitted by other firms regarding the proposed project, and shall conduct discussions with no less than three firms regarding anticipated concepts and the relative utility of alternative methods of approach for furnishing the required services and then shall select therefrom, in order of preference, based upon criteria established and published by him, no less than three of the firms deemed to be the most highly qualified to provide the services required.

**"NEGOTIATION OF CONTRACTS FOR ARCHITECTURAL AND ENGINEERING
SERVICES**

"SEC. 904. (a) The agency head shall negotiate a contract with the highest qualified firm for architectural and engineering services at compensation which the agency head determines is fair and reasonable to the Government. In making such determination, the agency head shall take into account the estimated value of the services to be rendered, the scope, complexity, and professional nature thereof.

"(b) Should the agency head be unable to negotiate a satisfactory contract with the firm considered to be the most qualified, at a price he determines to be fair and reasonable to the Government, negotiations with that firm should be formally terminated. The agency head should then undertake negotiations with the second most qualified firm. Failing accord with the second most qualified firm, the agency head should terminate negotiations. The agency head should then undertake negotiations with the third most qualified firm.

"(c) Should the agency head be unable to negotiate a satisfactory contract with any of the selected firms, he shall select additional firms in order of their competence and qualification and continue negotiations in accordance with this section until an agreement is reached."

Approved October 27, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-1188 (Comm. on Government Operations).
SENATE REPORT No. 92-1219 (Comm. on Government Operations).
CONGRESSIONAL RECORD, Vol. 118 (1972):

July 26, considered and passed House.
Oct. 14, considered and passed Senate.

APPENDIX B

SURFACE TRANSPORTATION AND UNIFORM RELOCATION ASSISTANCE ACT OF 1987

Apr. 2

SURFACE TRANSPORTATION ACT

P.L. 100-17

Sec. 111

SEC. 111. CONTRACTS.

(a) **LETTING OF CONTRACTS.**—Section 112(b) of title 23, United States Code, is amended by inserting “or that an emergency exists” before the period at the end of the first sentence.

(b) **CONTRACTING FOR ENGINEERING AND DESIGN SERVICES.**—Section 112(b) of such title is further amended by striking out “Construction” and inserting in lieu thereof “(1) IN GENERAL.—Subject to paragraph (2), construction” and by adding at the end thereof the following new paragraph:

“(2) **CONTRACTING FOR ENGINEERING AND DESIGN SERVICES.**—

“(A) **GENERAL RULE.**—Each contract for program management, construction management, feasibility studies, preliminary engineering, design, engineering, surveying, mapping, or architectural related services with respect to a project subject to the provisions of subsection (a) of this section shall be awarded in the same manner as a contract for architectural and engineering services is negotiated under title IX of the Federal Property and Administrative Services Act of 1949 or equivalent State qualifications-based requirements.

“(B) **APPLICABILITY.**—

“(i) **IN A COMPLYING STATE.**—If, on the date of the enactment of this paragraph, the services described in subparagraph (A) may be awarded in a State in the manner described in subparagraph (A), subparagraph (A) shall apply in such State beginning on such date of enactment, except to the extent that such State adopts by statute a formal procedure for the procurement of such services.

“(ii) **IN A NONCOMPLYING STATE.**—In the case of any other State, subparagraph (A) shall apply in such State beginning on the earlier of (I) August 1, 1989, or (II) the 10th day following the close of the 1st regular session of the legislature of a State which begins after the date of the enactment of this paragraph, except to the extent that such State adopts or has adopted by statute a formal procedure for the procurement of the services described in subparagraph (A).”



U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Subject: Contracting for Engineering and
Design Services

Date: May 13, 1987

From: Executive Director

Reply to
Attn. of: HNG-11

To: Regional Federal Highway Administrators

Passage of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law No. 100-17 (1987)) has placed new requirements on contracting for engineering and design services. Section 111(b) of the act, which amends 23 U.S.C. § 112(b), makes the procurement of engineering and design services qualifications-based, except as described below.

Contracts subject to this provision are those for program and project management, construction management and inspection, feasibility studies, preliminary engineering, design, engineering, surveying, mapping and architectural related services.

