NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
SYNTHESIS OF HIGHWAY PRACTICE 146

USE OF CONSULTANTS FOR CONSTRUCTION ENGINEERING AND INSPECTION

TRANSPORTATION RESEARCH BOARD
National Research Council

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USE OF CONSULTANTS FOR CONSTRUCTION ENGINEERING AND INSPECTION

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Topic Panel

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TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C. JUNE 1989

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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.

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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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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 construction engineers, contractors, administrators, and others concerned with using consultants as a replacement for or as a supplement to agency staffing on highway construction projects. Information is presented on determining the need for consultants as well as methods of hiring them and supervising and monitoring their work.

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, highway agency personnel reductions have meant that consultants have had to be engaged to adequately staff construction projects. This report of the

Transportation Research Board discusses how highway agencies are using consultants for construction engineering and inspection including hiring, qualifications, and agency oversight and control.

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.

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This synthesis was completed by the Transportation Research Board under the supervision of Robert E. Skinner, Jr., Director for Special Projects. The Principal Investigators responsible for conduct of the synthesis were Thomas L. Copas and Herbert A. Pennock, Special Projects Engineers. This synthesis was edited by Judith Klein.

Special appreciation is expressed to Robert B. Newman, Senior Vice President, Bergstralh-Shaw-Newman, Inc., who was responsible for the collection of the data and the preparation of the report.

Valuable assistance in the preparation of this synthesis was provided by the Topic Panel, consisting of Verdi Adam, Executive Vice President, Gulf Engineers and Consultants; Albert B. Ari, Chief, Bureau of Construction Engineering, New Jersey State Department of Transportation; Richard Harris, Executive Vice President, American Road and Transportation Builders Association; Peter C. Markle, Highway Engineer, Program Management Branch, Federal Highway Administration; Terry M. Mitchell, Research Materials Engineer, Federal Highway Administration; and Murray Yates, Director, Division of Construction, Florida Department of Transportation.

William G. Gunderman, Engineer of Materials and Construction, 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.

USE OF CONSULTANTS FOR CONSTRUCTION ENGINEERING AND INSPECTION

SUMMARY

During recent years, most state highway agencies have reduced the total number of permanent employees. Many of those leaving the agencies are highly experienced, and where they are being replaced, the replacements have less experience. During this same time period, the federal-aid highway program has increased and many state programs have increased.

In order to staff construction projects adequately, state highway agencies have increasingly engaged consultants to perform construction engineering and inspection (CEI) work. There is a concern that, in many instances, these consultant personnel are not adequately familiar with agency policies, procedures, or specifications and may not have sufficient highway CEI background.

The objectives of this synthesis are to report on the use of consultants for construction engineering and inspection; the qualification requirements for construction engineers and inspectors; and the agency oversight and control on projects with construction engineering and inspection by consultants.

Because of staffing limitations imposed on state agencies and the current popularity of privatization with state legislatures, agencies have little choice but to continue to use consultants for construction engineering and inspection. As in-house forces are reduced, a feasible way to provide the number of personnel needed for CEI services is through the use of consultants.

CURRENT PRACTICES

Use of Consultants

Twenty-nine of the 41 states and one of the three Canadian provinces that responded to the questionnaire use consultants for some portion of their CEI work. The primary reason that highway agencies use consultants for CEI services is to supplement in-house staff. Agency staffs have been reduced in nearly all states over the last 10 years while the construction work load, expressed in constant dollars, has increased. The use of consultants is one way to provide quality control and inspection without increasing the permanent staff within the agency.

Among the agencies reporting use of consultants, the portion of the work load assigned to consultants varied from 1 percent to 52 percent of the dollar volume and from less than 1 percent to 50 percent of the number of projects in those states that furnished data for both categories. The weighted average for these 19 states was 26 percent of the dollar volume and 15 percent of the projects. The average size of project supervised by consultants was $1,935,000.

Services Provided

Most agencies require consultants to provide essentially the same services provided by their own field crews, including staking or checking contractor staking; conducting or attending the preconstruction conference; performing field materials tests; inspecting, documenting, and preparing progress and final estimates; and preparing change orders. About half involve consultants in claims investigation. Most agencies require consultants to provide a qualified project engineer (titles vary) to take charge of assigned projects under the control of a state representative who provides liaison with the agency and monitors consultant performance. Four states assign agency personnel to directly manage the CEI work and use consultant personnel to fill out the crews. Ideally, the consultant acts as an extension of the agency staff in either case.

Consultant Staffing Estimates

Of the 27 agencies that responded to the question of who determines the proposed staff size for projects, 48 percent set the staffing requirements in the request for proposals, 21 percent allow the consultants to propose the staffing, and 30 percent set the staffing jointly with the consultants. Some states that have construction engineering manpower management systems use these systems to determine staffing needs or to check consultants' staffing estimates.

Staff Qualifications

In general, agencies require somewhat higher qualifications for consultant engineers than for their own staff. Thirteen states require consultant engineers to be registered professional engineers but only seven had this requirement for agency engineers.

Most states compare the résumés of technicians against their own personnel classification plans to evaluate qualifications.

Methods of Payment

The most common method of payment for CEI services is actual cost plus fixed fee. Normally, a maximum payment amount is included in the agreement.

Solicitation, Selection, and Negotiation

Typically, agencies use the same procedures for engaging CEI consultants that are used for engaging other engineering consultants. Two basic procedures were identified. The more common procedure is to develop a short list of firms qualified to perform the work—usually three—request proposals from these firms, evaluate the proposals, make a selection, and negotiate an agreement. In the other procedure, proposals are solicited from all interested firms. The advantages of the first procedure are: (a) there are fewer proposals to review and evaluate so the length of time to make a selection can be shortened and (b) consultants can reduce the number of proposals they have to prepare.

The time required for consultant selection varies from one and a half months to nine months. The typical time requirement is four to five months. When procedures require eight to nine months for selection, agencies must plan their needs well in advance.

About one-third of the 32 agencies queried in an earlier New Jersey survey reported overhead limitations ranging from 100 percent to 160 percent of direct labor costs. About one-third had no limit and the other third had no consultant CEI work under way. Actual overhead rates have generally been well below the maximums.

Authority, Responsibility, and Accountability

The Federal Highway Administration (FHWA) requires that a qualified public employee be placed in responsible charge of each contract or project to monitor compliance with the terms, conditions, and specifications of the contract. Consultant project engineers typically act for the state in much the same way as in-house project engineers.

Review and approval of items such as progress payments, change orders, significant changes in quantities, claims, time extensions, and final payments on consultant-supervised projects are the responsibility of the designated agency liaison officer.

Twenty agencies (of the 25 agencies responding to this question) hold the consultant responsible for any errors made by consultant personnel. The agency assumes this responsibility in the remaining states.

Administration and Monitoring

Consultant staffing of projects is subject to approval of the agency representative at all times during the course of the project. Agencies reported that it was much easier to remove unsatisfactory consultant engineers or technicians than to terminate agency employees who did not perform satisfactorily. Several agencies keep records of the performance of consultant employees so that personnel deemed unsatisfactory on one project cannot be transferred to another agency project.

The agency liaison officer has the responsibility of continually monitoring consultant performance throughout the project to ensure that contractors are being required to comply with the plans and specifications and that testing and documentation requirements are met.

Close-out evaluations are usually held to ensure that all contract requirements have been completed, to audit consultant costs including overhead rates and direct expenses, and to evaluate the consultant's overall performance. These evaluations are used for reference in future selections of CEI consultants.

CONCLUSIONS AND RECOMMENDATIONS

Need for Consultants for CEI

Agencies need to utilize all of the available options—permanent staff, seasonal employees, overtime, and contractor-furnished services such as staking or process quality control—to effectively manage their construction programs. The use of consultants for CEI is one more management option to provide adequate staffing for construction projects.

Agencies should utilize staffing guidelines and construction engineering manpower management systems to assess staffing needs to determine the need for outside assistance. The staffing guidelines can also be used to determine the level of effort needed in each skill level to properly staff projects.

Agencies should determine the level of effort for consultant CEI projects and include that information in the requests for proposals. Consultants can be permitted to propose

alternative staffing with adequate justification. Consultants should be responsible for actual staffing during construction subject to agency approval.

The scope of services can be varied to suit the needs of each project. Agencies should maintain flexibility in specifying consultant CEI services to make the best use of resources, both public and private.

There is a concern that if privatization is carried to its extreme, agencies will not have experienced personnel to administer consultant CEI contracts. Agencies should retain sufficient CEI work in-house (normally the low point of projected work loads) to provide training opportunities to maintain a trained work force capable of adequately administering consultant CEI contracts.

Agencies contemplating increasing the use of consultants for CEI should take advantage of the experience of states that have been making extensive use of CEI consultants. Visits or other contact should be made to learn the best methods and procedures to use and the pitfalls to avoid.

Personnel Qualifications

Agencies should specify minimum requirements for both engineers and technicians in the requests for proposals to ensure that consultants understand the qualifications expected and to make evaluation of proposals easier.

Agencies should require consultants to submit résumés for all key personnel to be assigned to a project. Any substitutions from those proposed should require agency approval. The length of time required for selection of consultants must be considered in establishing policies on substitutions. If an agency takes 8 to 10 months to select a consultant, it is unreasonable to expect candidate firms to be able to hold available personnel for such a long period of time.

CEI consultants should require, or at least encourage, their technicians to become certified in an appropriate certification program. At this time, the National Institute for Certification in Engineering Technologies (NICET) program meets the need in highway construction engineering and inspection better than other identified programs. This program provides for technician career development with recognition for increased levels of expertise. It is nationally recognized in the highway and transportation industry. Certification at a particular level gives agencies and consultants a reasonable guide to an individual's capabilities and qualifications.

Training

A consensus on the specific training needs for consultant CEI personnel could not be established in this study. The opinions varied considerably. In general, the training needs covered all aspects of construction inspection but were not the same for all consultants. Training in documentation procedures was identified as the most urgent training need for most consultant personnel.

Consultants rely primarily on on-the-job training for construction inspectors. Although there are currently trained, experienced inspectors in the job market, more training is essential to ensure an adequate number of qualified technicians in the future—especially if the use of consultants for CEI expands.

Consultants should take the responsibility for ensuring that their employees are trained rather than leaving it up to the employees or the agencies. An alternative method is for agencies to provide the training. The cost of conducting the training could be borne by the agency or charged to the consultants whose employees receive

the training. In either case, salaries and expenses for trainees should be at the consulting firms' expense.

Agencies that do not have written policies and procedures should prepare them to guide both in-house and consultant personnel in administering construction projects.

Administration of CEI Contracts

The effective administration of consultant CEI contracts requires that the agency representative make frequent visits to the job site. A field construction engineer—full- or part-time depending on project complexity and proximity of other projects—who can closely monitor the work should be assigned as liaison between the agency and the consultant.

Agencies should establish performance evaluation procedures for use in monitoring consultant performance on an ongoing basis to ensure that the services performed are satisfactory and, at project completion, for use in future selections.

Agencies should check the calibration of consultant test equipment and monitor testing procedures to ensure test accuracy.

Methods of Payment

Agencies should use methods of payments that encourage proper staffing—neither understaffing nor overstaffing. The cost-plus-fixed-fee method is the best method in most cases. There are usually too many uncertainties in performing CEI services to define the work adequately to effectively use the lump-sum method of payment.

Cost Comparisons

Few agencies can currently make accurate, realistic comparisons of total CEI costs between projects staffed with in-house and consultant personnel. Agency accounting systems should be modified to afford managers the ability to determine the true cost of construction engineering, whether it is performed by agency personnel, contractors, or consultants. Only then can true cost comparisons be made.

CHAPTER ONE

INTRODUCTION

This synthesis was undertaken to evaluate the effect of the increased use of consultants for construction engineering and inspection by state highway agencies.

DEFINITION OF THE PROBLEM

During recent years, there has been a tendency for state highway agencies to reduce personnel and a trend toward losses of highly experienced personnel, with their replacements being less experienced persons. The engineers and technicians recruited in the late 1950s and early 1960s will retire in the late 1980s and early 1990s. Yet there has been an approximately 50 percent increase in the federal-aid highway program since the enactment of the Surface Transportation Assistance Act of 1982 and corresponding increases in many state programs. In order for the state highway agencies (SHA) to adequately staff construction projects, consultants have been engaged to perform tasks that have traditionally been the responsibility of in-house employees. In many cases, these non-SHA employees are not adequately familiar with SHA policies, procedures, or specifications and may not have an adequate highway construction engineering and inspection background.

OBJECTIVES AND SCOPE

The objectives of this synthesis are to report on:

- the use of consultants for construction engineering and inspection;
- the qualification requirements for construction engineers and inspectors; and
- agency staffing levels for oversight and control on projects with construction engineering and inspection by consultants.

The general steps typically followed by highway agencies in using consultants for construction engineering and inspection are:

1. determine the need;
2. develop the scope of work including staffing qualifications and resource needs (personnel and equipment);
3. determine the type of contract;
4. solicit proposals, select the consultant, and negotiate the contract;
5. define authority, responsibility, and accountability—state/consultant/contractor;
6. administer and monitor the contract, including any consultant contract changes for changed conditions;
7. continue performance evaluation; and
8. close out and evaluate the results.

This synthesis addresses the methods used for this process, the extent of the use of consultants for construction engineering and inspection by state highway agencies, and the advantages and disadvantages of the use of consultants in comparison with in-house staffing.

METHODOLOGY

The research was carried out through a literature search; structured interviews of personnel from agencies, consultants, and contractors (eight consultants and six contractors were interviewed); and questionnaires to state and provincial highway and transportation agencies. Few publications were found dealing with the use of consultants for construction engineering and inspection.

Copies of the interview guides will be found in Appendix A. Many of the contractors and consultants work in only one or two states. Their candid comments might jeopardize relationships with their clients or each other. Consequently, they were promised anonymity in the synthesis.

Questionnaires were sent to the highway or transportation agency in each of the 50 states and the 10 Canadian provinces. Forty-one states and three provinces responded. Twenty-nine of these states and one of the provinces use consultants to perform some portion of their construction engineering and inspection work. Some questions were left unanswered on several questionnaires so there are not necessarily 30 responses for each question.

CHAPTER TWO

CURRENT PRACTICE

This chapter addresses the current practice in the use of consultants for construction engineering and inspection (CEI) work; scoping of the work; the types of contracts; solicitation, selection, and negotiation procedures; definition of authority, responsibility, and accountability; administration and monitoring of consultant contracts; and evaluation of performance.

DETERMINATION OF NEED FOR CONSULTANTS

Why Use Consultants?

The primary reason most agencies that responded to the questionnaire use consultants for CEI work is to supplement in-house staffs. Nearly all state highway and transportation agencies have reduced their construction staffs significantly during the last 10 to 15 years in response to reduced revenues during energy crises and staffing limitations imposed by state officials outside the agency. The reduction in revenues resulted in fluctuating work loads, which required reduction in forces in some states. Many states are reluctant to rebuild their staffs and risk facing layoffs again even if the hiring restrictions were removed. It is easier emotionally or procedurally to terminate consultants or individual consultant employees than to lay off an agency employee. The use of consultants for peak work loads is, of course, another way of saying "supplement agency staffs." Construction work is seasonal in all but a few states so there are peak needs during those months when contractors can pursue the work.

The next-most-often-given reason is to obtain expertise not available within the agency. This expertise may include giving periodic advice on construction problems or providing all of the CEI services. Occasionally, design firms, especially for complex bridge projects, will be required to provide oversight and consultation services during the construction phase as needed.

A number of states engage consultants or testing laboratories for out-of-state inspections.

The questionnaire responses are summarized below:

Reason for Using Consultants	*No. of Responses**
To supplement agency staff	27
To handle peak work loads	18
To obtain expertise not available in-house	9
To handle work for other agencies	4
To reduce the need for relocations	1
When there is an economic advantage	1

*The number of responses exceeds the number of agencies that returned questionnaires because most agencies gave more than one reason for using consultants.

Selection of Projects

Most agencies select projects individually for assignment to consultants to supplement in-house staff. District construction supervisors make staffing analyses to identify the anticipated work load, the staffing needs, and the personnel available to meet the need. Individual projects are then selected for assignment to consultants to balance staffing with the work load to ensure adequate inspection. Where construction engineering personnel management systems are in use, projected staffing deficiencies in districts or residencies are easily identified.

The California Department of Transportation (Caltrans) completes a "Contracting-Out Report" on every project that includes a recommendation on the use of consultants. The final decision is made by the Chief of the Division of Project Development.

Some projects are selected for assignment to consultants because they are in isolated locations where it is difficult to provide in-house staffing. The recent projects to rebuild the bridges connecting the Florida Keys is one example. Permanent transfers of engineers and technicians was undesirable because the improvement program was scheduled for completion in a relatively few years and there would then be no work for the crew. Temporary transfers would have taken staff from areas where they were needed. Consequently, consultants were engaged to provide the construction engineering and inspection.

Complex projects, especially major bridge projects, often require expertise not normally available within an agency. Consultants are frequently retained for the construction phase of these projects, either to provide the CEI for the project or to assist agency personnel. In the latter case, the contracts with the design consultants are frequently modified to permit design professionals familiar with the designs and plans to provide the technical expertise needed by the agency.

Four states assign agency project engineers and available staff to supervise construction projects and engage consultants to provide the remaining staff required to fill out the crews. Consultants are required to provide technicians, and sometimes engineers, in much the same way as employment contracting firms provide temporary clerical employees to businesses. Agency personnel are in charge and supervise both the in-house employees and the temporary employees furnished by the consultants. The responsibilities of the consultants in these states are quite limited.

Maryland's procedure is typical of the use of this method. In addition to assigning larger projects to consultants, Maryland supplements its regular staff with consultant technicians. The department assigns a chief inspector, and sometimes an office technician, to a project and all other personnel are furnished by a consultant. A two-year consultant contract to furnish technicians is awarded for each district. The department's chief

inspector is responsible for the project. The districts make the project assignments for both the department and consultant employees. As with department personnel, consultant technicians may be assigned to any project within the district. In 1986, the CEI function was staffed by 400 state employees and 236 consultant employees.

Virginia has also used this method for supplementing the department's staff, but is phasing it out, preferring to assign entire projects to consultants to better define responsibilities.

Types of Construction Projects

The types of projects assigned to consultants vary with each agency. Most agencies that use consultants for CEI assign major projects to consultants. Illinois typically assigns consultants to major urban freeway reconstruction projects or freeways on new construction. In Kentucky, projects chosen for administration by consultants are normally along major, new locations such as toll roads or economic development corridors and financed solely with state funds. Nebraska uses consultants only on federal-aid projects.

Three states reported using consultants only on local roads. New Jersey uses consultants only on local-aid work where the construction cost is more than $500,000. The local agencies will assume maintenance responsibility upon completion of the projects. Kansas and North Dakota use consultants only on projects that are the responsibility of local government agencies. In both states the state DOT has oversight responsibility.

Wisconsin engages consultants for small, simple projects or for specialty services, such as staking, as first assignments. As a consultant firm's experience with the department increases and performance is satisfactory, the firm is considered for more complex projects.

Volume of Work Assigned to Consultants

Twenty-nine of the 41 states and one of the three provinces that responded to the questionnaire use consultants for some portion of their CEI work. The portion varies from less than 1 percent up to half of the total agency CEI work load. The types of services assigned to consultants also vary widely, which accounts for some of the variation in the amount of work contracted to consultants. The services provided are discussed in more detail later in this chapter.

Nineteen states provided data on their annual construction program in terms of both dollar volume and number of contracts and the percentage of each administered by consultants. The use of consultants for CEI in these 19 states is shown in Table 1. As shown in the table, the amount of construction assigned to consultants ranged from 1 percent to 52 percent when based on the contract dollar value of the projects. The construction program represented by these percentages ranged from $1.8 million to $650 million. The number of contracts assigned to consultants ranged from fewer than 1 percent to 50 percent. Actual contracts per state range from 1 contract to 550 contracts.

Except for four states, the percentage of consultant use based on dollar volume is equal to or higher than that based on number of projects. The weighted average of projects assigned to consultants for these 19 states is 26 percent when based on dollar volume and 15 percent by number of projects. This seems to confirm that most states assign larger projects to consultants.

Figure 1 shows the dollar amounts of the annual construction program for the 15 states reporting the greatest use of consultants as measured by dollar volume. The number of contracts for each of the 15 states reporting the most contracts assigned to consultants is shown graphically in Figure 2.

The average project size ranged from $246,000 to $96,109,000.

TABLE 1

USE OF CONSULTANTS FOR CEI.

States Using Consult for CEI	Constr. $ Volume (000)	% by Consult	Dollar Volume by Consult (000)	Total No. of Contracts	% by Consult	No. by Consult	Average Value per Contract (000)
PA	$1,300,000	50	$ 650,000	1,100	50	550	$ 1,182
FL	884,554	52	459,968	385	22	85	5,431
CT	1,000,000	32	320,000	346	35	121	2,642
IL	850,000	20	170,000	900	2	18	9,444
SC	262,037	34	89,093	309	0.3	1	96,109
WA	358,000	18	64,440	200	2.5	5	12,888
KY	395,000	13	51,350	450	5	23	2,282
TN	364,196	11	40,062	459	2.8	13	3,117
MS	191,000	16	30,560	68	8	5	5,618
KS	250,000	11	27,500	350	32	112	246
WI	241,000	10	24,100	451	5	23	1,069
DE	90,000	25	22,500	100	15	15	1,500
NJ	244,200	9	21,978	90	22	20	1,110
VA	556,031	3	16,681	563	2	11	1,481
ND	89,500	16	14,320	235	12	28	508
CO	250,000	4	10,000	240	1	2	4,167
SD	101,536	4	4,061	180	3.5	6	645
NE	132,029	3	3,961	293	2	6	676
AR	180,000	1	1,800	300	0.5	2	1,200
Total	$7,739,083	26.1*	$2,022,373	7,019	14.9*	1,045	$1,935*

*Weighted Averages

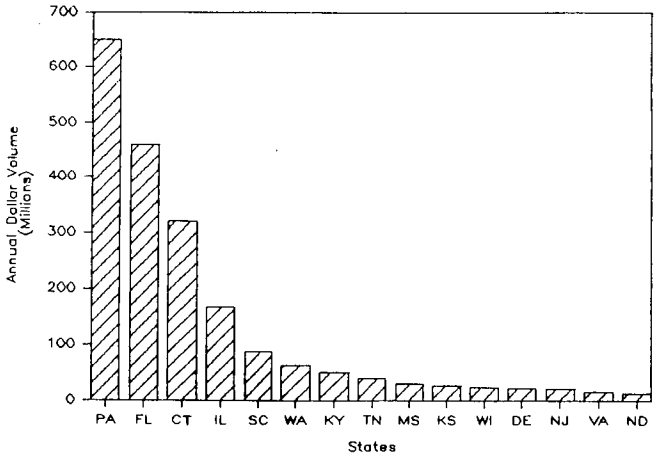

FIGURE 1 Construction engineering by consultant forces.

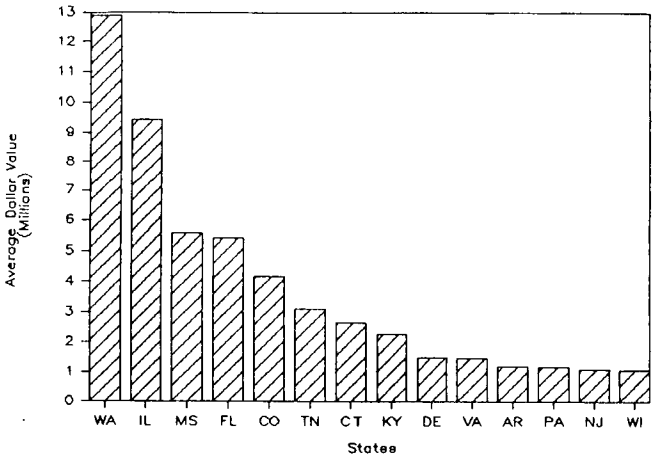

FIGURE 3 Average contract size of consultant CEI contracts.

The $96,000,000 project represents one project. Without it, the upper limit of the range is $12,900,000 and the weighted average is $1,850,000 instead of $1,935,000. The average contract amount per project for selected states is shown in Figure 3.

A special computer run was made by FHWA to obtain data on the relationships between contract costs and in-house costs for construction of roadway, bridge, and miscellaneous projects, and construction engineering and inspection (*1*). Information for a two-year period (1985 and 1986) was used. The information relates only to CEI work on federal-aid projects performed by either in-house or consultant forces and covers the total program. Data were not available by type of project. These data were tabulated by FHWA region to identify which sections of the country make the most use of consultants for CEI. The results are presented in Figure 4. The nationwide weighted average of construction engineering expenditures paid to consultants is 18 percent. The average percent of payments to CEI consultants in the two northeastern FHWA regions is greater than 35 percent, and the other regions varied from just over 2 percent up to 17 percent. (The states included in each region are shown in Appendix B.)

