ACEC/PA

American Council of Engineering Companies
of Pennsylvania

SELECTING THE RIGHT ENGINEERING FIRM

ACEC/PA
2040 Linglestown Road, Suite 200
Harrisburg, PA 17110
Phone: (717) 540-6811 Fax: (717) 540-6815
www.acecpa.org

Selecting the Right Engineering Firm

The Importance of Good Engineering

The most important ingredient in any construction project is its design. The quality of design from concept through completion is the single most important factor in determining a project's "life cycle" cost - the cost of design, construction, and the ongoing costs for operation and maintenance.

While design is the first step in the construction process, it dictates everything that follows: the size and layout of the facility; type of construction materials, capacity of mechanical and electrical systems; energy efficiency; and other factors. It's unfortunate, but true, that not even the best contractor using the finest construction materials can overcome the effects of poor design.

A sound engineering solution is particularly the most important ingredient in projects that do not directly involve construction. Management systems, maintenance programs, computer systems, studies and reports require the application of services provided by a qualified consulting engineer to protect the interest of the owner.

Qualifications-Based Selection (QBS) is a process that enables the project owner to obtain the services of a highly qualified engineering professional at a fair and reasonable cost, an investment in quality which will result in substantial savings over the life of the project.

Who is a Consulting Engineer?

A consulting engineer is a professional engaged in the practice of engineering. The consulting engineer may be an individual, or may be a firm with several or many employees. The consulting engineer is an independent business whose profits and income are subject to taxation in the community.

The consulting engineer is technically qualified by education and experience, and motivated by personal responsibility and professional integrity, to confine practice within capabilities. Because of the importance of qualifications and experience, the consulting engineer is registered, through examination and licensing as a professional engineer in the state or states in which he practices, and accepts legal responsibility for services performed.

The consulting engineer performs services for a fee. The engineer's services involve analysis, surveys, planning, design and implementation. The engineer is the technical expert acting on behalf of the owner. In addition to satisfying the economic interests of the owner, the engineer is also concerned with performance of systems, cost of operation, and continuity and reliability of service.

The consulting engineer believes that the separation of planning and design from actual construction and supplying of equipment is in the owner's best interest. As a ready reserve for management, the consulting engineer presents these advantages:

1. The consulting engineer has unique knowledge and experience of a broad range of project requirements and systems.
2. The consulting engineer is an independent professional - the engineer's judgment of methods, materials and manpower is objective.
3. The consulting engineer's goals are the owner's goals - to provide a successful project at reasonable cost.
4. The consulting engineer is flexible and mobile. The engineer is available when special engineering counsel is required.
5. The consulting engineer reduces the need for the organization and administration of an internal engineering staff formed to meet only peak load projects or specialized problems.
6. The consulting engineer builds professional stature and reputation on the successful completion of every project undertaken.

Services Offered by Consulting Engineers

Generally, consulting engineers are available to perform the following services:

1. Advice regarding investigations required to determine the feasibility of proposed projects, including the preparation of analysis, cost estimates and reports;

2. Collection of data such as topographic surveys, characteristics of subsurface materials, traffic census, origin and destination studies, manufacturing processes and related information;

3. Preparation of designs, construction contract plans, specifications and final cost estimates;

4. Assistance in advertising for construction bids and advice regarding award of contract;

5. Assistance during construction with interpretation of plans and specifications, reviewing shop drawings, and approval of periodic and final payments to construction contractors;

6. Resident engineering services during construction;

7. Observation of completed construction and supervision for performance tests to determine conformance with plans and specifications;

8. Preparation of record drawings of construction;

9. Assistance during initial start-up operations;

10. Contract operations services;

11. Consultation and other related technical and professional services. In addition to the general consulting services listed above, most consulting engineers have specific qualifications in a number of specialties. Contained in the ACEC/PA directory on the web site at www.acecpa.org is a listing of consulting engineering firms.

Consulting engineers stand ready to provide for future growth that may be indicated and to ensure economical, efficient projects at reasonable cost, both initial and operational.

Owner Responsibility

Every successful project is a team effort, involving the skills, ability and responsibility of the owner, engineer and contractor. The consulting engineer expects the owner to assign a responsible management representative, with authority to make required decisions and who will work with the engineer throughout the project. The owner also needs to have clearly stated project goals and objectives, to establish realistic criteria for future additions or expansion, and to provide an adequate and workable financial budget.