In general, the act requires Federal-aid highway engineering and design service contracts to be awarded in accordance with the provisions of Title IX of the Federal Property and Administrative Services Act of 1949, copy attached, (popularly known as the Brooks Architects-Engineers Act) or by using equivalent State qualifications-based procedures. In short, the Brooks Act provides that engineering and architectural service contracts are to be negotiated on the basis of demonstrated qualifications and competence and at fair and reasonable prices. The general procedure used in Brooks Act procurement consists of evaluating the qualifications of prospective firms, ranking them based on their qualifications, and negotiating price starting with the top ranked firm. If a fair and reasonable price cannot be negotiated with the top ranked firm, negotiations would continue with the next ranked candidate.

Under Section 111(b), States will be required to comply with the Brooks Act or use equivalent procedures unless they have or choose to establish a formal procurement procedure by State statute. The statutes need not specifically prescribe or preclude Brooks Act procedures but must be consistent with OMB Circular A-102, Appendix O.

Those States which now have a State statute governing the procurement of engineering and design services may continue to operate under their present procedures, or any other procedures they may choose that are consistent with their statutes. Those States which do not now have a State statute for

procurement of these services may continue under their present procedures until either the 10th day following the State's first complete regular legislative session beginning after April 2, 1987, or by August 1, 1989, whichever comes first. Beginning on that date, the State must comply with the Brooks Act or use equivalent State procedures unless it had enacted, or until it does enact, a statute establishing a procurement process.

Our proposed revision to 23 CFR 172, which had been under review in OMB, has been returned to Headquarters for modification to reflect the provisions of Section 111(b). We expect to publish the revised regulation in the Federal Register for notice and comment later this year.

All applicable Federal-aid contracts authorized after April 2, 1987, are subject to the provisions of the act. This act does not affect contracts for right-of-way, planning contracts not involving engineering, design and mapping services, and contracts for other types of professional services.



R. D. Morgan

APPENDIX C

NEW JERSEY'S LIABILITY AND INSURANCE PROVISIONS

ARTICLE 10

NO WAIVER OF LEGAL RIGHTS

Notwithstanding any other provision of this Agreement, for a period of 3 years after final acceptance all estimates and payments made pursuant to the Agreement, including the Final Payment, shall be subject to correction and adjustment for clerical or other errors in the calculations involved in the determination of quantities and payments. The CONSULTANT and the STATE agree to pay to the other any sum due under the provisions of this Article, provided, however, if the total sum to be paid is less than \$100, no such payment shall be made.

A waiver on the part of the STATE of any breach of any part of the Agreement shall not be held to be a waiver of any other or subsequent breach.

The CONSULTANT, without prejudice to the terms of the Agreement, shall be liable to the STATE at any time both before and after final acceptance for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the STATE's rights under any warranty or guaranty.

ARTICLE 11

LIMITATIONS OF LIABILITY

In no event, whether under the provisions of this Agreement, as a result of breach hereof, tort (including negligence) or otherwise, shall the STATE be liable to the CONSULTANT for any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, cost of capital, or interest of any nature.

ARTICLE 12

INDEMNIFICATION

The CONSULTANT shall defend, indemnify, protect, and save harmless the STATE, its agents, servants, and employees from and against any and all suits, claims, losses, demands or damages of whatever kind or nature arising out of or claimed to arise out of any negligent act, error, or omission of the CONSULTANT, its agents, servants, employees and subcontractors in the performance of this Agreement. The CONSULTANT shall, at its own expense, appear, defend and pay all charges for attorneys and all costs and other expenses arising from such suit or claim or incurred in

STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
DIVISION OF

connection therewith. If any judgment shall be rendered against the STATE for which indemnification is provided under this paragraph, the CONSULTANT shall at its own expense satisfy and discharge the same.

The STATE shall, as soon as practicable after a claim has been made against it, give written notice thereof to the CONSULTANT along with full and complete particulars of the claim. If suit is brought against the STATE or any of its agents, servants, and employees, the STATE shall expeditiously forward or have forwarded to the CONSULTANT every demand, complaint, notice, summons, pleading, or other process received by the STATE or its representatives.