Any construction engineering function designated as a contractor responsibility in the contract, such as staking and contractor quality control, is included in construction costs rather than in engineering costs in this analysis.

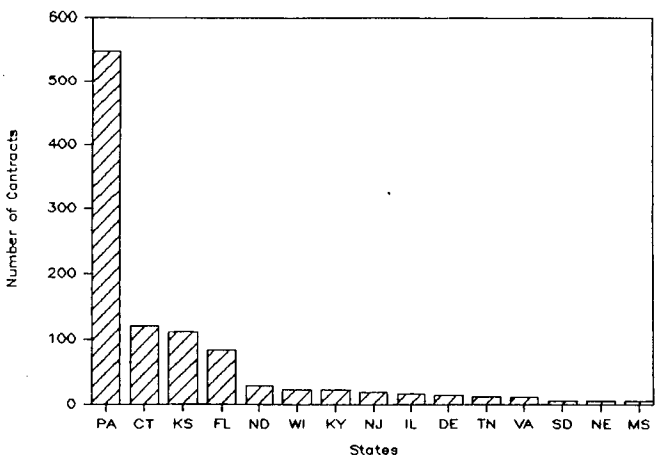

FIGURE 2 Number of CEI contracts by state.

Projected Use of Consultants

Of the 29 states that responded to the questionnaire and that use consultants for CEI, 10 (34 percent) foresee no change in the use of consultants, 7 (24 percent) expect an increase, and 7 anticipate that the use of consultants will decrease over the next three years. From these responses, it is expected that the amount of consultant CEI work will remain at about the current level for the next three years. The actual amount will depend on funds available and staffing policies. Utah is typical in that the department policy is to use CEI consultants only during periods of peak work loads. New Jersey expects the work load to require consultant assistance for the next two and a half to three years, after which it is planned that all CEI work will be performed by department personnel.

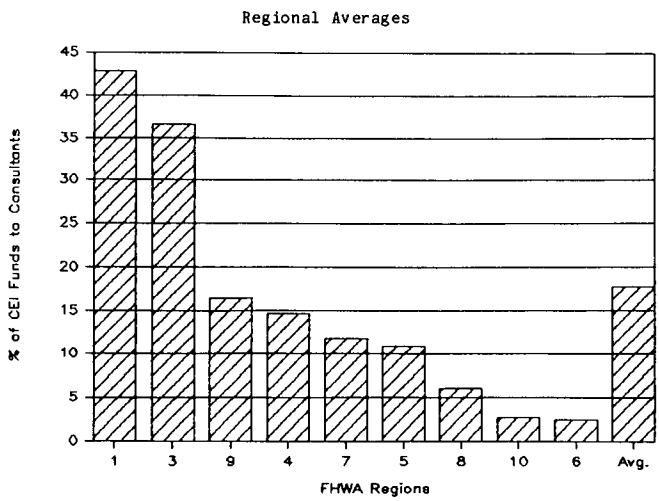

FIGURE 4 Percent of construction engineering funds to consultants (federal-aid projects) (*1*).

DEFINING SCOPE OF WORK

Consultant Services Provided

Most agencies require consultants to perform the same services that agency personnel would perform. These services may include showing the project, staking or checking contractor staking, conducting or attending the preconstruction conferences, field sampling and testing of materials, inspection, documentation, preparing progress estimates for payment, computing final quantities and costs, preparing change orders, and investigating claims and making recommendations. The exact services will vary between agencies and may also vary within an agency between districts or projects depending on the availability of in-house personnel and past experience with consultants. The services to be performed are defined in the CEI contracts.

The results from the questionnaires are tabulated in Table 2. Materials testing normally performed by the agency central laboratory or district laboratories and independent assurance testing are nearly always excluded from consultant contracts. Review and approval of the last four items—preparing progress estimates, preparing final estimates, preparing change orders, and processing claims—is always reserved to the agency.

Size of Projects

Generally, larger projects are assigned to consultants because they are easier for agencies to administer than smaller projects. Exceptions include local road projects and those in isolated areas.

Grouping of Projects

Projects are combined at times to make them more attractive to consultants or to facilitate traffic control or schedules. Only one agency reported combining small projects specifically for consultant supervision.

Definition of Scope

Four methods were identified for defining the scope of CEI work to be performed by consultants. They are tabulated below with the number of agencies using each method.

Method	Number of Agencies
Statement of work in the contract or agreement	12
Advertisement or RFP	5
Scoping meeting	3
Written scope statement	3

Most agencies develop individual scope statements to fit the requirements of each project. A typical Arizona scope statement (*2*) defines the responsibilities of the consultant as:

- acting as an extension of the ADOT staff;
- providing the resources necessary to handle all construction administration activities including survey crews, inspectors, material testing facilities and staff, resident engineer, and office

TABLE 2

SERVICES ASSIGNED TO CONSULTANTS

Activity	Percent of States Where Performed by Consultants
Showing project to contractors*	4
Staking or checking contractor staking	82
Conducting/attending preconstruction conference	89
Field materials testing	86
Inspection	93
Documentation	100
Preparing progress estimates	82
Preparing final estimates	82
Preparing change orders	68
Processing claims	46

Note: These percentages are based on the responses of 29 states that use consultants for CEI.

* Not all agencies show projects to contractors before bidding, and in many instances the CEI consultant does not have notice to proceed early enough in the process to perform this function.

engineering and clerical staff, including all equipment and supplies required to perform the work;

- handling all contacts with property owners and tenants during the project;
- arranging and conducting a preconstruction conference, including notifications and location arrangements;
- handling all requests and directives with the contractor during construction;
- documenting project activities and manpower requirements in accordance with the ADOT format, and coordinating with the ADOT project monitor on a regular basis throughout the term of the project;
- handling all change orders and other documentation in a professional, thorough, and timely manner;
- following up with written correspondence and personal contacts to obtain ADOT decisions and contractor notifications; and
- monitoring contractor activities in order to protect and preserve the public safety, including taking immediate and appropriate action to assure that traffic control plans are properly implemented and maintained.

A more detailed scope of work statement for an Arizona project is included for reference in Appendix C. This scope statement clearly and concisely defines the responsibilities of the consultant.

Two agencies use standard scope statements applicable to all CEI projects. In other agencies, it is more typical to prepare scope definitions unique to each project. Standard scope statements from New Jersey and one from Kansas are also included in Appendix C. In both of these states, consultants are used only for administration of local road construction. The use of standard scopes reduces the time required to engage consultants. Standard scope statements can be modified for unusual projects, of course.

Agency Support for Consultants

Some agencies provide support—office space or equipment—to reduce the costs for consultant services. Twelve of the 28 reporting agencies do not. The types of support provided include:

Item	*Number of Agencies*
Field office space	10*
Office equipment	2
Field labs	3*
Computers (or use of agency computers)	3*
Computer programs	7
Testing equipment	3
Survey equipment	3

*Some agencies require the contractors to furnish these items for either in-house or consultant-supervised projects.

Agencies normally furnish consultants with such items as plans, specifications, contract documents, and procedure manuals that are provided to in-house personnel for guidance in performing the CEI work.

As an example, the scope of services statement for a Florida project specified that the department would furnish the following items to the consultant:

- one copy of all current construction directives plus copies of any issued during the project;
- one copy of all current materials directives plus copies of any issued during the project;
- one copy of the *Materials Sampling, Testing, and Reporting Guide* plus any revisions;
- a sufficient number of copies of the department's construction manual;
- a tabulation of departmental training courses relating to construction engineering and inspection;
- a copy of the department's qualified products list;
- two copies of the department's *Manual on Traffic Control and Safe Practices*;
- one copy of the Guidelines for Project Personnel for Determination of Contractor's Compliance with Equal Employment Opportunity Provisions Included in Federal-Aid Contracts;
- one copy of the *Equal Opportunity Contract Administration Filing Procedures and Training Manual*;
- one copy of the *Field Sampling and Testing Manual*;
- one copy of the *Bureau of Materials and Research Manual on Inspection-in-Depth of the Materials and Construction Control Process*;
- one copy of the contract certification system packet;
- one copy each of the following estimate-preparation aids: *Basis of Estimate and Computations Manual, Sample Computations Manual, Final Estimate Preparation Short Course,* and *Carter Key Manual*;
- contract documents for the project;
- a sufficient number of copies of the department's Standard Specifications for Road and Bridge Construction;
- one copy of Professional Consultant Contract Administration Procedures;
- one copy of the most recent Roadway and Traffic Design Standards;
- one copy of the *Bureau of Construction Procedures Manual*;
- one copy of the Utility Accommodation Guide;
- a supply of all standard forms, disposable molds for casting concrete test cylinders, sample cartons, sample bags, and other expendable testing supplies; and
- those computer services normally provided to resident engineers, including but not limited to COGO, ROADS, CRS, MULE, the construction quantity programs and design programs necessary for verifying bridge quantities and the like and for project scheduling and control.

Agency Training Available for Consultant Personnel

Few agencies provide technical training specifically for consultant personnel. Most agency personnel believe that it is the responsibility of consultants to train their employees. However, eight states allow consultant personnel to attend regularly scheduled agency training sessions if space is available. The consultants are not reimbursed for the cost of personnel attending these courses. Three states that have audio-visual training available for agency personnel allow consultants to make use of it—

two loan the training material and one makes it available for purchase. Louisiana does provide training for consultant personnel and charges the firms for the cost of conducting the training. Arizona requires consultant personnel to take 66 hours of training covering such items as mass diagrams, construction materials, inspection of bituminous roadway construction, inspection of concrete, inspection of earthwork, office engineering, construction surveying, preparation of field books, and recording field measurements and computations (*2*). The department conducts the training and the consultant firms pay the salaries and expenses for participants.

Three agencies provide orientation training for consultant personnel. Maryland conducts an initial (one-day) indoctrination for newly assigned inspectors. South Dakota has a similar orientation course to explain the required procedures. New Jersey has a three-day orientation course covering documentation and the use of its *Manual of Uniform Record Keeping*.

Consultants do not have extensive programs for training CEI personnel. Typically, they take advantage of state-DOT- and FHWA-sponsored training opportunities to provide training for their employees. Other training that is used includes:

- university seminars;
- Asphalt Institute paving seminars;
- Intext Communications Systems (ICS) courses given in conjunction with NICET; and
- in-house training.

One consultant reported not having a training program and stated that lack of continuity of contracts did not make it cost-effective to invest in training for technicians.

Determination of Staffing

Of the 27 agencies that responded to this question, 48 percent (13 agencies) determine the staffing requirements, 21 percent (6 agencies) allow the consultant to set the staffing level, and 30 percent (8 agencies) set it jointly with the consultant. The staffing level is always subject to approval of the agency. Consultant-proposed staffing levels may be revised during negotiations.

New Jersey develops its own staffing estimate using its Construction Engineering Manpower Management System (CEMMS) to check the consultant's estimate. A copy of a sample staffing table is shown in Table 3. New Jersey provides consultants with software for developing their financial proposals. A sample printout is included in Appendix D. Use of this software makes proposal review much easier. (New Jersey's

TABLE 3

SAMPLE STAFFING TABLE—NEW JERSEY DOT

EXHIBIT A, PAGE 2

PROPOSAL DATE:

ENTER NAME OF FIRM:
ENTER PROJECT NAME AND FEDERAL PROJECT NUMBER:

JOB TITLE	ASCE OR NICET GRADE	1986 J	F	M	A	M	J	J	A	S	O	N	D	1987 J	F	M	A	M	J	J	A	S	O	N	D	(1)	(2)	(3)	(4)	(5)	(6)
P.M.*	VIII(A)			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	176		10.60			1,865.60
R.E.	IV(A)			80	173	173	173	173	173	173	173	173	93	133	80	80	80	173	173	173	173	173	173	173	173	173	80	3221		8.48			27,314.08
C.E.	II(A)			80	173	173	173	173	173	173	173	173	173	93				173	173	173	173	173	173	173	80			2675		5.83			15,595.25
A.O.E.	I(A)				173	173	173	173	173	173	173							173	173	173	173							1730		4.77			8,252.10
C.I.	IV(N)				173	173	173	173	173	173	173	173	173	133				173	173	173	173	173	173	173				2555		6.36			16,249.80
C.I.**	IV(N)				10	20	20	20	20	10								20	20	20	20	20							200	6.36	3.1	636	1,272.00
S.I.	III(N)				80	173	173	173	173	173	173	173	133					93	173	173	173	173	173					2209		5.30			11,707.70
S.I.**	III(N)				10	20	20	20	20	10								20	20	20	20	20							200	5.30	2.6	530	1,060.00
I	II(N)					173	173	173	173	173								93	173	173	173	173						1650		4.51			7,441.50
I**	II(N)					20	20	20	20									20	20	20	20								160	4.51	2.2	362	721.60
I	II(N)					173	173	173	173	173								93	173	173	173	173						1650		4.51			7,441.50
**	II(N)					20	20	20	20									20	20	20	20								160	4.51	2.2	362	721.60

NUMBERS AND ALL INFORMATION ENTERED BELOW THIS LINE ARE FOR ILLUSTRATION ONLY

ENTER 173 HOURS FOR EVERY FULL MONTH YOU ANTICIPATE THE EMPLOYEE TO WORK

ENTER PROPOSED OVERTIME HOURS FOR TITLES ELIGIBLE FOR O.T.

PROJECTED HOURLY RATE (3): TRANSFER PROJECTED AVERAGE HOURLY RATES FROM SALARY SCHEDULE

DIRECT LABOUR (6): TOTAL HOURS PER TITLE TIMES PROJECTED HOURLY RATE

DIRECT LABOR PREMIUM (5): TOTAL OVERTIME HOURS PER TITLE TIMES PREMIUM HOURLY RATE

TOTALS	15866	720		1889	99,642.73	
TOTAL LABOR (PREMIUM PORTION)					1,889.20	
TOTAL LABOR (STRAIGHT TIME PORTION)					99,642.73	
TOTAL LABOR (STRAIGHT TIME PORTION) X INTERIM OVERHEAD PERCENTAGE					114,589.14	INTERIM OVERHEAD PERCENTAGE = 1.15
GRAND TOTAL					$216,121.07	

* Limited to on-site visits to the project totalling 8 hours per month, including reasonable travel time.

** Overtime Hours

(1) Total hours (straight time)
(2) Total hours (overtime)
(3) Projected hourly rate
(4) Projected hourly rate (premium time)
(5) Direct Labor (premium portion)
(6) Direct Labor (straight time portion)

software is a revised version of software originally developed by New York DOT.)

Other states use various methods for estimating and checking the staffing required. In Florida, the department now determines the staffing levels to make proposals more uniform. This prevents consultants from proposing a low staff to get the award and then submitting claims to recover more money. The district construction engineer estimates the staffing level considering the complexity of the project, personnel requirements, and the estimated construction contract time in which consultant services will be required. In Maryland and Virginia, where consultant personnel are used to supplement in-house staffs on projects, the number of staff hours for each classification is stated in the advertisement.

Staff Qualifications

In general, CEI consultants are required to provide engineering personnel with somewhat higher qualifications than those required of agency employees. Thirteen of the states that responded to the questionnaires require consultants to furnish a professional engineer to supervise the work, but only seven required registration for in-house personnel performing this function. The results are tabulated in the next column and presented graphically in Figure 5.

Minimum Qualifications	*Agency*	*Consultant*
PE Registration	7	13
PE or Experience	2	4
PE or Civil Engineer Degree	0	1
Graduate Engineer	0	2
Graduate Engineer or Experience	2	0
Experience	14	5

Several states specify professional registration, but permit substitution of suitable experience or engineering degrees for registration for either agency or consultant personnel. Others permit qualification through experience and/or examination when engineering degrees are specified. The minimum qualifications in 14 of these states do not specify either college training or registration for in-house personnel to qualify to manage construction projects. Five states permit consultant project managers to qualify through experience.

The differences in agency requirements for in-house and consultant technicians are not as great as for engineers. Sixteen agencies reported having a formal classification plan that defined the minimum qualifications for agency personnel. Six agencies evaluate consultant technicians against the classification plan. Thirteen agencies evaluate consultant technician experience without having formal requirements, compared with six agencies for in-house personnel. The remaining six agencies have minimum requirements that include some type of certification for

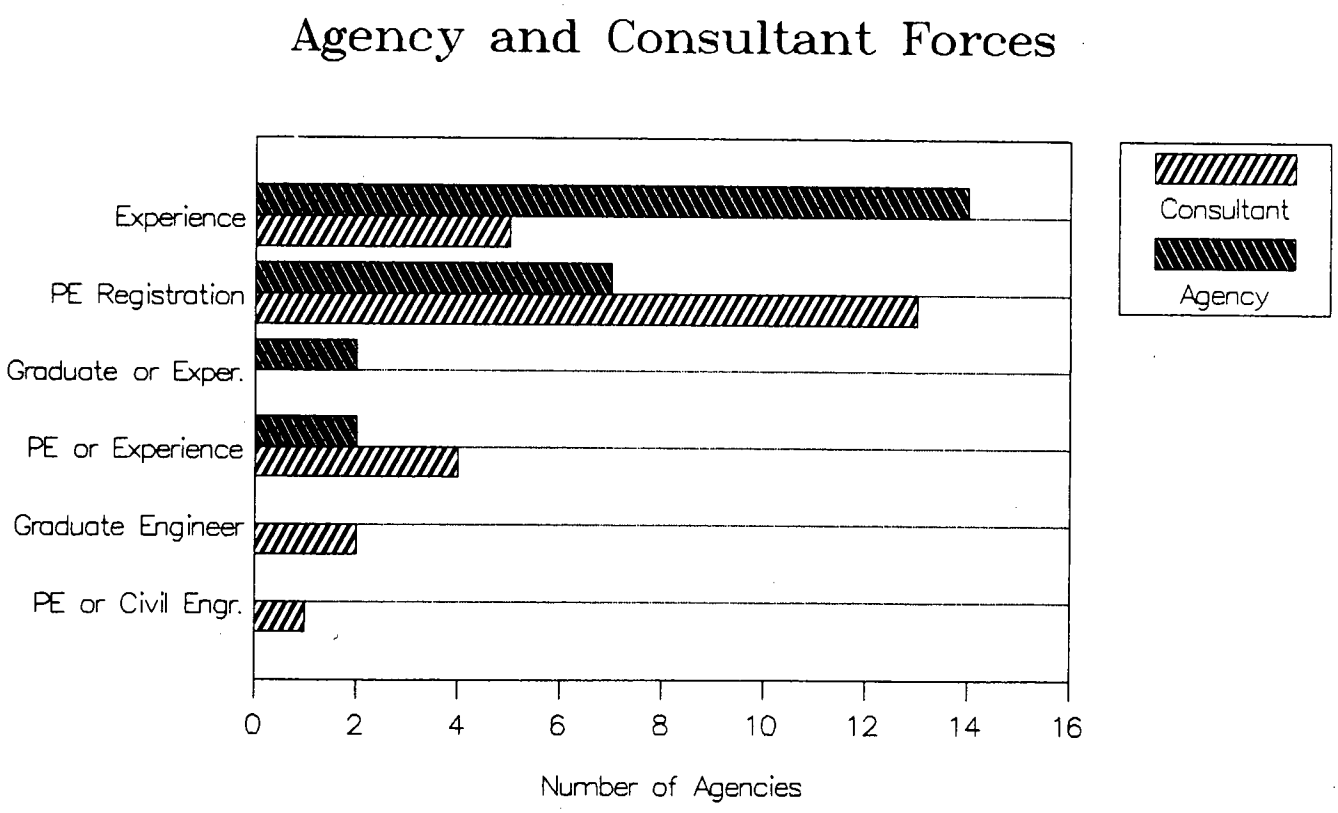

FIGURE 5 Engineer requirements.

consultant technicians. The requirements are summarized in Figure 6.

Representative consultant qualification requirements from selected states are listed below.

In an advertisement (*3*) for construction inspection services, the Pennsylvania DOT required that 60 percent of the inspection staff assigned to each project meet any of the following requirements:

- Be certified by NICET as a Transportation Engineering Technician—Construction, Level II or higher; or
- Be registered as a Professional Engineer by the Commonwealth of Pennsylvania with one year of highway experience acceptable to the department; or
- Be certified as an Engineer-in-Training by the Commonwealth of Pennsylvania with two years of highway experience acceptable to the Department; or
- Hold a bachelor of science degree in civil engineering with two years of highway experience acceptable to the department or a bachelor of science degree in civil engineering technology with two years of highway experience acceptable to the department; or
- Hold an associate degree in civil engineering technology with three years of highway experience acceptable to the department.

The remaining 40 percent must meet the following education and experience requirements:

- Graduation from high school or equivalent certification or formal training. Completion of a training program in construction inspection sanctioned by the department may be substituted for high school graduation; and
- One year of experience in construction inspection or workmanship that included reading and interpreting construction plans and specifications or one year of experience in a variety of assignments involving the testing of materials used in highway or similar construction projects.

Connecticut requires the consultant's project engineer to be certified by NICET as a Transportation Engineering Technician—Construction, Level IV. Furnishing a project engineer who was a registered professional engineer or held a bachelor of science degree in civil engineering would be an advantage in the selection process, however. All technicians must be certified by NICET at Level I or higher.

Kentucky requires the project engineer to be a registered professional engineer. The individual must be named in the proposal and a résumé submitted. There are no stated minimum requirements for technicians.

New Jersey requires that the full-time resident engineer on CEI contracts meet one of the following requirements:

- Be licensed by the New Jersey State Board of Professional Engineers and Land Surveyors, with a minimum of three years full-time job site experience acceptable to the department as a resident engineer responsible for the engineering and inspection of highway and/or bridge construction projects; or
- Have 10 years of full-time experience, acceptable to the department, involving engineering and inspection of highway and/or bridge construction projects, four years of which shall

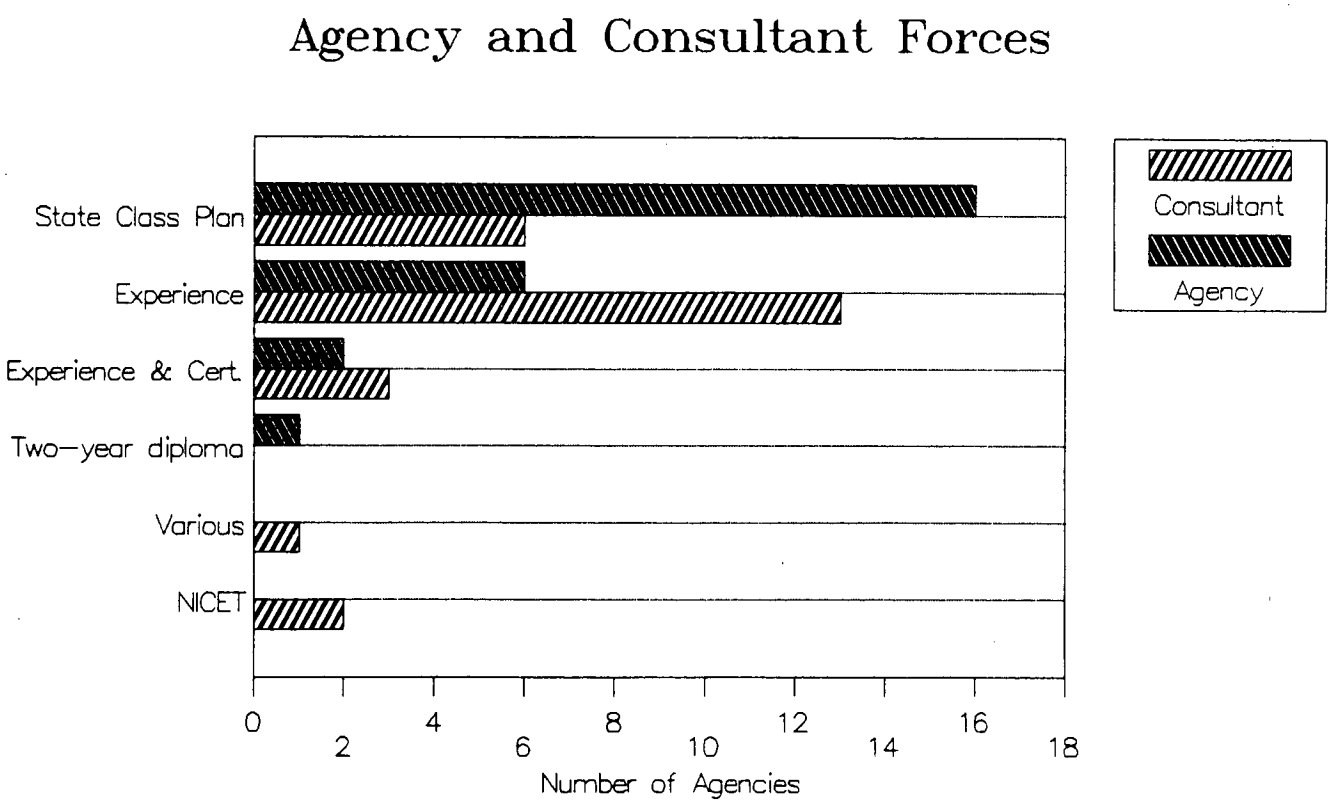

FIGURE 6 State technician requirements.

have been spent full time on the job site in the capacity of resident engineer; or

- Be certified by NICET as a Transportation Engineering Technician—Construction, Level IV, with a minimum of three years full-time job site experience acceptable to the department as a resident engineer on highway and/or bridge construction projects.

