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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP SYNTHESIS 390

**Performance-Based Construction Contractor
Prequalification**

A Synthesis of Highway Practice

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SUBJECT AREAS

Planning and Administration and Materials and Construction

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in Cooperation with the Federal Highway Administration

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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FOREWORD

Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, “Synthesis of Information Related to Highway Problems,” searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

*By Jon M. Williams
Program Director
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Research Board*

Performance-based construction contractor prequalification seeks to add contractors’ past performance to the prequalification process. Performance criteria may include construction quality, keeping to schedule, and safety record. This report summarizes experience and practice of state transportation agencies and includes information from non-transportation construction. The focus is on design-bid-build projects; however, there is also information on design-build and construction manager/general contractor projects.

Information was gathered through a literature review augmented by content analyses of administrative prequalification documents and Requests for Qualifications. A survey was administered to state transportation agencies and Canadian provincial transportation agencies. Finally, structured interviews were conducted with construction contractors to obtain an industry perspective.

Douglas D. Gransberg and Caleb Riemer of the University of Oklahoma collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

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PERFORMANCE-BASED CONSTRUCTION CONTRACTOR PREQUALIFICATION

SUMMARY Performance-based contractor prequalification goes beyond the financial prequalification provided by the surety industry when it issues a bond in conjunction with a public transportation project and includes a contractor's performance record in the prequalification process. A contractor with a marginal track record but the same level of financial assets will receive roughly the same bonding capacity, and hence the same opportunity to bid, as another contractor with a record of exemplary performance. This creates a situation in which the agency is subsidizing marginal performance, which in turn reduces the incentive for top performers to continue to superior performance. Therefore, a contractor prequalification system that directly rewards good past performance and encourages poor performers to improve is needed to rectify this unintended consequence.

The objective of this synthesis is to identify and synthesize current contractor performance-based prequalification practices based on construction quality, timely performance, safety record, and other criteria. Its focus is on traditional design-bid-build projects, but because the evaluation of qualifications is an important aspect of alternative project delivery methods, it also looks at state departments of transportation (DOT's) experience in design-build and construction manager/general contractor projects as well. Finally, it identifies those systems that have effectively been implemented in a manner that *furnishes an incentive for good contractor performance, while influencing marginal contractors to improve their performance to remain competitive in the industry, and adds value to the completed construction project.*

In addition to a rigorous literature review, the synthesis is based on new data from a survey, a set of structured interviews, case studies, and two content analyses. A general survey on performance-based contractor prequalification provided 52 responses from 41 U.S. state DOTs and seven Canadian provincial ministries of transportation. A content analysis of administrative prequalification documents from 43 U.S. states was conducted. Another content analysis of request for qualifications documents from 107 sets of performance-based prequalification request for qualifications (62 transportation projects and 45 non-transportation projects) from 27 states and two Canadian provinces also was conducted. For further verification, structured interviews with 10 construction contractors from nine states and one Canadian province were conducted to obtain the industry perspective on this subject. Finally, four case studies from different states were conducted to furnish specific information on performance-based contractor prequalification systems that had been implemented.

The synthesis' conclusions covered the gamut of contractor prequalification issues from the current administrative forms to post-project evaluation. They are as follows:

- The survey results and the prequalification form content analysis found that many factors used in performance-based prequalification are contained in the current administrative prequalification process. Therefore, the transition from a system of administrative prequalification only to performance-based prequalification could be accomplished smoothly.

- Bonding did not carry the weight in both administrative and performance-based prequalification processes as the other factors listed in this research. Three of the analyses looked at how often bonding, sureties, and insurances were required and found that they occurred on average less than 10% of the time. This is probably because agencies require these instruments to be submitted at project award. These findings contradict the “conventional wisdom” found in the literature that bonding capacity can be substituted for prequalification. In fact, the majority of U.S. DOTs and Canadian ministries of transportation (23 of 41 and 6 of 7, respectively) stated that they do not believe that a performance bond is an adequate substitute for prequalification. Thus, the synthesis concludes that the “soft” factors related to managerial competence and past performance are more important to the prequalification process than the “hard” aspects related to bonding and financial status. Additionally, bonding and financial factors are best restricted to general administrative prequalification and later as project-specific prequalification factors applied at the time of contract award (see conclusion 5 for details).
- A rigorous post-project contractor performance evaluation system can replace many of the commonly used minor performance-based prequalification factors and thereby simplify the process.
- Many of the current performance-based contractor prequalification programs result in an adjustment to a contractor’s bidding capacity. These seek to create a disincentive to marginal work by reducing the total amount of work a contractor can compete for if its performance is not satisfactory. Ontario has replaced performance bonds with a rigorous form of performance-based contractor prequalification that saves the province about \$70 million Canadian dollars (CDN) annually on bond costs. This leads to the conclusion that a system could be devised to reward contractors with good performance records by adjusting or reducing the percentage of the contract amount that they have to bond. This adjustment would give these contractors an incremental financial edge over marginal contractors that would be required to bid the costs of fully bonding the project.
- The next conclusion is a synthesis of the entire project that found that performance-based contractor prequalification essentially consists of a three-tiered system. The first tier is primarily financial and mirrors the current administrative prequalification systems found across the nation in a simplified form. The second tier is performance based and includes post-project contractor evaluations, and the final tier consists of project-specific prequalification. The last tier primarily will apply to projects being delivered by alternative methods such as design-build and construction manager and general contractor, but also could be used on traditional design-bid-build projects for which specific contractor technical qualifications and past project experience are keys to project success. The final tier (i.e., short-listing) needs to be included as an option in the prequalification system to ensure that an agency’s prequalification program can be applied uniformly to all its projects without regard to project delivery method.
- There are few actual barriers to implementing performance-based contractor prequalification. Many highway agencies have some form of contractor performance evaluation in their system. Many have some form of performance-based prequalification as well. The perspective of the contractors interviewed for this report was receptive to implementing this system, because it reduces the number of marginally qualified contractors against which they must compete. Thus, it appears that both the highway agencies and their industry partners will benefit from this change if some of the minor administrative hurdles and perceived barriers to implementation found in chapter four can be eliminated or surmounted.

CHAPTER ONE

INTRODUCTION**INTRODUCTION**

The subject of construction contractor prequalification based on performance is one that evokes two opposing reactions within the transportation industry. On one side, the argument revolves around ensuring that only competent constructors with a track record of quality work are given contracts to do more work with precious public funds. The other side's argument revolves around the inherent subjectivity of the process in which the definition of "qualified" does not spring from the inherently objective comparison of bid price. It also argues that a potential "Catch-22" exists whenever a contractor must have specific experience to be deemed qualified and, as a result, will never be able to become qualified for specific types or classes of work. All state departments of transportation (DOTs) have some form of prequalification in the sense that administrative procedures must be satisfied before a contractor can be included on the agency's bidders list. This report will call such a procedure "administrative prequalification" to differentiate it from the subject of this synthesis, performance-based prequalification.

SYNTHESIS OBJECTIVE

The objective of this synthesis is to identify and synthesize current contractor performance-based prequalification practices based on construction quality, timely performance, safety record, and other criteria. Its focus is on traditional design-bid-build (DBB) projects, but because the evaluation of qualifications is such an important aspect of alternative project delivery methods, it also looks at DOT experience in design-build (DB) and construction manager/general contractor (CM/GC) projects as well. Finally, it aims to find those systems that have been implemented effectively in a manner that furnishes an incentive for good contractor performance, while influencing marginal contractors to improve their performance to remain competitive in the industry, and that adds value to the completed construction project.

In addition to a rigorous literature review, the synthesis is based on new data from a survey, a set of structured interviews, four case studies, and two content analyses. A general survey on performance-based contractor prequalification provided 52 responses from 41 U.S. state DOTs and seven Canadian provincial ministries of transportation (MOTs).

A content analysis of administrative prequalification documents from 43 U.S. states was conducted. Another content analysis of request for qualifications (RFQ) documents from 107 sets of performance-based prequalification RFQs (62 transportation projects and 45 nontransportation projects) from 27 states and two Canadian provinces was also conducted. For further verification, structured interviews with 10 construction contractors from nine states and one Canadian province were conducted to obtain the industry perspective on this subject. Finally, four case studies from different states were conducted to furnish specific information on performance-based contractor prequalification systems that had been implemented.

PERFORMANCE-BASED PREQUALIFICATION BACKGROUND

NCHRP has produced two research reports in recent years that deal with this topic. The first is *NCHRP Web Document 38: Quality-Based Performance Rating of Contractors for Prequalification and Bidding Purposes* (Minchin and Smith 2001). This is one of the more recent research studies of this issue. The second is *NCHRP Report 561: Best Value Procurement Methods for Highway Construction Projects* (Scott et al. 2006). Although the latter report focused on project delivery methods, it contained a large amount of information on project-specific contractor prequalification.

Review of NCHRP Web Document 38

The Minchin and Smith 2001 report details the development of a numerical model to measure contractor past performance and integrate it into the bidding scheme through the calculation of a "contractor quality factor." This factor is determined based on a numerical analysis of past performance. It is implemented through the A+C bidding scheme authorized in FHWA Special Experimental Program 14 (FHWA 1998b). Table 1 shows how this system is implemented by subtracting a value associated with the "contractor quality factor" (i.e., the "C" factor in A+C) from the actual bid price to create a "modified bid" upon which the award decision is made by awarding it to the lowest modified bid. In this example, the high bidder has the low modified bid as a result of receiving a high quality score.

TABLE 1
EXAMPLE OF A+C BIDDING USING THE CONTRACTOR QUALITY FACTOR

Contractor	Bid Amount	Quality Points	\$/Quality Point	“C” Factor	Modified Bid
A	\$2,175,000	91	\$10,000	\$910,000	\$1,265,000
B	\$2,200,000	88	\$10,000	\$880,000	\$1,320,000
C	\$2,225,000	97	\$10,000	\$970,000	\$1,255,000

Source: Minchin and Smith (2001).

The issue with this system is essentially the derivation of the value of a well-qualified contractor to a given project. *NCHRP Web Document 38* from which Table 1 is taken does not reveal how the value of a quality point was established in this example, and a search of the literature for a rigorous method to develop this value came up empty as well. This leads to the inference that the number was set arbitrarily using a measure of professional judgment as to how important this factor was in relation to the estimated cost of the example project. In Table 1, the value is set at \$10,000 per quality point. If this value had been set at \$8,300 per quality point (as shown in Table 2), Contractor A, the low bidder based on price alone, would have won even though they were less qualified than Contractor C. Thus, the system is shown to be sensitive to the value placed on the quality points. A 17% change in this value gives the project to the low bidder and essentially wastes the time and effort by both the DOT and the industry competitors to prepare, submit, and evaluate qualifications in this procurement. Nevertheless, a method similar to this one has been used successfully by at least one DOT, Arizona (Arizona DOT 1997), to procure a large DB project.

TABLE 2
SENSITIVITY ANALYSIS OF MINCHIN AND SMITH’S CONTRACTOR QUALITY FACTOR

Contractor	Bid Amount	Modified Bid At \$8,300/pt	Bid % from low bid	Modified Bid % Difference from low bidder @ \$10,000/pt	Modified Bid % Difference from low bidder @ \$8,300/pt
A	\$2,175,000	\$1,419,700	—	—	—
B	\$2,200,000	\$1,469,600	1.15%	4.35%	3.51%
C	\$2,225,000	\$1,419,900	2.30%	-0.79%*	0.01%

*A negative value indicates the project will be awarded to this contractor rather than the low bidder.

This issue of sensitivity to arbitrarily assigned numbers and weights is detailed in a 2003 paper on best value award algorithms, which is the formula by which DOTs calculate a number similar to the “modified bid” in Table 1. This study evaluated four DOT best value award algorithms and one used by FHWA and found that “when given the same set of input, the effect of the various selection methods is pronounced ... every responsive bidder [in Table 3] can be selected as the winning proposal depending on how the

best value metric is calculated” (Gransberg and Molenaar 2003). The proliferation of award algorithms leads to confusion in the industry. Confusion about how to win leads to reduced competition and increases the likelihood of bid protest (Parvin 2000). The issue is noted at this early point in the synthesis as a warning about the potential problems of implementing performance-based contractor prequalification systems that might create a false sense of objectivity through formulaic methodologies such as the one proposed in the *NCHRP Web Document 38*.

Review of NCHRP Report 561

The second major report was *NCHRP Report 561: Best Value Procurement Methods for Highway Construction Projects* (Scott et al. 2006). Although the focus of this study was much broader looking at numerous ways to award a highway project on a basis of other than price alone, it delved thoroughly into the use of qualifications and past performance, including both administrative and performance-based prequalification as one part of the procurement practice as evidenced by the following quotation:

Best-value procurement methods allow various elements to be considered in selecting a contractor on the basis of performance. Objective elements include contractor experience with similar projects, completion within schedule, compliance with material and workmanship requirements, timeliness and accuracy of submittals, and record of safety. Subjective elements include effective management of subcontractors, proactive measures to mitigate impacts to adjacent properties and businesses, training and employee development programs, corporate commitment to achieving customer satisfaction, and client

relations. These elements not only affect the ultimate performance and overall cost of the completed facility, but also contribute to the efficient execution of the work. Efficiency is very important to contracting authorities that are interested in a high level of public acceptance. It is also recognized that, because of constrained staffing and budgets, it is not possible for state agencies to “inspect” quality into the work. Therefore, a procurement process is needed that considers *value-related elements* in awarding contracts (Scott et al. 2006). [Emphasis added.]

using performance-based qualification factors in the selection process, the DOT can filter out unqualified contractors, thereby increasing the probability that the project will be completed successfully (Gransberg and Ellicott 1996). However, the key to successful “public sector application of qualifications parameters in a bid is the use of these parameters in the selection process, and their application must be justifiable and defensible” (Scott et al. 2006). This speaks to the

TABLE 3
EXAMPLE OF BEST VALUE SELECTION WITH FIVE TYPICAL AGENCIES

Firm	Technical Score	Time	Price Proposal ⁶	Indiana DOT Low Bid, Fully Qualified ¹	Arizona DOT Best Value with Quality Credit ²	South Carolina DOT Low Composite Score ³	Washington State DOT High Best Value Score ⁴	FHWA Best Value ⁵
A	92	450	\$11,880,000	\$11,880,000	\$10,573,200	129,130	77.44	*63.10
B	86	460	10,950,000	10,950,000	10,074,000	*127,326	*78.54	62.73
C	76	500	9,850,000	9,850,000	*9,554,500	129,605	77.16	59.14
D	74	500	9,760,000	*9,760,000	9,564,800	NR	75.82	57.99
E	68	500	*9,700,000	NR	9,700,000	NR	70.10	53.54

Source: Gransberg and Molenaar (2003).

NR = not responsive.

*Winning proposal.

¹Fully qualified: Technical score > 70.

²Arizona DOT quality credit calculated similar to Table 1.1 “C” factor.

³See equation (2) in reference; Technical Score < 75.

⁴See equation (5) in reference.

⁵See equation (6) in reference.

⁶Winning proposal in low bid selection.

The term “value-related elements” will be an underlying foundation of this synthesis. As will be discussed later in this report, the members of the construction industry are not opposed to performance-based prequalification as long as the effort they must invest to participate adds value to the process and does not become a tedious recitation of facts and information that does not help the DOT differentiate the best qualified contractors in the pool. That finding from the contractor structured interviews intersects with the above quote and validates the idea that, for performance-based prequalification to be generally accepted by both the highway agency and industry, the process must demonstrate that it adds value to the completed project by reducing the risks associated with awarding the project to a marginally qualified constructor.

State agencies often use general past performance and experience criteria in their administrative prequalification procedures to admit a contractor to the state bidders list. By

concern expressed by Parvin (2000) with regard to reducing the probability of bid protest by making the performance-based prequalification system transparent and easy to understand. A case study of how the Minnesota DOT defended its prequalification method for a DB project is presented in chapter five and validates the idea that prequalification parameters must be both “justifiable and defensible” as cited by Scott et al. (2006).

Therefore, in light of the above discussion, this report will proceed with the following two guiding principles for evaluating potential performance-based contractor prequalification systems:

- The specific elements of a performance-based contractor prequalification system add value to the project in terms of reducing performance risk.
- The elements of performance-based contractor prequalification system are justifiable and defensible.

KEY DEFINITIONS

The report will use a number of terms-of-art in a precise sense throughout its entirety. To gain a full understanding of the meaning of this study, readers must understand the specific definition of each of these terms.

The report first explains the difference between administrative prequalification (the information submitted for inclusion on an agency-approved bidders list) and performance-based prequalification (the focus of this synthesis). Project-specific prequalification is also important in this report. The definitions for the three terms are as follows:

- **Administrative prequalification:** A set of procedures and accompanying forms and documentation that must be submitted for inclusion on an agency's approved bidders list. These forms may include an evaluation of financial statements, the dollar amount of work remaining under contract, available equipment and personnel, and previous work experience. This information may be provided on a project-by-project basis or on a specified periodic basis, such as annually.
- **Performance-based prequalification:** A set of procedures and backup documents that must be followed by a construction contractor to qualify to submit a bid on a construction project based on quality, past performance, safety, specialized technical capability, project-specific work experience, key personnel, and other factors. This information may be provided on a project-by-project basis or on a specified periodic basis. The project could be delivered using traditional DBB or alternative project delivery methods such as DB, CM/GC, or any other method.
- **Project-specific prequalification:** Contractor prequalification requirements that exist only for a single project. These requirements normally address project technical and procurement factors that are essential for the success of the given project. They may include criteria that require the contractor to have had past experience building a certain technology (i.e., seismic retrofit, intelligent transportation systems, etc.) or a given project delivery method such as DB. The requirements may extend to cover specific experience for key project personnel and specific types of plant and equipment.

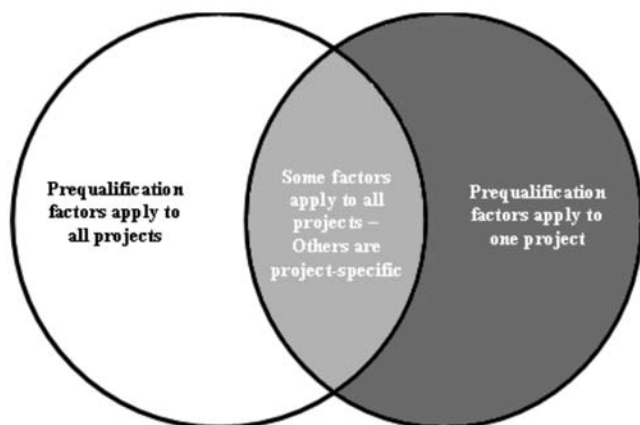
Performance-based prequalification can take two forms. First, it can be a general prequalification that allows a given contractor to bid on all projects. This form is the major focus of this synthesis. In its second form, it is a project-specific prequalification in that the process applies only to a given project and the contractor may resubmit its qualifications to bid on a different project. Each form has its advantages and disadvantages. The major advantage of general performance-based prequalification is the reduction in administrative effort expended both by the agency and the construction industry.

This form essentially shifts administrative prequalification to a higher level by adding in performance-based prequalification factors that apply to all projects regardless of type. The disadvantage to this form lies in its broadness, not providing a mechanism to tie qualifications to specific project requirements. Thus, it has an increased potential that a contractor can prequalify but still be marginally qualified to perform a given type or class of work, thus reducing the value added to the procurement process. Project-specific performance-based prequalification eliminates this issue by making each factor project related and filtering out those contractors whose past experience, while generally acceptable, does not show them to be well qualified for a given project's technical or other requirements. Thus, the major disadvantage of this form is the additional administrative burden that is placed on DOTs to develop a unique set of project-specific prequalification criteria and on the industry to submit a unique statement of qualifications (SOQ) for every project.

Theoretically, the above two forms can be overlapped to form a hybrid combination of both. Figure 1 illustrates this prequalification universe graphically. Thus, it is possible to divide performance-based prequalification into two phases: (1) phase one would entail a general prequalification based on factors that would be applicable to all projects; and (2) phase two would include one or more project-specific factors. This approach would reduce the administrative effort by using an annual general prequalification based on performance that admits a contractor to the bidders list and then follows up with an RFQ for specific projects for which the owner believes that specific factors are necessary to move a set of contractors from the overall bidders list to a project-specific short-list. In other words, the short-list would consist of the most qualified contractors for a specific project drawn from the pool of qualified contractors based on project-specific qualification factors. An example of this approach could be a seismic retrofit project for which past experience with the retrofit technology specified for the job would greatly facilitate timely completion and enhance quality assurance.