Why use Qualifications-Based Selection (QBS)?

Every problem or project is unique, with its own technical challenges. Yet, at the outset of most projects, it is difficult for the owner to fully grasp the complexities of the project or the variety of engineering services that will be required to develop a solution. The qualified consulting engineer fills these needs for the owner.

The consulting engineer serves as the agent of the owner, representing the owner's interests in day-to-day dealings with contractors, suppliers, equipment manufacturers and others providing goods and services on the project. For this reason it is vital that the owner and engineer share a professional relationship characterized by trust, respect and effective communication.

QBS fosters this type of relationship by bringing the owner and engineer together as a team, enabling them to define the project in detail and agree upon the services that will be required to make the project a reality. No wonder, then, that QBS is the most used procedure for selecting a consulting engineer.

Since 1972, all agencies of the Federal government have been required to use the QBS procedure for selecting design professionals. Nearly 40 states also mandate the use of a similar procedure.

In recommending the use of Qualifications-Based Selection by state and local governments, the American Bar Association says:

> *"The principal reasons supporting this selection procedure for architect, engineer and land surveying services are the lack of a definitive scope of work for such services at the time the selection is made and the importance of selecting the best qualified firm. In general, the architect, engineer or land surveyor is engaged to represent (the owner's) interest and is, therefore, in a different relationship with the (owner) from that normally existing in a buyer-seller situation. For these reasons, the qualifications, competence, and availability of the most qualified architect, engineer or land surveyor firm is considered initially, and price negotiated later."* – ABA

The consulting engineer should be selected only after an appropriate assessment of his or her qualifications for satisfying the project requirements. The engineering activities and services required in our expanding society, accompanied by the current technological explosion, requires the engineer to offer a great diversity of engineering talent and service to meet the owner's demands.

Selecting a Consulting Engineer

Selection of a consulting engineer should be guided by one primary consideration - the qualification of a consulting engineer for the project. The owner should approach the selection of a consulting engineer with the same attitude that would apply to the choice of a doctor or lawyer. Skill, availability, reputation and experience are all factors to consider, but beyond these, the owner should seek, in the consulting engineer, the professional characteristics of objectivity and devotion to the owner's personal interests.

The Qualifications-Based Selection process typically includes the following steps:

1.	Prepare Request for Qualifications
2.	Evaluate Submittals
3.	Conduct Site Visitation
4.	Interview Firms
5.	Rank The Firms
6.	Negotiate a Contract

If the owner has previous experience with a consulting engineer who has rendered satisfactory service for comparable projects, the owner may consider it unnecessary to go through the procedure outlined herein. Otherwise, the owner should proceed as follows:

1. IDENTIFICATION AND REQUEST FOR QUALIFICATIONS

Directories of engineering firms are available from the ACEC/PA office to help identify compatible firms. In addition, the announcement of the proposed project may be made in an official publication, in the general press, or ACEC/PA's weekly project bulletin "DESIGN NEWS SERVICE". A Request for Statements of Qualifications typically includes an indication of the type of project to be designed; the scope of services required; budget and/or time constraints; evaluation criteria; the form in which statement of interest and qualifications are to be submitted; and the submittal deadline. and the submittal deadline.

To simplify the task of comparing the relative qualifications and experience of various firms, many owners have adopted the use of a standard form for engineers to use in providing this information, such as the Federal Form-SF 254 and SF 255.

These forms provide an overall profile of the firm including size, experience, volume of business, areas of specialization, the firm's experience with projects of similar type, and the special expertise of personnel who would be assigned to the project. The owner may request the consulting engineer provide the additional detailed information in specific response to the request for proposal, including references.

2. EVALUATION

Evaluation of submittals is the next step in the selection process. Evaluation criteria generally include relevant experience and specific expertise; performance references on previous projects; qualification of consultants and availability of key personnel; and, current and projected workloads that would affect the firm's ability to perform the required work on schedule. The purpose of this preliminary evaluation is to select a manageable number of firms for personal interviews. The number of firms to be interviewed depends in part on the size, scope and complexity of the project, the number of qualified submittals and also on the time available to complete the selection process.