Maryland requires consultants to submit a résumé and proposed grade for each employee. The Construction Division evaluates the individual's qualifications from the résumés, using the state personnel classification plan for construction personnel as a base, and assigns a grade for each proposed consultant employee. Employees may be upgraded or downgraded while work is under way depending on their performance on the job. NICET certification is not required but is considered in setting grades.

Some states, such as Iowa and Utah, have state certification programs for selected CEI functions. These include areas such as aggregate testing, asphalt and concrete plant inspection, and nuclear density testing. Consultant personnel may be required to pass these states' certification requirements to qualify.

None of the consultants interviewed had an in-house requirement for technician certification. They work in specific states and their clients dictate the certification requirements. Technician development requires a long-term commitment. Because the CEI work load for most consultants varies from year to year, long-range plans for technician development are not cost-effective.

Engineers, on the other hand, can be used on a wider variety of assignments—design as well as construction—and they may substitute for senior technicians for short assignments. Registration is not only encouraged but required. Continued recruitment and development of engineers are essential to the growth of any engineering consulting firm.

TYPES OF CONTRACTS

DBE/WBE Requirements

Eleven of the 26 states that responded to this question set disadvantaged business enterprises (DBE) or women-owned business enterprises (WBE) goals for CEI consultant contracts. Eight of the 11 states have combined percentage goals ranging from 10 to 21 percent on essentially all CEI projects. Several states evaluate each CEI project before setting goals to ensure that the project is large enough or includes work that available DBE or WBE firms can perform. The use of DBEs is a factor in the selection or prequalification of CEI consultants in a number of states. Regulations issued by the U. S. Department of Transportation on October 21, 1987, include WBE firms in the definition of DBE businesses and eliminate the use of separate goals (*4*).

A few states do not permit subcontracting of consultant CEI services. With subcontractors, they believe that it is more difficult to determine responsibility if there are problems. Consequently, these states do not set DBE goals on CEI work, although DBE consultants are encouraged to compete for these projects.

Methods of Payment

The most common method of payment for CEI services is actual wages plus allowances for fringe benefits, overhead, and fees plus actual direct expenses. Fifteen of the 20 agencies that responded to this question use this method. Most states include regular wages plus overtime wages as a base for computing the allowances, with overtime at one and one-half times the straight rate. Others, such as New Jersey, apply the allowances to the straight hourly rates for all hours worked. The extra 50 percent paid to the employees is reimbursed, but none of the allowances can be added to this portion of the costs.

Five states pay specific rates for hours worked. The rates vary by classification of employee. Those states that use consultant technicians to supplement department crews use this method.

Several states have guidelines that permit lump-sum contracts, but this type of contract is rarely used because of the difficulty of accurately defining the level of effort on CEI contracts. FHWA procedures do not permit the use of lump-sum contracts for CEI services on federal-aid projects (*5*, p. 9).

Cost Limitations

Essentially all CEI contracts include a maximum total cost limit. The cost limits are based on the estimated required staffing, overhead and fee allowances, and direct expenses. No cost limitation guidelines based on a percentage of the construction costs were identified.

SOLICITATION, SELECTION, AND NEGOTIATION

The discussion of selection procedures and contract negotiation in this synthesis is limited to CEI contracts. *Synthesis 137: Negotiating and Contracting for Professional Engineering Services* and a future synthesis (Topic 18-10), *Contract Management Systems*, address these areas in greater detail. Nearly all states use the same procedures for retaining CEI consultants as for other engineering consultants.

Advertising

Projects in which CEI consultants are needed are typically advertised using the same methods as other engineering service procurements. The two most common methods are advertising for statements of interest (11 agencies), direct solicitation of firms listed by the agency (4 agencies), or a combination of both methods (8 agencies). Two states added the CEI work to design consultant contracts by change order, and so did not advertise.

Projects are advertised in one or more of these media:

- widely distributed state newspapers,
- officially designated newspapers,
- national trade journals such as *ENR*,
- advertising in local newspapers near the project site, and
- minority publications.

Five states reported advertising only in official publications such as the *Pennsylvania Bulletin*, the Florida Administrative

Weekly, and Maryland's The Daily Record. Consultants who are interested in work in those states must subscribe to and review these publications to learn of potential projects.

Florida advertises CEI projects each quarter, and interested consultants may submit a one-page letter of response; a short list is then prepared from a master list of prequalified consultants—usually three consultants; those on the short list have three weeks in which to submit technical and price proposals following a scope-of-service meeting. The district selection committee ranks the proposals and makes a final selection.

Prequalification Requirements

Fifteen of the 28 states that responded to this question require consultants to prequalify for CEI projects. Most of these states require consultants to maintain their prequalification continuously, but several provide for prequalification on individual projects. Typically, prequalifications must be renewed annually.

The information required on agency prequalification questionnaires, as reported by the 11 agencies who provided copies of their forms, is generally quite similar to that required on federal standard forms 254 and 255, although the format is different on each one. The type of information necessary to complete the forms includes office locations and staff in each office; the number of personnel in each discipline and, in some cases, the number of minorities; the firm's annual fees for 3 to 5 years; example projects for the last 5 to 10 years; and brief résumés of key employees. Four agencies require a listing of associate consultants the CEI consultant generally employs for specialty work. Two request financial statements and two ask for a list of available equipment—transits, levels, and testing equipment.

A few states maintain lists of consultants interested in providing CEI services but do not prequalify them. Various methods are used to update the list, including completion of forms similar to those described above.

Sample forms 254 and 255 are included in Appendix E.

Professional Liability Insurance

In addition to general liability insurance, 50 percent of the agencies that use CEI consultants require professional liability insurance for errors and omissions. The amount of coverage specified varies between projects in half of the agencies that require professional liability insurance and is the same for all projects in the others. The minimum coverage ranges from $50,000 to $1,000,000. Required coverage may be higher if specified in the contract.

The current difficulty in obtaining professional liability insurance for errors and omissions is restricting entry of new firms into this field when this insurance is required. Insurance companies consider construction inspection a very high risk for claims. They tend to lump all construction projects together—buildings, dams, highways, or bridges. Premiums for this insurance have increased and the amount of coverage decreased. The extra cost must be included in each firm's costs either directly or as a part of overhead. However, none of the agencies included in the questionnaires or interviews reported any difficulty at this time in attracting interest in their consultant CEI work.

Methods of Selection

Once it is determined that a consultant will be engaged to provide the CEI services for a project, agencies use a variety of steps in their methods of selection. The procedures for 10 states were reviewed in detail. Within those agencies, there are two main differences in the steps used to select consultants. One method involves advertising the projects and requesting proposals from all interested consultants. The other is to select firms for a short list, either from responses to advertisements or from the list of prequalified consultants, and request proposals from only those on the short list. Generally, three to five firms are selected for the short list. Seven of these 10 states use the short list method. There are two major advantages to the use of short lists: (a) the agency has fewer proposals to review and can get through the selection process quicker and (b) consultants can reduce the number of proposals to write, which ultimately should reduce overhead costs. For a typical project in Connecticut (where short lists are not used), 40 to 60 proposals are received from interested consultants (*6*).

The steps and sequences that these 10 agencies follow in selecting CEI consultants are shown in Figure 7. Minor adjustments were made in presenting the steps to get all 10 sequences on the same figure for comparison.

Criteria for Selection

Some combination of the criteria listed below is used by state agencies to evaluate and select CEI consultant proposals or statements of interest. Most states use five or six of these criteria. The criteria, as listed in rank order based on the frequency that they were mentioned in the questionnaires, are:

- the qualifications and experience of available staff members;
- past performance of the firm, especially performance for the agency;
- specialized expertise for the specific project;
- the firm's current work load and ability to meet the schedule;
- location of the firm's office with respect to the project;
- the professional reputation of the firm;
- price;
- familiarity with specifications, work processes, and the project;
- utilization of DBEs;
- satisfaction of prequalification requirements;
- proposal appearance, clarity, and completeness;
- financial condition of the firm;
- affirmative action plan;
- presentation;
- innovative approaches; and
- available equipment.

The first five criteria are used by at least 10 states; the next four by 3 to 5 states; and the rest by 1 or 2 states. Some of these criteria may be covered in the prequalification require-

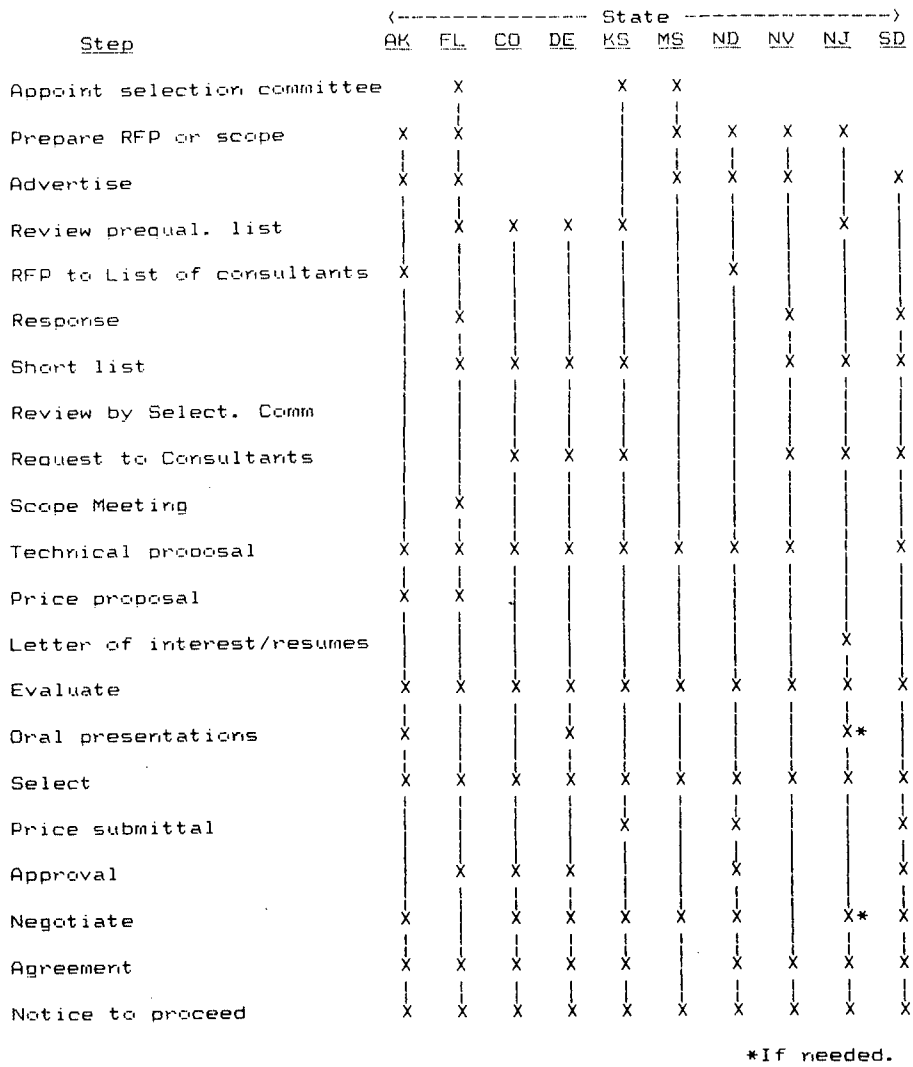

FIGURE 7 Sequence and steps to select CEI consultants.

ments and, therefore, were not mentioned again as selection criteria.

Virginia uses a score sheet for ranking its criteria for consultant selection (Figure 8). The criteria and maximum number of rating points (the numerical values in Figure 8) for each are:

- Firm location — 10 points
- Present work load—with department — 10 points
  —with division — 10 points
- Experience in type of work—firm — 10 points
  —personnel — 10 points
- Organizational capability — 10 points
- Minority business enterprise participation — 10 points

Each criterion is assigned a weight that varies from project to project. In the example, the weight assigned to each criterion varied from 25 percent for personnel experience to 10 percent for the ability to meet the time schedule. The total score for a consultant is found by multiplying each rating point value by the corresponding weight and then summing the products. Usually there are three raters; their scores are averaged to determine the "best" proposal. Typically, the raters are the assistant district engineer for construction from the district in which the project is located, the assistant construction engineer from central office assigned to the region (in which the district lies), and the manager of consultant services.

The South Dakota DOT uses an evaluation form with a maximum of 115 points for screening respondents for construction engineering inspection and surveying services. A copy is shown in Figure 9. The criteria are similar to those used by Virginia except that more weight is given to past performance and less to present work load.

The Arizona DOT sends information bulletins to alert consultants on its prequalified list about upcoming projects in which engineering services will be needed. In addition to a brief description of the work, these bulletins include the evaluation criteria. The department typically uses six criteria for rating statements of interest for CEI projects (*7*). The criteria, weight factors, and maximum points are shown in Table 4.

Included in the bulletin are instructions for rating consultant submissions on each of the criteria. The department limits con-

SCORE SHEET

No.
FIRM
ROUTE
PROJECT

		Numerical Value	Weight
A. Firm Location (Percent of Work to be Performed in Virginia)	0 - 10 11 - 20 21 - 30 31 - 40 41 - 50 51 - 60 61 - 70 71 - 80 81 - 90 91 - 100	1 2 3 4 5 6 7 8 9 10	20%
B. Present Workload (Dollar Value of Present Outstanding Fee Agreements Including Estimated Pending Contracts).	With Department 5,000,001 & Above 4,000,001 - 5,000,000 3,000,001 - 4,000,000 2,000,001 - 3,000,000 1,000,001 - 2,000,000 750,001 - 1,000,000 500,001 - 750,000 250,001 - 500,000 100,001 - 250,000 0 - 100,000	 1 2 3 4 5 6 7 8 9 10	10%
	With Division 400,001 & Above 350,001 - 400,000 300,001 - 350,000 250,001 - 300,000 200,001 - 250,000 150,001 - 200,000 100,001 - 150,000 75,001 - 100,000 50,001 - 75,000 0 - 50,000	 1 2 3 4 5 6 7 8 9 10	10%
C. Experience in Type of Work	Firm's Previous Experience	1 - 10	15%
	Personnel Working on Project - Previous Experience 1 - Least Experience 10 - Most Experience	1 - 10	25%
D. Organizational Capability	Ability to Meet Time Schedule 1 - Least Able 10 - Most Able	1 - 10	10%
F. Minority Business Enterprise Participation (Percentage of Work to be Performed by Minority Business)	0 1 - 2 3 - 4 5 - 6 7 - 8 9 - 10 11 - 12 13 - 14 15 - 17 18 - 20 21 & Above	0 1 2 3 4 5 6 7 8 9 10	10%

FIGURE 8 Evaluation form—Virginia (Virginia Department of Highways and Transportation).

EVALUATION FACTORS FOR SELECTING AN ENGINEERING FIRM

SCREENING OF RESPONDENTS
GSA FORM 255 SUBMITTAL FOR
CONSTRUCTION ENGINEERING
INSPECTION/SURVEYING SERVICES
(2/15/85)

Factors to be considered by the Selection Committee in determining the most appropriate and qualified engineering firm for a particular project are as follows:

	POINT VALUE	FIRM RATING	FIRM REMARKS
A. Experience of the engineering firm in performing specific services related to the project and their performance on comparable jobs	0-25		
B. Performance (1) Professional reputation of the engineering firm is a prime consideration; the reputation and character of a firm can best be determined by inquiries with previous clients and other references	0-15		
(2) Quality of workmanship and performance of the engineering firm; this may be determined by responsiveness to project paperwork, submittal of final documents and project closeout	0-15		
C. Qualifications and experience of principals of the engineering firm and of the project director and key staff engineers nominated for the project	0-25		
D. Depending on the nature of the project, the location of the engineering firm with respect to the project site may be important	0-10		
E. Familiarity of the engineering firm with applicable federal, state and local regulations, criteria, standards and procedures with respect to planning, design and approval of the project	0-15		
F. Other	10		
TOTAL	115		

_____
Signature

_____
Date

FIGURE 9 Evaluation form—South Dakota.

sultants to a submittal of 13 pages for the criteria plus 2 pages for the letter of introduction and 5 for supportive material, for a total of 20 pages. This requires submittals to be short and to the point to facilitate the review and rating process.

Another example of criteria and maximum points (from Cedar Falls, Iowa) is shown below:

• Company expertise	25 points
• Project manager	10 points
• Project engineer	25 points
• Project support staff	25 points
• Recent firm experience	25 points
• Past performance	20 points
a. With city	
b. With others	
• DBE qualifications	20 points
• DBE utilization	10 points
• Proximity to project	20 points
• Work load and commitments	20 points
Total	200 points

As in Virginia, the weight assigned to the criteria varies from job to job.

Maryland lists the rating criteria (but not the assigned weights) in the Request for Professional Services in The Daily Record advertisement. On one project (*8*), they were listed, in descending order of importance, as:

- key staff,
- similar project experience,
- compatibility of size of firm with size of proposed project,
- past performance on SHA projects, and
- capability to accomplish proposed work in required time.

Consideration for Local Firms

Essentially all states require consultants to establish local offices before award of CEI work. Although having a local office is not usually essential to qualify for a project, it is a significant advantage. About half of the states reported that selection criteria favored local firms. Some states such as Virginia are re-

TABLE 4

ARIZONA DOT RATING CRITERIA

STATEMENT OF INTEREST

CONSTRUCTION ADMINISTRATION

RECOMMENDED FORMAT AND CRITERIA ELEMENTS	CRITERIA WEIGHT FACTOR	MAXIMUM TOTAL POINTS
Introductory Letter		0
1. Project Understanding	2.0	20
2. Project Approach	2.0	20
3. Project Team	2.5	25
4. Staffing Schedule	1.0	10
5. Firm's Capacity	2.0	20
6. Minority Participation/ Affirmative Action Plan		5
Supportive Information		0
TOTAL		100

RATING

POINTS: 10 Outstanding 7.5 Good 5.0 Satisfactory 2.5 Marginal

quired by state law to include a factor for office location in the selection criteria. Although it is desirable that all engineering consultants understand local conditions and practices, it is essential that CEI consultant personnel be familiar with local soils, aggregates, construction practices, and the like to properly represent the agency.

Time Required for Selection

The length of time required by agencies to engage a CEI consultant, from the time the decision is made to use a consultant to notification to proceed, varies from less than three weeks to nine months. The times for selected agencies, where this information was available, are tabulated below:

State	*Time Required*	*Remarks*
Arizona	4 months (*2*)	
Connecticut	6 to 8 months (*6*)	Must plan well in advance.
Florida	5 months	Procedure decentralized and streamlined to reduce time.
Maryland	8 to 9 months	
Nevada	1½ months (*9*)	
New Jersey	2 to 2½ months	Can expedite to 2½ weeks.
Tennessee	4 to 5 months (*10*)	
Virginia	4 months	

For these agencies, the typical time required to engage a CEI consultant is four to five months.

Figure 10 shows the typical steps and time allowances for a Florida DOT CEI procurement and the relationship between the process for selecting the consultant and the advertising and award of the construction contract. Florida has recently decentralized and streamlined its process to reduce the time required to five months—a reduction of three to four months.

Virginia has streamlined its consultant selection process so that it now takes four months from first advertising for expressions of interest to issuing notice to proceed. A copy of their consultant procurement schedule is shown in Figure 11. Tennessee's procurement process takes four to five months.

Two exceptions are Nevada and New Jersey. Nevada's procedure can be completed in four to six weeks (*9*). New Jersey normally engages CEI consultants in 8 to 10 weeks, but with an expedited procedure can accomplish it in 2½ weeks. New Jersey uses a standard scope of work and standard agreements to reduce the total time. A copy of New Jersey's standard agreement is included in Appendix C for reference.

Overhead and Fee Allowances

In March 1986, the New Jersey DOT conducted a telephone survey of 32 state DOTs to determine prevailing overhead limits. About one-third of the states included in the survey have es-

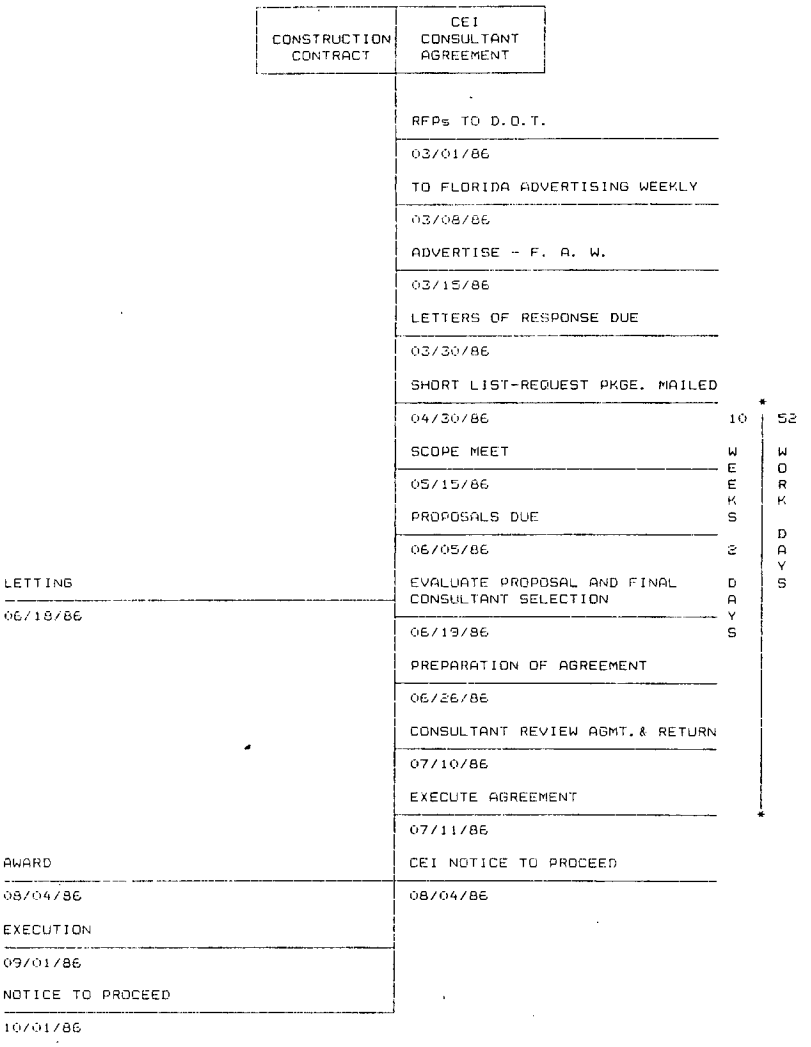

FIGURE 10 CEI schedule—Florida DOT.

tablished limits on the allowable percentage for overhead. The limits varied from 100 percent to 160 percent. Nearly another one-third do not have a set limit on overhead. The remaining states had no consultant CEI work under way. The data on overhead limitations on CEI contracts are:

Limitation	*Number of States*	*Remarks*
100%	1	
115%	1	
120%	3	
135%	2	
145%	1	Includes fee
150%	2	
160%	1	
Limit not specified	2	
No limit	9	
No consultant CEI under way	10	

At the time of the New Jersey survey, only one state specified a different limit for CEI work than for design work. The CEI limit was 15 percent lower than for design in that instance. New Jersey now specifies a maximum overhead rate of 115 percent for CEI consultants, 5 percent lower than for design consultants.

Connecticut reported typical overhead rates for CEI contracts of 82 to 89 percent. Florida has a design overhead limit of 135 percent, but no limit is specified for CEI work. Competition has kept rates in the 80 to 90 percent range. Most CEI consulting firms in Florida include field office overhead costs but not home office overhead. Neither Florida nor New Jersey permit the application of the overhead rate to the overtime premium rate.

In addition to direct salaries and overhead allowances, most agencies provide for the payment of reasonable nonsalary direct costs, such as travel, equipment, supplies, and the like. Any cost that cannot be recovered directly must, by default, be covered in the overhead or fee allowances. New Jersey provides guidelines to promote consistency and uniformity in the treatment of these items. A copy of these guidelines is included in Appendix F.