Public works authorities in New South Wales (NSW), Australia, use a version of the hybrid system that they call the "two envelope" method (New South Wales Department of Commerce 2007). In this system, contractors are prequalified on a performance basis. If necessary, project-specific qualification requirements are then published for a given project. Two envelopes are submitted at the bid tender, with the first containing the project-specific SOQ and the second containing the bid proposal. Envelope 1 is opened and all contractors that meet the minimum project-specific qualification requirements are assigned to what amounts to a "short-list." Those that do not make the short-list have their second envelope returned unopened. Then the second envelope for each contractor on the short-list is opened and the project is awarded to the lowest bidder. This is similar to the system used by the Indiana DOT called "low bid/fully

qualified” to award DB contracts (IDOT 1998). The previously described A+C bidding described in *NCHRP Web Document 38* (Minchin and Smith 2001) also falls into this hybrid category in the performance-based prequalification universe.



General Performance-Based Prequalification	Hybrid Prequalification	Project-Specific Performance-Based Prequalification
<ul style="list-style-type: none"> Financial factors Insurance factors Bond factors Past timely completion factors Safety record factors Others as appropriate 	<ul style="list-style-type: none"> Two Envelope Method A+C Bidding 	<ul style="list-style-type: none"> Technical factors Past project factors Key personnel factors Plant/equipment factors Others as appropriate

FIGURE 1 Performance-based contractor prequalification universe.

LITERATURE REVIEW

The literature on this subject is both extensive and rich, showing the relative importance of this area in the transportation industry. It is obvious from the literature review that all authors without exception believe that the qualifications of a given contractor can have a marked impact on the success of the projects it builds. In fact, one paper states that the most qualified contractor “correlates to the lowest administrative burden” for the agency (Molenaar and Songer 1998), implying that a well-qualified contractor requires less oversight and can be trusted to comply with contract requirements such as contractor quality control (QC). Another author goes on to justify prequalification by saying that “because of constrained staffing and budgets, it is not possible for state agencies to ‘inspect’ quality into the work” (Scott et al. 2006). The same author provides a succinct definition and motivation for establishing a thoughtful prequalification process.

Prequalification in its simplest form is an assessment of financial responsibility, which often mirrors what sureties look for in making their underwriting decisions

relating to issuance of bonds for public works projects. It also may include other factors such as demonstrated ability to perform a certain type of work. Whether by prequalification or other methods, public owners are increasingly exploring ways to include non-price factors, both qualitative and quantitative, in the procurement process to motivate contractors not only to improve their performance during construction, but equally as important, to build value into the end products of construction (Scott et al. 2006).

Once again, the idea of using prequalification to add value to the construction process is expressed. Additionally, the idea of using performance-based prequalification as a means to “motivate” contractors to “improve their performance during construction” is articulated, and tying these two ideas together becomes the objective for accruing the benefits of enhanced construction quality and reduced administrative burden. The NSW prequalification manual, which calls the process the “scheme,” describes these benefits as follows:

- Allows the NSW Government as a major buyer of construction-related services to more effectively implement continuous improvement initiatives in the construction industry to *achieve better project outcomes*; and
- Results in *significantly reduced tender assessment times and simplified contract administration* because prequalified tenderers [bidders] have already demonstrated an understanding of and compliance with NSW Government construction industry benchmarks, with management procedures and systems requirements; and
- In line with the NSW Government’s direction to do business with the best of the private sector, the Scheme provides for *incentives for good performance and also for the application of restrictions or sanctions in the event of poor performance* as measured against the respective scheme requirements (New South Wales Department of Commerce 2007). [Emphasis added.]

Thus, it appears that the benefits of performance-based contractor prequalification have been recorded both in the United States and overseas. Next, the motivations for implementing these programs will be explored in the literature.

Motivations for Developing and Implementing Performance-Based Prequalification

NCHRP Web Document 38 (Minchin and Smith 2001) essentially categorized the motivations for implementing a performance-based contractor prequalification program in two areas. The first had to do with “frustrations” felt by both owners and construction contractors, which are described as follows:

- Public owners generally treat low-quality construction work no differently than high-quality construction work.

- Public owners indirectly reward poor workmanship by not penalizing poor workmanship, thus giving a bidding edge to those contractors that consistently perform poorly.
- Administrative prequalification merely establishes a benchmark for financial capacity, not technical capability.
- Reliance on performance bonding does not protect the public owner from marginally competent contractors that have a strong financial foundation.

Many of these frustrations spring from the public agency's requirements to ensure free and open competition and to avoid unnecessary delays to much needed transportation projects resulting from bid protests. Prequalification is inherently a reduction in the level of free and open competition. Therefore, these programs must be well-designed and avoid an appearance of being arbitrary. The Delaware Code furnishes that state's DOT with the authority to prequalify construction contractors (Delaware Code 2001) and cites 10 specific reasons why a contractor can be found unqualified to bid. Two of these reasons, "inadequate experience to undertake the project" and "documented failure to perform on prior public or private construction contracts," fall into the performance-based prequalification realm. Neither, however, would apply to a marginally qualified contractor that had not been directly penalized for poor workmanship as expressed by *NCHRP Web Document 38*.

The NCHRP report also details a second more timely motivation for implementing performance-based contractor prequalification. This motivation deals with the movement toward alternative project delivery methods and a greater reliance on contractor QC. The report describes this motivation in the following terms:

Changes in regulations regarding use of contractor quality testing in quality assurance decisions and continuing reduction in DOT personnel will increase the need for "quality driven" contractors in public transportation construction projects. This change, coupled with more departments adopting performance-based and performance-related specifications, places more need on contractors to know and use quality management in their field operations management. With more contractors providing the quality control function, the DOTs' role would change to a quality assurance role. As one part of the quality assurance process, there is a need for comprehensive methods to evaluate a contractor's eligibility to engage in work from a quality perspective (Minchin and Smith 2001).

Another author expressed the same sentiments in a paper focused on contractor-led quality control:

As state highway agencies move further in this direction, it is incumbent on them to first plan carefully during the procurement phase to ensure that they choose qualified teams. They must then draft contracts and specifications that put sufficient checks and balances in place so that

these project delivery methods return quality equal to or better than that obtained by the traditional methods (Ernzen and Feeney 2002).

Thus, the motivation for implementing performance-based contractor prequalification is twofold. First, it furnishes a vehicle to reward good performance and, second, it satisfies a need to ensure that a better qualified contractor with a record of good performance is entrusted with a greater deal of autonomy in the quality management process. Thus, in both cases, the agency is properly discharging its responsibility to the traveling public to deliver a quality project with the public dollar. To accomplish this purpose, the program must have all the necessary components to collect contractor performance data, reduce that data in a meaningful manner, and utilize the performance output in the prequalification decision-making system.

Components of a Performance-Based Prequalification Program

NCHRP Synthesis Report 190 (Thomas and Smith 1994) found that DOTs rely on the following four strategies to qualify construction contractors to bid:

- Prequalification: contractor must be qualified before it can submit a bid
- Postqualification: only the lowest responsive bidder is required to submit qualifications to prove that it is also a "responsible" bidder
- Performance bonding: reliance on the surety industry to identify qualified contractors
- Contractor licensing: state-sponsored program to ensure that only qualified contractors can bid based on licensing requirements

This report focuses on the first strategy of prequalification. The literature review found that most performance-based contractor prequalification programs consisted of the same set of components (Russell et al. 1992; Al-Gobali and Bubshait 1996; Minchin and Smith 2001; Ernzen and Feeney 2002; Hancher and Lambert 2002; McLawhorn 2002; Scott et al. 2006; Norman-Eady 2007):

- A questionnaire and application furnished by the contractor that detailed the following information:
 - Financial data
 - Available equipment and plant
 - Construction experience for a specified period
 - Names and backgrounds of key personnel
 - Classes and types of work for which qualification was requested
- A formula or algorithm to convert financial data into a rated capacity that establishes the maximum amount of work a given contractor can be awarded in a given period

- A contractor project performance evaluation system that usually revolves around ratings assigned on a specific standard form
- A formula or algorithm to adjust the rated capacity based on the accumulated record of project performance evaluations
- An appeals process for a contractor that believes it has been unfairly or improperly rated

Several authors conducted research to determine the relative importance of the various components listed above. One early study involved a survey of construction professionals from both owner and contractor organizations and asked them to rank order 20 prequalification factors by importance. An intersection of the two groups found that both rated “financial stability,” “past project performance,” and “personnel availability and experience” as the “key decision variables relevant

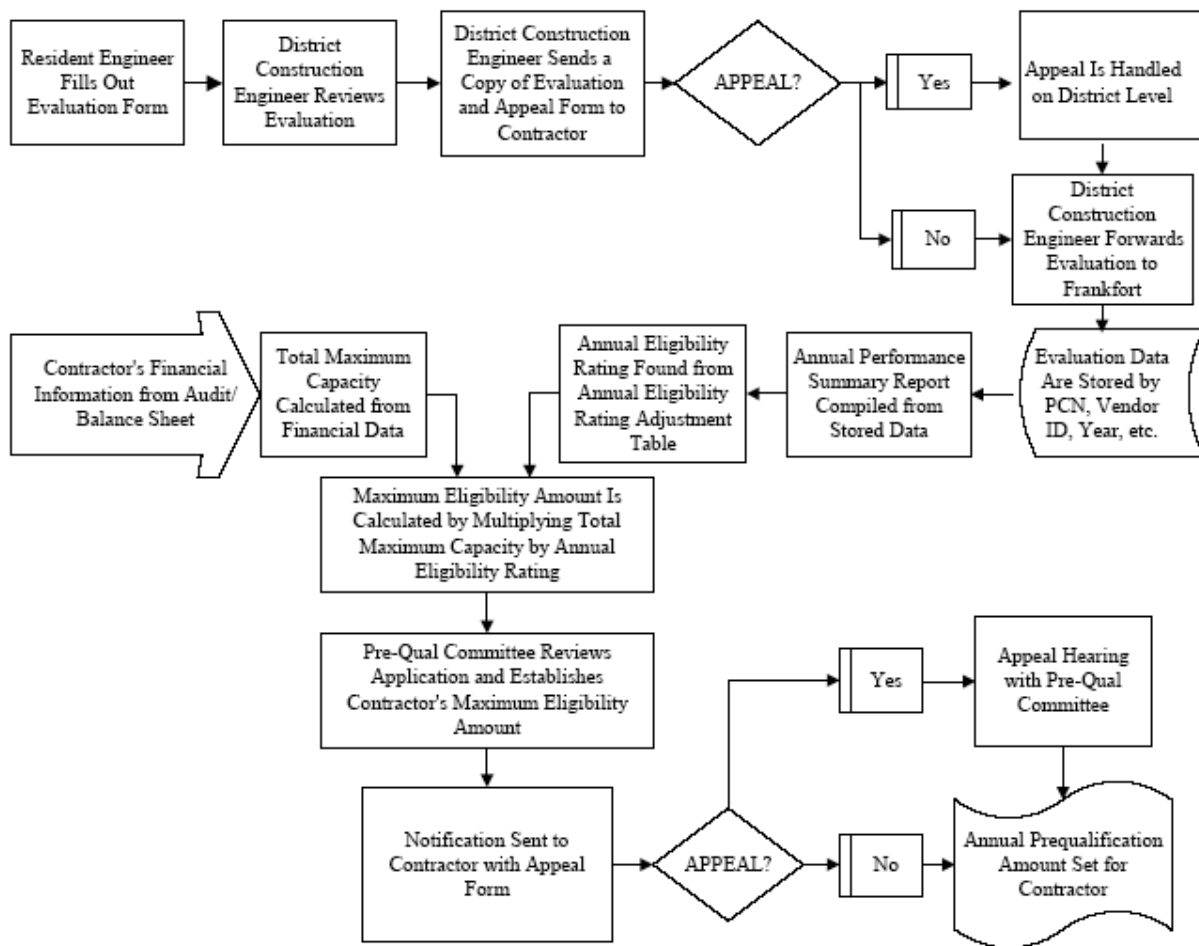


FIGURE 2 Kentucky Department of Highways performance-based contractor prequalification process (Hancher and Lambert 2002).

Figure 2, taken from a paper by Hancher and Lambert (2002), details the Kentucky Department of Highways quality-based contractor prequalification process. This program is indeed a performance-based system as it contains all of the previously cited components. From looking at the flow chart, it is evident that this program connects the calculation of total maximum financial capacity and performance evaluation by developing an “annual eligibility rating,” which is used to adjust the contractor’s capacity to what is termed its “maximum eligibility amount.” This value equals the amount of work a contractor may be awarded in the given year, and as a result, “lower-quality work will reduce the allowable work volume, whereas high-quality work will increase the allowable work volume” (Hancher and Lambert 2002).

for a generic contractor prequalification knowledge base” (Russell et al. 1992). The *NCHRP Web Document 38* study found that “project management/control skills,” “personnel experience,” “quality of final project,” and “experience with project type” were the most important for a similar group of survey respondents on essentially the same topic (Minchin and Smith 2001). When the two studies are combined, the two input components (contractor’s questionnaire/application and contractor project performance evaluation) are covered by these topics, thus validating those program components based on independent research.

The remainder of the information gleaned from the literature will be reported in the subsequent chapters as it

deals with the details of various performance-based contractor prequalification programs and their effectiveness. At this point, the literature review has demonstrated both the motivation for and the benefits of implementing performance-based contractor prequalification. It also furnished the framework against which the remainder of this synthesis report will be structured.

SYNTHESIS METHODOLOGY

This report is the result of an intersection between a comprehensive literature review, a national survey of both U.S. and Canadian public highway agencies, structured interviews with construction contractors, and formal content analyses of DOT administrative prequalification forms and project-specific RFQs. Additionally, case studies of DOT experience with performance-based prequalification were conducted to validate the results of the research. This methodology allowed the authors to not only collect information on performance-based contractor prequalification policies and procedures across the nation by means of the standard survey but also confirm those findings through a rigorous analysis of both types of prequalification documents. The literature allows the findings from the other research instruments to be put in a global context to identify trends and similarities and capture state-of-the-art practices in the more general topic of applying qualifications evaluation techniques used in alternative project delivery methods for traditional DBB projects. The triangulation of these three methods allows emerging and commonly used practices in this area to be identified.

Before describing the details of the research methodology, the relative importance of the various research instruments must be understood. As performance-based prequalification is still relatively new to much of the U.S. transportation industry and only a handful of states have significant experience, this study went beyond the typical synthesis literature review and survey to conduct two content analyses of administrative and performance-based prequalification documents. These analyses developed lines of converging information with the literature review and the survey responses by furnishing a quantitative analysis of how DOTs are actually applying prequalification to the project delivery process. This quantitative analysis provided valuable insight into the various ways in which public agencies are using this tool on both their traditional and alternative delivery projects. This study gives the greatest weight to the output from the general survey of highway agencies and the contractor structured interviews. The administrative prequalification form and RFQ content analysis were supporting lines of information. Finally, the case studies validated the conclusion, as appropriate, because they provided examples of how U.S. and Canadian highway agencies have implemented performance-based contractor prequalification, and they validated the recommendations for future research made in the final chapter.

Research Instruments

The synthesis employed the following major research instruments:

- Content analysis of U.S. state administrative prequalification forms
- Content analysis of U.S. and Canadian project-specific RFQs
- Survey of U.S. state and Canadian province transportation agencies
- Structured interviews of U.S. and Canadian construction contractors
- Case study analysis of U.S. and Canadian performance-based contractor prequalification programs

The structure and content of each of the instruments was developed to integrate with all other instruments, allowing the researcher to map the output of each instrument to the corresponding outputs and to identify data trends.

Formal Content Analyses

Two of the research instruments used in this synthesis consisted of content analyses of state DOT administrative prequalification documents and project-specific prequalification RFQ documents. These content analyses consisted of gathering and reviewing solicitation documents and searching for the requirements for qualifications that were outlined in the documents. The first formal content analysis furnishes quantitative measurements of current DOT requirements for prequalification factors. These measurements are calculated by counting the number of times that prequalification terms of interest are required by contractors for admission to the state bidders list. This type of analysis can be used to develop “valid inferences from a message, written or visual, using a set of procedures” (Neuendorf 2002). The primary approach is to develop a set of standard categories into which words that appear in the text of a written document, in this case a prequalification form, can be placed; the method then utilizes the frequency of their appearance as a means to infer the content of the document (Weber 1985). Thus, in this study, the content analysis consisted of two stages. First, all instances in which the words associated with contractor performance were found in each document, and their context, were recorded. Second, that context was used to determine, if possible, whether the information was important to the agency in a given context. This allowed an inference to be made regarding the given owner’s approach to administrative prequalification. When the results are accumulated for the entire population, trends can be identified and reported. This method was then repeated with other terms, such as past experience and financial capacity that were common to prequalification systems, and the context was recorded and then analyzed.

This process was repeated for the formal content analysis of the project-specific RFQ documents. The output from the two content analyses can then be compared to determine how prequalification policy is being implemented in the project-specific solicitation documents. The output also can be compared with the responses from the survey and structured interviews, which will be discussed in detail later in this chapter, to map respondents' output against their respective state policy and solicitation documents. The use of these instruments in conjunction with the comprehensive review of the literature allows the researcher to not only maintain a high level of technical rigor in the research but also follow Yin's three principles in the process of research data collection: using multiple sources, creating a database, and maintaining a chain of evidence (Yin 2004).

During this effort, the researcher was careful to remember that single sources provide limited data based on "one specific source" and that such a limitation can create difficulty when drawing results, in addition to a lack of "trustworthiness and accuracy" (Yin 2004). Multiple sources alleviate lack of trust, increase viability, and frequently provide supplementary realms of thought and research, which strengthens results.

Administrative Prequalification Content Analysis

The prequalification forms from 43 state DOTs were collected and analyzed (see Figure 3). The primary method was to categorize the various requirements listed on each form into a standard set that then could be used to compare the results of this content analysis with the results of the project-specific RFQ prequalification content analysis. The categories were taken from *NCHRP Report 561* (Scott et al. 2006), because this report had completed a content analysis of 50 case study projects and displayed the results in a given format. Selecting this framework allowed the researcher to intersect the synthesis content analyses with the literature and draw conclusions. *The NCHRP Report 561* categories are shown here. The first three factors were lumped under the single category of "prequalification" in *NCHRP Report 561*. Because this effort necessarily requires more detail, the categories are broken out for this analysis.

- Financial/Insurance
- Plant/Equipment
- Legal Record
- Past Project Performance
- Key Personnel Experience
- Subcontractor Information

- Project Management Plans
- Safety Record/Plan

A matrix was developed from the content analysis output containing key prequalification concepts and practices. As the project literature review and survey progressed, further review was necessary for topics that had not been identified in the original content analysis. The information gathered was reduced to general categories that are detailed in chapter two of this report. The content analysis output was further combined with the results of the survey for this project and the literature that was reviewed to create the synthesis.

Project-Specific Prequalification RFQ Content Analysis

In addition to the analysis of administrative prequalification documents, the study also sought to identify state or province project-specific performance-based prequalification policies and guidelines that were currently available. This effort was done to provide a comparison between general performance-based prequalification and project-specific prequalification. Consequently, 107 sets of performance-based prequalification RFQs (62 transportation projects and 45 nontransportation projects) from 25 states, the District of Columbia, and two Canadian provinces were assembled (see the geographic distribution of these projects in Figure 4). The process described for the administrative prequalification document content analysis was used to derive the content of each of those documents. The intersection between the output from this content analysis and the administrative prequalification documents permitted the researcher to determine a relative level of importance for similar factors in the two different systems. This process validated the conclusions and recommendations for future research listed in the final chapter.

General Survey of Public Highway Agencies

In addition to the content analysis, a survey was issued to the state construction engineers in U.S. DOTs and Canadian MOTs (see Appendix A for details). A total of 45 complete and seven partial responses were received. Survey responses were received from 41 states (see Figure 5). Responses from seven provincial MOTs are also included. This analysis separated the U.S. and Canadian responses to account for the difference in the construction contracting regulatory environment that exists in both countries and also to highlight potential innovative Canadian prequalification practices, keeping them from being lost in the total survey population.



FIGURE 3 Administrative prequalification content analysis (shading indicates states whose forms were analyzed).

