

Selecting quality consulting engineers for multi-discipline engineering projects

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The selection of a consulting engineer and construction contractor is a critical undertaking that must be done with utmost care to achieve the client's expectations of quality outcomes in the completed project. The selection process of an engineer and a contractor depends on the project delivery method that the client proposes to use for the execution of the project. The most widely-used project delivery method by clients is 'Design-Bid-Build', whereby a client separately engages a consulting engineer for the planning, design and supervision, and a contractor for the construction. Another project delivery method is 'Design-Build,' also referred to as Engineering, Procurement and Construction (EPC), in which a client engages one entity (or consortium) for the engineering design and construction. There are also other project delivery methods such as Construction Management At-Risk. This paper focuses on the criteria for selecting the consulting engineer for the planning and design of complex multi-discipline engineering projects such as ports and harbours to achieve quality outcomes of the completed project.

The consulting engineering industry remains largely responsible for the planning, design, inspection and management of the infrastructure needed to meet the world's ever increasing demand for food, water, sanitation, shelter, health services, transportation and energy. On a daily basis engineers tackle the problems of how to improve peoples' lives while preserving natural resources in a world with a growing population.

A certain degree of mystery surrounds the expertise offered by the consulting engineer, together with a lack of understanding of the fine balance of art, science and skilled judgment that is engineering. Some clients regard engineering services as another commodity that can be provided by the lowest bidder; others are required by law or other procurement regulations to use prescriptive tender and selection procedures that focus on deliverables and price. In either situation, the resulting impact is that of diminished quality of the completed project. Few, if any, of these procedures, however, acknowledge the underlying value of the consulting engineer's expertise – that of a trusted advisor.

The paramount importance of the selection of the right consulting engineer for each project is widely acknowledged. This holds true for any project, but even more so for large multi-discipline projects, whether it is the complex design of a new port involving dredging, breakwaters, piers and wharfs, roads, buildings, power generation, water supply, etc., or the reconstruction of an aging port. Selecting the right consulting engineer ensures that the owner's project objectives are met with the lowest project life-cycle cost. The International Federation of Consulting Engineers (FIDIC), in its publication 'Guidelines for the Selection of Consultants' recommends that the consulting engineer should be selected on the basis of the firm's professional competence and experience, managerial ability, availability of resources, professional independence, fairness of fee structure, professional integrity and quality management systems. FIDIC further recommends that the

'overriding concern should be the maintenance of appropriate quality of the professional services provided with due attention to suitability of purpose, economy and value, sustainability, efficiency, integrity, management of risks, public welfare, fair opportunity for all consulting firms and transparency of processes.' The selection method that achieves these objectives is Quality-Based Selection (QBS).

Background information

To FIDIC and the Multilateral Development Banks, QBS means Quality-Based Selection, a definition that covers both the qualifications of the client and consulting engineer in the selection process. In the United States, QBS means Qualifications-Based Selection, focused primarily on the qualifications of the consulting engineer in the selection process. Regardless of the specific definition of the acronym, QBS means a selection process by which the client selects the design firm deemed to be most qualified by objective criteria as opposed to the selection processes that allow the client to select the firm that either proposes the lowest price for providing engineering services, Cost-Based Selection (CBS) or by a combination of qualifications and price, Quality and Cost-Based Selection (QCBS).

The procurement of engineering services is one of the most important aspects of, and has the greatest impact on, ensuring quality in the constructed project. The client's challenge is to get a good 'return on investment' in design services. This can be achieved by selecting the best qualified design firm and negotiating the appropriate scope of work and fee with a view to obtaining the optimum benefits of a successfully constructed project. The impact of the engineer's efforts on innovations, exploration of alternatives, life-cycle costs and public safety is most critical to the project success.

The design professional is in a unique position to assist the client with both the scope of the project and the services required to fulfil the client's needs. The best way to develop a complete scope of services that fully meets the client's needs is through interaction between the selected design professional and the client. QBS has the advantages that:

- The best qualified firm is selected;
- A scope of services satisfactory to both parties is negotiated;
- A mutually agreed-upon fee is paid for the services; and
- A team approach between the client and the selected firm can be developed so that both parties have an interest in the project's success.