FHWA is developing procedures on "Administration of Contracts"; however, it has not been determined whether or not these procedures will contain specific guidance or even a range for the amount of fixed fees.

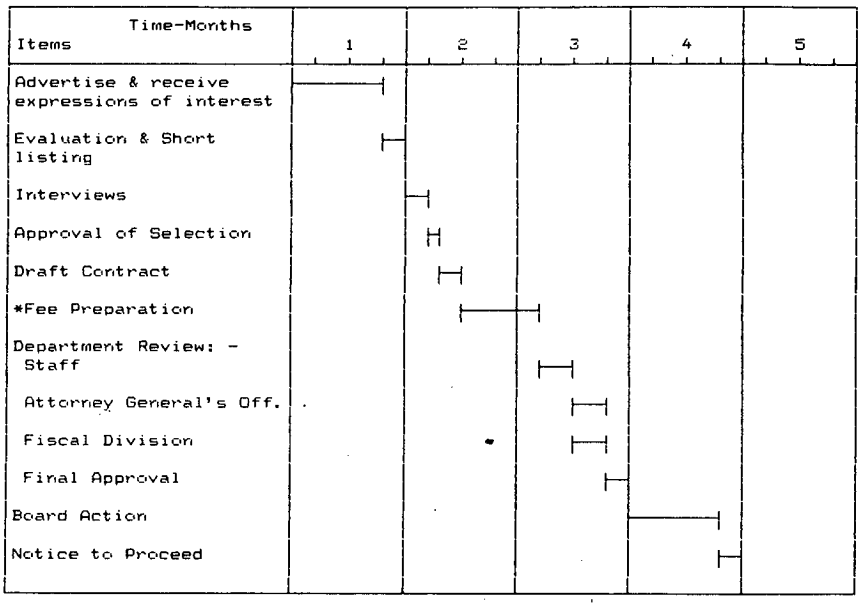

FIGURE 11 Consultant procurement process—Virginia.

Value Engineering Applications

Most states are including value engineering specifications in their construction contracts, at least on major projects, to encourage contractors to be innovative. Three states consider value engineering in the selection of consultant for CEI contracts. In Florida, short-listed firms are encouraged to include innovative concepts in their technical proposals. These concepts are evaluated by the Technical Review Committee before the final selection. Utah and Washington also consider value engineering concepts in selecting consultants.

AUTHORITY, RESPONSIBILITY, AND ACCOUNTABILITY

Authority

When the CEI work on federal-aid projects is performed by consultants, the FHWA requires that a qualified public employee be placed in charge of each contract or project and monitor compliance with the terms, conditions, and specifications of the contract (*5*, pp. 10–11). The public employee must:

- be involved in decisions leading to change orders or supplemental agreements;
- be familiar with the qualifications and performance of the consultant's staff;
- monitor the relationship between costs billed and contract progress;
- be aware of the day-to-day operations on the project;
- visit the project on a frequency commensurate with the magnitude and complexity of the work; and
- prepare a final performance evaluation report that includes, among other items, evaluations of timely completion, budget conformance, and quality of work.

The consultant project engineers typically act for the state in administering construction projects in much the same way as in-house project engineers. They deal directly with contractor supervisors in inspecting the work, interpreting the plans and specifications, testing materials, and enforcing contract provisions. Review and approval of items such as progress payments, change orders, significant changes in quantities and claims, time extensions, and final payments on consultant-supervised projects is the responsibility of the designated agency liaison officer, depending on which of these items the agency assigns to the consultants.

When consultant personnel are assigned to assist state project engineers, consultant technicians perform work assigned in the same way as that done by in-house technicians under the project engineer's supervision.

Liaison with the Agency

As stated above, the FHWA requires that a public employee be in charge of any federal-aid project. Consultant CEI personnel must work through the individual assigned to provide the liaison in dealings with the agency.

Four different methods for chain of command and reporting relationships were identified. They are:

- through normal agency channels;
- directly to head office;
- to the district; and
- through a general consultant.

In the first method, the CEI consultant reports to an agency liaison officer, who in turn reports through normal agency channels to the district and central office. This method is the most common, being used by 25 of the 28 states reporting. Typical

titles for liaison officers are resident engineer, area engineer, project engineer, project administrator, project manager, or inspector-in-charge. The liaison officer may have several projects to administer or, if it is a large project, only one. When more than one project is assigned, the projects may be supervised by either consultant or in-house personnel, or both.

In one state, CEI consultants report directly to the head of the construction function in central office. This method is used only for very large projects. In two states, the districts administer the CEI consultant contracts directly and treat consultant project engineers as extensions of the state staff.

In the last method, a general engineering consultant is employed to supervise the CEI consultants. The general consultant reports to the liaison officer, who then reports upward through normal agency channels. This method was found only on major undertakings involving many large projects in close proximity where the agency did not have sufficient personnel available or the expertise needed to provide the desired level of supervision. An agency employee must be in charge of the general engineering consultant and monitor the work of all consultants.

Accountability for Errors

The agency is responsible for errors or mistakes when an agency project engineer or chief inspector is in charge of the work, even though some of the employees are furnished by consultants. Nearly all agencies hold the consultant responsible on other types of assigned CEI projects.

Of the 25 agencies that responded to this question, 20 hold the consultant responsible for errors made by consultant personnel, and the agency accepts the responsibility in the remaining 5 states.

ADMINISTRATION AND MONITORING

Staffing During Construction

Actual levels of staffing during construction are subject to agency approval at all times. Consultants are expected to increase or decrease staffing in response to the actual work under way and the need for services. The agency is the final authority as to the correct staffing.

Agencies reported little difficulty in removing unacceptable engineers or technicians from consultant supervised CEI projects. Contracts typically specify that all personnel assigned must be approved by the agency. The agency has only to ask for replacement of any unsatisfactory employees and the consultant has no choice but to replace them. At least one agency maintains a computerized performance record of consultant employees to aid in approval of proposed staffing and to prevent reassigning an incompetent employee to another project. Several agencies reported that it is much easier to remove a consultant employee than an agency employee for incompetence or malfeasance.

Billing and Payment for Services

Progress payments are typically paid monthly for any of the methods of payment. Consultants are required to submit documentation—time sheets, expense reports, and the like—supporting monthly invoices for progress payments.

Another method for making progress payments is the payment of set amounts or percentages of the total cost at the completion of stages or phases of the work. The amounts or percentages are determined during negotiations. Only one state reported using this method.

A third method was identified on lump-sum CEI contracts in New Mexico. Consultant progress payments are prorated in the same ratio as the contractor's earnings—the percentage is based on the contractor's earnings to date versus the total bid price of the project. Tying the consultant's payments to the contractor's earnings could encourage a consultant to overstate the quantities completed.

The use of retainage on CEI consultant contracts was not included on the questionnaire. However, two states reported retainage requirements of 5 percent on CEI contracts. Florida reported 3 percent retainage on salary-related and fixed-fee earnings but no retainage on expense-related, premium overtime, and other cost portions. Undoubtedly, some other agencies also have retainage requirements.

Continuing Performance Evaluation

Nearly all agencies reported that the agency project manager has the continuing responsibility for reviewing and monitoring the work of consultant personnel; reviewing and approving such items as progress payments for the contractor and the consultant and change orders prepared by the consultant; auditing and authorizing final estimate payments; interpreting plans and specifications in the event of a conflict; and making decisions involving additional work or plan revisions.

This excerpt from a typical Kentucky DOT consultant agreement expresses the practice for most agencies: "All work under this agreement shall at all times be subject to the general supervision and direction of the Engineer and shall be subject to his review and approval." The "Engineer" refers to the agency project manager.

In Florida, the project manager makes daily reviews of the consultant and construction in progress to ensure work is performed in compliance with plans and specifications.

Alaska requires a close-out performance evaluation following the completion of each agreement. Interim evaluations are required monthly when any significant problems exist. Consultants are given an opportunity to rebut negative evaluations.

The number of contracts assigned to an agency project manager varies from 1 to 10 or so, depending on the size and complexity of the projects, agency work load, and available staff. Typically, only one major, complex project is assigned, but several other types of projects may be under the general supervision of one project manager.

The quality of the CEI services performed by consulting firms depends almost entirely on the capabilities of individual consultant employees. This is especially true of the consultant's resident engineer. Essentially all agencies continually monitor the performance of these individuals and, where performance is not satisfactory, have them removed. Generally, records are maintained to prevent an individual with an unsatisfactory performance record being assigned to another agency project.

Close-out Evaluations

Three types of evaluations performed at the end of the contract were identified: a check to ensure that all contract requirements have been completed, an audit of consultant costs, and a performance evaluation.

Agencies perform a check to ensure that all contract requirements have been fulfilled—as is normally performed on projects staffed by agency personnel. These include such items as materials tests and certifications reviews, as-built plans, documentation submittals, and final quantity calculations.

Depending on the type of agreement, most agencies conduct a post-contract audit to check the consultant's billings and additive rates—overhead and fringe benefits. Post-contract audits of additive rates are needed only when agreements provide for adjustments to actual rates experienced during the time of the contract.

The third evaluation covers consultant performance. South Dakota requires a formal evaluation of the consultant upon completion of each contract. The evaluation criteria include seven items with varying point values, as shown in Table 5.

TABLE 5

CLOSE-OUT EVALUATION CRITERIA—SOUTH DAKOTA DOT

Evaluation Criteria	Performance Range
1. Demonstration of knowledge of South Dakota DOT administration and procedures. Consider demonstrated familiarity with and administration of South Dakota standard specifications, contract provisions, specifications, contract provisions, inspection procedures, testing procedures, etc.	1 to 10
2. Ability to meet contract requirements with minimum direction. Consider whether the consultant was a self-starter and whether the South Dakota DOT designee had to spend considerable time instructing and correcting the consultant.	1 to 10
3. Adequate staff assigned to project.	1 to 10
4. Competent staff assigned to project.	1 to 15
5. General spirit of cooperation.	1 to 5
6. Quality of work. Consider the legibility, neatness, organization, format, errors, documentation, and other items pertaining to the quality of work and/or inspection.	1 to 25
7. Completion of work within the terms of the contract. Consider whether the comnsultant completed the work on or before the contract completion date; whether intermediate deadlines were met; and if the work was ready for the appropriate inspections.	1 to 25

CHAPTER THREE

CONSULTANT CEI VERSUS IN-HOUSE

The advantages and disadvantages of the use of consultants for construction engineering and inspection are discussed first in this chapter. Comparisons of cost for CEI services by consultants and in-house personnel then follow.

ADVANTAGES AND DISADVANTAGES

The advantages and disadvantages of consultants' performing CEI work compared with agency performance is discussed from three points of view—agencies, consultants, and contractors. As might be expected, there is no consensus about these advantages and disadvantages. The advantages and disadvantages listed were derived from responses to the questionnaire and interviews; some are contradictory, depending on the experience and point of view of those responding. However, each of the three groups listed many of the same advantages and disadvantages.

Agency Opinions

In general, most agency personnel are more comfortable when in-house personnel provide construction engineering and inspection rather than consultants. Those from agencies that have made more use of consultants for this function over the years tend to have fewer apprehensions.

Advantages

The advantages reported by agencies are tabulated in Table 6.

The major advantage of using consultants for CEI cited by agencies is that it allows them to better handle peak work loads without adding staff that would have to be laid off when the work load was reduced. The agencies can terminate consultant agreements more easily than they can lay off in-house employees. Most transportation agencies currently have limitations on the total number of personnel they can employ. This eliminates the option of increasing in-house staff to meet the increased work load. The use of consultants to supplement in-house staffing is necessary to ensure adequate inspection.

Another major advantage is the ability to obtain the services of experts, particularly for unusual projects undertaken infrequently. Large or unique bridge projects and tunnel construction are two such project types. Agencies may construct too few of these types of projects to maintain in-house expertise.

Consultants can be assigned projects that are difficult to staff with agency personnel. Projects may be difficult to staff because of the high cost of living in the project area, insufficient qualified local personnel available, unattractive state policies for short-term transfers, and the need for agency personnel at their current locations.

One agency reported that state procurement policies were too restrictive. Including equipment and office space in consultant agreements eased the problem.

Disadvantages

The disadvantages of using CEI consultants from the agencies' point of view are presented in Table 7. The disadvantage most

TABLE 6

ADVANTAGES OF USING CEI CONSULTANTS CITED BY AGENCIES

Advantage	Number of Agencies*
Improves ability to handle peak work loads	15
Makes it easier to control in-house staff size	12
Provides flexibility to add or reduce staff more quickly	9
Provides special expertise not available in-house	7
Makes it easier to staff difficult projects	2
Makes it easier to obtain equipment, offices, etc.	1
Is more competitive	1
Is in keeping with state's goal of increasing privatization	1

*Several agencies cited more than one advantage.

TABLE 7

DISADVANTAGES OF USING CEI CONSULTANTS CITED BY AGENCIES

Disadvantage	Number of Agencies
Costs are higher	11
Familiarity with procedures is lacking	9
Monitoring requires a duplication of effort/increased paperwork	8
Consultant forces may be poorly qualified	7
Training opportunities for in-house employees are lost	5
Training of consultant personnel must be continual	5
Salary disparities cause in-house morale problems	3
Control and responsiveness are lost	2
Consultants recruit agency employees	1
Consultants are more concerned with protecting themselves than the agency	1

frequently cited is that costs are higher. This is discussed in more detail later in this chapter.

Many agencies reported that consultant personnel are not familiar with agency methods, procedures, and requirements. This is especially true for consulting firms on first assignments for the agency. Consultant personnel must work on several projects for an agency before they fully understand agency requirements and procedures. In the interim, the quality of the inspection work may suffer. Although consultants usually have very competent engineers, their technicians are often untrained and inexperienced. Consultant personnel may be assigned to different types of work outside the highway construction field each season, which requires them to go through the learning curve repeatedly and makes it difficult for them to stay current.

The use of consultants for CEI adds an extra level of management in administering projects.

Agencies need qualified personnel to administer CEI contracts. The use of consultants reduces the opportunities for agency personnel to gain experience in construction engineering and inspection.

The salaries paid by consultants are typically higher than agency rates. These differences were reported to cause in-house morale problems when CEI consultants were used. Connecticut compared typical consultant salaries with DOT rates for selected positions (*11*, p. 9). The comparison is shown in Table 8.

The net effect on the cost to the project would depend on the number of persons assigned in each position.

One agency reported that consultants recruited agency personnel. Many agencies include clauses in CEI agreements that prohibit hiring currently employed agency personnel without written permission.

Consultant Opinions

Advantages

Consultants saw many of the same advantages that the agencies listed.

Consultants can provide access to trained engineers and technicians to meet the needs of a variable work load.

Consultants can staff up more easily to provide manpower for peak work loads. They have more flexibility in recruiting employees and in salary schedules. Consultants can also reduce staff more easily during slack periods and they generally operate with fewer personnel, resulting in leaner staffing.

The consultants interviewed believe that they staff with better-qualified inspectors and technicians and that their personnel are more ambitious.

TABLE 8

HOURLY RATE COMPARISON

	Consultant versus Connecticut DOT 1986		
Position	Consultant Max.	DOT	Consultant vs. DOT Percent
Project Manager	$ 32.69	$ 21.17	154
Resident Engineer	26.08	18.74	139
Chief Inspector	21.00	17.63	119
Office Engineer	17.25	16.01	108
Senior Inspector	18.50	16.01	116
Survey Party Chief	19.47	16.01	122
Inspector I	12.00	10.43	115
Secretary	12.00	10.20	118

Disadvantages

Consultants agree that their engineers and technicians may have difficulty understanding the agency's system and procedures. Actual procedures do not always conform with construction specifications and procedures manuals.

There is a lack of continuity when contracts are not renewed with the same consultant, especially when consultant personnel supplement in-house crews rather than having project responsibility from start to finish.

Agencies may make excessive checks or require excessive documentation when CEI work is not performed by in-house employees.

The cost of administering consultant contracts must be added to the consultant's costs, which increases the total construction engineering costs.

Contractor Opinions

Contractors' opinions varied. Some thought consultant personnel were better qualified than agency employees, although others held the opposite view.

Advantages

The contractors did not see as many advantages as either the agency or consultant representatives did.

Most of the contractors interviewed thought that consultant personnel they had dealt with were better educated, more professional, more career oriented, and more ambitious than agency employees were. Consultant personnel are concerned about getting the job done. State inspectors are too secure in their jobs. They are not concerned with expediting the work or delaying the contractor.

Generally, consultant performance is superior to in-house—free enterprise versus bureaucracy. Consultants have to be competitive, so they try harder. In-house construction inspection personnel vary from poor to very good. Consultants have been uniformly good.

TABLE 9

CONSTRUCTION ENGINEERING COST COMPARISONS

	Percentage of Construction Costs		
State	In-house Costs	Consultant Costs	Project Type and Remarks
Colorado	12.5	13*	
Delaware	7.3	9.4	Roadway
	10.2	7.7	Bridge
	10.4	7.5	Other
Florida	20	22	Up to $200,000
	18	20	$200,000 to $500,000
	14	15	$500,000 to $2,000,000
	10	11	Over $2,000,000
Illinois	5	9	All types
Kansas	7.5	10.2*	All types
Kentucky	7	11	Grade, drain, surfacing including bridges
Mississippi	8	13	Major bridges
Nebraska	9	14 to 19	Roads and bridges. Consultant costs include 4 % administrative costs.
New Jersey	12.9	14.6	Structure reconstruction
	16.8	14.0	Grading and paving
	15.4	22.0	Grading and paving with structures
	16.9	22.1	Intersection improvement
	9.4	12.0	Resurfacing (N.J. consultant cost data since 1985.)
South Carolina	7 to 12	10 to 15	Bridge
Tennessee	2 to 20	17	Consultants on large, complex projects, Department staff on all types.
Wisconsin	8.6	11.7	Roads and bridges. (1982 to 1986 data.)
Wyoming	12 to 15*	12 to 22*	Urban

*Does not include administrative costs.

Disadvantages

Most contractors prefer to have projects administered directly by the agency. Some of their reasons are listed below.

Consultants may not have the same authority that a state engineer would have. Consequently, it is more difficult to get field engineers for consultants to make decisions. They lack authority so they go by the "book"—follow the specifications to the letter. Consultants become middlemen between the contractors and the owners. There are more change orders. And it takes longer to get change orders prepared by consultants approved by the agency than those prepared in-house, although neither is quick enough.

Consultants cannot make decisions on items not completely covered by plans or specifications and therefore add another level in the chain of command and increase the time required for decisions.

Consultants have been harder to work with than agency employees. They bend over backwards to be tough to avoid any criticism from the state. Some consultants act as "hired guns"; they act as though they thought it necessary to have an adversarial relationship with the contractor.

Consultants lack knowledge of the interpretation of specifications. State employees may interpret them differently than a strict reading might imply. If a consultant questions them to determine actual practice, the state tends to be more strict than it typically is on its own projects. Consultant personnel have far less experience than state personnel.

Consultants use a minimum-sized staff and consequently slow down the contractor's operation.

CONSTRUCTION ENGINEERING COSTS—CONSULTANT VERSUS IN-HOUSE

It is generally perceived that construction engineering costs are higher if CEI is performed by consultants rather than by agency personnel. Construction engineering cost data were provided by 13 agencies in response to the questionnaires. These data, expressed as percentages of construction costs, are tabulated in Table 9. Except for some project types in Delaware and New Jersey, all of the data indicate that consultant CEI costs more than in-house. Agency administrative costs typically add one to two percentage points to the consultant costs. One state reported administration costs of 4 percent of construction costs, which increases the total CEI costs by 20 to 40 percent.

In many states the types of projects assigned to consultants are not the same as for in-house personnel. Valid comparisons between CEI costs cannot be made if the project types are dissimilar.

Connecticut made a comparison based on the estimated number of hours required for CEI work on a sample project. Using the same number of man-hours as a base, a cost estimate was prepared for performing the work by both consultants and DOT personnel. The comparison in Table 10 shows the estimate for consultant staffing to be 34 percent higher than for in-house staffing.

Valid comparisons of engineering costs between agencies are possible only if a study is made to determine which costs are included. Construction staking may be performed by the contractor, the consultant, or the agency, or partially by each. The responsibility for quality control also varies from state to state.

TABLE 10

CONSULTANT INSPECTION COSTS VERSUS DOT INSPECTION COSTS (CONNECTICUT)[a]

	Consultant			DOT		Consult.
Cost Item	Estimated Man-Hours	Hourly Rate	Cost	Hourly Rate	Cost	vs. DOT Percent
Resident Engineer	2,776	$22.95	$ 63,700	$17.62	$ 48,900	130
Senior Inspector	1,144	16.87	19,300	16.00	18,300	105
Inspector	3,688	13.45	49,600	13.37	49,300	101
Office Engineer	2,776	13.44	37,300	13.36	37,100	101
Secretary	1,388	8.72	12,100	4.32	6,000	202
Total Direct Labor			$182,000		$159,600	114
Burden/Fringe/Overhead			153,900		123,690	124
Subtotal - Labor & Overhead			$335,900		$283,290	119
Profit			33,590		0	
			$369,490		$283,290	130
Principal			8,400		0	
Direct Costs			19,100		13,100	146
			$396,990		$296,390	134

[a] $5 million bridge rehabilitation project (no overtime)

CHAPTER FOUR

CONCLUSIONS AND RECOMMENDATIONS

USE OF CONSULTANTS

Because of staffing limitations imposed on state agencies and the current popularity of privatization with state legislatures, agencies have little choice but to continue to use consultants for construction engineering and inspection. As in-house forces are reduced, a feasible way to provide the number of personnel needed for CEI services is through the use of consultants. Many of the current problems cited concerning consultant performance of CEI services—lack of knowledge of agency practices, slower decisions, the "middleman" perception, and the like—should be worked out as agencies, consultants, and contractors become more accustomed to consultant CEI.

Recommendation: Agencies need to utilize all of the available options—permanent staff, seasonal employees, overtime, and contractor-furnished services, such as staking or process quality control—to effectively manage their construction programs. The use of consultants for CEI is one more management option to provide adequate staffing for construction projects.

The process for engaging consultants for CEI takes several months in most agencies. It is essential that the need for consultants be identified early in the scheduling of projects. Consultant selection must be coordinated so that the notice to proceed corresponds with the contract letting. And, more important, planning must be accurate enough to prevent having agency employees underutilized because consultants were assigned projects that could have been staffed in-house.

Recommendation: Agencies should utilize staffing guidelines and construction engineering manpower management systems to assess staffing needs for determination of the need for outside assistance.

The staffing guidelines can also be used to determine the level of effort needed in each skill level to properly staff projects. States such as Florida and New Jersey have found that specifying the level of effort provides a more uniform basis for evaluating consultant submittals and discourages underestimating staffing to obtain a contract with the expectation of submitting claims to recover actual costs.

Recommendation: Agencies should determine the level of effort for consultant CEI projects and include that information in the requests for proposals. Consultants can be permitted to propose alternative staffing with adequate justification. Consultants should be responsible for actual staffing during construction, subject to agency approval.

The scope of services can be varied to suit the needs on each project. When agency staff is available to provide a portion of the CEI requirements on a project, the scope of services should be adjusted accordingly to take best advantage of agency and consultant personnel.

Recommendation: Agencies should maintain flexibility in specifying consultant CEI services to make the best use of resources, both public and private.

There is a concern that if privatization is carried to its extreme, agencies will not have experienced personnel to administer consultant CEI contracts. An effective way for engineers and technicians to gain the necessary experience is on the job—performing construction engineering and inspection, learning the problems and solutions first hand, and making the day-to-day decisions required to keep a project moving.

Recommendation: Agencies should retain sufficient CEI work in-house (normally the low point of projected work loads) to provide training opportunities to maintain a trained work force capable of adequately administering consultant CEI contracts.

If the limitations on increasing agency staffs for construction engineering and inspection continue, as it appears they will, more agencies will have to consider the use of consultants to perform this function. A number of states have now had considerable experience in scoping projects, selecting consultants, negotiating agreements, and administering CEI contracts.

States such as Arizona, Connecticut, Florida, New Jersey, New York, and Pennsylvania have considerable experience in administering consultant CEI contracts on a wide range of projects and are good sources of information for states with less experience.

Recommendation: Agencies contemplating increasing the use of consultants for CEI should take advantage of the experience of states that have been making extensive use of CEI consultants. Visits or other contacts should be made to learn the best methods and procedures to use and the pitfalls to avoid.

Many state and local agencies require consultants to submit their qualifications on federal forms 254 and 255. Other agencies use forms quite similar to these forms but with enough changes that extra effort is required to complete them. Because most consultants propose on work for various jurisdictions within their geographical areas, the use of these standards forms would greatly facilitate consultant responses to agency requests for qualifications.

Recommendation: Agencies should request consultant qualifications on federal forms 254 and 255 to reduce the level of effort for consultants responding to requests for qualifications. If additional information is required, it can be attached to the standard forms.