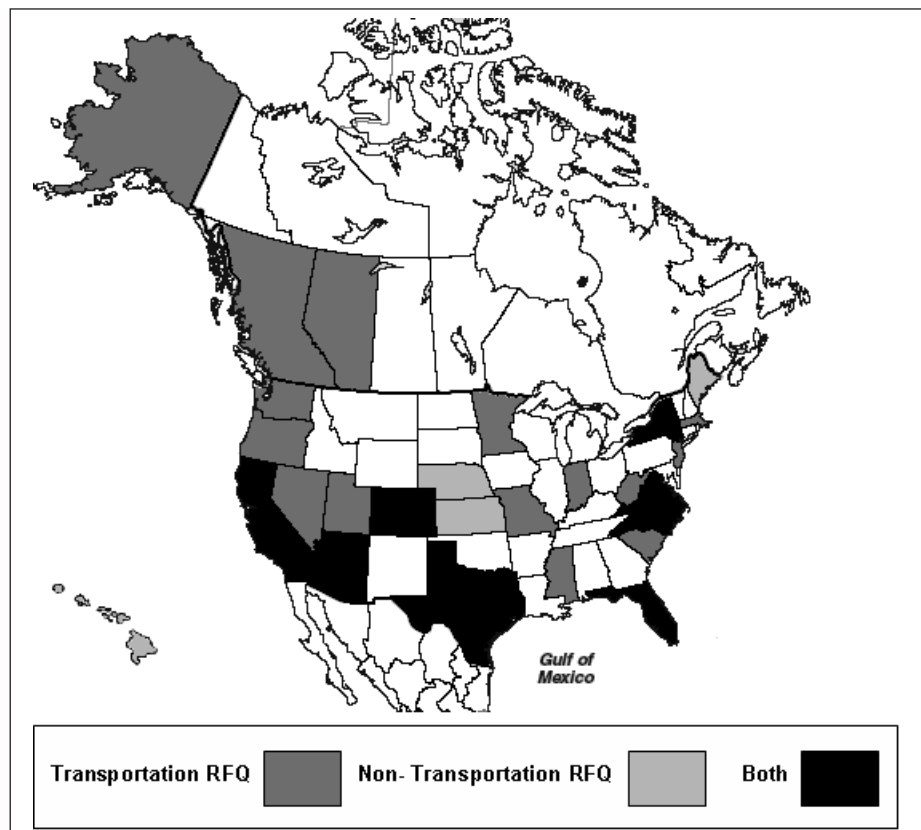


FIGURE 4 Project-specific requests for qualifications (RFQ) content analysis distribution.

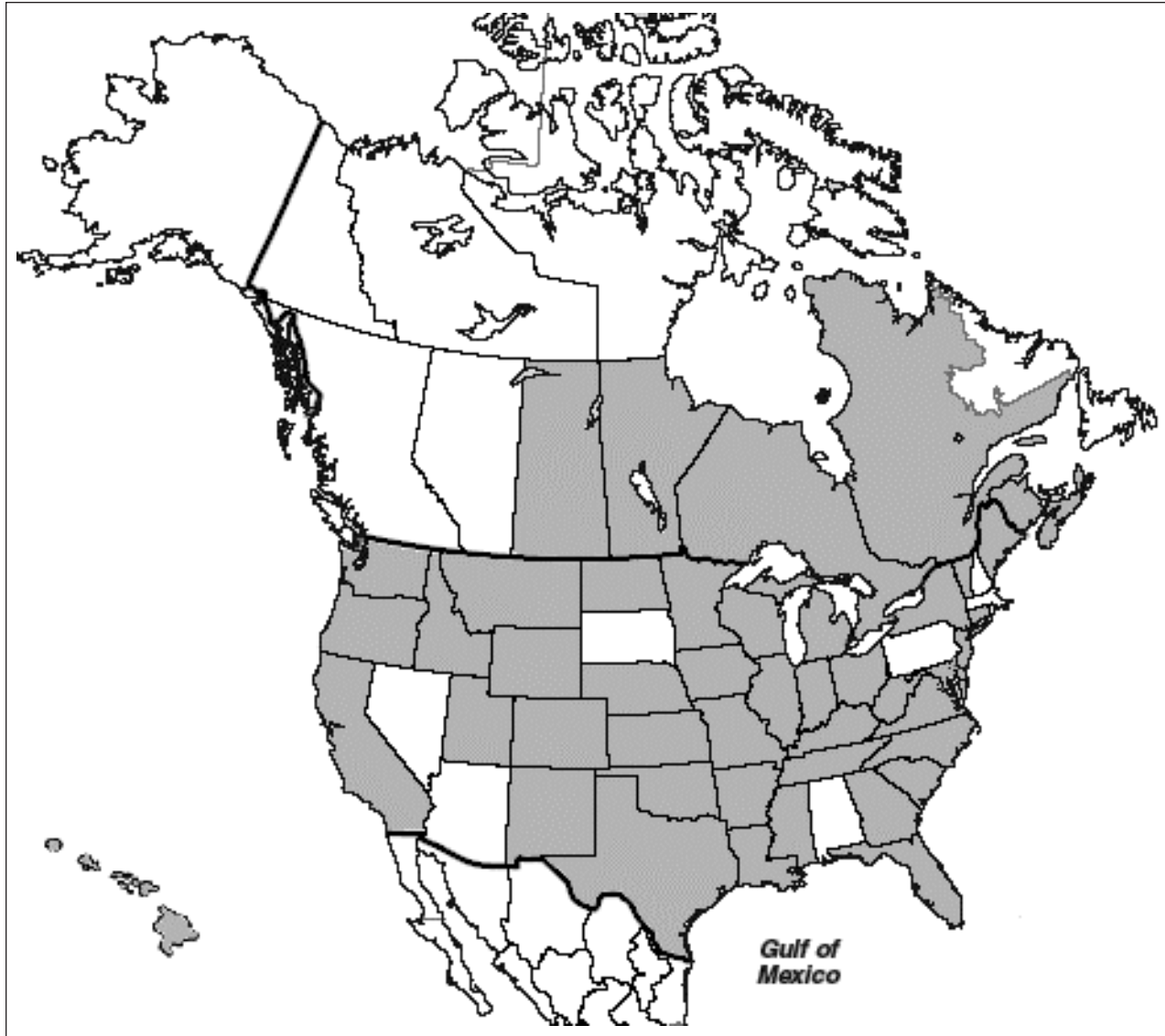


FIGURE 5 General survey responses—Respondents shown in shaded maps.

Contractor Structured Interviews

The ability to gauge the perception of the construction industry on this particular topic was essential for this study. Industry members include the business owners who are directly affected by any change to the requirements for bidding on public works contracts. Additionally, the construction industry has an enormous amount of political clout and can influence public highway agencies' ability to make changes of this nature. Nine U.S. and one Canadian contractor were interviewed (see Table 4 for details). They represented both large and small companies as well as local, regional, and national operations. The regional and national contractors had experience with more than one highway agency. The structured interview outlines were developed along similar lines to the method prescribed by the U.S. Government Accounting Office (GAO) (Litkowski 1991). The GAO method states that structured interviews can be used when

“information must be obtained from program participants or members of a comparison group ... or when essentially the same information must be obtained from numerous people for a multiple case-study evaluation” (Litkowski 1991). Both of these conditions apply to this synthesis; therefore, the tool is appropriate for the research.

The process involved (1) developing a questionnaire that was given to each interviewee during the interview and (2) collecting responses in the same order (the same questions were used for each interviewee). The information was gathered using face-to-face and telephonic interviews. Time was given per the GAO method to ensure that the interviewee understood each question and that the data collector understood the answer. Additionally, interviewers and interviewees were allowed to digress as desired, which allowed the researcher to collect potentially valuable information that was not originally contemplated. The output of the analy-

sis is used to present the contractor's perspective on various points discussed in the subsequent chapters.

TABLE 4
CONTRACTOR STRUCTURED INTERVIEW DETAILS

Location	Type Work	Annual Volume	Experience with Performance-Based Prequalification	Support Performance-Based Prequalification
Alberta	Regional General Contractor	<\$250 million	Yes	Yes
California	National General Contractor	>\$500 million	Yes	Yes
Colorado	National General Contractor	>\$500 million	Yes	Yes
Florida	National General Contractor	>\$500 million	Yes	Yes
Idaho	National General Contractor	>\$500 million	Yes	Yes
Michigan	Local Microsurfacing Contractor	<\$20 million	Yes	Yes
Missouri	Regional Chip Seal Contractor	<\$100 million	Yes	Yes
Nebraska	National General Contractor	>\$500 million	Yes	Yes
Oklahoma	Local Paving Contractor	<\$100 million	Yes	Yes
Texas	Regional General Contractor	<\$100 million	Yes	Yes

Case Studies

The surveys contained a question asking whether respondents would furnish case studies based on their experiences

with performance-based prequalification. Three agencies (Florida, Michigan, and Ontario) volunteered to furnish case study information. In addition to the agency case study interviews, the researcher synopsis a case study of a legal challenge to project-specific performance-based prequalification that was successfully defended by the Minnesota DOT and found in the literature.

The case studies were collected using Yin's methodology and the previously stated three principles of case study research data collection (Yin 2004). Therefore, the information gleaned from the case studies is coupled with information collected in the survey and the literature review to validate any conclusion drawn from the case studies. The case study information was gathered by both face-to-face and telephonic interviews.

Protocol to Develop Conclusions and Recommendations for Future Research

The major factor in developing a conclusion was the intersection of trends found in two or more research instruments. The intersection of more than two lines of converging information adds authority to the given conclusion. Additionally, greater authority was ascribed to information developed from the general survey of highway agencies and the contractor structured interviews. The administrative prequalification form and RFQ content analysis were considered to be supporting lines of information. Finally, the case studies were used to validate the conclusion as appropriate, because they provided examples of how U.S. and Canadian highway agencies have implemented performance-based contractor prequalification.

Recommendations for future research were developed based on the effective practices described in the literature and confirmed as effective by one of the research instruments but generally not widely used. Gaps in the body of knowledge found in this study were used to define the areas in which more research would be valuable. The conclusions and recommendations for future research are combined to form the performance-based contractor prequalification framework discussed in chapter six.

CHAPTER TWO

CONTRACTOR PREQUALIFICATION POLICIES AND PROCEDURES**INTRODUCTION**

This chapter will discuss four sets of analyses. The first is the formal content analysis that was done on the contractor administrative prequalification forms from 43 U.S. states. These forms represent the current minimum requirements for a contractor to be allowed to bid on projects in each state. Taking the population of forms as a single body of information, they show the various contractor qualification factors that are deemed important for bidding on transportation construction projects. Although many of these forms include some performance-based factors, they are termed “administrative prequalification” and are taken together as a set to represent the status quo for prequalification. They effectively represent a benchmark against which the survey responses can be measured. Not all 50 states have a form-based system. The states of Alaska, Hawaii, Louisiana, and Mississippi require registration with the state and bonds in lieu of administrative prequalification, while Georgia, Maryland, and Minnesota require only bonds and have no separate registration.

The second analysis comes from the general survey of highway agencies with regard to each agency’s administrative prequalification. In theory, the survey answers would be exactly the same as those found on the forms. This was not the case for several reasons. First, the prequalification-related terms-of-art are not standard across the nation. Although a concerted effort was made to use the most common terms and provide definitions when developing the survey questionnaire, it was functionally impossible to address all possible terms. Therefore, there is a limited mismatch between the survey and the terms used on each state’s prequalification forms and that issue probably accounts for some of the difference. Next, the survey responses reflected the current status of prequalification in each agency, and therefore, it is possible that a difference exists because the form found on the Internet at the DOT website may not have been the most current. This was true in a couple of cases in which the respondents indicated that their system was currently under modification and that their answers reflected current thinking. Finally, the questionnaire listed all the factors that were found across the United States, and it is possible that a respondent mistakenly checked a factor that was not on the agency’s current form. Nevertheless, the preponderance of the survey responses and the form output were in agreement.

Additionally, the survey responses were deemed to be the most current and up-to-date information on the subject.

The third analysis of survey responses pertains to the factors used in highway agency performance-based prequalification. This is the subject of this study and the most important analysis in the synthesis project. The output from this analysis can be compared with the output from the previous two analyses to determine those factors that are important on both administrative and performance-based prequalification programs. Additionally, the factors found in this analysis that were not found in the previous two analyses indicate those factors that are unique to performance-based contractor prequalification.

The results of the two survey output analyses are reported by splitting the U.S. and Canadian responses as separate populations. This is done for three reasons. The regulatory and legal environments in which highway construction is procured are somewhat different in each country. Therefore, it is appropriate to keep the two nations separate in the analyses to ensure consistency in the results. Second, seven Canadian provinces and 41 U.S. states responded. If the two were combined as a single population, the Canadian responses would be statistically swamped by the U.S. responses and lost to the analyst. Finally, as will be seen in the chapter five case study analysis of the Ontario MOT’s prequalification program, it is important to view the Canadian results separately to identify potential Canadian practices that could be imported for use by U.S. DOTs.

The final analysis consists of another content analysis of 107 sets of performance-based prequalification RFQs from 27 states and two Canadian provinces. The RFQs come from 62 transportation projects and 45 nontransportation (primarily buildings) projects. The nontransportation RFQs were included to allow the researcher to sample a parallel industry in search of potential ideas and trends that could be used in transportation projects. The output from this analysis comes from project-specific performance-based contractor prequalification and is used for comparison with the survey output for general performance-based prequalification to identify those factors that are unique to specific project concerns rather than to overall qualification. The survey also showed that, of the 41 U.S. respondents, 23 have authority to deliver projects using DB and 11 utilize public-private partnerships.

An additional five are using CM/GC project delivery. All of these alternative delivery methods utilize project-specific contractor prequalification. Therefore, to completely synthesize the topic, project-specific prequalification requirements must be understood within the context of the general performance-based contractor prequalification program.

PREQUALIFICATION REQUIREMENTS

Before getting into the details of the analyses, it is instructive to understand the requirements for prequalification as found by the survey. The survey asked four questions regarding agency requirements for administrative prequalification. Figure 6 shows the results of those questions. It shows that 35 states have prequalification requirements. Surprisingly, six states did not answer these questions, which may indicate that they either do not have a requirement or did not understand the question.

TABLE 5
USE OF PROJECT-SPECIFIC ADMINISTRATIVE PREQUALIFICATION CRITERIA

Project-Specific Prequalification Criteria	No. of Responses (of 14)
Monetary size	10
Technical complexity	6
Delivery method	6
Technical content	5
Traffic control issues	2
Environmental issues	1
3rd party issues	1
Quality assurance requirements	1
Location (urban vs. rural)	1

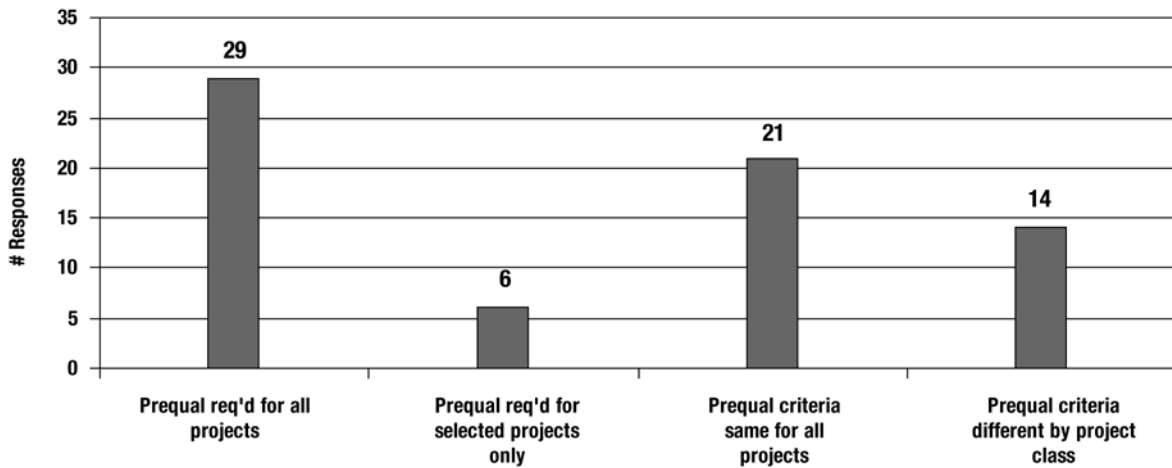


FIGURE 6 U.S. state administrative contractor prequalification requirements.

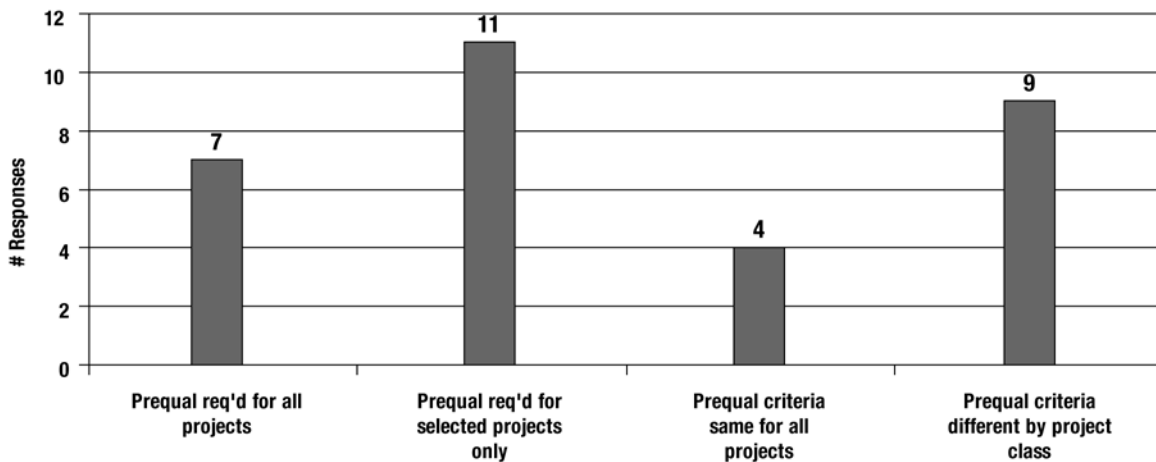


FIGURE 7 U.S. state performance-based contractor prequalification requirements.

Next, the survey sought to determine whether or not administrative prequalification criteria were applied uniformly across all projects. It found a 60% to 40% split between those that use the same criteria regardless of project class and those that have project class-specific criteria. Table 5 shows that those that differentiate by project class use project monetary size as the major factor, followed by technical complexity, project delivery method, and technical content. The remaining options in the survey were found to be trivial. Looking at this result, it seems that for those agencies that do differentiate by project class in their prequalification process, the major factors seem to relate to qualifying contractors that have the competence to deal with specific technical issues on individual projects, the appropriate financial capacity for a given type of project, and that also have experience with a given project delivery method. Finally, the fact that 40% of the respondents choose to differentiate in the above manner indicates that they perceive some value in adding this next level of complexity to their contractor prequalification systems.

The answers for the same questions as applied to performance-based contractor prequalification are summarized in Figure 7 and Table 6. The trend is reversed from the previous analysis with more agencies requiring performance-based prequalification for selected projects than generally for all projects. Additionally, twice as many agencies in this group use project-specific prequalification criteria than those that use the same criteria for all projects. The same top four prequalification criteria are cited, but in a different order of importance, which may portray a shift in philosophy from administrative to performance-based prequalification.

Comparing the differences in the prequalification requirements for the two systems in Figures 6 and 7, the trend toward providing project-specific reasons to use prequalification is found for those agencies that differentiate among their prequalification requirements on a project-by-project basis.