Great care should be taken in pre-screening to select the best firms to be interviewed for specific projects. The final selection can only be as good as the original screening. Since each firm should be given sufficient time - usually 45 minutes - to present its qualifications and since interviews may represent a considerable investment in travel and/or the commitment of time for the firm's personnel, only those that appear qualified to take on the project should be interviewed. Pre-screening to limit the number of interviews to four or fewer is clearly to the advantage of the owner as well.

Those firms invited to interview should be given as much advance information as possible about the project, the size and makeup of the interviewing panel, allocation of time for presentation and for a question/answer period, which is very useful to both the owner and the consulting engineer.

3. CONDUCT SITE VISIT

It is recommended that for the short listed firms a site/facility visitation be scheduled. This should take place at least two weeks prior to the interviews to allow the consulting engineer to observe the situation and ask questions before they finalize their presentation for the interview.

4. INTERVIEW FIRMS

Interviews are conducted after the evaluation process has identified three or four firms with the appropriate experience and qualifications for the project. The interviews provide an opportunity to compare the different approaches to the design process and interpretations of the specific program to serve the owner's needs. Interviews also allow for the comparison of the personal styles of each firm's managers and key personnel - an important consideration, since the firm selected will be closely associated with the owner's staff over a period of months or years. For that reason, owners should request that key personnel who will actually be assigned to the project appear at the interview.

5. RANK THE FIRMS

Ranking of the top firms to identify the best qualified firm is the next step. Ranking criteria might include such items as design ability and experience of the firm and the individual assigned to the project, demonstrated interest in the project, conveyed understanding of the unique requirements of the project, relevance of previous projects presented during the interview, availability of key personnel, schedule and budget performance on previous projects. Discussions with the top-ranked firm then follow to confirm its ability to perform the necessary services, on time, within budget and at the expected level of quality and further refine performance requirements.

6. NEGOTIATE A CONTRACT

Some owners mandate the method of compensation such as a percentage of construction costs, hourly rates, lump sum or some other formula. However, it is important to understand that design professionals base their compensation on their anticipated direct and indirect costs for providing the anticipated services, plus a normal profit margin. Thus, if the fee requested by the top-ranked firm is higher than the amount the owner can or will pay, it is reasonable and proper to review the scope of services to determine whether all the services requested are in fact necessary. If agreement on the scope of services and compensation cannot be reached, negotiations with the first-ranked firm are formally terminated, and the owner enters into negotiation with the firm that was ranked second and repeats the process.

Before negotiations and the signing of any agreements, there should exist between owner and consulting engineer a clear understanding of their individual and mutual responsibilities concerning the nature and extent of the services required. After a firm has been selected and consulting fees and the extent of services determined, an agreement should be signed.

Compensation for engineering services may be calculated or established by a variety of methods. Among those most commonly used are:

- Lump sum.
- Cost plus a fixed fee.
- Salary cost times a factor, plus incurred expenses.
- Per Diem.

Standard forms of agreement between the Owner and Engineer are available from the American Council of Engineering Companies (ACEC) phone: 202-347-7474 for adaptation to a particular project.

Working with the Consulting Engineer

The best service is provided when the consulting engineer has full information regarding the project at the outset. The Where, When, How and Why of the task are the tools with which the consulting engineer must solve the problem.

Achieving the greatest value from the consulting engineer is largely a matter of providing full information, clearly defining responsibilities and establishing workable lines of communication.

Similarly, the consulting engineer's assignment on the project must be clearly drawn. Is the engineer's work restricted to one phase of the project? Is the engineer to submit budget estimates? Is the engineer to recommend specific materials and equipment? Is the engineer to select the building site? Is the engineer to work with an architect? The spelling out of the consulting engineer's exact responsibilities will assure more efficient and economical service and eliminate misunderstanding.

It is important that liaison with the consulting engineer be assigned to the proper official within the owner's organization, so that communications between the consulting engineer and owner are consistent and prompt. It is equally important to bear in mind that the consulting engineer is a registered professional engineer. Maintenance of a professional relationship between owner and consulting engineer will assure a most satisfactory and successful result.

Sample Forms

Sample Forms for use in the selection of the right consulting engineer are attached as Appendix A-E. The forms should be modified to meet the specific requirements of the owner.