It is expressly agreed and understood that any approval by the STATE of the services performed and/or reports, plans or specifications provided by the CONSULTANT shall not operate to limit the obligations of the CONSULTANT assumed in this Article or in the other provisions of this Agreement. It is further understood and agreed that the STATE assumes no obligation to indemnify or save harmless the CONSULTANT, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the CONSULTANT expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the CONSULTANT's obligations assumed in this Agreement, nor shall they be construed to relieve the CONSULTANT from any liability, nor preclude the STATE from taking any other actions available to it under any other provisions of this Agreement or otherwise in law.

ARTICLE 13

INSURANCE

The CONSULTANT shall procure and maintain at its own expense, until at least one year after the completion of all work performed under this Agreement and any modification hereto, liability insurance for damages imposed by law and assumed under this Agreement, of the kinds and in the amounts hereinafter provided, from insurance companies admitted or approved to do business in the State of New Jersey. The CONSULTANT expressly understands and agrees that any insurance protection required by this Agreement shall in no way limit the CONSULTANT's obligations assumed in this Agreement, and shall not be construed to relieve the CONSULTANT from liability in excess of such coverage, nor shall it preclude the STATE from taking such other actions as are available to it under any other provisions of this Agreement or otherwise in law.

1. The types and minimum amount of insurance are as follows:

(a) Comprehensive General Liability Insurance

STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
DIVISION OF

The minimum limits of liability for this insurance shall be as follows:

Bodily Injury Liability

<u>Each Occurrence</u>	<u>Aggregate</u>
------------------------	------------------

Property Damage Liability

<u>Each Occurrence</u>	<u>Aggregate</u>
------------------------	------------------

The above required Comprehensive General Liability Insurance shall name the STATE as an additional insured. The coverage to be provided under this policy shall be at least as broad as the standard, basic unamended and unendorsed comprehensive general liability policy and shall include contractual liability coverage. The aggregate limits may be increased by the STATE, in its sole discretion, in order to provide adequate protection to the STATE.

(b) Comprehensive Automobile Liability Insurance

The Comprehensive Automobile Liability policy shall cover owned, non-owned and hired vehicles with minimum limits as follows:

Bodily Injury Liability

<u>Each Person</u>	<u>Each Occurrence</u>
\$500,000	\$1,000,000

Property Damage Liability

Each Occurrence

\$250,000

(c) Workers' Compensation and Employers' Liability

Workers' Compensation Insurance shall be provided in accordance with the requirements of the laws of this State and shall include an endorsement to extend coverage to any State which may be interpreted to have legal jurisdiction. Employers' Liability

STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
DIVISION OF

Insurance shall be provided with a limit of liability of not less than \$100,000 for each accident.

(d) Professional Liability Insurance

The CONSULTANT shall carry Errors and Omissions, Professional Liability Insurance and/or Professional Malpractice Insurance sufficient to protect the CONSULTANT from any liability arising out of professional obligations performed pursuant to the requirements of this Agreement. This insurance shall be in the amount of _____ and in such policy form as shall be approved by the STATE. Should the Consultant change carriers during the term of this Agreement, the CONSULTANT shall obtain from its new Errors and Omissions, Professional Liability Insurance and/or Professional Malpractice Insurance carrier an endorsement for retroactive coverage.

2. The CONSULTANT shall, prior to commencement of the services required under this Agreement, provide the STATE with valid Certificates of Insurance as evidence of the CONSULTANT's insurance coverage in accordance with the foregoing provisions. Such certificates of insurance shall specify that the insurance provided is of the types and is in the amounts required in 1(a), (b), (c) and (d) above.

The Certificates shall provide for thirty (30) days notice in writing to the STATE prior to any cancellation, expiration, or non-renewal during the term the insurance is required in accordance with this Agreement. The CONSULTANT shall further be required to provide the State with valid certificates of renewal of the insurance upon the expiration of the policies. The CONSULTANT shall also, upon request, provide the STATE with copies of each policy required under this Agreement certified by the agent or underwriter to be true copies of the policies provided to the CONSULTANT. All certificates and copies of insurance policies shall be forwarded to the STATE's coordinator for this Project.