TABLE 6
USE OF PROJECT-SPECIFIC PERFORMANCE-BASED
PREQUALIFICATION CRITERIA

Project-Specific Prequalification Criteria	No. Responses (of 14)
Delivery method	6
Technical complexity	5
Technical content	5
Monetary size	3
Traffic control issues	2
Location (urban vs. rural)	1
Environmental issues	1
QA requirements	1
3rd party issues	0

Contractor Administrative Prequalification Form Content Analysis

A review of 43 prequalification application forms shows that contractor administrative prequalification is widely used by

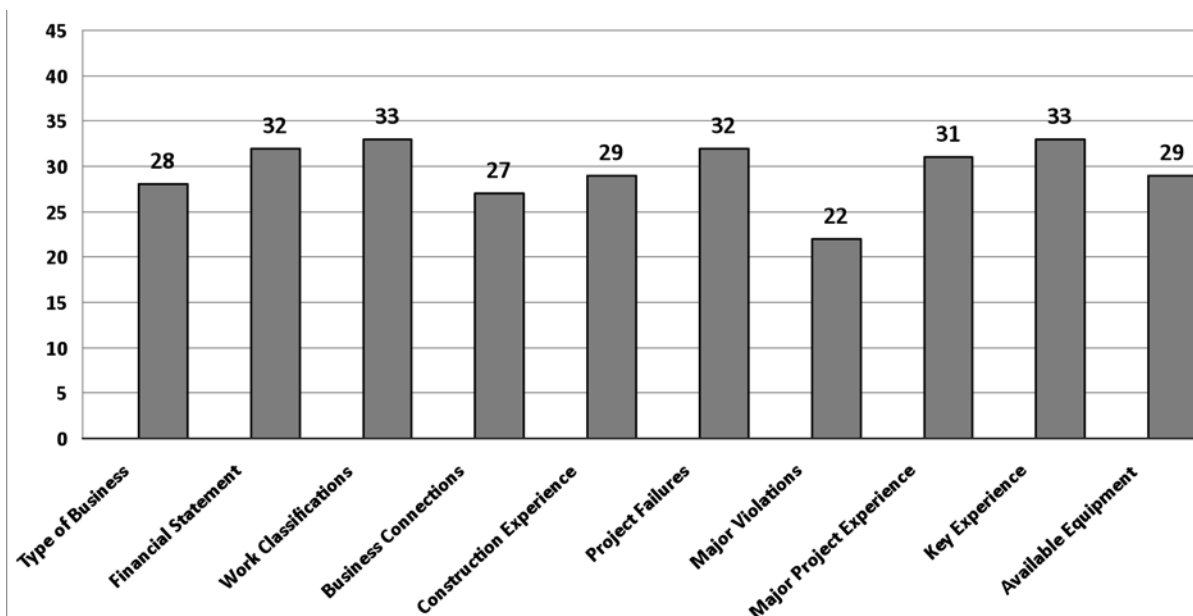


FIGURE 8 Major administrative contractor prequalification form factors.

state DOTs. Typically, the practice is based on a standard form that asks generic questions such as follows:

- What kind of work classification are you requesting?
- Do you have any experience with this type of work?
- What is your company's bonding limit?

All of these questions fall into some form of contractor administrative prequalification. This practice has worked for many years and has been a useful tool for all DOTs. Through the research survey, some trends were found in the data.

After close review of each state's administrative prequalification process, it was evident that certain key aspects held more importance toward prequalifying a construction contractor. As demonstrated in Figure 8, 10 factors of contractor administrative prequalification are specified in at least 22 of the 43 prequalification forms reviewed. These factors are as follows:

- Type of Business
- Financial Statements
- Work Classification
- Business Connections
- Construction Experience
- Project Failures
- Major Violations
- Major Project Experience
- Key Experience
- Available Equipment

These 10 factors cover a broad range of information on a given construction company and show a distinct trend. One can see in Figure 8, that three general categories of information are sought: financial information, managerial information, and experience/performance information. Of the top five factors, "financial statement" deals directly with a contractor's financial status; "project failures" and "key experience" are related to the company's managerial criteria; and "work classifications" and "major project experience" are related to the company's performance criteria. Thus, it can be concluded that administrative prequalification consists of a combination of (1) current financial condition (that is, a contractor's financial strength), (2) construction experience, and managerial ability (that is, a contractor's technical competence), and (3) past performance. It seeks to identify those contractors with a record of defaulting on contracts, presumably to eliminate them from the agency-qualified bidders list as not "responsible" (i.e., a bad risk for future work).

Criteria Categories

All prequalification factors can be grouped in four categories that are used as prequalification criteria. They are listed here for each of the 10 major factors categorized:

1. Financial criteria
 - a. Type of business
 - b. Financial statement
2. Managerial criteria
 - a. Key personnel experience
 - b. Major violations
 - c. Business connections
 - d. Project failures
3. Performance criteria
 - a. Work classifications
 - b. Construction experience
 - c. Major project experience
 - d. Available equipment
4. Bonding, sureties, and insurance

Financial Criteria

The first major factor in financial criteria is "Type of Business," and this determines whether the applicant is publicly or privately owned. This may seem benign, but it is actually determining who can legally authorize a bid, looking for apparent conflicts of interest, and seeking to identify potential legal issues with the business formation. The next major factor is "Financial Statements," which covers a broad range of possible information. Some states ask for a simple account of last year's receipts, whereas many other states require a full accounting of the company's financial status performed by a certified public accountant.

Managerial Criteria

Managerial criteria contain four of the above major factors. "Key Personnel Experience" basically looks to see whether the people working directly on the projects have the requisite experiences to complete the projects for which their firms will be prequalified. The "Major Violations" determines whether key principals in the organization have been previously disbarred from bidding and/or convicted of construction fraud, felony, or other crime. One can see that both deal with specific issues regarding the people who actually will be involved in completing the contracts for which the firm is prequalified. The "Business Connections" factor is seeking to identify any conflicts of interest with subsidiaries and material suppliers. For example, construction companies may own trucking companies, asphalt plants, and quarries with which the state already may have a separate supply or service contract. These other contracts

might appear to give that contractor an advantage. “Project Failures” requires the applicant to list all projects that they did not complete, usually by being held in default of the contract. Sometimes this factor extends to defaulted projects that key individuals were involved with while working with other companies.

Performance Criteria

Performance criteria include factors that relate to the past project performance of the applicant and the ability of the applicant to perform on any upcoming projects. “Work Classification” determines what type of construction a company is qualified to compete for and complete. This question is asked many different ways, however. Most states merely ask the applicant to complete a checklist of classes of construction work. Others ask the applicant to list the type of work by state specification number. The “Construction Experience” question usually requests how long the applicant has been working in the construction field as a prime contractor and in some cases as a subcontractor. “Major Project Experience” allows the contractor to elaborate on key successes they may have had in the past or simply to list all the projects that they have completed within a given number of years. Some states extend the applicable experience to projects completed for other governmental agencies and private owners. Projects cited in this section usually were constrained to those completed in the past three years. Most states asked the applicants to declare current ongoing workload at the time of their application. “Available Equipment” typically covers the construction plant and equipment the applicant owns and is available for use on agency projects. In some cases, it also includes equipment that is available to rent or lease. All four of these factors come together to give performance criteria major importance in the prequalification process.

Bonding, Sureties, and Insurance Criteria

Finally, bonding, sureties, and insurance criteria were shown to have a lower impact than would be expected. This may be for several reasons, but the chief one is that contractors are required to furnish bonds and insurance on a project-by-project basis. Thus, agencies that did not ask for this type of information on their forms may be assuming that they will receive these instruments individually as each project is awarded.

When the 10 major factors are grouped into the four criteria along with the minor factors listed on the questionnaire in Appendix A, the results shown in Figure 9 can be developed and the trend regarding the weights of each type criteria can be identified. The sum of managerial criteria

and performance criteria carries three times more weight than the sum of financial criteria and bonding, sureties, and insurance criteria, 76% to 24%, respectively. These two criteria deal with the same aspects used in the performance-based contractor prequalification programs discussed in the literature review. This analysis allows one to map the results of the prequalification form content analysis directly to the results of the general survey responses for administrative prequalification, which is discussed in the next section.

Administrative Prequalification Survey Analysis

The general survey of U.S. states broke the prequalification process into two categories: administrative and performance based. The survey contained a series of questions regarding the specifics of each respondent’s administrative prequalification program. In short, administrative prequalification was defined as the process used to qualify a contractor to bid on a given agency’s construction projects. Figure 10 ranks the results of the responses for that survey and shows a clear stratification of administrative prequalification factors, of which the top eight factors will be deemed major.

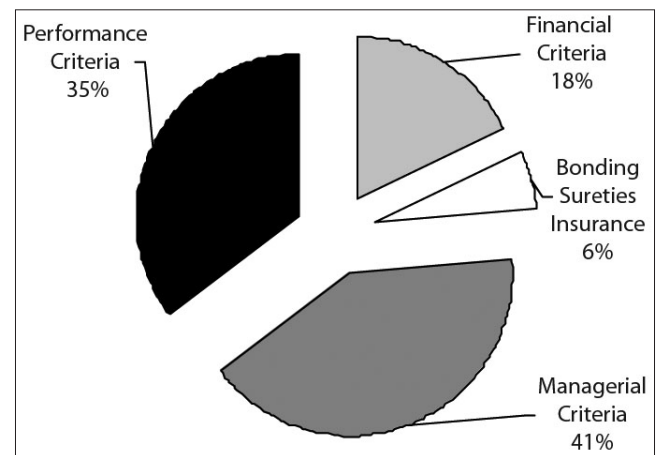


FIGURE 9 Administrative prequalification form criteria breakdown.

These eight major factors can be broken into the same criteria as that used for the state prequalification form content analysis:

1. Performance Criteria
 - a. Major project experience
 - b. Available equipment
 - c. Performance evaluations

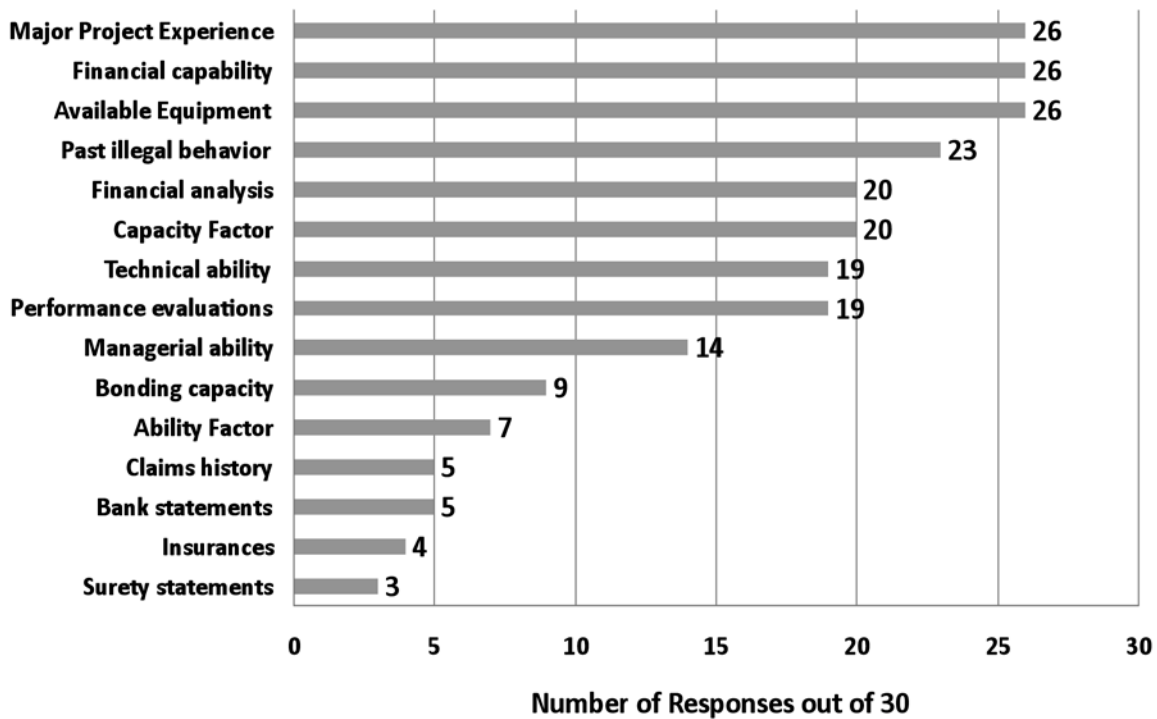


FIGURE 10 Surveyed administrative prequalification factors ranked.

2. Financial Criteria
 - a. Financial capability
 - b. Financial analysis
 - c. Capacity factor
3. Managerial Criteria
 - a. Past illegal behavior
 - b. Technical ability
4. Bonding, Sureties, and Insurance

The first three major performance criteria have been discussed with the exception of “Performance Evaluations.” These evaluations are used by 27 of the 41 states replying in the survey. This process rates how well a contractor performed in various evaluated aspects on past projects. This is an important feature of performance-based contractor prequalification and will be discussed in detail in chapter three.

The three major financial criteria are noticeably different than those factors found in the content analysis of the prequalification forms. However, these factors look at the contractor’s past, present, and future financial ability to complete a major construction project. “Financial Capability” describes the company’s finances at the present, and “Financial Analysis” dissects what a company has done in the past and calculates a factor of how they have fared.

Finally, “Capacity Factor” is calculated as a function of the two previous factors to determine the company’s financial limitations for future projects.

The last two factors in the managerial criteria category were discussed in the section “Contractor Administrative Prequalification Form Content Analysis,” but they are not used in the same context in this analysis. “Past Illegal Behavior” determines whether a contractor has a criminal record as well as looks for any construction-related legal issues such as fraudulent claims. “Technical Ability” seeks to determine whether the management team is experienced enough to effectively manage a construction project of a given magnitude in the requested work classification. Once again, bonding, sureties, and insurance did not include specific criteria that could be classified as major factors. The minor factors in this category were statements from bonding, sureties, and insurance companies, and as shown in Figure 10, those factors were reported to be used only by a small number of respondents.

By grouping all the factors for administrative prequalification into the same four criteria as the prequalification form content analysis, Figure 11 shows a breakdown of how the factors fit into each of the four criteria. All of the major and minor factors are listed in the questionnaire contained in Appendix A. Once again, the sum of the managerial and performance criteria is greater than that of the other two categories. Financial criteria carry more weight in this area than previously shown with the prequalification forms. Nevertheless, when the results of the two analyses are taken together in

the context of performance-based prequalification, one can conclude that the existing agency systems for administrative prequalification already contain a significant amount of performance-based information. This leads to the inference that those agencies that want to move from administrative to performance-based prequalification will not have difficulty, because both the agency and the construction industry are familiar with submitting and evaluating information regarding past performance and current levels of experience and technical competence.

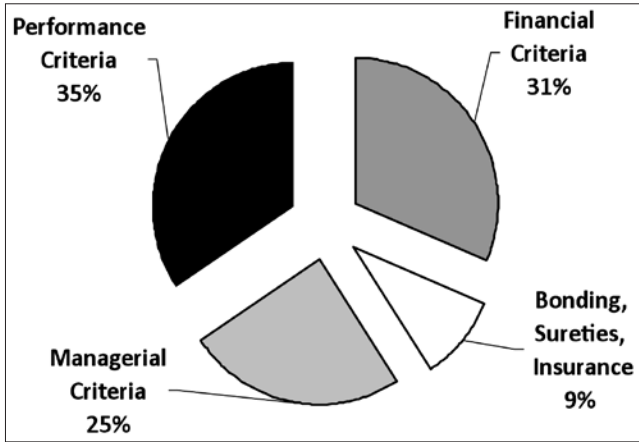


FIGURE 11 Surveyed administrative prequalification criteria breakdown.

Performance-Based Prequalification Survey Analysis

After the administrative prequalification questions, the survey asked a series of questions about performance-based prequalification. This was defined as the process required by a construction contractor to qualify to submit a bid on a construction project. Prequalification was based on quality, past performance, safety, specialized technical capability, project-specific work experience, key personnel, and other factors. The questionnaire listed 17 possible factors and gave the respondents the opportunity to write in factors of their own. Figure 12 shows the major factors of the performance-based prequalification. Major factors were defined as those selected by 50% or more of the respondents, which indicates that they play an important role in contractor performance-based prequalification.

The major factors broken down into the four previously described criteria categories are as follows:

1. Performance Criteria
 - a. Major project experience
 - b. Available equipment
 - c. Quality and workmanship

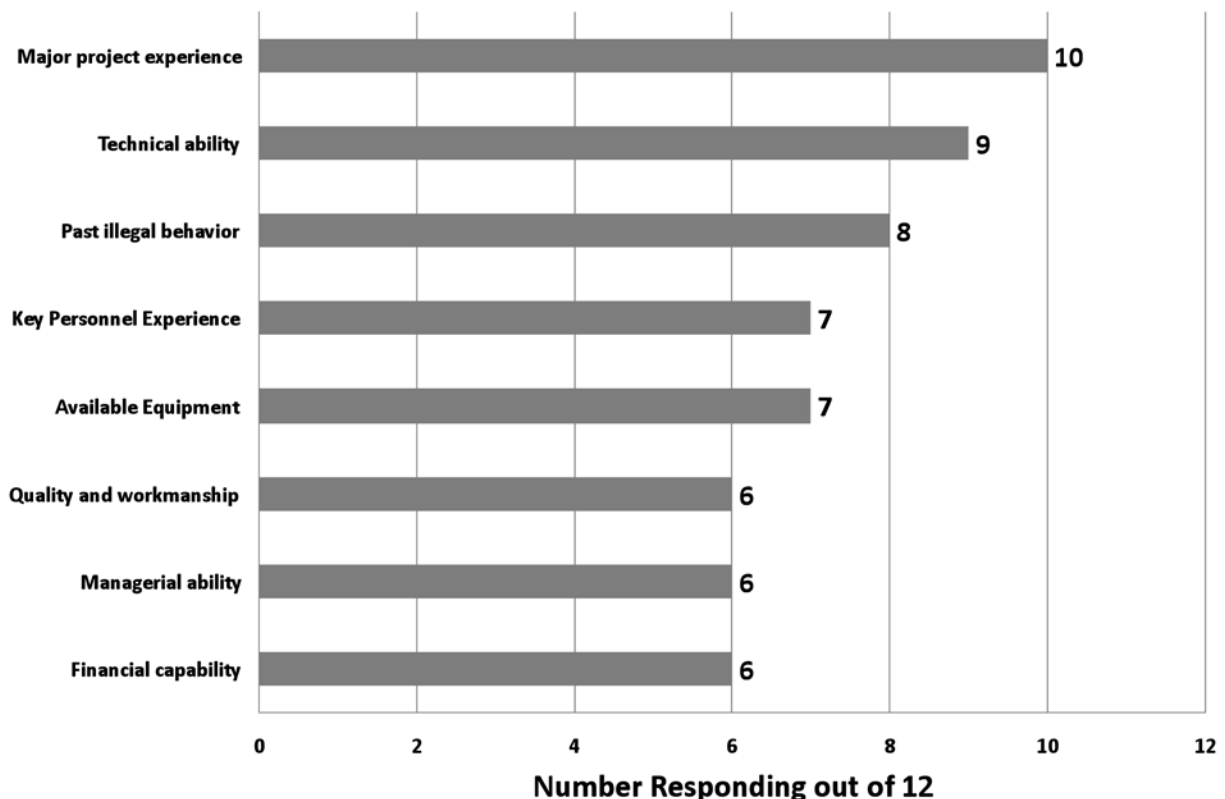


FIGURE 12 Ranking of survey performance-based prequalification major factors.

2. Financial Criteria
 - a. Financial capability
3. Managerial Criteria
 - a. Technical ability
 - b. Past illegal behavior
 - c. Key personnel experience
 - d. Managerial ability
4. Bonding, Sureties, and Insurance

The three major performance criteria listed above consist of “Major Project Experience,” “Available Equipment,” and “Quality and Workmanship.” Of these three, two have been described in this chapter. Quality and workmanship was not a factor in the administrative prequalification process, but it is an important aspect in a performance-based contractor prequalification system. Quality and workmanship incorporate the contractor’s ability to build what the highway agency specified as the final product. It speaks to the contractor’s ability to conform to contract requirements as described by the plans and specifications. This factor is the crux of using contractor project performance evaluations in the prequalification process and is discussed in detail in chapter three.

Financial criteria play a role in the performance-based prequalification process, but this role is less significant than the role they played in administrative prequalification. Only one major factor deals with financial criteria in the performance-based prequalification process, which is “Financial Capability.” In administrative prequalification, financial capability was defined as the condition of the contractor’s present finances. Financial capability in the performance-based prequalification context seeks to determine whether the contractor has the ability to execute a construction project without serious cash flow constraints. It can also be defined as the contractor’s fiscal responsibility in dealing with the state, its subcontractors, and the public.

Managerial criteria play a large role in the performance-based prequalification process. Following are the four major factors:

1. Past illegal behavior
2. Key personnel experience
3. Technical ability
4. Managerial ability

Two of the above major factors have not yet been defined. Technical ability can best be described as the contractor’s expertise and experience in constructing technically complex projects. Managerial ability covers the contractor’s ability to manage the in-house resources, subcontractors, and project control tasks such as scheduling to the degree required to successfully complete a construction project. Again, bonding, sureties, and insurance criteria did not have any major factors. Some minor factors were related to bonding, sureties, and insurance, but as shown in Figure 13, those factors equated to only 12% of the total criteria breakdown.