PERSONNEL QUALIFICATIONS

Agencies, as they gain experience with consultant CEI, typically state the required qualifications for consultant personnel in the requests for proposals to ensure that qualified personnel are proposed. The trend is toward specifying better-qualified personnel. Although the capabilities of all assigned personnel are important, the qualifications of the project engineer and the chief inspector are the most critical.

Recommendation: Agencies should specify minimum requirements for both engineers and technicians in the requests for proposals, to ensure that consultants understand the qualifications expected and to make evaluation of proposals easier.

Recommendation: Agencies should require consultants to submit résumés for all key personnel to be assigned to a project. Any substitutions of key personnel should require agency approval.

Generally, agencies use the same or similar requirements for consultant personnel that they use for their own forces. As a rule, consultants are responding to the agencies' requirements rather than taking the lead in personnel qualifications.

Recommendation: CEI consultants should require, or at least encourage, their technicians to become certified in an appropriate certification program. At this time, the NICET program meets the need in highway construction engineering and inspection better than other identified programs do. This program provides for technician career development with recognition for increased levels of expertise. It is nationally recognized in the highway and transportation industry. Certification at a particular level gives agencies and consultants a reasonable guide to an individual's capabilities and qualifications.

The length of time required for selection of consultants must be considered in establishing policies on substitutions. If an agency takes 8 to 10 months to select a consultant for a particular project, it is unreasonable to expect the candidate firms to be able to hold personnel available for such a long period of time.

TRAINING

A consensus on the specific training needs for consultant CEI personnel could not be established in this study. The opinions varied considerably. In general, the training needs covered all aspects of construction inspection but were not the same for all consultants. Training in documentation procedures was identified as the most urgent training need for most consultant personnel.

Consultants rely primarily on on-the-job training for construction inspectors. Although there are currently trained, experienced inspectors in the job market, more training is essential to ensure an adequate number of qualified technicians in the future—especially if the use of consultants for CEI expands.

Many agencies developed formal training programs to help their personnel become qualified. There is a continuing need for training—to train new employees in the basic techniques, to enhance skills, to achieve versatility, and to provide refresher training. When there is space available, the agencies typically allow consultant personnel to attend their training sessions. Frequently, these sessions are conducted in the off-season and consultant personnel are not available to attend.

An alternative method is for agencies to provide the training. The cost of conducting the training could be borne by the agency or charged to the consultants whose employees receive the training. In either case, salaries and expenses for trainees should be at the consulting firms' expense.

Recommendation: Consultants should take the responsibility for ensuring that their employees are trained rather than leaving it up to the employees or the agencies.

Written policies and procedures to supplement the standard specifications are needed by agency personnel to guide them in uniformly administering construction projects and interpreting specifications. Many of these individuals have been with agencies for a long time and have learned the policies and procedures even when they have not been put in writing. Consultants generally lack such long-term experience with agency policies and procedures, so it is essential that they be provided with clear, concise, written procedures if they are to act on behalf of the agency as they should.

Recommendation: Agencies that do not already have written policies and procedures should prepare them to guide both in-house and consultant personnel in administering construction projects.

ADMINISTRATION OF CEI CONTRACTS

The effective administration of consultant CEI contracts requires that the agency representative make frequent visits to the job site. The desired frequency of visits, of course, will vary with the complexity of the work and the progress of the contractor. It is impractical in all but the smallest states to administer consultant CEI contracts from agency headquarters. It is too difficult to make timely visits to the project to ensure adequate inspection.

Recommendation: A field construction engineer—full- or part-time, depending on project complexity and proximity of other projects—who can closely monitor the work should be assigned as liaison between the agency and the consultant.

Adequate inspection and documentation are essential to ensure that contractors complete their work in conformance with the plans and specifications. The performance of consultant firms and their employees must be monitored to ensure that they are enforcing contract requirements. Monitoring should be a continuing effort. Consultants should be informed of the results of the reviews so they can take corrective action if it is needed. Consultant employees who perform unsatisfactorily should be

removed from the project. Performance evaluations should be considered in future consultant selections.

Recommendation: Agencies should establish performance-evaluation procedures for use in monitoring consultant performance on an ongoing basis to ensure that the services performed are satisfactory and, at project completion, for use in future selections.

The use of consultant personnel to fill out in-house project staffs has several disadvantages not found when the consultant has responsibility for the entire project. There is a lack of continuity of inspectors when construction projects carry over beyond the time limit for the consultant agreement. Nearly all professionals take pride in a job well done. When consultant personnel do not see a project through to completion, it is difficult for them to see it as "their" project, to feel a sense of ownership in the finished project.

This method does, however, provide agencies another option for supplementing in-house staff to ensure adequate inspection coverage.

Recommendation: When feasible, entire projects should be assigned to consultants to better define responsibilities and improve job satisfaction.

Several states are retaining construction management consultants to administer CEI consultant contracts for selected major highway improvements that each involve a number of major projects. The construction management consultants must work under the supervision of an agency employee. This arrangement adds another level of management to the process.

Recommendation: A research project should be undertaken to evaluate the effectiveness of using construction management consultants for administering CEI consultant contracts.

When consultants perform the materials testing on construction projects, their testing equipment must be accurately calibrated and their testing personnel must conduct the tests in conformance with standard methods to ensure validity of the test results.

Recommendation: Agencies should check the calibration of consultant test equipment and monitor testing procedures to ensure test accuracy.

METHODS OF PAYMENT

The CEI portion of construction projects should be properly staffed throughout the projects to ensure quality construction without excessive costs for unnecessary personnel whether they are staffed by agency or consultant personnel. The method of payment selected for consultant agreements should encourage appropriate staffing. For example, lump-sum payments should be used only for contracts in which the work can be very well defined. There are usually too many uncertainties in performing CEI services—weather conditions, contractor capability, traffic conditions, and the like—to define the work adequately to effectively use the lump-sum method of payment. Lump-sum contracts could encourage consultants to understaff the work as well.

A better method for CEI services is the payment of actual costs plus fixed fee. Usually agencies that use this method pay for direct salaries; plus an allowance for company burden, fringe benefits, and overhead; plus direct expenses; plus an allowance for fee or profit. Usually a maximum total cost is specified in the agreement to discourage overstaffing. Typically the allowance for the fee is fixed and does not change unless the scope of work is increased.

Recommendation: Agencies should use methods of payments that encourage proper staffing—neither understaffing nor overstaffing. The cost-plus-fixed-fee method is the best method in most cases.

COST COMPARISONS

Few agencies can currently make accurate, realistic comparisons of total CEI costs between projects staffed with in-house and consultant personnel. The accounting systems do not generally include all of the in-house costs for either in-house performance of the work or for administration of consultant contracts.

Although obvious construction engineering costs on individual projects can be identified, procedures typically do not provide for including all appropriate costs needed to make valid comparisons on an ongoing basis or to assess the overall cost impact of using consultants for CEI.

Cost data must be compiled so that valid comparisons of similar types of projects can be made.

Recommendation: Agency accounting systems should be modified to afford managers the ability to determine the true cost of construction engineering, whether it is performed by agency personnel or consultants. Only then can true cost comparisons be made.

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QUESTIONNAIRE

Agency_____

Questionnaire completed by:_____

Position_____

Date____/____/87. Telephone No._____(In case of questions)

1. Do you use consultants for construction engineering and inspection (CEI)?

   Yes_____No_____ If yes, please answer the following questions.

2. What is your annual construction program?

   Dollar volume? $_____

   Number of contracts? _____

3. What percent of your construction program is administered by consultants?

   Dollar volume? _____%

   Number of contracts? _____%

4. What is the projected use of consultants for the next three years?

   Increase _____
   Decrease _____
   No change _____

5. How do you select projects to be administered by consultants?

6. How are CEI projects advertised?

7. Do you prequalify CEI consultants? Yes_____No_____If yes, describe the procedure or enclose a copy.

8. What criteria are used for selection of CEI consultants?

9. Do criteria favor local firms? Yes____No____Explain

10. What are the procedures for selecting consultants?

11. Are there DBE/WBE requirements for consultant CEI projects? Yes____No____

    If yes, what are typical requirements?

12. Are value engineering proposals by consultants considered in making selections? Yes____No____Comments

13. What guidelines are provided to define the work to be performed by the consultant?

14. Do you require professional liability insurance?

    Yes____No____

    If yes, what is the amount of coverage required?
    $_____

    Is it the same for all projects?

15. Who sets staffing level for proposed projects?

    Agency____Consultant____Comments

16. What methods of payment are used?

17. What services are consultants expected to perform?

    Showing the project to prospective bidders? Yes____No____

    Staking or checking of contractor staking? Yes____No____

    Conducting or attending the preconstruction conference? Yes____No____

    Materials testing? Yes____No____

    Inspection? Yes____No____

    Documentation? Yes____No____

    Progress payments? Yes____No____

    Computation of final quantities and payments? Yes____No____

    Preparing change orders? Yes____No____

    Processing claims? Yes____No____

    Other? Describe

    Comments

18. Are any CEI tasks excluded from consultant services and performed by agency? Yes____No____If yes, which ones?

    Reasons for exclusions?

19. What are the minimum qualification requirements for the consultant person

in charge of a project?

Professional engineer? Yes____No____

Graduate engineer? Yes____No____

Other requirements? (Experience, training, etc.)

What are the minimum qualification requirements for an agency employee in charge of a project?

Professional engineer? Yes____No____

Graduate engineer? Yes____No____

Other requirements? (Experience, training, etc.)

20. What are the qualification requirements for each level of CEI consultant technicians?

Experience_____

Training_____

Is certification required? Yes____No____

If yes, who certifies? Agency____NICET____Other____

If certification is by agency or other, please describe.

Are requirements different for technicians assigned to surveying, testing, inspecting or office work? Yes____No____If yes, please describe.

What are the qualification requirements for each level of agency construction technician?

Experience_____

Training_____

Is certification required? Yes____No____

If yes, who certifies? Agency____NICET____Other____

If certification is by agency or other, please describe.

Are requirements different for technicians assigned to surveying, testing, inspecting or office work? Yes____No____If yes, please describe.

21. Are any agency training courses or material available to consultant personnel? Yes____No____ If yes, please describe.

22. What support--office space, computer programs, testing equipment, survey equipment, etc.--is provided to consultants?

23. Why do you use consultants for CEI?

24. What are the advantages to the agency by using CEI consultants?

25. What are the disadvantages?

26. What construction engineering costs are you experiencing (as a percent of construction costs) for:

Type of construction	In-house	Consultant
_____	_____%	_____%
_____	_____%	_____%
_____	_____%	_____%
_____	_____%	_____%
_____	_____%	_____%

Are costs of in-house administration included in the percentage for consultants? Yes____No____ If not, what percentage do these costs represent? _____%

27. Who administers CEI consultant contracts?

What are the lines of authority, chain of command, and reporting relationships?

What control does the agency excercise over the work?

Who is responsible for errors? Consultant_____Agency_____

INTERVIEW GUIDE--CONSULTANTS

Name of Person(s) Interviewed_____

Position_____

Firm_____

Date_____/_____/86. Telephone_____Visit_____Conducted by_____

1. Which states have you provided Construction Engineering and Inspection (CEI) services?

2. Which other agencies?

3. What percent of your current work is CEI services?

4. How do you determine staffing needs for projects you propose to undertake?

5. Are your construction engineers registered professional engineers?

6. What percent of your technicians are NICET certified?
   By level Tech IV
   Tech III
   Tech II
   Tech I

   Are you aware of any other certification programs?

   In which do you participate?

   Is your lab certified? AMRL____CCRL____Other____

7. How do you recruit engineers and technicians?

8. Is there a problem in hiring skilled personnel in sufficient numbers?

9. What training programs do you have?

10. Are plans, specifications and standards adequate?

11. What are the advantages of consultant CEI?

12. The disadvantages?

13. What do CEI costs typically run (as a % of construction costs)?
    Project size (define by construction cost)

    Small

    Medium

    Large

14. What are your firm's current professional & technical affiliations?

    TRB_____
    ASCE____
    ASTM____
    ACI_____
    AWS_____

INTERVIEW GUIDE--CONTRACTORS

Name of Person(s) Interviewed_____

Position_____

Firm_____

Date_____/_____/86. Telephone_____Visit_____Conducted by_____

1. Which states do you normally bid?

2. Have you completed highway construction projects administered by consultants?

3. In your experience, what are the pros and cons of consultant CEI vs in-house CEI?

   Advantages?

   Disadvantages?

4. What is your annual workload in dollars?

5. What percent of that work was handled by consultants?

6. Have your ever employed consultants for construction control--staking or testing?

   Your basis for selection?

   Basis for payment?

   Your experience?

APPENDIX B

STATES IN FHWA REGIONS

Region 1

Connecticut
Maine
Massachusetts
New Hampshire
New Jersey
New York
Rhode Island
Vermont
Puerto Rico

Region 3

Delaware
District of Columbia
Maryland
Pennsylvania
Virginia
West Virginia

Region 4

Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

Region 5

Illinois
Indiana
Michigan
Minnesota
Ohio
Wisconsin

Region 6

Arkansas
Louisiana
New Mexico
Oklahoma
Texas

Region 7

Iowa
Kansas
Missouri
Nebraska

Region 8

Colorado
Montana
North Dakota
South Dakota
Utah
Wyoming

Region 9

Arizona
California
Hawaii
Nevada

Region 10

Alaska
Idaho
Oregon
Washington

APPENDIX C

EXAMPLE SCOPE STATEMENTS

1. Typical Arizona DOT Scope Statement
2. Excerpts from New Jersey DOT Standard Consultant Agreement
3. Special Construction Provisions—Kansas DOT

TYPICAL ARIZONA DOT SCOPE STATEMENT
SCOPE OF WORK CONTRACT NO. 87-18
STATE ROUTE 64, TUSAYAN

GENERAL

The CONSULTANT will serve as an extension of the ADOT staff to administer the construction contract in accordance with ADOT's plans, specifications, standards, and manuals.

The CONSULTANT will handle all construction administration; he shall furnish survey crews, inspectors, materials testing laboratory equipment and staff, Resident Engineer, office clerical staff, vehicles and all equipment and supplies, as required to provide the service outlined herein.

The CONSULTANT will handle all contacts with property owners and businessmen, regarding project questions and problems.

The State will assign a State-employed Engineer-in-Charge, hereinafter called the ENGINEER, to the project covered by this Agreement. The ENGINEER will be the State's official representative on the project.

The CONSULTANT shall be the only authorized contact with the CONTRACTOR during construction. ADOT shall send all information and requests for the CONTRACTOR to the CONSULTANT for relay to the CONTRACTOR.

The CONSULTANT will be responsible for arranging a preconstruction conference, notifying all the parties involved, requiring all the proper documents as detailed in Section 108 of the Construction Manual, and leading the preconstruction conference after award of contract.

The CONSULTANT providing construction administration services and the CONTRACTOR performing project construction, for the same construction project, cannot have the same parent company or any corporate association.

STAFFING

The CONSULTANT'S personnel assigned to the project must have prior construction experience in the areas of work which they are to perform. Key personnel, as defined below and as identified in the technical proposal, shall not be replaced on the project without State approval. The CONSULTANT shall maintain a good working relationship with the CONTRACTOR and any person employed by the CONSULTANT or by any Sub-Consultant who, in the opinion of the ENGINEER, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall at the written request of the ENGINEER be removed immediately by the CONSULTANT or Sub-Consultant employing such person and shall not be employed again in any portion of the work without the approval of the ENGINEER.

The CONSULTANT shall have the necessary personnel available to work whatever schedule the contractor works.

The following positions are defined as "key personnel." The CONSULTANT may identify additional positions as "key" as well:

- Resident Engineer
- Survey Party Chief
- Chief Inspector
- Materials Laboratory Supervisor
- Field Office Supervisor

The Resident Engineer listed above shall be registered in the State of Arizona in Civil Engineering or an approved related field.

The Resident Engineer shall be available to begin work within one week of the execution of this Agreement. He shall also participate in the pre-bid conference, if one is held.

The Survey Party Chief shall be experienced in the layout of major highway projects including structures, and shall supervise all CONSULTANT staking. All survey work shall be performed under the general direction of a Registered Land Surveyor.

The CONSULTANT shall furnish a specialist in construction traffic control, other than the Resident Engineer.

The traffic control specialist assigned to this project shall be thoroughly familiar with the ADOT Traffic Control Manual for Highway Construction and Maintenance. That individual shall be assigned to inspect the work of the CONTRACTOR involving the maintenance and protection of traffic requirements of the CONTRACT, and shall be subject to call 24 hours per day seven days a week. Nighttime and weekend inspection shall be made and documented by this individual in accordance with ADOT requirements. The ENGINEER shall have a phone num-

ber where the CONSULTANT can be reached regarding emergency situations after hours and on weekends and holidays.

The CONSULTANT'S Resident Engineer shall be on the project full time or as otherwise authorized by the ENGINEER. If the project is double-shifted with similar work demands on each shift, then the CONSULTANT shall be required to provide a second Resident Engineer. Inspector's hours shall parallel the CONTRACTOR'S work hours.

The CONSULTANT shall furnish a Materials Laboratory Supervisor in accordance with the requirements of Appendix B [to this scope of work]. The Materials Laboratory Supervisor shall be responsible for all materials testing, documentation, and reporting of test results, including all off-site laboratory testing.

The CONSULTANT shall also furnish a field office supervisor who is experienced in construction documentation and progress reporting.

The CONSULTANT will maintain separate and distinct records and files for each construction project. The CONSULTANT will maintain all necessary inspection diaries, log books, survey staking records, material test reports, and all needed documentation to justify all pay requests; all according to ADOT standards. ADOT standards include but are not limited to: 1986 Construction Manual, ADOT Materials Testing Manual, ADOT Policy and Directives Manual, and other manuals that are referred to in the Project Contract. One set of all pertinent documents will be furnished to the CONSULTANT by the State, and will be returned to the State at the completion of this CONTRACT.

The CONSULTANT shall provide sufficient trained personnel to adequately and competently perform the requirements of this Agreement.

Office and field laboratory supplies and equipment, except as otherwise specified, required to carry on the provisions of the CONTRACT shall be furnished by the CONSULTANT. Required forms will be furnished by the State.

Key personnel, other than the resident engineer, shall be available to begin work a minimum of 30 days prior to the anticipated start-up of construction activity. The ADOT ENGINEER will determine the actual starting dates of these individuals.

CONSULTANT SERVICES

Materials Testing

The CONSULTANT is responsible for all materials testing. He shall accomplish this by either using his own forces and equipment or by subcontracting the work to an outside laboratory. Whether the CONSULTANT provides his own laboratory or subcontracts the work to a Sub-Consultant for materials testing, the laboratory shall meet the requirements of Appendix B [to this scope]. Quality assurance sampling will be performed by the State. Asphaltic concrete mix designs will be approved by the ADOT Central Laboratory in accordance with Section 406-4 through 406-6 of the Supplemental Specifications dated July 1985. Concrete mix designs, which include any admixtures, shall be submitted to the CONSULTANT for review with final approval made by the ENGINEER. The CONSULTANT or Sub-Consultant cannot provide mix design services for the CONTRACTOR.

The CONSULTANT will be responsible for verifying the calibration of the CONTRACTOR'S hot plant to accommodate the approved asphaltic concrete mix design. This calibration will be performed prior to the initial placement of AC and any interruption exceeding two days. Calibration reports will be submitted to the State.

All material test results will be obtained by the CONSULTANT within the requirements established in Appendix A [to this scope].

The CONSULTANT will maintain an up-to-date weekly materials log on all test results in his office. Final record sampling for project acceptance shall be completed by the State. Sampling frequency shall follow the terms of the ADOT Sampling Guide unless otherwise approved by the ENGINEER. The frequency of split samples for correlation testing will be determined by the ENGINEER, but will generally occur at the approximate rate of one in five. The split sample will be delivered to the ENGINEER for testing and evaluation within two days from the date of sampling.

At the end of the project construction, the CONSULTANT shall submit the following signed certification:

This is to certify that:

The results of the tests on acceptance samples indicate that the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in reasonably close conformity with the approved plans and specifications; and such results compare favorably with the results of the independent assurance sampling and testing.

Exceptions to this certification are explained on the back hereof, or on attached sheet.

Surveying

Construction survey will be provided by the CONTRACTOR, as described under Section 925 of the 1985 Supplemental Specifications. The CONSULTANT shall be responsible for survey work identified as work to be performed by the Department, as described under Section 925 of the 1985 Supplemental Specifications. The CONSULTANT'S survey work shall include providing all control points for establishing construction centerlines, structure locations, right-of-way boundaries and project limits. All control points and bench marks shall be set in concrete. In addition, the CONSULTANT will review and approve the CONTRACTOR's written outline of his proposed methods of staking, marking of stakes, grade control for various materials courses, referencing, structure control, and any other procedures and controls necessary for survey completion.

The CONSULTANT shall make inspections and random checks of the CONTRACTOR'S staking and layout work, at important stages of construction, and shall order all improper work to be redone. The CONSULTANT or Sub-Consultant shall not perform survey work for the CONTRACTOR.

The CONSULTANT shall take all measurements and all other pertinent information necessary to compile monthly and final estimates, reports and as-built plans.

Inspection

The CONSULTANT is responsible for inspecting the work of the CONTRACTOR to ensure compliance with the project specifications on all contract items. The CONSULTANT will not be permitted to change inspection personnel without approval of the ENGINEER.

Requests for inspection of prefabricated items or review and approval of shop drawings, will be submitted to the ADOT ENGINEER. The Design Consultant shall review and approve all shop drawings.

Documentation

The CONSULTANT will prepare intermediate and monthly pay estimates (ADOT 12-6405) and submit to the ENGINEER for further processing. These estimates will be prepared in accordance with the instructions outlined in Section 1315.00 of the 1986 Construction Manual.

The CONSULTANT will submit narrative progress reports to the ENGINEER on a weekly and monthly basis. The weekly reports shall be delivered to the ENGINEER by Monday afternoon following the week covered in the report, and they shall contain considerable detail about happenings on the project. The monthly reports shall be delivered to the ENGINEER by the fifth of each month, and they shall consist of a brief recap of the project progress for the previous month.

The CONSULTANT will hold weekly meetings with the CONTRACTOR and ENGINEER during the course of construction, as outlined in the Construction Manual. These meetings shall be tape-recorded by the CONSULTANT, and he shall produce a written summary and submit a copy to the ENGINEER and a copy to the CONTRACTOR.

The CONSULTANT will be required to submit a management schedule each week based on the CONTRACTOR'S schedule. This schedule will show the CONSULTANT'S manpower plan for a two-week period to cover the CONTRACTOR'S operation. A copy of the schedule shall be submitted to the ENGINEER by Friday of each week for approval. The schedule will indicate the type and number of personnel anticipated to cover the CONTRACTOR'S operation for each day of the two-week period. Also, a Staffing Plan shall be prepared in accordance with CEMMS policies and procedures, as outlined in Chapter 2, Section 12 of the CEMMS System Manual, and submitted to the ENGINEER prior to start of work based on the CONTRACTOR'S original construction progress schedule. A copy of ADOT's micro-staffing plan will be provided for the CONSULTANT'S use. The microcomputer staffing plan has been developed by ADOT for use on an IBM microcomputer using MS-DOS operating system, and Lotus 1-2-3 commercial software.

A separate Engineer's Field Office will be provided by the CONTRACTOR for the use of the Department's CONSULTANT Engineer within the limits of the project, as described under Section 926 of the 1985 Supplemental Specifications. Additional office equipment, and other costs not provided for under the Engineer's Field Office bid item, will be paid by the CONSULTANT.

The State will provide copies of approved microcomputer programs for the preparation of progress payment estimates and other construction documentation. These programs have been developed by ADOT for use on an IBM microcomputer using MS-DOS operating system and revelation commercial software. Monthly payroll reports distributing CONSULTANT labor costs to the whole hour by CEMMS function code will be provided to the ENGINEER at the time the CONSULTANT submits his billing. A summary report of man-hours by CEMMS function code will be prepared and submitted to the ENGINEER. The summary report format will be provided by the Department.

The CONSULTANT shall compile and submit, in accordance with the Construction Manual, all reports, monthly and final estimates, records, as-built plans showing all changes from project plans and other pertinent data, photographs of various phases of construction, and all other data that may be required for proper completion of records of the project. A diary describing the progress of the work, specific problems encountered, and all other pertinent information relative to the execution of the project and all records shall be kept in accordance with the Construction Manual.

The CONSULTANT will initiate all CONTRACTOR Change Orders and Force Account Work Requests, including written justification and cost analysis for same. These are to be delivered to the ENGINEER. If approved, the CONSULTANT shall obtain the CONTRACTOR'S signature, and return the forms to the ENGINEER for final execution. The CONSULTANT may initiate a Change Order or Force Account for $5,000.00 or less, with only the approval of the ENGINEER.