In the event that the CONSULTANT provides evidence of insurance in the form of certificates of insurance valid for a period of time less than the period during which the CONSULTANT is required by the terms of this Agreement to maintain insurance, said certificates shall be acceptable, but the CONSULTANT shall be obligated to renew its insurance policies as necessary and to provide new certificates of insurance from time to time, so that the STATE is continuously in possession of evidence of the CONSULTANT's insurance in accordance with the foregoing provisions.

APPENDIX D

NEW YORK'S PROGRESS AND COST-CONTROL SYSTEM

EXHIBIT 4
JUL 1986

PROJECT PROGRESS SCHEDULE AND COST CONTROL REPORT

Immediately after the Get Start Meeting, the Consultant shall prepare a Progress Schedule and Cost Control Report for controlling and monitoring work. The degree of detail necessary is dependent upon the complexity of the project. The Department and the Consultant should reach an understanding in this regard prior to actual preparation of the Progress Schedule and Cost Control Report. An example of a recommended format is shown on the following pages. Although the charts are self-explanatory the important considerations are as follows:

1. The major subdivisions of the work shown in the scope of services are divided into tasks of sufficient importance to allow meaningful analysis of progress. The manhours per title and their associated hourly rates are tabulated and used to determine the total relative manpower effort and funds required to accomplish each task. Based on these totals, each task shall be assigned a weighted percentage of the effort associated with completion of the overall project.
2. Based on scheduled progress for each task, and the weighting of each task, the scheduled overall progress for each task, major subdivision, and the overall project, is shown in monthly increments on the bar chart with a method also shown for charting actual progress. A line graph depicting overall progress should be superimposed on the bar chart. The date of key submissions and important activities should also be identified on the chart. These key submission are used as periodic check points to insure that payments are consistent with progress.
3. The percent of work completed for each task and subdivision, as well as overall, since the last report should also be shown.
4. Manhours and hourly rates by title for each major subdivision are utilized to determine the direct technical salary required to accomplish the work. These results are shown in the Budget column of the Cost Control Report.
5. Each month the percent of work completed for each task shall be entered on the progress chart. The weighted percentage is then utilized to determine the weighted percent complete for each task and subsequently for each major subdivision and the overall project. These shall be shown on the progress chart and entered in the % Phase Complete column of the Cost Control Report.

The Progress Chart and Cost Control Report are collectively utilized to analyze Progress versus Expenditures and provides the basis for the monthly Progress Report. A sample Progress Report is included in this Exhibit.

EXHIBIT 4
JUL 1986

COST CONTROL REPORT

SUBJECT : PIN XXXX.XX DXXXXX
RELOCATION OF ROUTE XX
NEXT COUNTY

(See Instruction on CONR 324-2)

Period Ending July 31, 1986

PROJECT PHASE	1 THIS PERIOD	2 TO DATE	3 ESTIMATED TO COMPLETE	4 ESTIMATED TOTAL (2 + 3)	5 BUDGET	6 UNDER (OVER) (5 - 4)	7 % PHASE COMPLETE	8 % (4 + 5)
IA Survey	212	1,480	75	1,555	1,515	(40)	95	103
IB Mapping	420	420	340	760	760	0	55	100
IIA Alternates	1,010	1,950	900	2,850	3,013	163	70	95
IIB Engineering	2,010	4,050	12,100	16,150	16,520	370	25	98
IIIA Draft Report	0	0	8,035	8,035	8,035	0	0	100
IIIB Final Report	0	0	6,170	6,170	6,170	0	0	100
Overhead	4,200	9,085	31,763	40,848	41,415	567	-	99
Fixed Fee	996	2,221	7,864	10,085	10,085	-	-	100
TOTAL A: Include Salary Overhead & Fixed Fees	8,848	19,206	67,247	86,453	87,513	1,060	-	99
OUT-OF-POCKET EXPENSE: (Exclusive of Sub-Cont. Cost)	150	860	2,740	3,600	3,600	0	-	100
OUT-OF-POCKET EXPENSE: (Sub-Contractor's Cost Only)	-	-	-	-	-	-	-	-
TOTAL B: TOTAL ESTIMATED COST	8,998	20,066	69,987	90,053	91,113	1,060	-	99