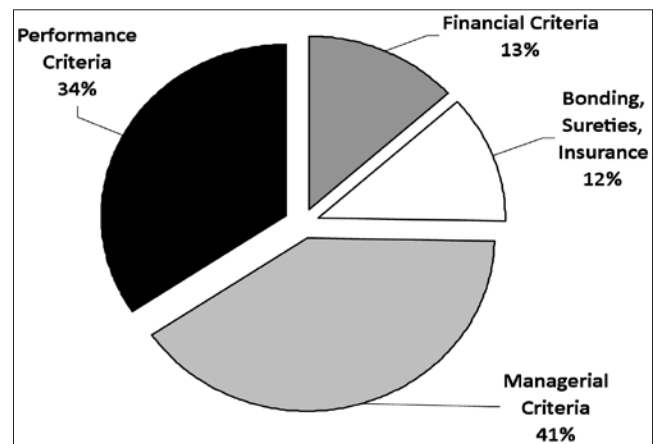


FIGURE 13 Surveyed performance-based prequalification criteria breakdown.

Figure 13 shows that “Financial Criteria” and “Bonding, Sureties, Insurance” encompass only 25% of the performance-based prequalification process, whereas the sum of “Performance Criteria” and “Managerial Criteria” make up 75% of the performance-based prequalification process. This means that the performance-based prequalification process is heavily weighted to factors that relate to the agency’s experience with how well the contractor and its key personnel have performed on past projects.

Taking the combined results of the administrative prequalification form content analysis, the survey results for contractor administrative prequalification, and the survey results for contractor performance-based prequalification leads to a distinct trend. All three prequalification analyses assigned the most weight to factors in the managerial and performance criteria categories over the financial and bonding, surety, and insurance criteria categories. Some of the major factors were different in each analysis, but each system predominately seeks to measure the ability of a contractor to perform and manage a construction project using different approaches.

The administrative prequalification form content analysis and the administrative prequalification survey both found

factors related to the past, present, and future aspects of a contractor's experience using a checklist approach. For instance, if the contractor has previously completed a given classification of work, it is found to be qualified without regard to the quality of that work. Both analyses showed that administrative prequalification is essentially an inventory of experience without regard for the quality of performance related to that experience. Thus, it would appear that a contractor with sufficient financial assets and marginal experience or performance would be considered fully qualified. Nevertheless, the survey responses for contractor performance-based prequalification measured the same aspects of a contractor's situation with a different set of priorities. This system adds the contractor's evaluated performance record on top of the foundation established in the other two analyses. For instance, key personnel experience is a factor used to determine technical ability and managerial ability. Finally, although contractor bonding and insurance is included in all three of these analyses, it carries the least weight of all the factors.

Analysis of Canadian Survey Responses

When comparing the prequalification systems used in Canada with that of the systems portrayed by the U.S. survey respondents, some differences are noticed. For instance, by comparing the results in Figure 14 with those of its American counterpart (shown in Figure 11), the 28% change between these two figures demonstrates that the Canadians place more importance on the "Bonding, Sureties, Insurance" criteria. The Canadians also place less importance on managerial criteria. Nevertheless, all seven survey respondents use administrative prequalification.

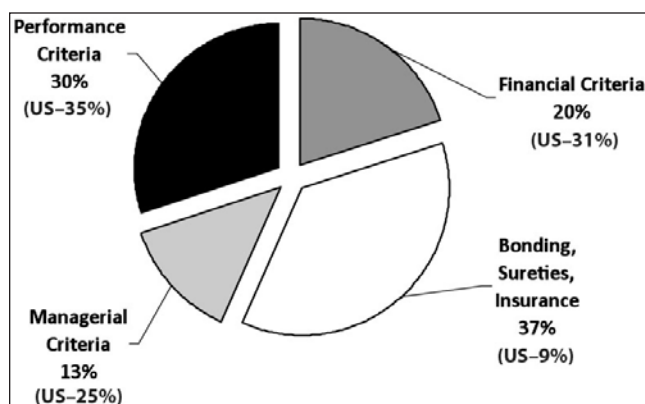


FIGURE 14 Canadian survey response breakdown for administrative prequalification criteria.

Figure 15 shows that the breakdown of Canadian survey responses for performance-based prequalification criteria is similar to the U.S. breakdown shown in Figure 13. The Canadians place greater importance on the managerial criteria, however. This follows the pattern that would be expected in a dual prequalification process, with the administrative

prequalification relying more heavily on financial criteria and bonding criteria, and requiring only basic managerial and performance criteria information to determine whether the contractor has the basic skills to handle a typical project. The performance-based prequalification relies more heavily on managerial and performance criteria to determine whether a contractor's past record demonstrates its ability to adequately perform on a typical project.

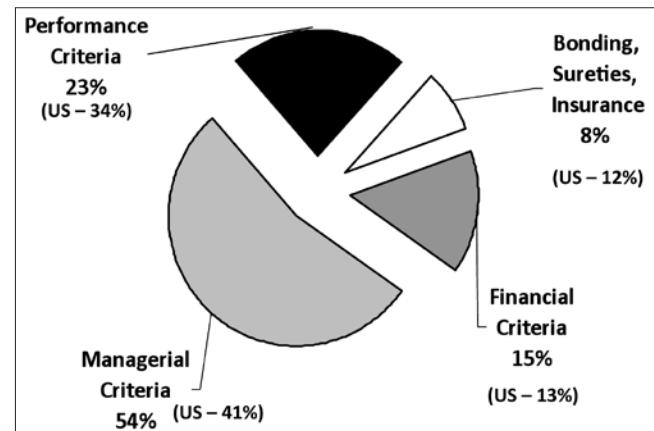


FIGURE 15 Canadian survey response breakdown for performance-based prequalification criteria.

Comparing the U.S. and Canadian responses leads to the idea that administrative prequalification could be focused on the contractor's financial health and fundamental business condition to measure its capacity to successfully enter into construction contracts rather than on contractor past performance. Performance-based prequalification then could be focused on a contractor's record in successfully furnishing the technical skills, experience, and quality that would enhance the probability that it could finish a given project on schedule, within budget, and to the requisite level of constructed quality. This would create a two-step prequalification system that could measure the synergy between a construction company's underlying financial strength and its commitment to satisfying its customer, the highway agency, through its actual performance.

REQUEST FOR QUALIFICATIONS CONTENT ANALYSIS

Project-specific performance-based contractor prequalification is commonly used in best-value project delivery methods such as DBB best-value (sometimes called A+C bidding), CM/GC, and DB (Scott et al. 2006). The major thrust in this form of prequalification is to ensure that the contractor and its key personnel have both the necessary specific technical experience and a track record of success building a specific type of project. Contractors often are required to pass the agency's administrative prequalification process in addition to submitting their project-specific qualifications for the given project. The content analysis of RFQs furnishes the

study with a broader base of DOT experience than did the general survey. RFQs were found from 27 states and two Canadian provinces, whereas the survey found that only 12 states and four provinces used the broader form of performance-based contractor prequalification, which is the focus of this synthesis. Thus, the objective of this analysis is to look for trends in project-specific prequalification that can be applied to overall performance-based prequalification.

The RFQ content analysis followed the same pattern as that used in the administrative prequalification form content analysis. Because of the inherent difference in the salient purposes of the two types of documents, not all the factors were identical. The RFQ prequalification factors were broken down into the nine major categories shown in Table 7, which can then be grouped into the four types of criteria used in the previous analyses (see Figures 16 and 17). Additionally, projects were split between transportation and nontransportation to determine whether different prequalification factors are used and to continue the search for applicable trends outside the transportation sector.

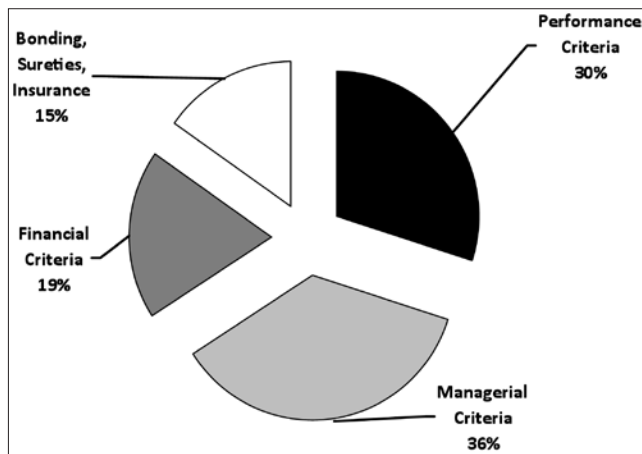


FIGURE 16 Transportation project RFQ criteria breakdown.

Once again the combination of performance and managerial criteria outweighs the financial and bonding, sureties, and insurance criteria by a factor of roughly 2 to 1 in both types of project-specific prequalification projects. The transportation project financial and bonding criteria increased in weight from the performance-based prequalification criteria shown in the survey from 25% to 34% of the total weight, respectively. This is probably for the same reason cited in the performance-based prequalification survey analysis—that is, the agency expected to get bonding, surety, and insurance information with each project. Because the RFQs are project-specific, they are asking for this information as part of the evaluation of contractor qualifications for a given project.

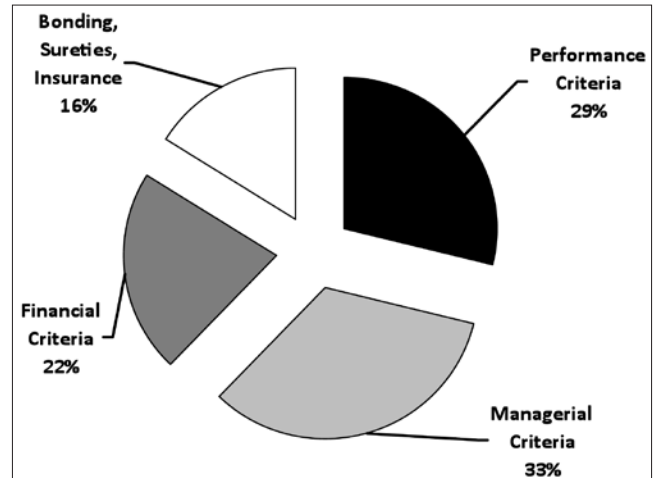


FIGURE 17 Nontransportation project RFQ criteria breakdown.

TABLE 7 REQUESTS FOR QUALIFICATION PREQUALIFICATION CONTENT ANALYSIS RESULTS

Prequalification Factor	Transportation Projects		Non-Transportation Projects	
	# RFQs	% RFQs	# RFQs	% RFQs
Past Performance	62	100.0%	45	100.0%
Key Personnel Experience	56	90.3%	36	80.0%
Management Plans	41	66.1%	34	75.6%
Quality Plans	36	58.1%	24	53.3%
Subcontracting Plan	34	54.8%	20	44.4%
Current Workload	16	25.8%	16	35.6%
Safety Record	30	48.4%	16	35.6%
Financial Information	59	95.2%	45	100.0%
Bonding, Sureties, Insurance	60	96.8%	45	100.0%

CONTRACTOR PERSPECTIVE ON PERFORMANCE-BASED PREQUALIFICATION

The contractors were asked to identify the prequalification factors that were used by the agencies with which they worked. Figure 18 illustrates the output from that analysis and is broken down in the same manner as previous analyses. This constitutes one of Yin’s “lines of converging information” and validates the previous results by once again showing the

preponderance of weight being assigned to performance and managerial criteria. Contractors were asked to identify those factors that they believed were most effective in encouraging well-qualified contractors to bid on projects for which performance-based contractor prequalification was in effect. Of 10 responses, the majority (one local, two regional, and four national) cited integrating past project performance evaluations into the prequalification process as the most effective practice. This was followed by key personnel experience and financial capability, both of which were each cited by two local, one regional, and two national contractors.

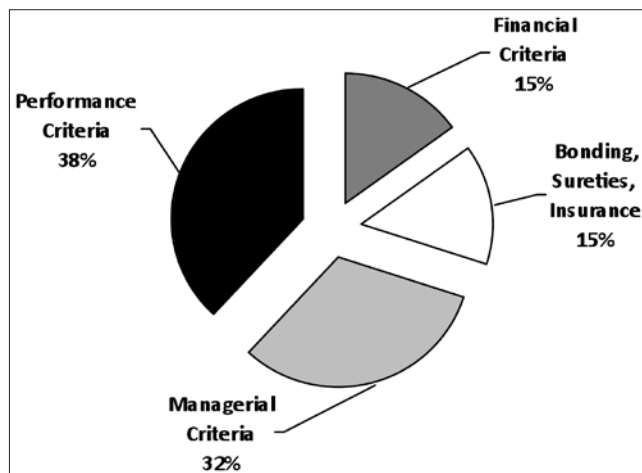


FIGURE 18 Performance-based prequalification criteria breakdown from contractor interviews.

Figure 18 shows that the contractor perspective is in line with the agency perspective on this subject. Some of the comments that were captured outside the structured interview questionnaire were enlightening. Essentially, all the interviewed contractors supported the idea of performance-based prequalification. Three contractors (one local, one regional, and one national) indicated that a well-qualified contractor with a proactive QC program cannot fairly compete against a marginally qualified contractor with a poor track record of quality performance. The well-qualified contractor cannot build the project as “cheaply” as the marginal contractor because the agency ultimately will accept substandard work because of the pressures to open the transportation facility to traffic as soon as possible. The interviewed contractors

believe that marginally qualified contractors bid the project knowing that, ultimately, they will not have to achieve the specified level of quality. This perception is confirmed in the literature—for example, one study found that highway agencies “indirectly reward poor workmanship by not penalizing poor workmanship, thus giving a bidding edge to those contractors who consistently perform poorly” (Minchin and Smith 2001). Therefore, they strongly support a system that will remove this disparity from the construction project delivery environment.

SUMMARY

From the previous discussion, it is evident that the five different analyses yielded the same general trend. That trend is that managerial and past performance criteria carry greater weight in the contractor prequalification process than do financial and bonding criteria. The general survey asked whether the ability to furnish a performance bond constituted sufficient verification of a contractor’s qualification to successfully complete a construction project. The fact that four states only require bonds with no administrative prequalification form submission indicates that for those agencies the answer is yes. Additionally 17 respondents to the survey also answered yes to the same question. Thus, those agencies have a culture that is willing to trust the surety industry with regard to contractor qualification. Additionally, seven more respondents take that trust to a new level by being willing to accept a performance bond for less than 100% of the contract amount. When asked whether the agencies they deal with believe that the ability to bond a project constitutes sufficient evidence of contractor qualification, one local, one regional, and four national contractors answered yes. Remembering that these administrative systems have been in place for decades leads one to the conclusion that bonding capacity is definitely a tried-and-true indicator of contractor capability. This thought tends to conflict with the output from the majority of the other states, which clearly showed that past performance was important. Thus, those agencies with a culture of relying on the surety for de facto prequalification of construction contractors may indeed need to address this issue as a potential barrier to the implementation of performance-based contractor prequalification.

CHAPTER THREE

CONTRACTOR PERFORMANCE EVALUATIONS**INTRODUCTION**

The motivation for evaluating contractor performance and then integrating those evaluations into the performance-based contractor prequalification system is simple. It provides a tangible means to reward good contractors and a disincentive for marginal contractors. Other countries have taken performance evaluation to the next level and created performance contracts that serve as good models for North American highway agencies. The motivation for the evaluation of contractor performance in New Zealand is explained as follows:

The concept of performance-based contracts originated from a consideration of four factors, namely, (a) the increasing lack of personnel within the national road departments ...; (b) the frequency of claims ...; (c) the need to *focus more on customers' satisfaction* by seeking to identify the outcomes, products, or services that the road users expect to be delivered, and *by monitoring and paying for those services on the basis of customer-based performance indicators*; and (d) the need to shift greater responsibility to contractors throughout the entire contract period *as well as to stimulate and profit from their innovative capabilities* (Cabana, et al. 1999). [Emphasis added.]

These four factors exist in the United States as well and support the use of contractor performance evaluation. A U.S. research study reports that “there are a number of issues associated with this criterion [past performance]... Careful consideration could therefore be given to a decision to use such a process to ensure that appropriate questions are asked and that the results are both fair to the contractor and useful to the owner” (Scott et al. 2006). In Canada, the Ontario Ministry of Transportation (MTO) implemented a contractor performance evaluation system in 2001 (Minchin and Smith 2001). This system is discussed in detail as a case study in chapter five. To summarize, MTO uses its program of performance appraisals and infraction reports for each project to establish an overall performance rating, which is maintained on a three-year moving average basis for contractor prequalification. Poor performance is penalized through the infraction system, which effectively reduces the amount of MTO work a marginal contractor can bid on at any given point in time (MTO 2004). Indeed, the evaluation system has proven itself to work so well that MTO no lon-

ger requires prequalified contractors to furnish performance bonds, saving the province a significant amount of money each year (Minchin and Smith 2001).

CONTRACTOR PERFORMANCE EVALUATION ISSUES

Implementing a post-project contractor performance system can be controversial if the process has not been thoughtfully developed. One author describes the overall problem of contractor past performance evaluation like this:

[Owners] must carefully consider how to implement it such that it is *accurate and unbiased* and could evaluate the pros and cons when making the decision to use past performance in the evaluation. Owners ... may decide to address past performance by asking for evaluations for similar projects completed by the contractor in the recent past, often asking for specific data relating to schedule, cost, and claims performance on those specific projects. The use of these metrics can be controversial due to concerns relating to due process because the contractors do not have the opportunity to object to negative ratings and because of concerns regarding the validity of the information obtained (Scott et al. 2006). [Emphasis added.]

Taking the reports by Minchin and Smith (2001) and Scott et al. (2006) together, essentially four major issues with post-project contractor performance evaluation must be addressed in a successful system:

- Accuracy of the rating
- Fairness of the evaluation system
- Consistency between raters and from project to project
- Effective life of a given evaluation

Evaluation Accuracy

The first issue deals with the agency's ability to field an evaluation system that *accurately* measures contractor performance. Being responsive to this issue will involve ensuring that measurable standards are established and published for those factors to be evaluated. Most highway agencies have some form of quality management program that has established standards that both agency and contractor personnel understand. These standards can be used in the evaluation system as long as no conflict develops that would be det-

rimental to either program. Quality is but one factor and will be discussed in detail later in this chapter. Other factors, such as those listed in the survey, can be evaluated if a measurable standard can be set. Many of the factors found in the literature on contractor evaluation programs are inherently subjective. One excellent example is contractor efforts to “mitigate cost and time overruns” (FDOT 2005). FDOT recognizes the subjectivity of this evaluation factor in its program and seeks to reduce it as much as possible by establishing a scoring scheme that correlates with the issuance of a “deficiency letter” when the agency believes the contractor is not acting to mitigate time and cost overruns. The FDOT system is as follows:

Mitigate Cost and Time Overruns [12 points total]—The contractor takes the initiative and works diligently to avoid cost or time increases and to mitigate the effects of changed conditions whenever they do occur. Requests for additional money or time are well documented (complete and accurate), fair, and submitted timely.

- 12 points—The contractor worked diligently to avoid cost and time increases or to mitigate the effects of changed conditions. All requests for additional money or time were in good faith, accurate, timely, and well documented. If additional documentation is requested, it was promptly provided. No more than one (1) deficiency letter by the CEI noting contractor’s failure to mitigate cost and time impacts.
- 9 points—No more than two (2) deficiency letters by the CEI noting contractor’s failure to mitigate cost and time impacts.
- 6 points—No more than three (3) deficiency letters by the CEI noting contractor’s failure to mitigate cost and time impacts.
- 4 points—No more than four (4) deficiency letters by the CEI noting contractor’s failure to mitigate cost and time impacts.
- 0 points—Five (5) or more deficiency letters by the CEI noting contractor’s failure to mitigate cost and time impacts (FDOT 2005).

The important factor to note in the FDOT system is the requirement for its personnel to *notify the contractor* when they believe it is not acting in the state’s best interest by issuing a deficiency letter. Thus, this step creates an opportunity for communication between the agency and its contractor regarding what the agency expected and how the contractor can correct its behavior if future cost and time overrun issues arise.