The ENGINEER will be available, on request, to assist the CONSULTANT with the preparation of Change Orders, Monthly Estimates, etc. This will be considered an informational service only, to explain the paperwork flow. The CONSULTANT will be expected to follow up in an expeditious manner to avoid any delay. Timely submittals of documentation (i.e. mix design submittal, claim specifications, etc.), correspondence, conduct of meetings, and transmittal of response to the CONTRACTOR required to meet any time constraints of the project will be the responsibility of the CONSULTANT.

At the end of the project construction, the Resident Engineer shall submit a signed certification that all work was done in substantial conformance with the Plans and Specifications and that all payments were made for work performed at bid prices agreed to in the CONTRACT. In addition, a set of as-built plans showing all field changes shall be submitted to ADOT. The as-built plans shall be signed by the Resident Engineer.

The CONSULTANT will submit the final estimate to ADOT within 30 days after the date of acceptance of the PROJECT by the State, in accordance with Section 1316 of the Construction Manual.

EXCERPTS FROM NEW JERSEY DOT STANDARD CONSULTANT AGREEMENT

SCOPE OF WORK **Prepared July 31, 1986**

THIRD, the Consultant agrees to:

A. Provide to the satisfaction of the State, construction engineering and inspection services until the completion and final acceptance of the Construction Contract by the State. These

services by the Consultant shall effect substantial conformance between each item of the Contractor's work and the provisions of the Contract documents. All items of work shall be subjected to detailed engineering and inspection procedures, in accordance with the State's specifications and practices. The State shall provide materials testing and inspection to the degree normally provided for a State-inspected construction project.

B. Check construction for compliance with shop drawings. Take such necessary action as may be required to prevent incorporation of materials and equipment that have not been properly approved and certified. Confirm that all manufacturers' tests required under the Construction Contract specifications have been performed before any material or equipment is incorporated in the work.

Notify the contractor in writing of any and all unacceptable work or material and report promptly to the State's Engineer that the particular work or material fails to conform with the Construction Contract plans or specifications.

C. Become familiar with the plans, specifications, and other related Construction Contract documents and conduct a preconstruction conference with the State, Construction Contractor, and representatives of other relevant departmental units, public or private agencies, and local governing bodies. Detailed minutes shall be prepared by the Consultant and copies distributed to all interested parties and participants.

Conduct a utility preconstruction meeting and act as liaison in subsequent meetings with representatives of the utility and the Contractor.

D. Report to and be directly responsible to a State's Engineer. The State shall assign the State's Engineer responsible for administering consultant contracts to monitor the contract covered by this Agreement. The State's Engineer shall be the State's representative for the contract.

E. Provide a full-time Resident Engineer on the Construction Contract meeting one of the following requirements:

1. Licensed by the New Jersey State Board of Professional Engineers and Land Surveyors, with a minimum of three years full-time job site experience acceptable to the Department as a Resident Engineer responsible for the engineering and inspection of highway and/or bridge construction projects.

2. Ten years of full-time experience, acceptable to the Department, involved in engineering and inspection on highway and/or bridge construction projects, four years of which shall have been spent full time on the job site in the capacity of resident engineer.

3. Certified by National Institute for Certification of Engineering Technologies (NICET) as a Transportation Engineering Technician Highway Construction, Level IV, with a minimum of three years full-time job site experience acceptable to the Department as a resident engineer on highway and/or bridge construction projects.

F. Provide a sufficient number of trained engineering and inspection personnel, as approved by the State's Engineer, to adequately and competently perform the requirements of this agreement. Fifty percent of the technical personnel, other than the resident engineer, assigned to the project must meet one of the following requirements:

1. Be NICET certified as a Transportation Engineering Technician-Highway Construction, Level II or higher, with a minimum of two (2) years of highway construction experience acceptable to the State.

2. Have a minimum of five (5) years full-time experience, acceptable to the State, as a construction engineer or inspector on highway and/or bridge construction, with a state, county, federal, or municipal department of transportation.

3. Be licensed as a Professional Engineer with a minimum of one (1) year of highway construction experience acceptable to the State.

4. Be certified as an Engineer-in-Training with two (2) years of highway construction experience acceptable to the State.

In lieu of the above requirements, the remaining 50 percent of consultant technical personnel assigned to a state construction project shall meet any of the following requirements:

1. Hold a Bachelor of Science Degree in Civil Engineering with two (2) years of highway construction experience acceptable to the State or a Bachelor of Science Degree in Civil Engineering Technology with three (3) years of highway construction experience acceptable to the State.

2. Hold an Associate Degree in Civil Engineering Technology with four (4) years of highway construction experience acceptable to the State.

G. Review and recommend for approval Construction Contract Progress Schedule and updates.

H. Utilize all resources at its command to effect completion of the Construction Contract by the date set by those documents. To the degree possible, prevent delays resulting from the Contractor's procedures. To this end, constantly monitor the adequacy of the Contractor's progress schedule, personnel, equipment, and the availability of necessary materials and supplies. If the Consultant determines that the Contractor's operation and procedures may lead to a delay, the Consultant shall, in writing, notify the Contractor and the State's Engineer immediately of that determination and provide recommendations to prevent such delay.

I. Take all measurements and gather all pertinent information necessary to compile monthly and final estimates, reports, and as-built plans.

J. Prepare and maintain all required records, reports, and calculations in accordance with procedures established by New Jersey Department of Transportation Standard Specifications, Contract Plans and Specifications, Operations Bulletins, and Construction and As-Built Manuals. Train all Consultant personnel assigned to the project in those procedures.

K. Compile and submit, in accordance with directions of the State's Engineer, all reports, monthly and final estimates, records, as-built calculations, and plans showing all changes from the Construction Contract plans, other pertinent documentation, photographs of various phases of construction, and all other data that may be required for proper completion of records of the Construction Contract. Such records are to include, but not be limited to, on-the-job site files of correspondence, reports of job conferences, test reports, shop drawings, purchase orders, materials deliveries, and other submissions, reproductions, or original Construction Contract documents, including all addenda, change orders, supplemental drawings, and other project-related documents.

Maintain a daily job diary in accordance with the New Jersey Department of Transportation Construction Manual to include descriptions of work progress, specific problems encountered, corrective actions taken, construction equipment, material deliveries, weather conditions, material shortages, tests, labor disputes, general observations, and all other information pertinent to the execution of the Construction Contract.

L. Prepare and recommend for approval all Construction Contract change orders and supplementary agreements. Maintain cost-accounting records in respect to portions of the work to be performed by change orders on a time and materials basis and/or unit cost basis. Prepare time and materials cost estimates for any changes resulting from Construction Contract revisions. Negotiate prices with Contractor for changes resulting from design or Contract revisions and recommend negotiated prices for approval.

M. Monitor the Contractor for compliance with all local, state, and federal laws, ordinances, rules, regulations, or orders. Enforcement of such laws, rules, ordinances, regulations, requirements, precautions, orders, and decrees shall remain with the appropriate Federal, State, and local agencies or officials charged with this duty and responsibility.

N. In the event that interpretation of the meaning and intent of the plans and specifications becomes necessary during construction, consult with the State's Engineer and transmit his interpretation to the Contractor.

O. Monitor Contractor's affirmative action, MBE, and training programs. Review all program reports required by the Construction Contract and submitted by the Contractor for compliance with Contract goals. Transmit reports to appropriate agencies. Provide advice on how to improve mediocre or substandard programs. Final approval of the Contractor's affirmative action, MBE, and training programs shall remain with the State.

P. Review for conformance with the plans and specifications Contractor's maintenance of traffic plan for vehicle and pedestrian traffic. Monitor this plan when implemented.

Q. Maintain documentation of all contractual liability claims. Make recommendations concerning engineering aspects of such claims to the State.

R. Receive, investigate, and answer all complaints and inquiries from property owners, citizens, and officials. Refer complaints to the Contractor and maintain a log showing disposition of each complaint. Refer unresolved complaints, with recommendations, to the State.

S. Provide the State with a letter, signed by a consultant's engineer licensed to practice in the State of New Jersey, certifying that the project was constructed in substantial conformance with the plans and specifications, except for those changes delineated in the letter.

T. Return to the State any original calculations, survey notes, engineering, or other data provided by the State. Provide certification thereon of all original as-built plans, as-built calculations, maps, engineering data, final estimates, and any other engineering data produced by the Consultant.

Documents prepared by the Consultant and its subcontractors in pursuance of the terms of the Agreement shall be delivered to and become the property of the State.

U. Provide résumés and proposed salaries of all personnel to the State's Engineer for approval prior to assignment to the project. Should it be determined that members of the field inspection staff would benefit from attendance at one or more State-run training schools, such members may be directed to attend. Costs of attending such training sessions, including employee compensation, travel expenses, and other related costs, shall not be reimbursable as direct charges, but shall be allowable as overhead.

1. The Consultant's project manning table shall list all job titles that may be used in providing the indicated services, with their equivalent American Society of Civil Engineers (ASCE) and/or National Institute for Certification of Engineering Technologies (NICET) Grades.

2. At least one individual of the field inspection staff assigned to the project shall have received formal training in the maintenance and protection of traffic. That individual shall be assigned to inspect the work of the Contractor involving the maintenance and protection of traffic.

V. Begin work on the project within five working days after receipt of both an executed copy of the Agreement and written direction from the State to proceed. Begin work on any Consultant Contract Modification within five working days after receipt of both an executed copy of the Consultant Contract Modification and written direction to proceed.

W. Complete all work and submit the final estimate to the State's Engineer in accordance with the anticipated schedule approved by the State or within 60 calendar days after contract time is stopped on the Construction Contract.

X. Coordinate and advance all work items in the Agreement and any subsequent Consultant Contract Modification efficiently and economically, consonant with the anticipated schedule. If the work cannot be completed as scheduled, request in writing a reasonable extension of time. All such requests shall include a statement as to the cause of the delay. The requests shall be provided to the State at the time that the need becomes apparent but at least 15 days prior to the scheduled completion date.

Y. Submit the following on a monthly basis for the State's approval:

1. Progress report indicating the percentage of the project completed, including a breakdown of the services rendered for the Contract.

2. Statement of the project status regarding its conformance with the schedule and scope of services along with a list of those memoranda, letters, and other submissions to which the Consultant is awaiting a response.

3. Invoices prepared for payment according to the provisions of this Agreement.

Z. Stop all work promptly, if so directed in writing by the State.

AA. Submit final vouchers for services to the State within 120 calendar days after contract time is stopped on the Construction Contract.

AB. Perform its obligations under the Agreement with the understanding that the State and Federal Highway Administration have the right to review, and must find acceptable, the project and all documents produced by the Consultant pertaining to the project.

AC. Modify the scope of services to be performed upon written direction from the State, and negotiate appropriate increases or decreases in cost with the State based on the modifications.

AD. Submit, prior to the first invoice submitted, a list of all employees of the Consultant and any subcontractors, excluding administrative personnel, but including partners or principals performing technical functions, stating their names, titles, hourly wage rates, and the effective date of such wage rates in descending order of wage scale format and thereafter in accordance with the "All Consultants" memoranda dated February 1, 1985 and February 2, 1986 for the Agreement duration. The State may request special documentation of any wage rate or individual job function at any time it deems necessary during the Agreement duration. No individual shall be shown on any invoice unless his function and wage rate have been approved by the State.

All Consultant man-hours shall be invoiced by task and by appropriate position in a manner and on a form, or forms, previously approved by the State. Invoices shall not be processed for payment by the State unless first marked "approved" by the Designated Representative of the State.

AE. Maintain all books, documents, papers, accounting records, and other evidence pertaining to the cost incurred during the performance of the work under this Agreement, including all work performed during the preparation of proposals. Said materials shall be made available at the Consultant's office at all reasonable times during the period of this Agreement and for three years from the date of final payment for inspection and/or audit by authorized representatives of the State and Federal Governments. Copies of the material shall be furnished upon request. Following the passage of three years from the date of payment, said material may be destroyed upon receipt of written permission from the State.

AF. Allow representatives of the State and Federal Governments to visit the offices of the Consultant periodically, without notice, in order to monitor work on this project.

KANSAS DOT
SPECIAL CONSTRUCTION PROVISIONS

I. SCOPE OF SERVICES

A. SERVICES TO BE PERFORMED BY THE CONSULTANT

The Consultant agrees to:

(1) Attend all conferences designated by the KDOT, or required under the terms of the Agreement.

(2) Designate a Project Engineer/Project Manager who shall meet KDOT's certification policy and report and transmit Project activity and documents to KDOT's Construction Office.

(3) Assign a sufficient number of technically qualified and experienced personnel to the Project to perform the services required under the Agreement, in a timely manner to avoid delay to the Contractor.

(4) Become familiar with the standard practices of the KDOT, the Contract Documents (Specifications, Construction Contract Proposal, Special Provisions and Plans), and the Contractor's proposed schedule of operations prior to beginning field services to be performed under the Agreement.

(5) Perform the Consultant's field operations in accordance with accepted safety practices.

(6) Furnish all equipment required to accomplish the Consultant's services, and to check or test it prior to use on the Project.

(7) Provide for Consultant personnel such transportation, supplies, materials and incidentals as are needed to accomplish the services required under the Agreement.

(8) Undertake the following:

Transmit orders from the KDOT to the Contractor and provide guidance in the proper interpretation of the Specifications and Plans.

Perform or provide construction surveys, staking, and measurements needed by the Contractor (unless provided for in the contract where contractor construction staking is to be performed as a bid item by the Contractor) and perform measurements and surveys that are involved in the determination of final pay quantities.

Inspect all phases of construction operations to determine the Contractor's compliance with Contract Documents and to reject such work and materials that do not comply with Contract Documents until any questions at issue can be referred to and be decided by the KDOT Field Engineer.

Take field samples and/or test materials to be incorporated in the work, and reject those not meeting the provisions of the Contract Documents until any questions at issue can be referred to and be decided by the Field Engineer.

Make certain that test report records or certificates of compliance for materials tested off the Project site and required, prior to the incorporation in the work, have been received.

Keep such daily diaries, logs, and records as are needed for a complete record of the Contractor's progress, including Project Engineer/Manager and Inspector's diaries.

Measure and compute all materials incorporated in the work and items of work completed, and maintain an item account record.

Provide measurement and computation of pay items.

Prepare and submit, or assist in preparing, such periodic intermediate and final reports and records as may be required by the KDOT and as are applicable to the PROJECT, which *may* include:

a. Progress Reports
b. Weekly statement of working days
c. Notice of change in construction status
d. Report of field inspection of material
e. Test report record

f. Contractor pay estimates
g. Pile driving data
h. Piling record
i. Final certification of materials
j. Explanation of quantity variation
k. Statement of time
l. Other records and reports as required by the Project

Review, or assist in reviewing, all Contractor submittals of records and reports required by the KDOT, as applicable to the Project, which may include:

a. Requests for partial and final payment
b. Other reports and records as required by the individual Project

(9) Collect, properly label or identify, and deliver to the KDOT all original diaries, logs, notebooks, accounts, records, reports, and other documents prepared by the Consultant in the performance of the Agreement, upon completion or termination of the Agreement.

(10) Return, upon completion or termination of the Agreement, all Manuals, Contract Documents, guides, written instructions, unused forms, and record-keeping books, and other documents and materials furnished by the KDOT. The Consultant shall be responsible for replacing lost documents or materials at the price determined by the KDOT.

(11) Prepare and submit a certification of Project completion.

(12) Prepare and deliver (when Project is completed) one copy of major changes to the plans (by letter) to the KDOT. The letter should contain such items as the following:

a. Earthwork and Culverts
   1. A revised list of bench marks
   2. Location of gov. bench marks
   3. Major changes in alignment
   4. Major changes in grade line
   5. Established references on cornerstones
   6. Major changes in location of drainage structures
   7. Major changes in flow line of drainage structures
   8. Drainage structures added or deleted
   9. Any change of access control

b. Bridges
   1. Changes in stationing
   2. Changes in type, size or elevation of footings
   3. Changes in grade line

APPENDIX D

STANDARD SOFTWARE OUTPUT FOR PREPARING CONSULTANTS' FINANCIAL PROPOSALS—NEW JERSEY

Exhibit A, Page 1

STAFFING TABLE
ENTER NAME OF FIRM:
ENTER PROJECT TITLE AND FEDERAL PROJECT NUMBER:

PROPOSAL DATE:

JOB TITLE	ASCE (A) OR NICET (N) GRADE	AVERAGE HOURLY RATES PRESENT DATE	PROJECTED (MO/YR)	MAX. HOURLY RATES 1986	1987	1988	OVERTIME CATEGORY
Project Manager* (P.M.)	VIII(A)	$10.00	$10.60	$11.00	$11.66	$12.36	A
Resident Engineer (R.E.)	IV (A)	8.00	8.48	9.00	9.54	10.11	A
Office Engineer (O.E.)	II (A)	5.50	5.83	6.00	6.36	6.74	B
Asst Office Eng (A.O.E.)	I (A)	4.50	4.77	5.00	5.30	5.62	C
Chief Inspector (C.I.)	IV (N)	6.00	6.36	6.75	7.16	7.58	C
Sr Inspector (S.I.)	III (N)	5.00	5.30	6.00	6.36	6.74	C
Inspector (I)	II (N)	4.25	4.51	5.25	5.57	5.90	C

NOTE: THE ABOVE RATES HAVE BEEN CALCULATED FOR PURPOSES OF NEGOTIATION. HOWEVER, THE MAXIMUM HOURLY RATE PAYABLE AT ANY TIME IS LIMITED TO THE NJDOT-ESTABLISHED MAXIMUM RATE IN EFFECT AT THAT TIME.

OVERTIME POLICY:

Category A - No overtime compensation.
Category B - Overtime compensated at straight time rate.
Category C - Overtime compensated at straight time X 1.50.

Overtime applies to hours worked in excess of the normal working hours of 8 hours per day.

* Hourly rate limited to the current NJDOT maximum allowable.

INSTRUCTIONS:

ALL INFORMATION ENTERED BELOW THIS
LINE IS FOR INFORMATION ONLY. (DO NOT PRINT)

ALL PROPOSAL SHEETS MUST BE DATED AS OF THE LATEST REVISION MADE.

JOB TITLE
LIST THE FIRM'S DESCRIPTIVE TITLES FOR THE STAFF EXPECTED TO BE ASSIGNED TO THIS PROJECT.
MORE JOB TITLES MAY BE LISTED HERE THAT SHOWN IN THE STAFFING TABLE, IF THE ADDITIONAL TITLES MIGHT BE USED BUT ARE NOT ESTIMATED FOR.

ASCE OR NICET GRADE
ENTER THE ASCE OR NICET GRADE CLOSEST TO THE FUNCTIONS BEING PERFORMED ON THIS PROJECT BY THE PERSONS IN EACH JOB TITLE.

AVERAGE HOURLY RATES, PRESENT DATE (NOT TO EXCEED ESTABLISHED MAXIMUMS)
ENTER THE PRESENT AVERAGE HOURLY RATE OF ALL OF THE PERSONS IN THE FIRM (OR OFFICE) FOR EACH JOB TITLE, ENTER AVERAGE HOURLY RATE REFLECTED IN YOUR FIRM'S CURRENT SALARY LISTING ON FILE IN OUR OFFICE.
NOTE: USE ACTUAL RATES OF ASSIGNED INDIVIDUALS WHEN KNOWN.

AVERAGE HOURLY RATES, PROJECTED MIDPOINT
PROJECT PRESENT RATES FROM EXPECTED START OF CONSTRUCTION TO MIDPOINT OF PROJECT. USE YOUR FIRM'S ANTICIPATED RATE OF ESCALATION, BUT DO NOT EXCEED THE CURRENT MAXIMUM ESCALATION RATE APPROVED BY NJDOT. THESE PROJECTED HOURLY RATES WILL BE USED IN THE STAFFING TABLE TO DETERMINE TOTAL DIRECT LABOR COSTS. ENTER THE MONTH AND YEAR OF THE MIDPOINT OF THE PROJECT.

MAXIMUM HOURLY RATES
ENTER A MAXIMUM HOURLY RATE FOR EACH YEAR OF THE TERM OF THE AGREEMENT, FOR EACH TITLE. THESE RATES CANNOT BE EXCEEDED FOR THE GIVEN YEAR AND TITLE. THE CURRENTLY APPROVED MAXIMUM RATE OF ESCALATION MAY BE USED, BUT THE MAXIMUM HOURLY RATE PAYABLE AT ANY TIME IS LIMITED TO THE ESTABLSIHED MAXIMUM RATE IN EFFECT AT THAT TIME.

OVERTIME CATEGORY
THIS COLUMN OR SOME OTHER METHOD MUST BE USED TO CLEARLY INDICATE WHICH TITLES OR PERSONS WITHIN THAT TITLE RECEIVE OVERTIME COMPENSATION, AND AT WHAT RATE.

ENTER YOUR FIRM'S OVERTIME POLICY AT THE BOTTOM OF THIS PAGE OR ATTACH A SEPARATE PAGE IF NECESSARY. THE OVERTIME POLICY MUST CLEARLY INDICATE HOW & WHEN EACH INDIVIDUAL RECEIVES COMPENSATION & HOW HOLIDAYS, SICK LEAVE, VACATION & WEEKEND WORK AFFECT THAT COMPENSATION.

EXHIBIT A, PAGE 2

PROPOSAL DATE:

ENTER NAME OF FIRM:
ENTER PROJECT NAME AND FEDERAL PROJECT NUMBER:

JOB TITLE	ASCE OR NICET GRADE	1986 J	F	M	A	M	J	J	A	S	O	N	D	1987 J	F	M	A	M	J	J	A	S	O	N	D	(1)	(2)	(3)	(4)	(5)	(6)	
P.M.*	VIII(A)			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	176		10.60			1,865.60	NUMBERS AND ALL INFORMATION ENTERED BELOW THIS LINE
R.E.	IV(A)			80	173	173	173	173	173	173	173	93	133	80	80	80	173	173	173	173	173	173	173	173	80	3221		8.48			27,314.08	ARE FOR ILLUSTRATION ONLY
C.E.	II(A)				80	173	173	173	173	173	173	173	93				173	173	173	173	173	173	173	80		2675		5.83			15,595.25	
A.O.E.	I(A)					173	173	173	173	173	173							173	173	173	173					1730		4.77			8,252.10	ENTER 173 HOURS FOR EVERY
C.I.	IV(N)					173	173	173	173	173	173	173	133				173	173	173	173	173	173	173			2555		6.36			16,249.80	FULL MONTH YOU ANTICIPATE
C.I.**	IV(N)					10	20	20	20	20	10							20	20	20	20	20					200	6.36	3.1	636	1,272.00	THE EMPLOYEE TO WORK
S.I.	III(N)					80	173	173	173	173	173	173	133				93	173	173	173	173	173				2209		5.30			11,707.70	
S.I.**	III(N)					10	20	20	20	20	10							20	20	20	20	20					200	5.30	2.6	530	1,060.00	ENTER PROPOSED OVERTIME HOURS
I	II(N)						173	173	173	173	173						93	173	173	173	173					1650		4.51			7,441.50	FOR TITLES ELIGIBLE FOR O.T.
I**	II(N)						20	20	20	20								20	20	20	20						160	4.51	2.2	362	721.60	
I	II(N)						173	173	173	173	173						93	173	173	173	173					1650		4.51			7,441.50	PROJECTED HOURLY RATE (3):
**	II(N)						20	20	20	20								20	20	20	20						160	4.51	2.2	362	721.60	TRANSFER PROJECTED AVERAGE HOURLY RATES FROM SALARY SCHEDULE
																																DIRECT LABOUR (6): TOTAL HOURS PER TITLE TIMES PROJECTED HOURLY RATE
																										TOTALS	15866	720		1889	99,642.73	DIRECT LABOR PREMIUM (5): TOTAL OVERTIME HOURS PER TITLE TIMES PREMIUM HOURLY RATE

* Limited to on-site visits to the project totalling 8 hours per month, including reasonable travel time.