History of QBS in the United States

QBS is the most widely endorsed method by which public clients select design professionals in the United States. In 1972, the United States Congress passed the Brooks Act (P.L. 92-582), which established a QBS procedure for the procurement of design services for public works projects.

Section 902 of P.L. 92-582 states:

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

Forty-four states have adopted statutes modelled after the Brooks Act requiring the QBS process on publicly funded state projects. Particularly because of concerns for public health and safety, the QBS process has long been enthusiastically supported by every professional engineering society.

The QBS process in the United States

The QBS process in the United States generally includes the following steps:

1. Public announcement (newspapers, bulletin boards, websites, federal publications, etc.) of projects, including a basic description of the projects and prioritised listing of criteria to be used in the evaluation and ranking of the submissions.
2. Full and open competition based on a careful review and evaluation of the responding firms’ capabilities, experience, technical skills and personnel.
3. Discussions/interviews with the top-ranked firms (generally no more than six) regarding anticipated concepts and alternative methods.
4. Ranking of the most qualified firms in order of preference.
5. Negotiation of a fair and reasonable fee with the top-ranked firm based upon the agreed upon scope of services. On federally funded projects, the ‘design fee’ is limited to a maximum six per cent of the estimated client budget for the project with additional fees for surveys, geo-technical investigations and shop drawing reviews.
6. Failing agreement, formal termination of the negotiations, and an invitation to the next-ranked firm to undertake negotiations. This process is continued until an agreement is successfully concluded.

The FIDIC recommended QBS process

QBS is the preferred method recommended by FIDIC for procurement of engineering services. The process is generally similar to the United States process and includes the following

steps as shown in Figure 1:

1. Announcement and pre-qualification (long listing) involves the establishment of a list of consulting firms which appear to be qualified for the project.
2. Short listing involves the selection of from three to six firms (three or four for complex projects) from the long list of firms that best meet the qualifications and experience required for the project.
3. Request for proposals (RFP) is the stage in which the client formally writes to each of the firms on the short list and invites proposals. The RFP normally contains the Letter of Invitation, Terms of Reference (TOR), Information to Consultants (ITC), and the proposed Agreement for the engagement. The TOR should contain information on the scope of services that should be compatible with the client’s budget.
4. Preparation and submission of proposals.
5. Evaluation of proposals. This is usually undertaken by a selection committee formed by the client. The selection committee has the responsibility to systematically evaluate and rank the proposals in order of preference against the selection criteria outlined in the RFP. Figure 2 summarises FIDIC’s recommendations for scoring of the proposals at the evaluation phase.
6. Selection of the top-ranked firm (usually the firm with the highest overall technical score) and invitation for negotiations of an appropriate fee that is mutually agreed on. If agreement cannot be reached with the top-ranked firm, the negotiations are terminated and begun with the second-ranked firm. The process is repeated down the list until an agreement is reached.

Why use QBS?

Engineering services are unique

Engineering services are procured differently than services in other project phases. Generally, at the time an engineer is engaged on a project, the scope of the work has not been entirely defined; therefore, there are no specific parameters on which to base a price estimate. Price bidding only works when there is clearly a specified project scope, such as the construction phase.

The critical element in the design process is the creation of a collaborative spirit between professional and client. If price is an initial consideration, design professionals’ proposals will attempt to assume the client’s needs. Minimal standards will most likely