Evaluation Fairness

One paper describes fairness in contractor selection as giving all bidders “the same information” and treating them “equally without any discrimination” (Palaneeswaran and Kumaraswamy 2000). Performance-based contractor prequalification seeks to discriminate between contractors with satisfactory records of performance and those with less

than satisfactory performance records. Therefore, as the post-project evaluation scheme furnishes the input to that process, it is important that the methods used for evaluation are deemed to be fair and as objective as possible.

The fairness issue basically deals with ensuring that the evaluation system is transparent and furnishing a mechanism for contractors to appeal a negative rating. Transparency means that the evaluation system and all its components are published in advance of the evaluation and that the agency applies them exactly as they are published (Molenaar and Johnson 2003). Furnishing an appeals process demonstrates to the contracting industry that the agency is open to challenges of its evaluation system by creating due process before a contractor is penalized by a negative rating (Scott et al. 2006). These two aspects will greatly ameliorate negative perceptions of the possible harmful impacts of a new contractor performance evaluation system (Molenaar and Johnson 2003). In fact, to enhance the appearance of fairness, the Kentucky Department of Highways (DOH) allows the contractors to rate the DOH’s performance on the same projects. These contractor ratings are used by the DOH to “determine quality improvements needed, personnel training needed, and topics for discussion at the annual meetings with the contractor associations and for evaluations of personnel and other uses as deemed appropriate” (Hancher and Lambert 2002). Finally, one of the regional contractors that was interviewed indicated that the most important feature of a DOT contractor evaluation program is fairness, validating the ideas found in the literature.

A last aspect of fairness is the ability of a contractor to appeal a negative rating that it deems to be inappropriate and get it changed or removed from the record. One research report speaks to the idea that fairness demands that a contractor have recourse to “due process” (Scott et al. 2006). Although a DOT does not want to create a special formal disputes resolution system for performance evaluations, it does need to provide a mechanism in its evaluation framework through which a contractor can protest what it believes to be an unfair assessment of its performance. This mechanism can be as simple as allowing the contractor to add rebuttal comments to the evaluation form and charging the chain of command above the evaluator to investigate and determine whether the contractor’s protest has merit before entering the final evaluation into the system. Seven of the 10 (one local, two regional, and four national) contractors stated that the systems they operated under had an appeal process. Additionally, 22 of the 31 survey respondents indicated that they used a post-project performance evaluation with an appeals process. That means that roughly 20% of the systems do not furnish a mechanism for contractor feedback. The contractor interview results are roughly in the same orders of magnitude and confirm that fact.

Evaluation Consistency

The agency's ability to achieve consistency from project to project and between different evaluators on a single contractor was cited in one of the contractor structured interviews as its major concern. This response came from a national contractor with experience with performance-based prequalification and contractor evaluation in several different states. The Kentucky DOH guidelines for preparing contractor performance evaluations states: "Evaluations shall be performed in an objective, *consistent*, and well-documented manner" (Hancher et al. 2001) [emphasis added]. Therefore, both the owner and the contracting industry see achieving consistency as a desirable goal in contractor evaluation schemes.

Highway agencies have long experience in implementing methods that achieve consistency in their quality management programs. For example, one paper addresses the crux of this issue by stating: "[quality assurance] action could be aimed not only at *attaining consistency* between what the agency wants and what it specifies but also at *maintaining consistency* between what the agency wants and receives" (Pathomvanich et al. 2002) [emphasis added]. This paper on quality assurance (QA) associates the verbs "attaining" and "maintaining" with the process of achieving total consistency. By borrowing this idea from the QA world, highway agencies can apply the same to actions to achieve consistency in contractor evaluations.

The first step is to attain consistency. Reviewing the Kentucky DOH's use of contractor evaluations of the DOH, one sees a strong element of striving to attain consistency. Attaining consistency in the DOH program includes personnel training and personnel evaluation to ensure that the evaluators understand and apply the evaluation scheme as it is designed and published. Next, using the contractor input to identify quality improvements and topics for discussion with the industry are aspects of maintaining consistency after it has been attained. It can be concluded that an effective contractor evaluation scheme must be a living program in much the same manner that the agency implements its QA program.

Effective Life of an Evaluation

The final issue deals with how long a given evaluation remains as an active component of a contractor's performance record. This issue can be broken down into three subissues. First, as stated in this synthesis' objective, an evaluation system should encourage a marginal contractor to improve its performance. To achieve this end, the life of a negative evaluation should be finite and eventually be dropped from the active performance record. If the evaluation had an infinite life, the incentive to improve performance would never outweigh the penalty assessed

for poor performance. The survey found that 78% of those agencies with a contractor evaluation scheme kept the evaluations active for three to five years. Of the case study agencies (see chapter five), Michigan and Ontario kept the evaluations active for three years and Florida kept them in the record for longer than three years. Thus, it would appear that an active lifetime of at least three years seems to be appropriate.

The second subissue deals with impact of a single negative evaluation. The survey asked whether a negative evaluation would automatically disqualify a contractor from bidding on future work. Only one agency (Quebec) answered that it would. None of the interviewed contractors indicated that the scheme with which they had experience followed that approach. This is a drastic adverse procurement action. In the litigious U.S. construction industry, disqualification and debarment is a serious step that likely results in legal action. Thus, it is safe to conclude that an effective contractor evaluation scheme need not disqualify the contractor for a single bad performance and that the life span of a given evaluation ought to be on the order of three years.

A final subissue pertains to the way evaluations are conducted on multiyear projects as opposed to single-season projects. A large proportion of typical transportation construction projects are awarded and constructed in a single season. Therefore, a contractor that may have had initial performance issues in the early stages of a project should be allowed to "recover" and not be penalized if it has taken appropriate steps to correct early deficiencies. This would argue for a system of interim evaluations that provides a conduit for issue resolution before the final rating. It also suggests that multiyear projects might have more than a single final project contractor performance evaluation to ensure that the agency is kept properly informed of current contractor performance based on the most recent information.

U.S. CONTRACTOR PERFORMANCE EVALUATION SURVEY OUTCOMES

The analysis of the responses to the survey questions about post-project performance evaluation led to a number of discoveries. First, post-project performance evaluation factors can be grouped into three categories: project performance, managerial, and project closeout. The first two categories relate to the previous analyses and the third one is new to this feature of the process. Also, the survey respondents' perception of how implementing performance-based prequalification with a rigorous contractor evaluation project indicates that most project aspects will improve or not change, although other aspects would be negatively affected by the system.

Post-Project Performance Evaluations

The respondents were asked to identify the factors used by their state organization for post-project contractor performance evaluation (a complete listing of these factors is shown in Appendix B). When these factors are graphed (see Figure 19) and ranked by number of respondents who use each factor, a hierarchy of importance is established. This hierarchy can be broken into three distinct groups:

- Project performance factors using the same definition as previous analyses
- Managerial performance factors using the same definition as previous analyses
- Project closeout performance factors, which are defined as those evaluated factors that relate to the manner in which the job is completed and any postconstruction issues

Project Performance Factors

As shown by rank in Figure 19, the project performance factors category is composed of seven factors that deal specifically with how the contractor is performing the work on a project:

- Timely project completion
- Timely and complete submittals
- Environmental compliance
- Proper maintenance of traffic
- Impacts to the traveling public
- Disadvantaged business enterprise (DBE) utilization
- Level of effort displayed on the job

Impacts to the traveling public describe the contractor’s ability to maintain safe and steady traffic flow through their

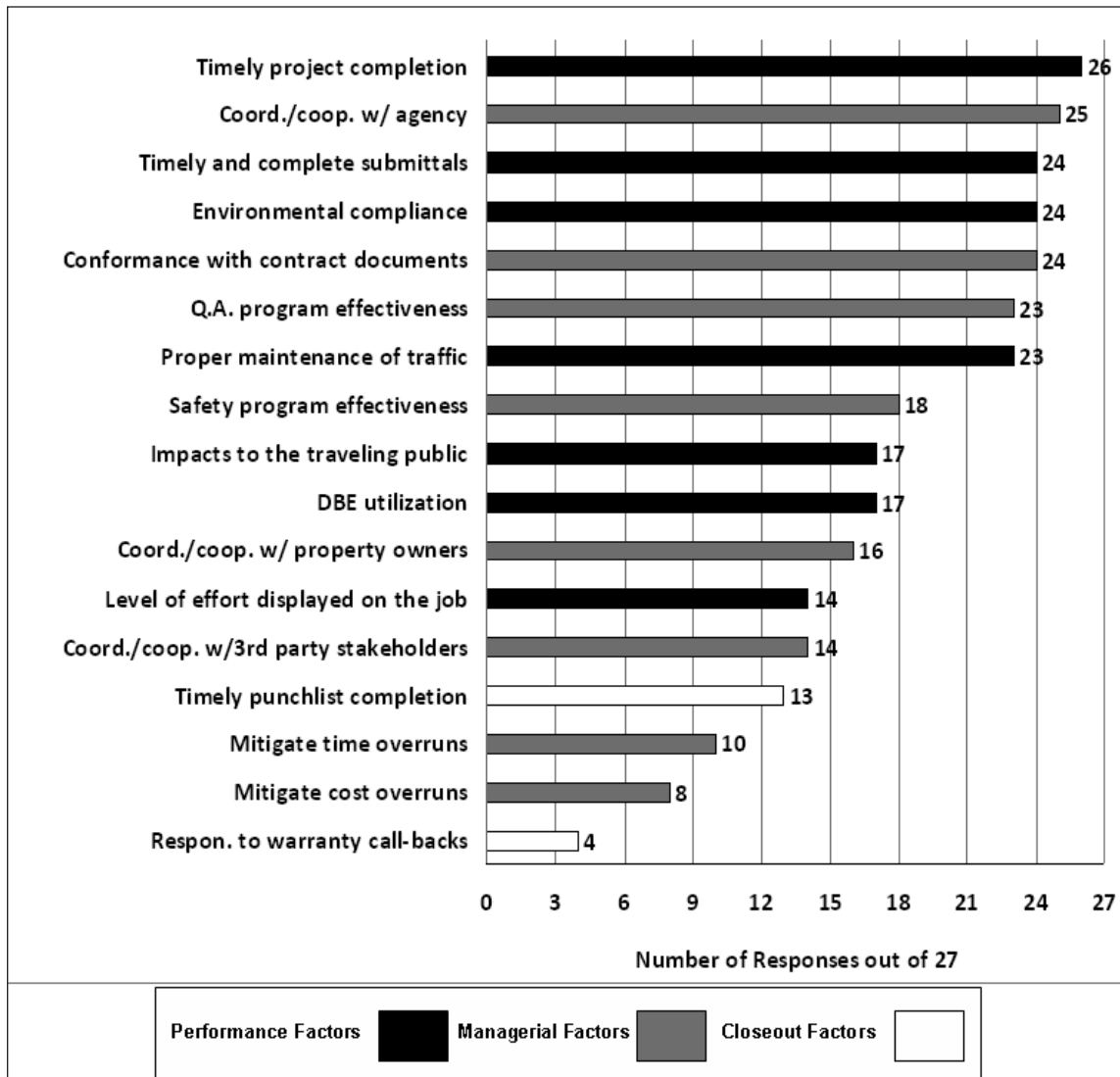


FIGURE 19 Surveyed post-project performance evaluation factors.

project. DBE utilization describes the ability of the contractor to accomplish stated goals for qualified DBE participation in the construction project. The level of effort displayed is defined by the agency representative on the project and describes the effort displayed by the contractor and its employees to maintain constant and effective work flow.

Managerial Performance Factors

Managerial performance factors are composed of three factors that are the heart of contractor management ability, including the willingness of the contractor's personnel to work proactively with agency officials and representatives. The factors in this category are as follows:

- Coordination and cooperation with agency
- Conformance with contract documents
- QA program effectiveness
- Safety program effectiveness
- Coordination and cooperation with property owners
- Coordination and cooperation with third-party stakeholders
- Mitigation of time overruns
- Mitigation of cost overruns

These factors encapsulate the contractors' quality management program effectiveness and evaluate how well the contractor is working to the letter of the contract. QA program effectiveness ties directly to quality and workmanship, one of the major factors on performance-based prequalification. Safety program effectiveness deals with the contractor's ability to prevent accidents among both the workforce and the public. The next two factors deal with how well the contractor works with individuals not affiliated with the state agency such as business owners, city leaders, other government agencies, and utilities. Finally, mitigating time and cost overruns measures the contractor's willingness to keep the impact of change orders and other contract modifications to their lowest reasonable value throughout the project. In some states, like Florida, the initial reasonableness of contractor change order proposals is evaluated using these factors.

Project Closeout Performance Factors

Project closeout performance is a separate category and includes the following two factors:

- Timely punchlist completion
- Responsiveness to warranty call-backs

These factors are generally addressed toward the end of the project. Timely punchlist completion deals specifically with project closeout activities and working with the agency to correct any minor deficiencies or final construction items.

Responsiveness to warranty call-backs reflects the contractor's willingness to stand behind the work they have completed in a manner that ensures quality and workmanship as discussed in the previous chapter.

Evaluation Factor Breakdown

As shown in Figure 20, the breakdown of the post-project performance evaluation process is roughly equal for performance and managerial factors. When these factors are compared with the criteria discussed in the previous chapter's performance-based prequalification factor analysis (shown in Figure 10), it is clear that the factors used in the contractor performance evaluation system are essentially the same as those listed in the performance-based prequalification survey output. This leads to the conclusion that the contractor performance evaluation system must nest within the performance-based contractor prequalification program to be effective.

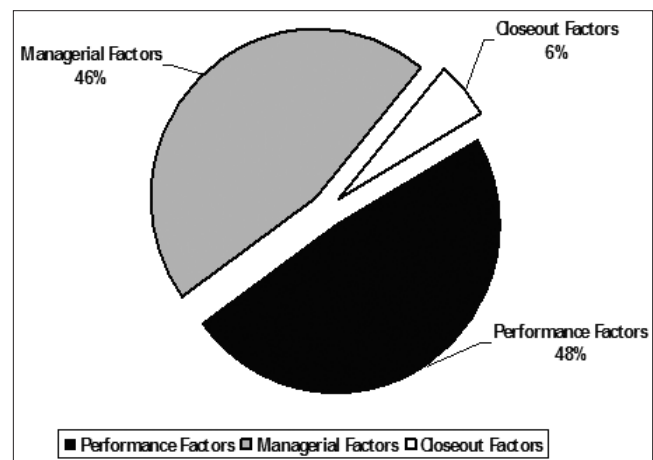


FIGURE 20 Breakdown of post-project performance evaluation criteria.

CONTRACTOR EVALUATION USAGE

Next, the manner in which contractor performance evaluations were utilized by the surveyed state agencies was analyzed. The majority (64%) used post-project performance evaluations as a factor in their administrative prequalification process, as shown in Figure 21. Another 24% use it for performance-based prequalification, and some responses indicated that it was used for both. A few agencies used this for the release of retainage or final payment. Additionally, 6% of the respondents conduct contractor evaluations, but do not feed them back into their process in any manner. When the 3% that did not know how they were used is added to the 6% that do not employ them, nearly one-tenth of the sample does not exploit the potential benefits of this powerful contract communication tool. Overall, this graph illustrates the point that contractor performance evaluations are used to feed the contractor prequalification process.

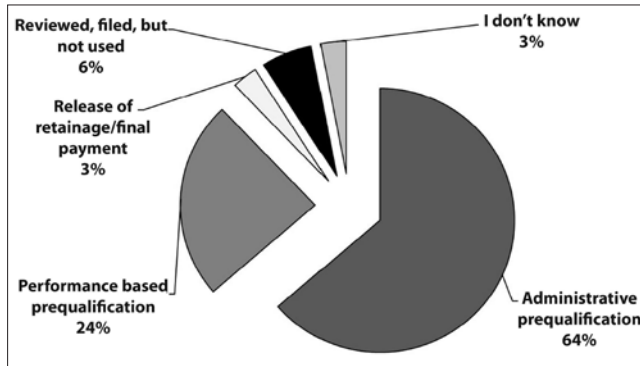


FIGURE 21 Breakdown of post-project performance evaluation use.

The use of contractor project performance evaluations encompasses the three major aspects of project success: cost, time, and quality. Of the three, all highway agencies have formal quality management programs that have been used for extended periods of time. Also, of the three, final project quality is the aspect whose impact is felt beyond the end of construction. Therefore, contractor project performance evaluation programs must necessarily be synchronized with agency quality management programs and, in cases in which they are used, must furnish a means to directly evaluate the performance and effectiveness of contractor QC programs.

PERFORMANCE-BASED PREQUALIFICATION AND CONTRACTOR QUALITY CONTROL

One aspect of performance-based contractor prequalification that cannot be overlooked is its impact on the agency's quality management program. Ensuring the quality of the final product is ultimately a major reason for implementing performance-based contractor prequalification. The FHWA allows state DOTs to use contractor test results in project acceptance decisions (FHWA 2004) and that authority has increased the emphasis on contractor QC programs. A contractor's performance in properly implementing its approved contractor QC plan certainly could be evaluated as part of the prequalification process. Many factors will independently influence the outcome of any construction project. However, performance can be influenced by the system employed to ensure quality (TRB 1979). The survey showed that nearly 70% of the respondents use contractor test results as part of their quality management programs. Only seven of those respondents indicated that contractor test results of performance in that area were carried into their prequalification processes. Thus, this is an area in which performance-based prequalification could be implemented.

Project-Specific Performance Contractor Quality Control Evaluation

Although the experience with using contractor QC performance as part of the prequalification performance is limited, this issue has been researched in one area and some guidance on the topic can be gained. That area is in the use of project-specific prequalification requirements for DB transportation projects. To effectively transfer design liability to the design-builder, an agency must also transfer many of the traditional QA responsibilities. This leads to a concern that the "fox may be guarding the hen house" (Gransberg and Molenaar 2008). Most DB projects require that competing contractors submit an SOQ for evaluation by the agency. Thus, the opportunity to eliminate marginally qualified contractors from competition exists at the outset of each DB project procurement process. A study by Ernzen and Feeny (2002) of the Arizona DOT's DB program (appropriately titled, "Contractor-Led Quality Control and Quality Assurance Plus Design-Build: Who Is Watching The Quality?") addressed this concern directly by comparing project QA test data on a DB project for which the design-builder had been assigned the responsibility for QA. To conduct this assessment, the design-builder was provided with data from a similar project delivered by traditional DBB means. It found the following:

Analysis of the data shows that despite a highly compressed schedule, the quality of the material on the project exceeded the project specifications and was similar to the quality of work completed for the state under traditional contracting methods with an Arizona DOT-operated QA program (Ernzen and Feeny 2002).

That DB project quality was roughly equal to the quality found on the DBB projects was confirmed by a 2006 FHWA report. The FHWA *Design-Build Effectiveness Study* (2006) reports actual results that confirm this belief as summarized in the following quotation:

On average, the [DOT] managers of design-build projects surveyed in the study estimated that design-build project delivery reduced the overall duration of their projects by 14 percent, reduced the total cost of the projects by 3 percent, and *maintained the same level of quality as compared to design-bid-build project delivery.* [Emphasis added.]

Therefore, taking the two studies together, it is evident that linking contractor past performance to the need for viable and trustworthy contractor QC programs is possible, even in a DB environment in which the agency must give up much of the traditional control it has in DBB project delivery. Fortunately, the literature contains examples of two long-standing contractor evaluation systems described in the next sections. These examples can be used as models for agencies that wish to implement this type of system.

Singapore Construction Quality Assessment System

The Singapore Building and Construction Authority (2005) uses a system called CONQUAS 21. It involves a rigorous and seemingly objective evaluation of contractor construction quality. The evaluation output is maintained in a database and is used to rate contractors for prequalification. The limiting aspect of CONQUAS 21 is that it is focused totally on construction quality and does not attempt to evaluate other aspects of contractor performance. It maintains its objectivity by using a go/no-go evaluation for a published set of construction quality standards for various technical features of work. For instance, structural steel is broken out into the following assemblies:

- Main Member/Partially Assembled Component
- Metal Decking
- Erection Tolerances
- Corrosion and Fire Protection
- Welding Test Reports

Contractor QC testing and owner QA efforts are used to determine whether or not each rated component met the published quality standards. A score is merely the sum of the “go” responses divided by the total number of evaluated items. These are plugged into a weighted criteria scheme that gives those members that have the greatest impact on overall structural quality more weight than those that are ancillary features. For instance, main bridge structural members would be assigned more weight in the scheme than the guard rails. After all the major features are rated, an overall project performance rating is developed using a weighting scheme that uses the same logic as that used for the individual features of work.