** Overtime Hours

(1) Total hours (straight time)
(2) Total hours (overtime)
(3) Projected hourly rate
(4) Projected hourly rate (premium time)
(5) Direct Labor (premium portion)
(6) Direct Labor (straight time portion)

TOTAL LABOR (PREMIUM PORTION)	1,889.20
TOTAL LABOR (STRAIGHT TIME PORTION)	99,642.73
TOTAL LABOR (STRAIGHT TIME PORTION) X INTERIM OVERHEAD PERCENTAGE	114,589.14
GRAND TOTAL	$216,121.07

INTERIM OVERHEAD PERCENTAGE = 1.15

Exhibit B, Page 1

ESTIMATE OF DIRECT NON-SALARY COST

PROPOSAL DATE: ENTER NAME OF FIRM

ENTER PROJECT TITLE AND FEDERAL PROJECT NUMBER

1.	TRAVEL (exclusive of commutation)		
a)	USE OF CONSULTANT OWNED VEHICLES		
	2 inspectors x 23 da/mo. x 18 mos. x 5 mi/da. = 4,140 mi.		
	Total On-Job Travel 4,140 mi. x 0.18 /mi.	745.20	
b)	USE OF NON-CONSULTANT OWNED VEHICLES		
	5 inspectors x 23 da/mo. x 18 mos. x 5 mi/da. = 10,350 mi.		
	Total On-Job Travel 10,350 mi. x 0.18 /mi.	1,863.00	
			$2,608.20
2.	EXPENDABLE MATERIALS AND EQUIPMENT		
	Bob Points, Cloth Tapes & Thermometers, 6' Rules	200.00	
	Safety Vests	100.00	
	Hard Hats	100.00	
	TOTAL		$400.00
3.	USE OF COMPUTER (if authorized)		
	N/A		0.00
4.	PHOTOGRAPHS		
			$100.00
	TOTAL DIRECT NON-SALARY COST		$3,108.20

ALL INFORMATION ENTERED IS FOR ILLUSTRATION ONLY

TRAVEL COMPENSATION RATE LIMITED TO MAXIMUM $0.18/MILE. IF AUTOMOBILE LEASING IS PROPOSED, A COMPARISON OF COSTS, MILEAGE vs LEASING SHOULD BE SHOWN ON A SEPARATE SHEET.

LIST ALL ITEMS OF DIRECT NON-SALARY COSTS EXPECTED TO BE USED IN THIS AGREEMENT. PLEASE NOTE THAT ONLY DIRECT COSTS WHICH ARE NORMALLY RECOVERABLE BY YOUR FIRM'S ACCOUNTING SYSTEM WILL BE ALLOWED. IF THE PRE-AWARD AUDIT EVALUATION DETERMINES THAT CERTAIN COSTS ARE NOT RECOVERABLE AS DIRECT CHARGES, THEY WILL BE REMOVED FROM THE AGREEMENT, AND/OR DISALLOWED IN FINAL AUDIT.

TO THE LEFT ARE EXAMPLES OF BREAKDOWNS OF VARIOUS TYPES OF COMMON DIRECT NON-SALARY COST FOR CONSTRUCTION INSPECTION AGREEMENTS

STAFFING TABLE

PROPOSAL DATE:

ENTER NAME OF FIRM:

ENTER PROJECT TITLE AND FEDERAL PROJECT NUMBER:

JOB TITLE	ASCE (A) OR NICET (N) GRADE	PRESENT DATE	PROJECTED (MO/YR)	MAX. HOURLY RATES 1986	1987	1988	OVERTIME CATEGORY
Project Manager* (P.M.)	VIII(A)	$10.00	$10.60	$11.00	$11.66	$12.36	A
Resident Engineer (R.E.)	IV (A)	8.00	8.48	9.00	9.54	10.11	A
Office Engineer (O.E.)	II (A)	5.50	5.83	6.00	6.36	6.74	B
Asst Office Eng (A.O.E.)	I (A)	4.50	4.77	5.00	5.30	5.62	C
Chief Inspector (C.I.)	IV (N)	6.00	6.36	6.75	7.16	7.58	C
Sr Inspector (S.I.)	III (N)	5.00	5.30	6.00	6.36	6.74	C
Inspector (I)	II (N)	4.25	4.51	5.25	5.57	5.90	C

NOTE: THE ABOVE RATES HAVE BEEN CALCULATED FOR PURPOSES OF NEGOTIATION. HOWEVER, THE MAXIMUM HOURLY RATE PAYABLE AT ANY TIME IS LIMITED TO THE NJDOT-ESTABLISHED MAXIMUM RATE IN EFFECT AT THAT TIME.

OVERTIME POLICY:

Category A - No overtime compensation.
Category B - Overtime compensated at straight time rate.
Category C - Overtime compensated at straight time X 1.50.

Overtime applies to hours worked in excess of the normal working hours of 8 hours per day.

* Hourly rate limited to the current NJDOT maximum allowable.

INSTRUCTIONS:

ALL INFORMATION ENTERED BELOW THIS LINE IS FOR INFORMATION ONLY. (DO NOT PRINT)

ALL PROPOSAL SHEETS MUST BE DATED AS OF THE LATEST REVISION MADE.

JOB TITLE
LIST THE FIRM'S DESCRIPTIVE TITLES FOR THE STAFF EXPECTED TO BE ASSIGNED TO THIS PROJECT.
MORE JOB TITLES MAY BE LISTED HERE THAT SHOWN IN THE STAFFING TABLE, IF THE ADDITIONAL TITLES MIGHT BE USED BUT ARE NOT ESTIMATED FOR.

ASCE OR NICET GRADE
ENTER THE ASCE OR NICET GRADE CLOSEST TO THE FUNCTIONS BEING PERFORMED ON THIS PROJECT BY THE PERSONS IN EACH JOB TITLE.

AVERAGE HOURLY RATES, PRESENT DATE (NOT TO EXCEED ESTABLISHED MAXIMUMS)
ENTER THE PRESENT AVERAGE HOURLY RATE OF ALL OF THE PERSONS IN THE FIRM (OR OFFICE) FOR EACH JOB TITLE. ENTER AVERAGE HOURLY RATE REFLECTED IN YOUR FIRM'S CURRENT SALARY LISTING ON FILE IN OUR OFFICE.
NOTE: USE ACTUAL RATES OF ASSIGNED INDIVIDUALS WHEN KNOWN.

AVERAGE HOURLY RATES, PROJECTED MIDPOINT
PROJECT PRESENT RATES FROM EXPECTED START OF CONSTRUCTION TO MIDPOINT OF PROJECT. USE YOUR FIRM'S ANTICIPATED RATE OF ESCALATION, BUT DO NOT EXCEED THE CURRENT MAXIMUM ESCALATION RATE APPROVED BY NJDOT. THESE PROJECTED HOURLY RATES WILL BE USED IN THE STAFFING TABLE TO DETERMINE TOTAL DIRECT LABOR COSTS. ENTER THE MONTH AND YEAR OF THE MIDPOINT OF THE PROJECT.

MAXIMUM HOURLY RATES
ENTER A MAXIMUM HOURLY RATE FOR EACH YEAR OF THE TERM OF THE AGREEMENT, FOR EACH TITLE. THESE RATES CANNOT BE EXCEEDED FOR THE GIVEN YEAR AND TITLE. THE CURRENTLY APPROVED MAXIMUM RATE OF ESCALATION MAY BE USED, BUT THE MAXIMUM HOURLY RATE PAYABLE AT ANY TIME IS LIMITED TO THE ESTABLSIHED MAXIMUM RATE IN EFFECT AT THAT TIME.

OVERTIME CATEGORY
THIS COLUMN OR SOME OTHER METHOD MUST BE USED TO CLEARLY INDICATE WHICH TITLES OR PERSONS WITHIN THAT TITLE RECEIVE OVERTIME COMPENSATION, AND AT WHAT RATE.

ENTER YOUR FIRM'S OVERTIME POLICY AT THE BOTTOM OF THIS PAGE OR ATTACH A SEPARATE PAGE IF NECESSARY. THE OVERTIME POLICY MUST CLEARLY INDICATE HOW & WHEN EACH INDIVIDUAL RECEIVES COMPENSATION & HOW HOLIDAYS, SICK LEAVE, VACATION & WEEKEND WORK AFFECT THAT COMPENSATION.

EXHIBIT B. PAGE 3

CLEARLY INDICATE HWO & WHEN EACH INDIVIDUAL RECEIVES COMPENSATION & HOW HOLIDAYS, SICK LEAVE, VACATION & WEEKEND WORK AFFECT THAT COMPENSATION.

PROPOSAL DATE:

ENTER NAME OF FIRM:

ENTER PROJECT NAME AND FEDERAL PROJECT NUMBER:

JOB TITLE	ASCE OR NICET GRADE	1986 J	F	M	A	M	J	J	A	S	O	N	D	1987 J	F	M	A	M	J	J	A	S	O	N	D	(1)	(2)	(3)	(4)	(5)	(6)
P.M.*	VIII(A)	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	192		10.60			2,035.20
A.O.E.	I(A)				173	173	173	173	173	173	173					173	173	173	173	173						2076		4.77			9,902.52
S.I.	III(N)	173	173	93	173	173	173	173	173	173	173	173	133	80	80	93	173	173	173	173	173	173				3247		5.30			17,209.10
S.I.**	III(N)				10	20	20	20	20	20	10						20	20	20	20	20						220	5.30	2.65	583	1,166.00
I	II(N)			173	173	173	173	173	173	173	173					173	173	173	173	173	173					2422		4.51			10,923.22
I**	II(N)				10	20	20	20	20	20	10						20	20	20	20	20						220	4.51	2.26	497	992.20
TOTALS																										7937	440			1080	42,228.24

NUMBERS AND ALL INFORMATION ENTERED BELOW THIS LINE ARE FOR ILLUSTRATION ONLY

ENTER 173 HOURS FOR EVERY FULL MONTH YOU ANTICIPATE THE EMPLOYEE TO WORK

ENTER PROPOSED OVERTIME HOURS FOR TITLES ELIGIBLE FOR O.T.

PROJECTED HOURLY RATE (3): TRANSFER PROJECTED AVERAGE HOURLY RATES FROM SALARY SCHEDULE

DIRECT LABOUR (6): TOTAL HOURS PER TITLE TIMES PROJECTED HOURLY RATE

DIRECT LABOR PREMIUM (5): TOTAL OVERTIME HOURS PER TITLE TIMES PREMIUM HOURLY RATE

* Limited to on-site visits to the project totalling 8 hours per month, including reasonable travel time.

** Overtime Hours

(1) Total hours (straight time)
(2) Total hours (overtime)
(3) Projected hourly rate
(4) Projected hourly rate (premium time)
(5) Direct Labor (premium portion)
(6) Direct Labor (straight time portion)

TOTAL LABOR (PREMIUM PORTION)	1,080.20
TOTAL LABOR (STRAIGHT TIME PORTION)	42,228.24
TOTAL LABOR (STRAIGHT TIME PORTION) X INTERIM OVERHEAD PERCENTAGE	48,562.48
GRAND TOTAL	$91,870.92

INTERIM OVERHEAD PERCENTAGE = 1.15

ESTIMATE OF DIRECT NON-SALARY COST

PROPOSAL DATE: ENTER NAME OF SUBCONTRACTOR

ENTER PROJECT TITLE AND FEDERAL PROJECT NUMBER

1. TRAVEL (exclusive of commutation)		
a) USE OF SUBCONTRACTOR-OWNED VEHICLES		
2 inspectors x 23 da/mo. x 20 mos. x 5 mi/da. = 4,600 mi.		
Total On-Job Travel 4,600 mi. x 0.18 /mi.	828.00	
b) USE OF NON SUBCONTRACTOR-OWNED VEHICLES		
2 inspectors x 23 da/mo. x 14 mos. x 5 mi/da. = 3,220 mi.		
Total On-Job Travel 3,220 mi. x 0.18 /mi.	579.60	
		$1,407.60
2. EXPENDABLE MATERIALS AND EQUIPMENT		
Bob Points, Cloth Tapes & Thermometers, 6' Rules	100.00	
Safety Vests	50.00	
Hard Hats	50.00	
TOTAL		$200.00
3. USE OF COMPUTER (if authorized)		
N/A		0.00
4. PHOTOGRAPHS		
		$100.00
TOTAL DIRECT NON-SALARY COST		$1,707.60

ALL INFORMATION ENTERED IS FOR ILLUSTRATION ONLY

TRAVEL COMPENSATION RATE LIMITED TO MAXIMUM $0.18/MILE. IF AUTOMOBILE LEASING IS PROPOSED, A COMPARISON OF COSTS, MILEAGE vs LEASING SHOULD BE SHOWN ON A SEPARATE SHEET.

LIST ALL ITEMS OF DIRECT NON-SALARY COSTS EXPECTED TO BE USED IN THIS AGREEMENT. PLEASE NOTE THAT ONLY DIRECT COSTS WHICH ARE NORMALLY RECOVERABLE BY YOUR FIRM'S ACCOUNTING SYSTEM WILL BE ALLOWED. IF THE PRE-AWARD AUDIT EVALUATION DETERMINES THAT CERTAIN COSTS ARE NOT RECOVERABLE AS DIRECT CHARGES, THEY WILL BE REMOVED FROM THE AGREEMENT, AND/OR DISALLOWED IN FINAL AUDIT.

TO THE LEFT ARE EXAMPLES OF BREAKDOWNS OF VARIOUS TYPES OF COMMON DIRECT NON-SALARY COST FOR CONSTRUCTION INSPECTION AGREEMENTS

Exhibit B, Page 5

SUMMARY

NAME OF SUBCONSULTANT

PROPOSAL DATE:

ENTER PROJECT TITLE AND FEDERAL PROJECT NUMBER

Item IA, Direct Technical Salaries (estimated) subject to audit	$42,228.24
Item IB, Direct Technical Salaries Premium Portion of overtime subject to audit (estimate)	$1,080.20
Item II, Direct Non-Salary Cost (estimated) subject to audit	$1,707.60
Item III, Overhead (estimated) subject to audit	$48,562.48
Item IV, Fixed Fee (negotiated)	$4,000.00
Item II Direct Non-Salary Cost (estimated) subject to audit (Sub-Consultant Cost)	$0.00
Total Estimated Cost	$97,578.52

ALL NUMBERS ARE FOR ILLUSTRATION ONLY

THERE IS TO BE ONE COLUMN FOR EACH PROJECT, AND ONE COLUMN FOR TOTALS

ALL ENTRIES IN THIS EXHIBIT FOR ITEMS I, II & III MUST BE DERIVED IN A PREVIOUS EXHIBIT

Exhibit C

SUMMARY

PROPOSAL DATE:

NAME OF FIRM:

Item IA, Direct Technical Salaries (estimated) subject to audit	$99,642.73
Item IB, Direct Technical Salaries Premium Portion of overtime subject to audit (estimate)	$1,889.20
Item II, Direct Non-Salary Cost (estimated) subject to audit	$3,108.20
Item II, Direct Non-Salary Cost (estimated) subject to audit (Sub-Contractor Cost)	$0.00
Item III, Overhead (estimated) subject to audit	$114,589.14
Item IV, Fixed Fee (negotiated)	$5,000.00
Item II Direct Non-Salary Cost (estimated) subject to audit (Sub-Consultant Cost)	$97,578.52
Total Estimated Cost	$321,807.79
MAXIMUM AMOUNT PAYABLE	$325,000.00

ALL NUMBERS ARE FOR ILLUSTRATION ONLY

THERE IS TO BE ONE COLUMN FOR EACH PROJECT, AND ONE COLUMN FOR TOTALS

ALL ENTRIES IN THIS EXHIBIT FOR ITEMS I, II & III MUST BE DERIVED IN A PREVIOUS EXHIBIT

MAXIMUM AMOUNT PAYABLE
ROUND TOTAL ESTIMATED COST UP TO NEXT $5,000.

APPENDIX E
SAMPLE FORMS 254 AND 255

STANDARD FORM (SF) **254**

Architect-Engineer and Related Services Questionnaire

Form Approved
OMB No. 9000-0004

Purpose:

The policy of the Federal Government in acquiring architectural, engineering, and related professional services is to encourage firms lawfully engaged in the practice of those professions to submit annually a statement of qualifications and performance data. Standard Form 254, "Architect-Engineer and Related Services Questionnaire" is provided for that purpose. Interested A-E firms (including new, small, and/or minority firms) should complete and file SF 254's with each Federal agency and with appropriate regional or district offices for which the A-E is qualified to perform services. The agency head for each proposed project shall evaluate these qualification resumes, together with any other performance data on file or requested by the agency, in relation to the proposed project. The SF 254 may be used as a basis for selecting firms for discussions, or for screening firms preliminary to inviting submission of additional information.

Definitions:

"Architect-engineer and related services" are those professional services associated with research, development, design and construction, alteration, or repair of real property, as well as incidental services that members of these professions and those in their employ may logically or justifiably perform, including studies, investigations, surveys, evaluations, consultations, planning, programming, conceptual designs, plans and specifications, cost estimates, inspections, shop drawing reviews, sample recommendations, preparation of operating and maintenance manuals, and other related services.

"Parent Company" is that firm, company, corporation, association or conglomerate which is the major stockholder or highest tier owner of the firm completing this questionnaire; i.e. Firm A is owned by Firm B which is, in turn, a subsidiary of Corporation C. The "parent company" of Firm A is Corporation C.

"Principals" are those individuals in a firm who possess legal responsibility for its management. They may be owners, partners, corporate officers, associates, administrators, etc.

"Discipline", as used in this questionnaire, refers to the primary technological capability of individuals in the responding firm. Possession of an academic degree, professional registration, certification, or extensive experience in a particular field of practice normally reflects an individual's primary technical discipline.

"Joint Venture" is a collaborative undertaking by two or more firms or individuals for which the participants are both jointly and individually responsible.

"Consultant", as used in this questionnaire, is a highly specialized individual or firm having significant input and responsibility for certain aspects of a project and possessing unusual or unique capabilities for assuring success of the finished work.

"Prime" refers to that firm which may be coordinating the concerted and complementary inputs of several firms, individuals or related services to produce a completed study or facility. The "prime" would normally be regarded as having full responsibility and liability for quality of performance by itself as well as by subcontractor professionals under its jurisdiction.

"Branch Office" is a satellite, or subsidiary extension, of a headquarters office of a company, regardless of any differences in name or legal structure of such a branch due to local or state laws. "Branch offices" are normally subject to the management decisions, bookkeeping, and policies of the main office.

Instructions for Filing (Numbers below correspond to numbers contained in form):

1. Type accurate and complete name of submitting firm, its address, and zip code.
   1a. Indicate whether form is being submitted in behalf of a parent firm or a branch office. (Branch office submissions should list only personnel in, and experience of, that office.)
2. Provide date the firm was established under the name shown in question 1.
3. Show date on which form is prepared. All information submitted shall be current and accurate as of this date.
4. Enter type of ownership, or legal structure, of firm (sole proprietor, partnership, corporation, joint venture, etc.)
   Check appropriate boxes indicating if firm is (a) a small business concern; (b) a small business concern owned and operated by socially and economically disadvantaged individuals; and (c) Women-owned; (See 48 CFR 19.101 and 52.219-9).
5. Branches of subsidiaries of large or parent companies, or conglomerates, should insert name and addresss of highest-tier owner.
   5a. If present firm is the successor to, or outgrowth of, one or more predecessor firms, show name(s) of former entity(ies) and the year(s) of their orginal establishment.
6. List not more than two principals from submitting firm who may be contacted by the agency receiving this form. (Different principals may be listed on forms going to another agency.) Listed principals must be empowered to speak for the firm on policy and contractual matters.
7. Beginning with the submitting office, list name, location, total number of personnel and telephone numbers for all associated or branch offices, (including any headquarters or foreign offices) which provide A-E and related services.
   7a. Show total personnel in all offices. (Should be sum of all personnel, all branches.)
8. Show total number of employees, by discipline, in submitting office. (If form is being submitted by main or headquarters office, firm should list total employees, by discipline, in all offices.) While some personnel may be qualified in several disciplines, each person should be counted only once in accord with his or her primary function. Include clerical personnel as "administrative." Write in any additional disciplines—sociologists, biologists, etc.—and number of people in each, in blank spaces.
9. Using chart (below) insert appropriate index number to indicate range of professional services fees received by submitting firm each calendar year for last five years, most recent year first. Fee summaries should be broken down to

STANDARD FORM (SF) **254**

Architect-Engineer and Related Services Questionnaire

reflect the fees received each year for (a) work performed directly for the Federal Government (not including grant and loan projects) or as a sub to other professionals performing work directly for the Federal Government, (b) all other domestic work, U.S. and possessions, including Federally-assisted projects, and (c) all other foreign work.

Ranges of Professional Services Fees

INDEX		INDEX	
1.	Less than $100,000	5.	$1 million to $2 million
2.	$100,000 to $250,000	6.	$2 million to $5 million
3.	$250,000 to $500,000	7.	$5 million to $10 million
4.	$500,000 to $1 million	8.	$10 million or greater

10. Select and enter, in numerical sequence, **not more than thirty** (30) "Experience Profile Code" numbers from the listing (next page) which most accurately reflect submitting firm's demonstrated technical capabilities and project experience. **Carefully review list.** (It is recognized some profile codes may be part of other services or projects contained on list; firms are encouraged to select profile codes which best indicate type and scope of services provided on past projects.) For each code number, show total number of projects and gross fees (in thousands) received for profile projects performed by firm during past few years. If firm has one or more capabilities not included on list, insert same in blank spaces at end of list and show numbers in question 10 on the form. In such cases, the filled-in listing **must** accompany the complete SF 254 when submitted to the Federal agencies.
11. Using the "Experience Profile Code" numbers in the same sequence as entered in item 10, give details of at least one recent (within last five years) representative project for each code number, up to a **maximum** of thirty (30) separate projects, or portions of projects, for which firm was responsible. (Project examples may be used more than once to illustrate different services rendered on the same job. Example: a dining hall may be part of an auditorium or educational facility.) Firms which select less than thirty "profile codes" may list two or more project examples (to illustrate specialization) for each code number so long as total of all project examples does not exceed thirty (30). After each code number in question 11, show: (a) whether firm was "P," the prime professional, or "C," a consultant, or "JV," part of a joint venture on that particular project (New firms, in existence less than five (5) years may use the symbol "IE" to indicate "Individual Experience" as opposed to firm experience); (b) provide name and location of the specific project which typifies firm's (or individual's) performance under that code category; (c) give name and address of the owner of that project (if government agency indicate responsible office); (d) show the estimated construction cost (or other applicable cost) for that portion of the project for which the firm was primarily responsible. (Where no construction was involved, show approximate cost of firm's work); and (e) state year work on that particular project was, or will be, completed.
12. The completed SF 254 should be signed by a principal of the firm, preferably the chief executive officer.
13. Additional data, brochures, photos, etc. should not accompany this form unless specifically requested.

NEW FIRMS (not reorganized or recently-amalgamated firms) are eligible and encouraged to seek work from the Federal Government in connection with performance of projects for which they are qualified. Such firms are encouraged to complete and submit Standard Form 254 to appropriate agencies. Questions on the form dealing with personnel or experience may be answered by citing experience and capabilities of individuals in the firm, based on performance and responsibility while in the employ of others. In so doing, notation of this fact should be made on the form. In question 9, write in "N/A" to indicate "not applicable" for those years prior to firm's organization.