MAXIMUM AMOUNT PAYABLE 95,000

CONSULTANTS PROGRAM MANAGER

NAME
TITLE
DATE

FOR D.O.T. USE ONLY

Reviewed by _____

DATE _____

Action Needed: _____

CCNR 324-2 (3/76)

COST CONTROL REPORT INSTRUCTIONS

The Cost Control Report is to be completed each month. Copies are to be sent to the Program Manager and the Contracts Bureau within fifteen days after the end of each monthly period.

The purpose of the Cost Control Report is to provide cost data for the continuing evaluation of the PROJECT. The cost figures in the report do not have to be based on accounted expenses, but should be a reasonable estimate which will give a true picture of expenditures at the end of the reporting period.

The ENGINEER will maintain and provide the following information on the Cost Control Report:

This Period - All costs other than out-of-pocket expenses will be allocated by project phase for the reporting period.

To Date - Cumulative costs to date of report will be reported for each phase.

Estimated to Completion - The ENGINEER will make a judgment of the cost needed to complete each particular phase of the study. This estimate need not be the difference between cumulative costs and budget. It should represent the cost needed to complete a particular phase of the PROJECT regardless of the budgeted amount.

Estimated Total - This column is obtained by adding the costs in the "to date" column and the "estimated to completion" column.

Budget - The approved current budget amount for each phase of the PROJECT should appear in this column.

Under (Over) - This column is the difference between the "Estimated Total" column and the "Budget" column.

% Phase Completed - This column will be a percentage estimate of work completed to date for each phase. The figure in this column will be a judgmental factor which the ENGINEER determines to indicate the work effort completed during the reporting period.

% - Estimated Total/Budget - This column will be expressed as a percent which will represent the estimated total cost divided by the budgeted cost.

Out-of-Pocket Expenses - All out-of-pocket expenses for the PROJECT will be accrued for the reporting period. Out-of-pocket expenses will not be charged against specific project phases.

Total (B) - This row will be computed by adding data from the "Total (A)" columns and "Out-of-Pocket Expenses" columns. Total (B) under line (5) Budget should show the total Estimated Cost, not the Maximum Amount Payable. The Maximum Amount Payable is shown separately. The Consultant's Project Manager will review and sign the Cost Control Report.

INSTRUCTIONS FOR D.O.T. USE ONLY

The program manager and the Contracts Bureau will review the Cost Control Report.

- a) If after review of the report, the program manager determines that the report was properly and correctly completed, he will sign, date and indicate no action needed by writing the word "None" under action needed. This copy of the report will be filed in the Program Manager's project file.
- b) If after review of the report, the Contracts Bureau is satisfied that the project may be completed within the Maximum Amount Payable, the reviewer will sign and date the report writing the word "None" under action needed. This copy of the report will be filed in the Contracts Bureau project file.
- c) If either unit determines that some action is needed based on the Cost Control Report, the reviewer will sign and date the report indicating the action needed. This report with a report on the action taken by the reviewer will be filed in the project file.

THE TRANSPORTATION RESEARCH BOARD is a unit of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. It evolved in 1974 from the Highway Research Board, which was established in 1920. The TRB incorporates all former HRB activities and also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 270 committees, task forces, and panels composed of more than 3,300 administrators, engineers, social scientists, attorneys, educators, and others concerned with transportation; they serve without compensation. The program is supported by state transportation and highway departments, the modal administrations of the U.S. Department of Transportation, the Association of American Railroads, the National Highway Traffic Safety Administration, and other organizations and individuals interested in the development of transportation.

The National Academy of Sciences is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Frank Press is president of the National Academy of Sciences.

The National Academy of Engineering was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Robert M. White is president of the National Academy of Engineering.

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