This system has several obvious advantages. First, the measurement of quality against a published standard removes much of the subjectivity from the evaluation. Hence, it could be less controversial to implement. Next, the focus on construction quality using a rigorous system to evaluate contractor QC program effectiveness creates an incentive to maximize quality to improve the contractor evaluation and enhance a contractor’s prequalification rating. Because Singapore uses these ratings to assemble bidders lists, this system creates an incentive for achieving acceptable quality the first time.

CONQUAS 21 also has several disadvantages. The fact that it evaluates only quality creates an environment in which budget and schedule are no longer valued in the prequalification process. Thus, a contractor with an excellent construction quality record but poor management and project control abilities receives the same rating as a contractor with an equal quality record but a history of finishing jobs on time and to budget. Second, there appears to be no place to insert evaluation factors for proactive contractors that strive to mitigate

project cost and time problems on behalf of the owner. Thus, there is no incentive to form partnerships on a project.

Nevertheless, CONQUAS 21 appears to be a great model for the construction quality evaluation piece of performance-based contractor prequalification. Nothing would prevent a highway agency from adding the other evaluation categories for schedule, budget, and willingness to cooperate with the owner and third-party stakeholders on a given project. This combination is found in the contractor evaluation system used by many federal agencies.

Federal Construction Contractor Appraisal Support System

The FHWA’s Federal Lands Highway Divisions use the Department of Defense Construction Contractor Appraisal Support System (CCASS) (FHWA 1998a, 2005). An NCHRP study reports the following:

The federal government and a number of state agencies have for many years maintained a database of contractor evaluations on past projects and often use this resource as a means to measure the contractor’s track record. Despite certain drawbacks, this appears to be the best means of assessing past performance as it allows contractors the opportunity to appeal negative ratings (Scott et al. 2006).

The CCASS evaluation system has been used for decades and not only records actual contractor performance but also enables federal agencies to make a decision on the “responsibility” of bidders in a DBB project (FHWA 1998a; DOD 2007). In this system, a low bidder with several unsatisfactory ratings can be found to be “not responsible” and not awarded the contract. CCASS requires that the agency evaluate the contractor’s performance in the five areas shown in Table 8.

The way in which its quality of work evaluation is implemented in relation to contractor QC in the FHWA system is described as follows:

The first of these elements, Quality of Work, essentially overlaps the contractor’s inspection system requirements under FAR [Federal Acquisition Regulation] Clause 52.246-12, Inspection of Construction [contractor QC plan]. That is, a contractor which fails to maintain an effective quality control inspection system will generally warrant an unsatisfactory rating in the Quality of Work category. Deficient contractors must be clearly notified of the deficiencies and provided an opportunity to correct them. Evaluations may be shared with other contracting agencies and private entities. Evaluations may be used, in part, for determinations of responsibility prior to award of sealed bid contracts or in evaluating past performance as a part of source selection for a negotiated contract (FHWA 1998a).

As indicated in the previous quote, the FHWA requires that the contractor be notified if the agency believes it is not performing at a satisfactory level. This kind of mandated com-

munications between the owner and the contractor gives the contractor the ability to correct the defect found by the owner and, if necessary, to refute or clarify those perceived defects. In fact, the CCASS process requires that the agency forward all its ratings to the evaluated contractor and gives that entity 30 days to comment on the rating (DOD 2007). The agency must then review the contractor's comments and determine whether or not to adjust the final rating. That this long-lived system is effective is evidenced by the fact that a recent survey of both federal agency evaluators and their evaluated contractors found that 92% of the government respondents and 98% of the contractors believed that it is an "effective tool for improving government-contractor communication" ("Contractor Performance Assessment Reporting System" 2007). An example of how one of the Federal Lands Highway Divisions applies the rating system for quality is as follows:

Quality of work reflects the contractor's management of the quality control program, as well as the work performed. Questions, which could be addressed, are as follows: Has a quality product been provided? If not, specifically describe the deficiency in quality and the shortcomings in the contractor's quality control system responsible for it, for example:

- Inadequate control
- Failure to perform necessary testing
- Failure to implement [the mandated] inspection process

- Inadequate or incomplete quality control documentation
- Failure to identify and correct deficient work
- Inadequate materials and shop drawings submittals
- Incorporation of unspecified materials (FHWA 2005)

CCASS evaluations are filed and remain in the contractor's record for six years. They are used to determine responsibility on DBB contracts and as part of the prequalification process on DB and other types of negotiated contracts. Given the above discussion, using some form of evaluation of a given contractor's actual QC performance has a positive impact on final project quality. Additionally, that evaluation may be part of a performance-based contractor prequalification program.

PERCEIVED IMPACT OF PERFORMANCE-BASED PREQUALIFICATION ON PROJECTS

To measure the potential impact of performance-based contractor prequalification on future transportation projects, the survey asked the following: "Regardless of your experience with contractor prequalification, in your opinion what impact would performance-based contractor prequalification have on the following project aspects?"

TABLE 8

DEPARTMENT OF DEFENSE CONSTRUCTION CONTRACTOR APPRAISAL SUPPORT SYSTEM (CCASS) RATING AREAS

<p>1. Quality Control</p> <ul style="list-style-type: none"> • Quality of workmanship • Adequacy of contractor QC plan • Implementation of contractor QC plan • Quality of QC documentation • Storage of materials • Adequacy of submittals • Adequacy of QC testing • Adequacy of as-builts 	<p>4. Effectiveness of Management</p> <ul style="list-style-type: none"> • Cooperation and responsiveness • Management of resources/personnel • Coordination and control of subcontractors • Adequacy of site clean-up • Effectiveness of job-site supervision • Compliance with laws and regulations • Professional conduct • Review/resolution of subcontractor issues • Implementation of subcontracting plan (DBE)
<p>2. Timely Performance</p> <ul style="list-style-type: none"> • Adequacy of initial progress schedule • Adherence to approved schedule • Resolution of delays • Submission of required documentation • Completion of punchlist • Submission of updated and revised progress schedules • Warranty response 	<p>5. Compliance with Labor Standards</p> <ul style="list-style-type: none"> • Correction of noted deficiencies • Payrolls properly completed and submitted • Compliance with labor laws and regulations with specific attention to Davis-Bacon Act and EEO requirements
<p>3. Compliance with Safety Standards</p> <ul style="list-style-type: none"> • Adequacy of safety plan • Implementation of safety plan • Correction of noted deficiencies 	<p><i>Possible Ratings:</i> Outstanding, Above Average, Satisfactory, Marginal, Unsatisfactory in each area plus an overall rating for project.</p>

Source: *Construction Contractor Appraisal* (2007).

The survey then provided a list of project aspects and asked the respondent to choose whether implementation would make that project aspect “Better,” “No Change,” or “Worse.” It also allowed the respondents to select “No Opinion.” The results are shown in Table 9.

Table 9 shows that the majority of respondents felt that implementing performance-based contractor prequalification would not have a negative impact on any project aspect except the “Number of Bidders.” For this particular aspect, “worse” indicates that there would be fewer bidders if everyone was prequalified based on their previous project performance. This confirms the very essence of performance-based prequalification: that marginal contractors will be encouraged to improve their performance to protect their unrestricted ability to bid. Therefore, this response can be interpreted as a vote for performance-based prequalification. Few respondents believed that implementing this process would make any of the other project aspects worse, as seen by 2% selecting “worse” in only three categories.

This particular analysis is integral to the idea of identifying potential barriers to implement the proposed system. DOT respondents would not be opposed to implementing performance-based contractor prequalification. Table 9 shows that the majority believe it will generally improve many, if not most, project aspects. This intersects with the information found in the literature review as evidenced by the following quotation: “The process of short-listing to only qualified bidders who have a proven track record with budget and schedule performance could, and does, enhance performance” (Molenaar and Songer 1998).

ANALYSIS OF CANADIAN SURVEY RESPONSES

The Canadian results can be compared with the U.S. results to see how the two countries approach the same issue. Only four of the seven respondents used a post-project contractor evaluation system. Figure 22 uses the same labels for project performance, managerial performance, and project close-out performance as the U.S. results shown in Figure 19. The

TABLE 9
IMPACT OF PERFORMANCE-BASED CONTRACTOR PREQUALIFICATION ON PROJECT ASPECTS

Project Aspect	Better	No Change	Worse	No Opinion
Number of bidders	5%	37%	37%	21%
Material quality	37%	41%	0%	22%
Workmanship quality	59%	15%	0%	26%
Safety	46%	22%	0%	32%
Maintenance of traffic	34%	37%	0%	29%
Level/amount of agency inspection required	20%	54%	2%	24%
Timely project completion	44%	29%	0%	27%
Timely construction submittal completion	39%	37%	0%	24%
Timely punchlist completion	41%	34%	0%	25%
Personnel experience	29%	42%	0%	29%
Personnel competence	37%	37%	2%	24%
Number of contractor-initiated change order requests	17%	54%	0%	29%
Number of claims/disputes	24%	47%	0%	29%
Responsiveness on warranty call-backs	24%	35%	0%	41%
Achievement of DBE goals	32%	42%	2%	24%
Environmental compliance	27%	44%	0%	29%
Contractor cooperation with agency	44%	32%	0%	24%
Contractor cooperation with property owners	24%	49%	0%	27%
Contractor cooperation with third-party stakeholders	24%	49%	0%	27%
Contractor cooperation with public concerns	29%	44%	0%	27%

Note: Shading indicates predominate opinion.

Canadians gave more weight to “Safety Program Effectiveness” and “Responsiveness to Warranty Call-backs.” With these two notable exceptions, the Canadian post-project evaluation system is roughly the same as that found in the United States. In Figure 23, the Canadian results are grouped into the three categories in the same manner as the U.S. results.

the United States is probably a viable proposition and could be accomplished without a negative impact on U.S. projects.

Overall, the results of the Canadian side of the survey reinforce some of the findings from the U.S. analysis. The Canadians place a greater emphasis on the business side of

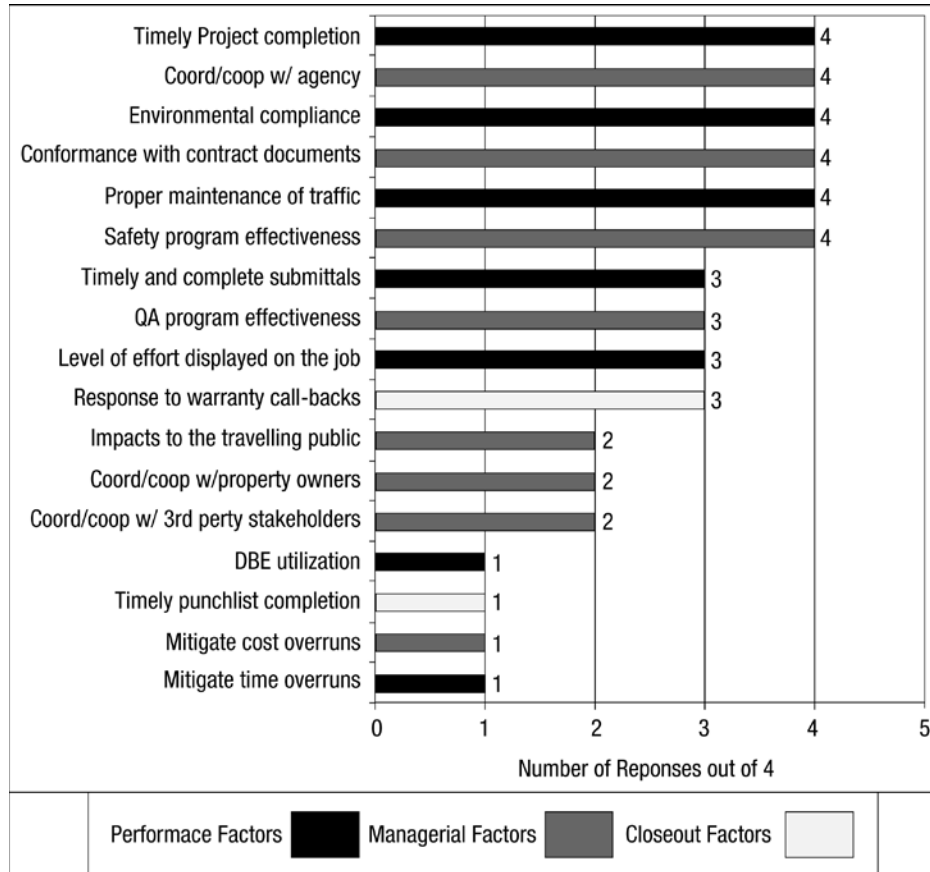


FIGURE 22 Canada-surveyed post-project performance factors.

Comparing Figure 23 with Figure 20 shows that results from the two countries are almost identical. Therefore, it appears that the post-project performance evaluation approach in Canada is not remarkably different than the one used in the United States. This validates the list of factors used in the survey as accounting for the major elements of post-project performance evaluation and lends authority to the conclusions drawn in this chapter.

Table 10 outlines the perceived impact of performance-based prequalification. The table shows that the majority of Canadian respondents believe that implementing performance-based contractor prequalification would not negatively affect any project aspect other than the number of bidders. This is consistent with what the U.S. analysis found and shows that, even though the legal and regulatory environment is different in Canada, the impact of implementing this program would be roughly the same. It also leads to the inference that importing certain features of the Canadian system for use in

administrative prequalification and more of a management and production emphasis on the performance-based prequalification process.

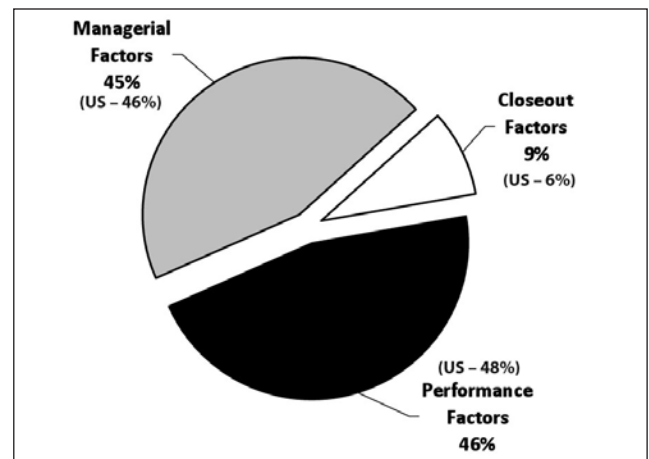


FIGURE 23 Canada breakdown of post-project performance evaluation criteria.

TABLE 10
CANADA IMPACT OF PERFORMANCE-BASED
CONTRACTOR PREQUALIFICATION ON PROJECT ASPECTS

Project Aspect	Better	No Change	Worse
Number of bidders	14%	29%	43%
Material quality	86%	14%	0%
Workmanship quality	100%	0%	0%
Safety	57%	29%	14%
Maintenance of traffic	57%	29%	14%
Level/amount of agency inspection required	29%	57%	14%
Timely project completion	57%	43%	0%
Timely construction submittal completion	29%	43%	0%
Timely punchlist completion	29%	43%	0%
Personnel experience	43%	57%	0%
Personnel competence	71%	29%	0%
Number of contractor-initiated change order requests	29%	57%	0%
Number of claims/disputes	43%	57%	0%
Responsiveness on warranty call-backs	86%	14%	0%
Achievement of DBE goals	0%	14%	0%
Environmental compliance	71%	29%	0%
Contractor cooperation with agency	86%	0%	14%
Contractor cooperation with property owners	43%	57%	0%
Contractor cooperation with third-party stakeholders	57%	43%	0%
Contractor cooperation with public concerns	43%	43%	14%

Note: No opinion responses not shown.

Shading indicates the predominate opinion of respondents.

CONTRACTOR PERSPECTIVE ON POST-PROJECT PERFORMANCE EVALUATION

The contractors were given the same list of evaluation factors as given to the agency survey respondents. Figure 24 is a breakdown of that output and can be compared with Figure 20, which shows the agency responses. The two figures are roughly the same, with contractors shifting the emphasis to managerial factors and adding a bit more weight to the closeout factors. The contractor output again validates the agency results. Regarding the use of contractor test results, of the 10 responding contractors, one local, one regional, and five national contractors had completed projects for which this program was in effect. However, only

two (one regional and one national) had experience with agencies that carried contractor QA performance into their prequalification system and one of those was the Canadian contractor. One of the interviewees, a national contractor, stated that the two programs need to be complementary rather than conflicting. In other words, a contractor with a proactive quality management program should not be penalized on its evaluations if it reports and corrects deficiencies as they are identified. The bottom line is that the contractors see the post-project performance evaluation as an essential part of the performance-based prequalification system. Their major concerns center around fairness and consistency in the ratings. These validate both the information found in the literature and the results of the agency survey.

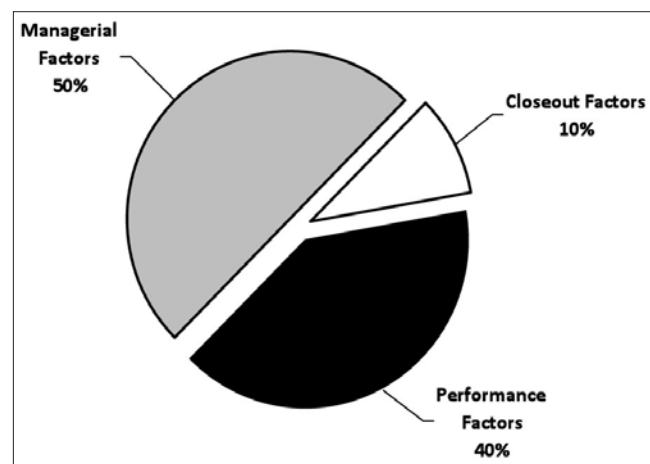


FIGURE 24 Contractor breakdown of post-project performance evaluation factors.

SUMMARY

The major factors of both performance-based contractor prequalification and of contractor project performance evaluations were discussed in this and the previous chapter. It is clear that most of the survey respondents feel that implementing performance-based contractor prequalification with a rigorous system of project performance evaluation would have a positive impact on those project aspects listed in the survey. The contractors echo the owners' sentiments. The rationale driving this perception is the essential connection between a performance evaluation of current work feeding the prequalification for future work. When project performance evaluation affects a contractor's ability to bid on future work, it encourages the contractor to improve its performance on its ongoing projects. Molenaar and Johnson (2003) would predict that this ultimately will translate into higher-quality roads and bridges.

CHAPTER FOUR

BARRIERS TO IMPLEMENTATION**INTRODUCTION**

Any change to the status quo will encounter some resistance. Competitive bidding for highway projects has traditionally entailed an award that is made to the lowest responsive and responsible bidder (Minchin and Smith 2001). The definitions of “responsive and responsible” are well established in each highway agency’s area of operations. Integrating performance-based prequalification contingent on contractor evaluation into those definitions has already been done in the federal sector (DOD 2007). To do so effectively at the state level may require overcoming a number of barriers to implementation. These barriers are both actual and perceptual. *NCHRP Web Document 38* (Minchin and Smith 2001) lists the following implementation issues:

- Integration with existing construction administration systems, such as site manager
- Qualifications of the evaluators
- Evaluation process administrative rules
 - Frequency of evaluations
 - Appeals process development
 - Life span of evaluations and duration of disqualification
- Impact on contractor bonding
- Legal implications

ACTUAL BARRIERS TO IMPLEMENTATION

The first implementation issue regarding integration of contractor evaluations with existing construction administration systems could require a significant commitment in personnel to monitor it and be open to criticism. Scott et al. (2006) cites the fact that the federal CCASS system discussed in chapter three “has been accused of being resource intensive, overly subjective or biased, and subject to challenge.” An agency that is not using contractor evaluations will need to devote the appropriate level of personnel assets to implement a system that does use evaluations. Additionally, that staff will have to maintain the evaluation database and ensure that the most current information is used in each procurement action. The MTO (see chapter five for details) has a staff of three full-time employees to operate and administer their performance-based prequalification program (Tun-

istra 2008). However, neither the literature nor the survey contained information regarding the required staffing levels. This will be a significant issue for small states and does require future research to provide meaningful guidance.