Experience Profile Code Numbers for use with questions 10 and 11

001 Acoustics; Noise Abatement
002 Aerial Photogrammetry
003 Agricultural Development; Grain Storage; Farm Mechanization
004 Air Pollution Control
005 Airports; Navaids; Airport Lighting; Aircraft Fueling
006 Airports; Terminals & Hangars; Freight Handling
007 Arctic Facilities
008 Auditoriums & Theatres
009 Automation; Controls; Instrumentation
010 Barracks; Dormitories
011 Bridges
012 Cemeteries *(Planning & Relocation)*
013 Chemical Processing & Storage
014 Churches; Chapels
015 Codes; Standards; Ordinances
016 Cold Storage; Refrigeration; Fast Freeze
017 Commercial Buildings *(low rise)*; Shopping Centers
018 Communications Systems; TV; Microwave
019 Computer Facilities; Computer Service
020 Conservation and Resource Management
021 Construction Management
022 Corrosion Control; Cathodic Protection; Electrolysis
023 Cost Estimating
024 Dams *(Concrete; Arch)*
025 Dams *(Earth; Rock)*; Dikes; Levees
026 Desalinization *(Process & Facilities)*
027 Dining Halls; Clubs; Restaurants
028 Ecological & Archeological Investigations
029 Educational Facilities; Classrooms
030 Electronics
031 Elevators; Escalators; People-Movers
032 Energy Conservation; New Energy Sources
033 Environmental Impact Studies, Assessments or Statements
034 Fallout Shelters; Blast-Resistant Design
035 Field Houses; Gyms; Stadiums
036 Fire Protection
037 Fisheries; Fish Ladders
038 Forestry & Forest Products
039 Garages; Vehicle Maintenance Facilities; Parking Decks
040 Gas Systems *(Propane; Natural, Etc.)*
041 Graphic Design
042 Harbors; Jetties; Piers; Ship Terminal Facilities
043 Heating; Ventilating, Air Conditioning
044 Health Systems Planning
045 Highrise; Air-Rights-Type Buildings
046 Highways; Streets; Airfield Paving; Parking Lots
047 Historical Preservation
048 Hospital & Medical Facilities
049 Hotels; Models
050 Housing *(Residential, Multi-Family; Apartments; Condominiums)*
051 Hydraulics & Pneumatics
052 Industrial Buildings; Manufacturing Plants
053 Industrial Processes; Quality Control
054 Industrial Waste Treatment
055 Interior Design; Space Planning
056 Irrigation; Drainage
057 Judicial and Courtroom Facilities
058 Laboratories; Medical Research Facilities
059 Landscape Architecture
060 Libraries; Museums; Galleries
061 Lighting *(Interiors; Display; Theatre, Etc.)*
062 Lighting *(Exteriors; Streets; Memorials; Athletic Fields, Etc.)*
063 Materials Handling Systems; Conveyors; Sorters
064 Metallurgy
065 Microclimatology; Tropical Engineering
066 Military Design Standards
067 Mining & Mineralogy
068 Missile Facilities *(Silos; Fuels; Transport)*
069 Modular Systems Design; Pre-Fabricated Structures or Components
070 Naval Architecture; Off-Shore Platforms
071 Nuclear Facilities; Nuclear Shielding
072 Office Buildings; Industrial Parks
073 Oceanographic Engineering
074 Ordnance; Munitions; Special Weapons
075 Petroleum Exploration; Refining
076 Petroleum and Fuel *(Storage and Distribution)*
077 Pipelines *(Cross-Country—Liquid & Gas)*
078 Planning *(Community, Regional, Areawide and State)*
079 Planning *(Site, Installation, and Project)*
080 Plumbing & Piping Design
081 Pneumatic Structures; Air-Support Buildings
082 Postal Facilities
083 Power Generation, Transmission, Distribution
084 Prisons & Correctional Facilities
085 Product, Machine & Equipment Design
086 Radar; Sonar; Radio & Radar Telescopes
087 Railroad; Rapid Transit
088 Recreation Facilities *(Parks, Marinas, Etc.)*
089 Rehabilitation *(Buildings; Structures; Facilities)*
090 Resource Recovery; Recycling
091 Radio Frequency Systems & Shieldings
092 Rivers; Canals; Waterways; Flood Control
093 Safety Engineering; Accident Studies; OSHA Studies
094 Security Systems; Intruder & Smoke Detection
095 Seismic Designs & Studies
096 Sewage Collection, Treatment and Disposal
097 Soils & Geologic Studies; Foundations
098 Solar Energy Utilization
099 Solid Wastes; Incineration; Land Fill
100 Special Environments; Clean Rooms, Etc.
101 Structural Design; Special Structures
102 Surveying; Platting; Mapping; Flood Plain Studies
103 Swimming Pools
104 Storm Water Handling & Facilities
105 Telephone Systems *(Rural; Mobile; Intercom, Etc.)*
106 Testing & Inspection Services
107 Traffic & Transportation Engineering
108 Towers *(Self-Supporting & Guyed Systems)*
109 Tunnels & Subways
110 Urban Renewals; Community Development
111 Utilities *(Gas & Steam)*
112 Value Analysis; Life-Cycle Costing
113 Warehouses & Depots
114 Water Resources; Hydrology, Ground Water
115 Water Supply, Treatment and Distribution
116 Wind Tunnels; Research/Testing Facilities Design
117 Zoning; Land Use Studies
201 _____
202 _____
203 _____
204 _____
205 _____

3

STANDARD FORM 254 (REV. 10-83)

STANDARD FORM (SF)

254

Architect-Engineer and Related Services Questionnaire

1. Firm Name / Business Address:

1a. Submittal is for ☐ Parent Company ☐ Branch or Subsidiary Office

2. Year Present Firm Established:

3. Date Prepared:

4. Specify type of ownership *and* check below, if applicable.

A. Small Business
B. Small Disadvantaged Business
C. Woman-owned Business

5. Name of Parent Company, if any:

5a. Former Parent Company Name(s), if any, and Year(s) Established:

6. Names of not more than Two Principals to Contact: Title / Telephone

1)
2)

7. Present Offices: City / State / Telephone / No. Personnel Each Office

7a. Total Personnel _____

8. Personnel by Discipline: *(List each person only once, by primary function.)*

___ Administrative	___ Electrical Engineers	___ Oceanographers	___
___ Architects	___ Estimators	___ Planners: Urban/Regional	___
___ Chemical Engineers	___ Geologists	___ Sanitary Engineers	___
___ Civil Engineers	___ Hydrologists	___ Soils Engineers	___
___ Construction Inspectors	___ Interior Designers	___ Specification Writers	___
___ Draftsmen	___ Landscape Architects	___ Structural Engineers	___
___ Ecologists	___ Mechanical Engineers	___ Surveyors	___
___ Economists	___ Mining Engineers	___ Transportation Engineers	___

9. Summary of Professional Services Fees Received: (Insert index number)

	Last 5 Years (most recent year first)				
	19____	19____	19____	19____	19____
Direct Federal contract work, including overseas					
All other domestic work					
All other foreign work*					

*Firms interested in foreign work, but without such experience, check here: ☐

Ranges of Professional Services Fees

INDEX
1. Less than $100,000
2. $100,000 to $250,000
3. $250,000 to $500,000
4. $500,000 to $1 million
5. $1 million to $2 million
6. $2 million to $5 million
7. $5 million to $10 million
8. $10 million or greater

STANDARD FORM 254 (REV. 10-83)

10. Profile of Firm's Project Experience, Last 5 Years

Profile Code	Number of Projects	Total Gross Fees (in thousands)	Profile Code	Number of Projects	Total Gross Fees (in thousands)	Profile Code	Number of Projects	Total Gross Fees (in thousands)
1)			11)			21)		
2)			12)			22)		
3)			13)			23)		
4)			14)			24)		
5)			15)			25)		
6)			16)			26)		
7)			17)			27)		
8)			18)			28)		
9)			19)			29)		
10)			20)			30)		

11. Project Examples, Last 5 Years

Profile Code	"P", "C", "JV", or "IE"	Project Name and Location	Owner Name and Address	Cost of Work (in thousands)	Completion Date (Actual or Estimated)
		1			
		2			
		3			
		4			
		5			
		6			
		7			

		8			
		9			
		10			
		11			
		12			
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		14			
		15			
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		21			
		22			
		23			
		24			
		25			
		26			
		27			
		28			
		29			
		30			
12. The foregoing is a statement of facts Signature: _____ Typed Name and Title: _____				Date:	

STANDARD FORM (SF) 255

Architect-Engineer and Related Services Questionnaire for Specific Project

Form Approved
OMB No. 3090-0029

Purpose:

This form is a supplement to the "Architect-Engineer and Related Services Questionnaire" (SF 254). Its purpose is to provide additional information regarding the qualifications of interested firms to undertake a specific Federal A-E project. Firms, or branch offices of firms, submitting this form should enclose (or already have on file with the appropriate office of the agency) a current (within the past year) and accurate copy of the SF 254 for that office.

The procurement official responsible for each proposed project may request submission of the SF 255 "Architect-Engineer and Related Services Questionnaire for Specific Project" in accord with applicable civilian and military procurement regulations and shall evaluate such submissions, as well as related information contained on the Standard Form 254, and any other performance data on file with the agency, and shall select firms for subsequent discussions leading to contract award in conformance with Public Law 92-582. This form should only be filed by an architect-engineer or related services firm when requested to do so by the agency or by a public announcement. Responses should be as complete and accurate as possible, contain data relative to the specific project for which you wish to be considered, and should be provided, by the required due date, to the office specified in the request or public announcement.

This form will be used only for the specified project. Do not refer to this submittal in response to other requests or public announcements.

Definitions:

"Architect-engineer and related services" are those professional services associated with research, development, design and construction, alteration, or repair of real property, as well as incidental services that members of these professions and those in their employ may logically or justifiably perform, including studies, investigations, surveys, evaluations, consultations, planning, programming, conceptual designs, plans and specifications, cost estimates, inspections, shop drawing reviews, sample recommendations, preparation of operating and maintenance manuals, and other related services.

"Principals" are those individuals in a firm who possess legal responsibility for its management. They may be owners, partners, corporate officers, associates, administrators, etc.

"Discipline", as used in this questionnaire, refers to the primary technological capability of individuals in the responding firm. Possession of an academic degree, professional registration, certification, or extensive experience in a particular field of practice normally reflects an individual's primary technical discipline.

"Joint Venture", is a collaborative undertaking of two or more firms or individuals for which the participants are both jointly and individually responsible.

"Key Persons, Specialists, and Individual Consultants", as used in this questionnaire refer to individuals who will have **major** project responsibility or will provide **unusual or unique** capabilities for the project under consideration.

Instructions for Filing (Numbers below correspond to numbers contained in form):

1. Give name and location of the project for which this form is being submitted.

2. Provide appropriate data from the *Commerce Business Daily* (CBD) identifying the particular project for which this form is being filed.

   2a. Give the date of the *Commerce Business Daily* in which the project announcement appeared or indicate "not applicable" (N/A) if the source of the announcement is other than the CBD.

   2b. Indicate Agency identification or contract number as provided in the CBD announcement.

3. Show name and address of the individual or firm (or joint venture) which is submitting this form for the project.

   3a. List the name, title, and telephone number of that principal who will serve as the point of contact. Such an individual must be empowered to speak for the firm on policy and contractual matters and should be familiar with the programs and procedures of the agency to which this form is directed.

   3b. Give the address of the specific office which will have responsibility for performing the announced work.

4. Insert the number of personnel by discipline presently employed (on date of this form) at office specified in block 3b. While some personnel may be qualified in several disciplines, each person should be counted only once in accord with his or her primary function. Include clerical personnel as "administrative." Write in any additional disciplines—sociologists, biologists, etc.—and number of people in each, in blank spaces.

5. Answer only if this form is being submitted by a joint venture of two or more collaborating firms. Show the names and addresses of all individuals or organizations expected to be included as part of the joint venture and describe their particular areas of anticipated responsibility, (i.e., technical disciplines, administration, financial, sociological, environmental, etc.)

   5a. Indicate, by checking the appropriate box, whether this particular joint venture has worked together on other projects.

NSN 7540-01-152-8074

255-102

STANDARD FORM 255 (Rev. 10-83)
PRESCRIBED BY GSA FAR (48 CFR) 53.236-2(c)

STANDARD FORM (SF) 255

Architect-Engineer and Related Services Questionnaire for Specific Project

Standard Form 255
General Services Administration,
Washington, D. C. 20405
Fed. Proc. Reg. (41 CFR) 1-16 . 803
Armed Svc. Proc. Reg. 18-403

Each firm participating in the joint venture should have a Standard Form 254 on file with the contracting office receiving this form. Firms which do not have such forms on file should provide same immediately along with a notation at the top of page 1 of the form regarding their association with this joint venture submittal.

6. If respondent is not a joint venture, but intends to use outside (as opposed to in-house or permanently and formally affiliated) consultants or associates, he should provide names and addresses of all such individuals or firms, as well as their particular areas of technical/professional expertise, as it relates to this project. Existence of previous working relationships should be noted. If more than eight outside consultants or associates are anticipated, attach an additional sheet containing requested information.

7. Regardless of whether respondent is a joint venture or an independent firm, provide brief resumes of key personnel expected to participate on this project. Care should be taken to limit resumes to only those personnel and specialists who will have major project responsibilities. Each resume must include: (a) name of each key person and specialist and his or her title, (b) the project assignment or role which that person will be expected to fulfill in connection with this project, (c) the name of the firm or organization, if any, with whom that individual is presently associated, (d) years of relevant experience with present firm and other firms, (e) the highest academic degree achieved and the discipline covered (if more than one highest degree, such as two Ph.D.'s, list both), the year received and the particular technical/professional discipline which that individual will bring to the project, (f) if registered as an architect, engineer, surveyor, etc., show only the field of registration and the year that such registration was first acquired. If registered in several states, do not list states, and (g) a synopsis of experience, training, or other qualities which reflect individual's potential contribution to this project. Include such data as: familiarity with Government or agency procedures, similar type of work performed in the past, management abilities, familiarity with the geographic area, relevant foreign language capabilities, etc. Please limit synopsis of experience to directly relevant information.

8. List up to ten projects which demonstrate the firm's or joint venture's competence to perform work similar to that likely to be required on this project. The more recent such projects, the better. Prime consideration will be given to projects which illustrate respondent's capability for performing work similar to that being sought. Required information must include: (a) name and location of project, (b) brief description of type and extent of services provided for each project (submissions by joint ventures should indicate which member of the joint venture was the prime on that particular project and what role it played), (c) name and address of the owner of that project (if Government agency, indicate responsible office), (d) completion date (actual when available, otherwise estimated), (e) total construction cost of completed project (or where no construction was involved, the approximate cost of your work) and that portion of the cost of the project for which the named firm was/is responsible.

9. List only those projects which the A-E firm or joint venture, or members of the joint venture, are currently performing under direct contract with an agency or department of the Federal Government. Exclude any grant or loan projects being financed by the Federal Government but being performed under contract to other non-Federal governmental entities. Information provided under each heading is similar to that requested in the preceding Item 8, except for (d) "Percent Complete." Indicate in this item the percentage of A-E work completed upon filing this form.

10. Through narrative discussion, show reason why the firm or joint venture submitting this questionnaire believes it is especially qualified to undertake the project. Information provided should include, but not be limited to, such data as: specialized equipment available for this work, any awards or recognition received by a firm or individuals for similar work, required security clearances, special approaches or concepts developed by the firm relevant to this project, etc. Respondents may say anything they wish in support of their qualifications. When appropriate, respondents may supplement this proposal with graphic material and photographs which best demonstrate design capabilities of the team proposed for this project.

11. Completed forms should be signed by the chief executive officer of the joint venture (thereby attesting to the concurrence and commitment of all members of the joint venture), or by the architect-engineer principal responsible for the conduct of the work in the event it is awarded to the organization submitting this form. Joint ventures selected for subsequent discussions regarding this project must make available a statement of participation signed by a principal of each member of the joint venture. ALL INFORMATION CONTAINED IN THE FORM SHOULD BE CURRENT AND FACTUAL.

STANDARD FORM 255 (Rev. 10-83)

OMB Approval No. 3090-0029

STANDARD FORM (SF) 255 Architect-Engineer Related Services for Specific Project	1. Project Name / Location for which Firm is Filing:	2a. *Commerce Business Daily* Announcement Date, if any:	2b. Agency Identification Number, if any:

3. Firm (or Joint-Venture) Name & Address	3a. Name, Title & Telephone Number of Principal to Contact
	3b. Address of office to perform work, if different from Item 3

4. Personnel by Discipline: (List each person only once, by primary function.)

___ Administrative	___ Electrical Engineers	Oceanographers	
___ Architects	___ Estimators	Planners, Urban/Regional	
___ Chemical Engineers	___ Geologists	Sanitary Engineers	
___ Civil Engineers	___ Hydrologists	Soils Engineers	
___ Construction Inspectors	___ Interior Designers	Specification Writers	
___ Draftsmen	___ Landscape Architects	Structural Engineers	
___ Ecologists	___ Mechanical Engineers	Surveyors	
___ Economists	___ Mining Engineers	Transportation Engineers	___ Total Personnel

5. If submittal is by JOINT-VENTURE list participating firms and outline specific areas of responsibility (including administrative, technical and financial) for each firm: (Attach SF 254 for each if not on file with Procuring Office.)

5a. Has this Joint-Venture previously worked together? ☐ yes ☐ no

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6. If respondent is not a joint-venture, list outside key Consultants/Associates anticipated for this project (Attach SF 254 for Consultants/Associates listed, if not already on file with the Contracting Office).

Name & Address	Specialty	Worked with Prime before (Yes or No)

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7. Brief resume of key persons, specialists, and individual consultants anticipated for this project.	
a. Name & Title:	a. Name & Title:
b. Project Assignment:	b. Project Assignment:
c. Name of Firm with which associated:	c. Name of Firm with which associated:
d. Years experience: With This Firm ___ With Other Firms ___	d. Years experience: With This Firm ___ With Other Firms ___
e. Education: Degree(s) / Year / Specialization	e. Education: Degree(s) / Years / Specialization
f. Active Registration: Year First Registered/Discipline	f. Active Registration: Year First Registered/Discipline
g. Other Experience and Qualifications relevant to the proposed project:	g. Other Experience and Qualifications relevant to the proposed project:

7. Brief resume of key persons, specialists, and individual consultants anticipated for this project.	
a. Name & Title:	a. Name & Title:
b. Project Assignment:	b. Project Assignment:
c. Name of Firm with which associated:	c. Name of Firm with which associated:
d. Years experience: With This Firm ___ With Other Firms ___	d. Years experience: With This Firm ___ With Other Firms ___
e. Education: Degree(s) / Year / Specialization	e. Education: Degree(s) / Years / Specialization
f. Active Registration: Year First Registered/Discipline	f. Active Registration: Year First Registered/Discipline
g. Other Experience and Qualifications relevant to the proposed project:	g. Other Experience and Qualifications relevant to the proposed project:

7. Brief resume of key persons, specialists, and individual consultants anticipated for this project.	
a. Name & Title:	a. Name & Title:
b. Project Assignment:	b. Project Assignment:
c. Name of Firm with which associated:	c. Name of Firm with which associated:
d. Years experience: With This Firm ___ With Other Firms ___	d. Years experience: With This Firm ___ With Other Firms ___
e. Education: Degree(s) / Year / Specialization	e. Education: Degree(s) / Years / Specialization
f. Active Registration: Year First Registered/Discipline	f. Active Registration: Year First Registered/Discipline
g. Other Experience and Qualifications relevant to the proposed project:	g. Other Experience and Qualifications relevant to the proposed project:

7

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7. Brief resume of key persons, specialists, and individual consultants anticipated for this project.	
a. Name & Title:	a. Name & Title:
b. Project Assignment:	b. Project Assignment:
c. Name of Firm with which associated:	c. Name of Firm with which associated:
d. Years experience: With This Firm ___ With Other Firms ___	d. Years experience: With This Firm ___ With Other Firms ___
e. Education: Degree(s) / Year / Specialization	e. Education: Degree(s) / Years / Specialization
f. Active Registration: Year First Registered/Discipline	f. Active Registration: Year First Registered/Discipline
g. Other Experience and Qualifications relevant to the proposed project:	g. Other Experience and Qualifications relevant to the proposed project:

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8. Work by firm or joint-venture members which best illustrates current qualifications relevant to this project (list not more than 10 projects).

a. Project Name & Location	b. Nature of Firm's Responsibility	c. Project Owner's Name & Address	d. Completion Date (actual or estimated)	e. Estimated Cost (in thousands)	
				Entire Project	Work for which Firm was/is responsible
(1)					
(2)					
(3)					
(4)					
(5)					
(6)					
(7)					
(8)					
(9)					
(10)					

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9. All work by firms or joint-venture members currently being performed directly for Federal agencies.

a. Project Name & Location	b. Nature of Firm's Responsibility	c. Agency (Responsible Office) Name & Address	d. Percent complete	e. Estimated Cost (In Thousands)	
				Entire Project	Work for which firm is responsible

10

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10. Use this space to provide any additional information or description of resources (including any computer design capabilities) supporting your firm's qualifications for the proposed project.

11. The foregoing is a statement of facts.

Signature: _____ Typed Name and Title: _____

Date:

GSA OC 75-10944

☆ U.S. GOVERNMENT PRINTING OFFICE : 1986 O - 155-707

STANDARD FORM 255 (Rev. 10-83)

APPENDIX F

GUIDELINES FOR DIRECT NONSALARY COST ITEMS, CONSULTANT CONSTRUCTION ENGINEERING AGREEMENTS, NEW JERSEY DOT

GUIDELINES FOR ACCEPTABLE ITEMS CHARGEABLE AS DIRECT NONSALARY COSTS

A. General

The following guidelines are applicable and consistent with the provisions of Federal Acquisition Regulations, Subpart 1-31.2 as modified by Subpart 1-31.105 for most Consultant Construction Engineering Agreements. The objective of these guidelines is to provide consistency and uniformity on the treatment of direct nonsalary and overhead items for all projects being done by a Consultant. These guidelines are also flexible, and if a consultant's normal practice is to include an item as direct nonsalary on all projects, it may be included as direct nonsalary on this project even though the item may be listed as overhead in these guidelines. In some instances because of the structure of the Consultant's Accounting System, there may be conflicts with the requirements of Federal Acquisition Regulations. When conflicts exist, the requirements of the Federal Acquisition Regulations prevail (e.g., when items are charged as direct nonsalary costs to this agreement, similar types of expenses must be identified and segregated in the firm's records for all projects, including fixed-price type agreements). If this is not done, these expenses may not be claimed as direct nonsalary costs and may only be recovered in overhead. In case of any difference in the interpretation of these guidelines, the matter shall be submitted through the Regional Construction Engineer to the Chief Engineer (Construction & Maintenance) who shall review and issue a clarification.

B. Transportation

1. Reasonable *on-the-job* mileage (exclusive of commutation) by Consultant-owned vehicles at a rate approved by the State.
2. Reasonable *on-the-job* mileage (exclusive of commutation) by non-Consultant-owned vehicles at the lesser of either the rate paid by the Consultant or the rate approved by the State.

C. On-site Visits by Consultant's Management Personnel

Reasonable travel expenses based on the State's Rules and Regulations and direct technical labor for one person above the Resident Engineer will be reimbursed for consultant initiated visits to the project site. Such visits shall be limited to a total of eight hours per month.

In addition, reimbursement will be made as described above for all visits to the site specifically requested by the Regional Construction Engineer or additional visits specifically authorized by the Regional Construction Engineer.

D. Communications

1. Telephones—Generally, telephones are provided and paid for at the job site by the State's Contractor under the contract item Field Office Telephone Service. The phone is provided to facilitate the technical and administrative communications necessary to adequately and timely supervise the contract. The phone is not there for the Consultant's use to manage his business nor for the personal use of the State's and the Consultant's employees. The Consultant should strive for the reasonable use of the telephone within the intended purposes stated above. In the event that the reasonable use of the telephone is abused, the Regional Construction Engineer shall investigate and may direct the Consultant to initiate a telephone-usage-monitoring system. The following guidelines are to used for all telephone calls:
   a. Technical Telephone Communications
      (1) From the Consultant's Main Office are acceptable as overhead costs.
      (2) From the Field Office are acceptable as charges against the item Field Office Telephone Service.
   b. Administrative Communications or Communications Having to Do with Personal Matters
      (1) From the Consultant's Main Office are acceptable as charges only in overhead.
      (2) From the job site to the Consultant's Main Office are to be made collect and are chargeable to overhead only.
   c. Personal Phone Calls
      (1) From the Consultant's main office are not acceptable for charges (anytime).
      (2) From the Field Office are not acceptable against the item Field Office Telephone Service and should be made collect, or by credit card.
2. Mail, Parcel Post, and Other Delivery Charges—All delivery charges for both technical and administrative materials are acceptable as overhead.

E. All Other Equipment

This would fall into three general categories unless other reimbursement conditions for unique and/or very costly equipment are agreed upon at the time of negotiations.

1. Tools of the Trade—These have a long life span. Depreciation on these tools of the trade would be acceptable in overhead.
2. Expendable Technical Equipment—That is equipment that would be expended during the life of the agreement. This equipment would be acceptable as a direct nonsalary cost.
3. Office Supplies—That is all supplies that are normal to the operation of any office would be acceptable only as an overhead cost.

As specific indications of the general comments above, the following equipment would be considered under each of these categories:

   a. Tools of the Trade: (Depreciation Overhead)
      1. Cameras and camera equipment

2. Measuring equipment such as plumb bobs, steel tapes
3. Testing equipment such as air meters, slump cones, and rods, etc.
4. Drafting equipment such as scales, triangles, drafting sets, templates, protractors, etc.

b. Expendable Technical Equipment: (Direct nonsalary)
1. Film and its development
2. Plumb bob points and cord
3. Cloth tapes, six-foot rulers (no more than 1 per inspector)
4. Asphalt thermometers and concrete thermometers

c. Office Supplies: (Overhead)
1. Company letterheads
2. Scratch pads
3. Pens, pencils and erasers
4. Clip boards
5. Pencil sharpeners
6. Cellophane tape
7. Staplers, hole punches, etc.

d. Personal Equipment: Equipment such as rain gear, cold-weather clothing, boots, gloves, safety shoes, if provided by the consultant in normal practice, may be acceptable as an allowable overhead cost subject to the limitations of FAR 1-32.2.

F. Other Specialized Technical Charges, which will be acceptable as direct nonsalary costs—any special technical equipment specifically noted in the direct nonsalary cost breakdown by mutual agreement.

G. Miscellaneous

Sublet services are reimbursable as direct nonsalary cost.

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.

The Institute of Medicine was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Samuel O. Thier is president of the Institute of Medicine.

The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purpose of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Frank Press and Dr. Robert M. White are chairman and vice chairman, respectively, of the National Research Council.

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National Research Council
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