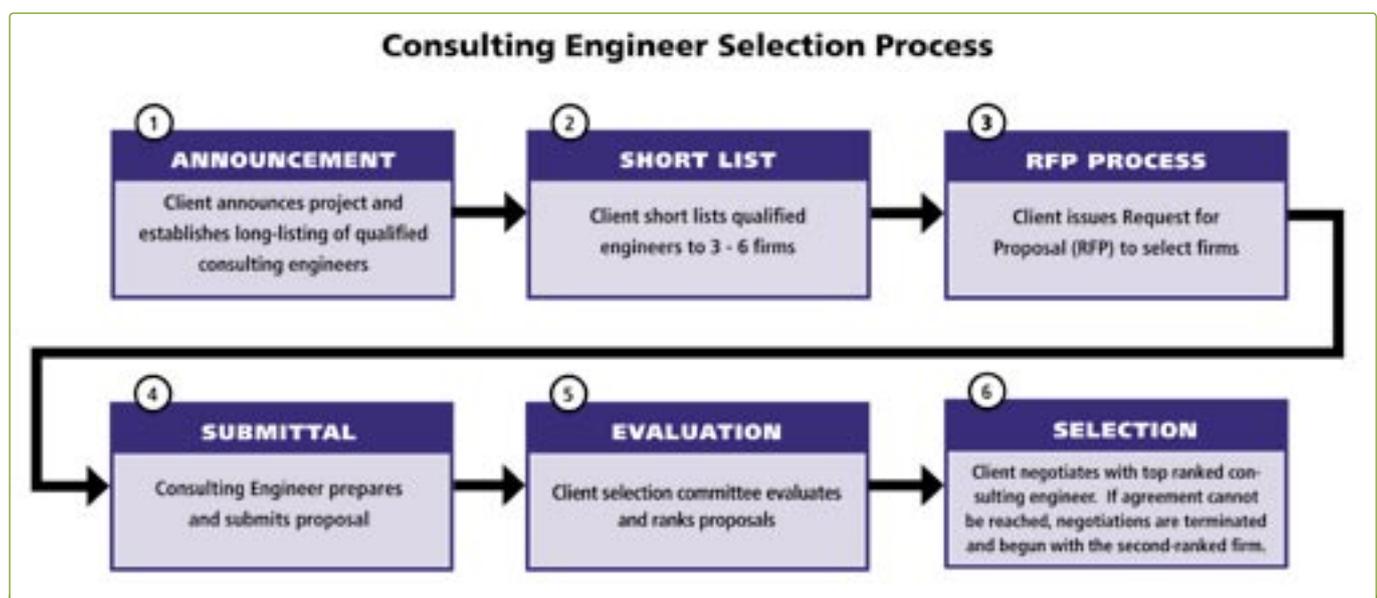


Figure 1. FIDIC recommended QBS process.

be used, because a firm cannot judge exactly what the client wants; advanced technologies or new features which could result in considerable cost savings over the life of the project may not be considered alternatives in the design in order to minimise design costs.

Long-term savings

A high-quality engineer’s design can have a dramatic savings effect on maintenance and operations over the life-cycle of a project. Even though the design fee amounts to only a small percentage (generally no more than 6 percent on federal work) of the overall project cost, the result of the engineer’s design can greatly impact the life-cycle costs.

When engineers compete for projects by the QBS method, price is considered; it is taken into account after the most qualified firm is selected. The Brooks Act procurement procedure for engineering services requires that the negotiated fee for the design firm must be ‘fair and reasonable.’ If the most qualified firm cannot agree with the client on a fee, the second most qualified firm is contacted for negotiations. This process continues until a ‘fair and reasonable’ fee is obtained.

Safeguarding public interest

Public health and safety considerations are at stake with public sector projects. There is a responsibility to the taxpayers to obtain the highest quality and safest project design possible. To assure that the highest standards are obtained, the QBS method is most suited for engineering services and helps to safeguard against abuses often found in the low-bid method of procurement. The QBS selection process creates six objective steps which a public client follows: public notice, submittals, review of submittals, ranking of respondents, negotiations, and engagement. All

evaluations for selection are systematic and consistent. This creates an accountable record of the public owner’s selection of the design professional.

Encourage competition

QBS is the most competitive and open form of procurement possible. The process is based on a firm’s ability to perform a job and not merely on the lowest price a firm can offer. Since each firm is reviewed with respect to the personnel that will actually work on a project, a small firm has the opportunity to match its design team against a larger firms’ design team. Additionally, the skills, experiences and specialisation of the firm and specific design team members are considered; not merely a firm’s number of employees or national reputation.

When following the Brooks Act procedures, request for design proposals are widely publicised. This encourages a large number of all sizes of firms to compete for federal projects. Far fewer design firms will compete for contracts under the price bidding method. Small firms cannot afford to submit the elaborate and expensive price proposals which are required to compete for projects.