Additional Information

For additional information on selecting the right consulting engineer or to receive personal assistance in setting up a QBS selection procedure, contact:

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Fax: (717) 540-6815

Appendix A

Preliminary Scope of Service

(Model Form)

Name of Project _____
Project Owner _____
Project Location _____
Contact Person _____
Address _____
_____
Phone _____

Project Description _____
_____
_____
_____

Total Budget _____

Source of Financing _____

Project Schedule:
Planned Date of Design Start-up _____
Planned Date of Design Completion _____
Planned Date of Construction Start-up _____
Planned Date of Construction Completion _____

Site Requirements or Restrictions _____
_____
_____

Professional Services Required _____
_____
_____

Attachments:

Feasibility Studies
Land Surveys
Other Information

Appendix B

Invitation to Submit a Statement of Professional Qualifications

(Model Form)

To: (Name of Firm)

From: (Individual & Title)
(Name of Owner)

Subject: Invitation to Submit Statement of Professional Qualifications

Project: (Name of Project and Project Number)

The (Name of Owner) will retain an engineering firm to perform engineering and related services for (Name of Project).

Your firm is invited to submit its statement of Professional qualifications to become eligible for an interview that could lead assignment of the project. It is our intention to review the statements of qualifications and select (number) firms for further consideration. The short listed firms will be given tours of the project site and granted interviews prior to final selection of an engineering firm.

Your statement should include:
(List information that should be included)

Statements of Qualifications must be received by 5:00 p.m. on (date). Statements of qualifications received after the stated date and time will not be considered.

Statements of Qualifications should be transmitted to:

Name: _____
Title: _____
Address: _____
_____
Phone No. _____

Appendix C

Statement of Qualifications Evaluation Form

(Model Form)

Project _____Name of Reviewer _____

Engineering Firm _____

Criteria	Rating	X	Weight *	=	Score
1) Firm's history and resource capability to perform required services					
2) Evaluation of assigned personnel					
3) Related experience (as appropriate) design services, construction coordination, etc.					
4) Cost controls experience and results					
5) Familiarity with local area geography and facilities					
6) Ability to relate to project requirements					
7) Analysis of subjective statements applicable to the project					
8) Reference check (quality, ability to control cost and meet schedule, communication)					
9) Other _____ _____ _____					
Total Score					

Rating Key: 1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent, 5 = Superior

*Weight of criteria should be determined from a consensus of all selection team members from 1 to 10 depending on the importance of the criteria to the project.

Appendix D

Design Firm Reference Check

(Model Form)

Project Name _____

Engineering Firm _____

Reference information:

Owner _____Person referenced _____

Address _____Person Contacted _____

Phone _____

1. What was your project? _____
2. When was it completed? _____
3. What did they do for you? (planning, design, construction services)_____

_____

4. Name of firm's representative you worked with most closely _____

_____

	Excel 4	Good 3	Fair 2	Poor 1
5. What is your overall evaluation of the quality of the work performed by the firm?				
6. How would you rate the firm's performance in terms of meeting schedules and deadlines?				
7. Was the budget, cost control and financial administration within planned controls and limitations?				
8. How would you rate the firm's overall attitude and ability to communicate and work cooperatively?				

Grand Total _____

Add each firm's score following the reference check and then transfer to the statement of qualifications Evaluation form as a line item on the firm's evaluation sheet.

Appendix E

Evaluation Form of Short Listed Firms

(Model Form)

Name of Project _____

Name of Design Firm _____

Name of Evaluator _____

	Possible Points	Points Awarded
1. Grasp of Project Requirement Firms analysis , interview preparation & level of interest.	**10**	
2. Design Approach/Methodology Technical alternatives, creativity, problem solving ability.	**20**	
3. Project Management Proposed project schedule, cost controls.	**15**	
4. Key Project Personnel Qualifications & experience of project manager and other key personnel.	**20**	
5. Project Design Team Sub-consultants who would be made part of the design project team.	**10**	
6. Firm responsiveness Plan for project reports, general attitude and ability to communicate.	**10**	
7. Experience Similar project experience, familiarity with state and local regulatory agencies.	**15**	
	Total Score	

Notes: _____

_____

_____