Future challenges of QBS

It has been 33 years since Congress passed the Brooks Act and QBS became the law in the US. With the support of 44 states that have passed their own versions of the Brooks Act, QBS has become the cornerstone of the architectural and engineering industry in the US. Yet, despite this fact, QBS continues to face challenges at both the federal and state levels, prompting the industry to remain vigilant in its defence of QBS. The focus at the federal level has primarily been defensive actions to protect the Brooks Act. However,

EVALUATION CRITERION	PROJECT CATEGORY			
	Simple Project		Innovative – complex Project	
	Small – medium	Large	Small – medium	Large
COMPANY CHARACTERISTICS	70	50	10	30
<ul style="list-style-type: none"> • Similar experience • Quality Management System • Business Integrity Management System • Environmental Management System • Availability of Resources 				
MANAGERIAL CAPABILITY	20	25	40	35
<ul style="list-style-type: none"> • Organisation • Key personnel • Compliance with time schedule 				
APPROACH	10	25	50	35
<ul style="list-style-type: none"> • Methodology • Meaningful partnerships • Transfer of know-how • Innovation 				

Figure 2. FIDIC recommendations for scoring proposals.

at the state level, the fight has been more pronounced in an effort to have all 50 states adopt this law and expand it to the county and municipal level to ensure that all local procurement decisions are made using QBS. The future of QBS hinges on the success of these ongoing efforts.

Low cost, low bid procurement initiatives continue to have political appeal among some elected officials and, faced with a lack of balanced information, voters may be prone to respond favorably to these initiatives. If QBS is to survive in this political environment, the industry must continue to educate policymakers and the general public that procuring engineering services based on qualifications is the surest way to safeguard the public interest and ensure that tax dollars are well spent.

Summary

The main advantage of QBS is that the design professional and the client work in a collaborative spirit to maximise the quality, value, cost effectiveness and usefulness of the final product. Design professionals believe strongly that their services should be selected on the basis of qualifications and competence. This widely accepted method, adhered to by the federal government and 44 states, provides for vigorous and open competition among design firms in the areas of personnel, experience, prior performance, and technical skills. Using QBS can assure the acquisition of the most capable professional, while at the same time obtaining a price that is 'fair and reasonable' to the client.

ABOUT THE AUTHOR



Gregs Thomopoulos is President & CEO of Stanley Consultants, Inc., an international consulting engineering company headquartered in Muscatine, Iowa USA. The organisation, founded in 1913, has successfully completed more than 23,000 engagements in all 50 states and 93 countries and is ranked among the largest engineering companies in the United States and internationally.

He is a member of the Executive Committee of the International Federation of Consulting Engineers (FIDIC) and Chair of its Business Practices Committee. He is also Chair of the International Committee of the American Council of Engineering Companies (ACEC).

Gregs has a Bachelors degree in civil engineering from the University of Kansas, and a Masters degree in Structural Engineering and Structural Mechanics from the University of California, Berkeley. He was awarded Doctor of Humane Letters, Honoris Causa, by Teikyo Marycrest University, Davenport, Iowa, in 1996.

He joined Stanley Consultants 1965 and subsequently spent 10 years on various assignments for the company in West Africa and East Africa before returning to the firm's corporate headquarters in 1978 as a Vice President and Head of the company's International Division. He was elected President of the firm in 1987.

He is a Licensed Professional Engineer in 14 States and Puerto Rico, and is a Fellow of the American Council of Engineering Companies (ACEC) and the American Society of Civil Engineers. He is also a member of the Iowa Engineering Society and the National Society of Professional Engineers.

ABOUT THE ORGANISATION

The **International Federation of Consulting Engineers (FIDIC)**, was founded in 1913 to represent internationally suppliers of technology-based intellectual services for the built and natural environment. Based at the World Trade Centre 2, Geneva Airport, Switzerland, the federations is charged with promoting and implementing the industry's strategic goals on behalf of 73 national Member Associations representing most of the private practice consulting engineers in the world. These number some 650,000 professionals working in 44,000 firms that provide services on a fee for service basis in a industry with an annual turnover of some USD 170 billion. Member firms endorse FIDIC's statutes and policy statements and comply with FIDIC's Code of Ethics which calls for professional competence, impartial advice and open and fair competition. FIDIC is widely recognised as the main provider of standard forms of contract for infrastructure and consulting services. These complement a broad range of business practice publications, the organisation of the industry's premier annual conference and a major programme of capacity building training courses and seminars. FIDIC is also charged with representing the industry in contacts with multilateral development banks and international agencies.

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