Evaluator Qualifications

Next, the agency will need to ensure that its evaluators are indeed qualified to evaluate the subject contractors. In most cases, contractors are evaluated by the agency construction personnel who administer the evaluated contract. Implementation will require that an ongoing training program for the evaluators be developed and fielded to ensure consistency between evaluators and different types of projects. Additionally, this kind of program will be necessary to demonstrate the agency’s commitment to fairness and the reduction of as much subjectivity in the process as possible. Agencies that currently use this type of system—such as the FHWA (FHWA 2005) and the Florida DOT (Sadler 2007)—have found that a review of all contractor evaluations at a level above the evaluator is also required to make the program as consistent as possible. This issue was raised in the contractor structured interviews, in which two local, two regional, and four national contractors indicated that their major concern was the agencies’ ability to consistently rate them from project to project.

Evaluation Administrative Rules

The administrative rules of the process need to be transparent and logically derived (Parvin 2000). Determining the frequency of evaluations is important. The trend found in the literature (FHWA 2005; DOD 2007; MTO 2007; Sadler 2007) appears to support at least one interim evaluation before the final evaluation. Florida DOT furnishes evaluations on a monthly basis. The theme is to notify the contractor when it is not performing well and give it the opportunity to correct its deficiencies and shortcomings before they become part of the permanent record.

This notification leads to the need for an appeals process whereby the contractor can refute an unfavorable rating and that provides the contractor due process before it is penalized by the system. Of the survey respondents, 77% indicated that they had an appeals process for their contractor evaluations and all but one (Quebec) stated that a negative performance

evaluation does not automatically disqualify a contractor. Once again, the theme is to ensure that the process is both fair and justifiable.

The next issue is the life span of a specific evaluation. The survey showed that the majority (73%) of the respondents had systems in which the evaluations were maintained in the active record for at least three years. The literature intersects with this finding from the survey and goes on to specify a “rolling 3-year average” (Hancher and Lambert 2002; MTO 2007). Thus, it would appear that this creates an added incentive for contractors to perform in a manner that earns them high ratings as it would take three years for a poor rating to be flushed out of the prequalification system. The issue of how long a contractor remains disqualified was not covered in the survey, but the literature shows that it tends to be a function of the reason for which they were sanctioned. Those that lost their qualification for criminal acts usually are debarred indefinitely. Those that are disqualified for marginal performance, usually for defaulting on a contract, can regain their qualification after proving to the agency that they have fixed the problems that led to their exclusion. The issue of multiyear contracts discussed in the previous chapter is also important when establishing administrative rules for evaluation of life span.

Evaluation Impact on Contractor Bonding

This issue deals with contractors that normally have construction contracts with more than one owner or agency. The contractor’s bonding capacity must be spread across all its clients until it is exhausted. Therefore, an unfavorable rating from a highway agency could be viewed by the surety in a manner that might cause it to reduce the available bonding to work for other owners. *NCHRP Synthesis 190* (Thomas and Smith 1994) concluded that, although state DOT capacity factors used in prequalification appear to parallel the bonding capacity computed by sureties, “it is highly improbable” that they will be the same. Nevertheless, bonding companies do adjust final bonding capacities for factors that are outside the financial analysis (Minchin and Smith 2001) and, therefore, it is probable that an unfavorable rating by a DOT might reduce a contractor’s ability to bid work for other owners.

Legal Implications

The last issue deals with legal implications. None of the survey respondents indicated that they had laws that would prohibit performance-based contractor prequalification. Only one indicated that it had internal procurement policies that prohibit it. The contractor structured interviews showed a similar trend with only one local contractor citing DOT internal procedures as a possible barrier to implementation. Therefore, while the literature does contain a number of discussions regarding possible legal issues, it can be concluded

that for the most part these issues are not going to constitute a barrier to implementation.

PERCEIVED BARRIERS TO IMPLEMENTATION

Changing a system that has been in place for decades requires changing the organization’s procurement culture and that will inevitably encounter resistance from both internal and external stakeholders that are both comfortable with the status quo and believe that change is truly unnecessary (Ellicott 1994). A previous NCHRP Synthesis (Gransberg and Molenaar 2008) measured the magnitude of the impact of perceptions on the ability to change the procurement paradigm for transportation projects. The procurement change in that study was the shifting of some QA responsibilities to the contractor in DB projects. That study found that in spite of quantitative evidence the change would not be deleterious to ultimate project quality and that 50% of the public officials still felt that change was dangerous. It also found that 86% of the members of the construction industry who would be affected directly by the procurement system change believed that the change ultimately would be beneficial. The difference in the two groups’ perceptions was both interesting and important. The study showed that the greatest resistance to change came from within the highway agencies that are the ultimate decision makers on procurement system change. Thus, it is important to consider the issue of perceived barriers to the implementation of performance-based contractor prequalification.

Perceived Barriers from the Literature

The literature shows that a major perceived issue is the ability for an agency to develop and implement a system that is both fair and equitable (Al-Gobali and Bubshait 1996; Minchin and Smith 2001; Hancher and Lambert 2002). *NCHRP Web Document 38* took a close look at some of these perceived barriers to implementation of performance-based contractor prequalification. That study issued a survey that included the following questions and response rates:

- Is it possible to justly rate a contractor’s quality of work and tie it to qualification? When all of the respondents are considered, 80% said yes, 12% said no, and 8% gave some other answer. Of the DOT respondents, 83% said yes, 9% said no, and 8% gave some other answer. Of the contractors, 66% said yes, 28% said no, and 6% gave some other answer.
- Is it possible to justly rate a contractor’s quality of work and factor it into a bid to determine the awardee of a contract? When all respondents are considered, 47% said yes, 37% said no, and 16% gave some other answer. Of the DOT respondents, 50% said yes, 33% said no, and 17% gave some other answer. Of the contractors, 34% said yes, 57% said no, and 9% gave some other answer (Minchin and Smith 2001).

Looking at the response rate to the first question, a potential perceived issue could create a barrier to implementation. Nearly one-third of the contractors believed that it would be impossible for an agency to “justly rate a contractor’s quality of work.” Although a minority, a number of DOT personnel agreed with this notion. When the question was changed to cover the use of contractor past performance evaluations in the contract award decision, the percentages of negative perceptions increased for both groups. Thus, this leads to the inference that highway agencies that intend to implement performance-based contractor prequalification will need to address possible negative perceptions from both inside their organizations and within the construction contracting community.

Perceived Barriers from the Contractor Interviews

Public procurement policy research has found that perceptions are often of equal importance to facts. Legislative action is heavily influenced by perceptions. One report on construction procurement policy implementation classifies perceptions as “barriers to broad acceptance” (Byrd and Grant 1993). Thus, it is important to understand the breadth and range of potential negative perceptions when developing a plan to implement a significant change in construction procurement policy such as performance-based contractor prequalification.

Another perception issue regarding performance-based contractor prequalification is the possibility that smaller general contractors may be at a disadvantage as a result of having less financial capacity to both obtain and maintain the state-of-the-art in highway construction equipment and to pay the higher salaries it takes to attract and retain highly qualified project management personnel (Minchin and Smith 2001). This issue is particularly important in states with relatively small construction budgets whose construction industry is particularly dependent on local firms. The fear is not that these firms cannot furnish satisfactory quality and timeliness, but rather that their work will be compared with national contractors and evaluated lower for the reasons previously cited. As part of this synthesis, a series of contractor structured interviews were conducted, half of which were with smaller local and regional contractors. None of the contractors that were interviewed expressed this concern, regardless of size. However, most believed that there are contractors that feel this way.

The contractor structured interview questionnaires asked three questions regarding barriers to implementation and in only one case (a national contractor) did a contractor express the idea that the industry would oppose such an initiative. That was regarding post-project evaluations, and that contractor’s issue was the agencies’ ability to develop and implement a system that was fair. This intersects with the literature findings and, although the response rate was 1 out of 10, it still confirms the need to be sensitive to equity and

consistency issues in the development of contractor evaluation programs.

The real measure from this research instrument of contractor perceptions was the output from the portion of the interviews for which the contractors were asked to rate their perception of how implementing performance-based prequalification would affect the same set of project aspects as those that were listed in the general agency survey. The contractor responses are shown in Table 11 and demonstrate solid support for the system. They agreed with owners that the numbers of bidders would be the only negative impact because performance-based prequalification would necessarily reduce the number of marginal contractors that were qualified to bid. After that, the contractor rated every other aspect as either better or no change, tracking closely to the agency responses. This leads to the conclusion that the perception that the construction community will be resistant to this change in the procurement process is incorrect. As previously stated, however, agencies that are contemplating the change need to be sensitive to the possible negative perceptions and take steps to ensure that their internal and external stakeholders are assured that the change will result in a system that is both fair and equitable.

Looking at the output from Table 11, it is apparent that agency personnel believe that the area that will show the greatest level of improvement is in workmanship quality. The contractors perceived that the prequalification process drove them to increase the experience and competence of their personnel. Both groups agreed that implementing performance-based prequalification would not appreciably change the number of contractor-initiated change orders. The perceptions were different regarding the impact on the number of claims, however, with the contractors feeling that such a program would create an environment that would discourage claims. The other project aspect in which agency and contractor perceptions diverged was in the area of level of agency inspection required. Most of the contractors believed that the agency could reduce its inspection levels, which may be related to their belief that they would need to increase the quality of the people they assigned to the job. Most of the owners felt that performance-based prequalification would have no appreciable impact on that aspect of their work.

The final perceived issue addressed in the contractor structured interviews was their opinion of how their competitors and subcontractors felt about performance-based prequalification. Nearly all (9 of 10) of the contractors indicated that their peers and competitors would support prequalification, and the remaining one, a national contractor, indicated that it would be neutral to the idea. Two-thirds of the contractors believed that their subcontractors would either support it or be neutral to the idea, with only one (a national contractor) indicating that its subcontractors would oppose it.

TABLE 11
IMPACT OF IMPLEMENTING PERFORMANCE-BASED CONTRACTOR PREQUALIFICATION ON VARIOUS PROJECT ASPECTS:
AGENCY AND CONTRACTOR PERCEPTIONS

Project Aspect	Agency Responses			Contractor Responses		
	B	N	W	B	N	W
Number of bidders	5%	37%	37%	0%	0%	100%
Material quality	37%	41%	0%	78%	22%	0%
Workmanship quality	59%	15%	0%	89%	11%	0%
Safety	46%	22%	0%	89%	11%	0%
Maintenance of traffic	34%	37%	0%	78%	22%	0%
Level/amount of agency inspection required	20%	54%	2%	89%	11%	0%
Timely project completion	44%	29%	0%	78%	22%	0%
Timely construction submittal completion	39%	37%	0%	89%	11%	0%
Timely punchlist completion	41%	34%	0%	89%	11%	0%
Personnel experience	29%	41%	0%	100%	0%	0%
Personnel competence	37%	37%	2%	100%	0%	0%
Number of contractor-initiated change order requests	17%	54%	0%	33%	67%	0%
Number of claims/disputes	24%	46%	0%	67%	33%	0%
Responsiveness on warranty call-backs	24%	34%	0%	67%	33%	0%
Achievement of DBE goals	32%	41%	2%	22%	78%	0%
Environmental compliance	27%	44%	0%	56%	44%	0%
Contractor cooperation with agency	44%	32%	0%	78%	22%	0%
Contractor cooperation with property owners	24%	49%	0%	67%	33%	0%
Contractor cooperation with third-party stakeholders	24%	49%	0%	56%	44%	0%
Contractor cooperation with public concerns	29%	44%	0%	67%	33%	0%

B = better; N = no change; W = worse.

Note: Percentages by category will not all sum to 100% as the survey allowed respondents to also select “no opinion” as a response.

SUMMARY

The previous discussion and the comparison of both agency and contractor output from the survey and interviews support the conclusion that there are few actual barriers to implementing performance-based contractor prequalification. Many highway agencies already have some form of contractor evaluation in their system. Many have some form of performance-based prequalification as well. The contractors interviewed for this report were receptive to implementing this system, because it reduces the number of marginally qualified contractors against which they must compete. Nevertheless, implementation must

be sensitive to some of the perceived barriers discussed above. This sensitivity can take the form of ensuring that all aspects of performance-based contractor prequalification are transparent to the industry and that the agency implements the system exactly as it is published. Internal checks and balances need to be in place and operating to assuage industry concerns regarding fairness and consistency. Agency personnel need to be trained on how to conduct the evaluations. Agencies need to ensure that the algorithm with which the evaluations are fed into the prequalification formula does not contain any inherent bias regarding contractor size. In summation, the research shows that if an agency is sensitive to potential perceptions, there are no major barriers to implementation.

CHAPTER FIVE

PREQUALIFICATION CASE STUDIES**INTRODUCTION**

The preceding chapters have discussed the trends in the United States and Canada regarding performance-based contractor prequalification. Many states have integrated performance-based features into their standard prequalification process. Interviews with both agency personnel and construction contractors lead one to the conclusion that the salient feature of performance-based contractor prequalification is a contractor evaluation program that feeds the prequalification process in a fair and equitable manner. One interviewee termed this “a contractor evaluation system with *teeth*.” Another comment captured on a survey indicated that “we need a system that rewards good contractors and limits poor contractors. In my mind, the only way to do that is to limit the amount of work a contractor can be qualified to do.” Thus, combining those two thoughts led the researcher to seek specific case studies from agencies that have the following:

- A seemingly objective contractor performance evaluation system that feeds its prequalification process in a meaningful way
- A specific process that uses the performance evaluation output to reward contractors with a good record and encourage contractors with a poor record to improve

With those criteria in mind, the following three agencies were found to exemplify the objectives stated above:

- Michigan Department of Transportation (MDOT)
- Florida Department of Transportation (DOT)
- Ontario Ministry of Transportation (MTO)

Additionally, a seminal court case regarding the content of the Minnesota DOT’s prequalification program for DB projects furnishes an insightful look at how an agency can successfully defend itself against a legal challenge to contractor prequalification by structuring its program in a thoughtful, objective manner. Therefore, this chapter presents the details of four case studies, which exemplify the successful implementation of performance-based contractor prequalification for agencies that may want to strengthen their programs.

METHODOLOGY

Case study information was collected using a combination of Yin’s (1994) methodology for case study research and Oppenheim’s (1992) approach to conducting structured interviews. A case study outline was developed and used to collect the same information for each of the three prequalification case studies. Additionally, a structured interview questionnaire was prepared and used to guide the interview of each agency expert. This allowed the output to be directly compared and contrasted. Before getting into the details of each specific case, it is instructive to first compare the three case study agencies’ responses with the outline and survey.

Prequalification Factors

Table 12 is an inventory of each agency’s performance-based prequalification factors based on the factors given in the survey. The important point is that none of the agencies used any of the last seven factors shown in the table. This is logical in that those factors tend to be project-specific and, as a result, neither the contractor nor the agency has the ability to evaluate them on a general basis. The previous discussion of project-specific performance-based contractor prequalification found these factors to be important components for identifying qualified contractors for a specific project. Thus, this leads to the conclusion that factors that tend to be project-specific could be eliminated from a general prequalification system.

Next, Table 12 shows that all three case study agencies include the following factors in their systems:

- Financial capability
- Calculated capacity factor from financials
- Detailed financial analysis
- Equipment and plant
- Performance evaluations
- Past project experience

These six factors can be logically divided into two categories. The first four factors involve measuring the contractor’s financial health, which is done in most administrative prequalification systems reviewed in this research. The second category is composed of the last two factors, which include rating the contractor’s past performance and applicable experience for the work for which it is applying to be

a qualified bidder. Thus, the case study agencies all use a combination of financial qualification and performance or experience qualification to form the core of their performance-based prequalification programs.

TABLE 12
COMPARISON OF CASE STUDY AGENCY PERFORMANCE-BASED PREQUALIFICATION FACTORS

Performance-Based Prequalification Factor	Florida DOT	Michigan DOT	Ontario DOT
Financial capability	X	X	X
Calculated capacity factor from financials	X	X	X
Bonding capacity	X		
Surety statements	X		
Detailed financial analysis	X	X	X
Bank statements	X		
Insurances	X		
Managerial ability	X	X	
Resumes for key personnel			X
Professional licensing for key personnel			
Key personnel past project experience			X
Equipment and plant	X	X	X
Technical ability	X	X	
Calculated ability factor from financials	X		
Past illegal behavior	X	X	
Performance evaluations	X	X	X
Claims history	X		X
Past project experience	X	X	X
Timely completion of past projects			X
Quality of material and workmanship			X
Workman's compensation modifier			
Quality assurance plans			
Safety plans			
Environmental plans			
Traffic control plans			
Level of subcontracting			
Use of DBEs			

The two U.S. DOTs also include factors related to managerial and technical ability as well as past illegal behavior. This is in contrast to the Ontario system, which is much less complex, and even more different when one considers that Ontario does not require performance bonding from its prequalified contractors. Although no conclusions can be drawn from this comparison, it does make the argument for keeping these types of programs as simple as possible. This idea coincides with the contractor interview comments regarding the requirement to furnish large amounts of tedious company information that would not seem to affect the prequalification decision.

TABLE 13
COMPARISONS OF CASE STUDY AGENCY PERFORMANCE EVALUATION FACTORS

Performance Evaluation Factor	Florida DOT	Michigan DOT	Ontario DOT
Level of effort displayed on the job	X		
Proper maintenance of traffic	X	X	X
Impacts to the traveling public	X		X
Timely and complete submittals	X	X	X
Timely project completion	X	X	X
Environmental compliance	X	X	X
Coordination/cooperation with agency	X	X	X
Coordination/cooperation with property owners	X	X	X
Coordination/cooperation with third-party stakeholders	X	X	X
Conformance with contract documents	X	X	X
Quality assurance program effectiveness	X	X	X
Safety program effectiveness	X	X	X
DBE utilization	X		
Mitigate cost overruns	X		
Mitigate time overruns	X		
Timely punchlist completion			
Responsiveness to warranty call-backs			
Other: Personnel and equipment;		X	
Management competence		X	

Contractor Evaluation Factors

Table 13 shows each agency's performance evaluation factors. The reader could note that contractor evaluation is project-specific and therefore one would expect it to be more detailed than prequalification. The upshot is that in all three cases the contractor evaluations are used to feed the performance-based prequalification systems and, thus, could be viewed as input. Both Florida and Ontario use the evaluation output to adjust the amount of work on which a given rated contractor can bid. The table clearly shows that the heart of a successful contractor evaluation system includes evaluation of various aspects of project timeliness, the contractor's level of coordination and cooperation, and effectiveness of its quality and safety programs. Additionally, proper maintenance of traffic during construction was also important.

Table 14 compares how each case study agency administers its contractor performance evaluation system. All three agencies provide the contractor with a copy of a performance evaluation and have an appeals system to address negative evaluations. Perhaps most important, none of them uses a single negative performance evaluation to disqualify a contractor.

TABLE 14
COMPARISON OF CASE STUDY AGENCY PERFORMANCE
EVALUATION SYSTEM ADMINISTRATION

Output Usage	Florida DOT	Michigan DOT	Ontario DOT
Does the contractor receive a copy of the completed performance evaluation?	Yes	Yes	Yes
Are you required to notify the contractor prior to submission if the performance evaluation is considered negative?	Yes	No	Yes
Is there an appeals process for a contractor that receives a negative performance evaluation?	Yes	Yes	Yes
How long do performance evaluations remain on the record?	>3 years	3 years	3 years
Does a negative performance evaluation automatically disqualify a contractor?	No	No	No

Impact of Implementing Performance-Based Prequalification

Table 15 shows a side-by-side comparison of each agency's assessment of the impact of its performance-based contractor prequalification program on various aspects of a generic project. It is apparent that the interviewed agency representatives felt that their respective programs were

largely beneficial, rating most categories as better with performance-based contractor prequalification. An exception is the impact on the number of bidders: two agencies indicated no change and one believed that it reduced the number of bidders. Both Florida and Ontario have had substantial experience with this process and, as a result of its longevity, may have given a "no change" answer because the system has been institutionalized. Intuitively, if an agency is able to eliminate poor-performing contractors through prequalification procedures, it would follow that the number of potential bidders would decrease. Another result is that two of the three agencies felt that the program would have no change on contractor-initiated change order requests. In the interviews, both indicated that those were a function of project aspects that had no relationship to the ability of the contractor. Therefore, contractors would have no choice but to request a change, if one was authorized, regardless of their qualifications or the mechanics of the prequalification system.

After comparing the three case study agencies side by side, we can delve into the details of each agency's contractor prequalification program. Because Michigan does not directly incorporate its evaluation output into a calculation of bidding capacity with the state, it will be reviewed first.

MICHIGAN DEPARTMENT OF TRANSPORTATION PREQUALIFICATION PROGRAM CASE STUDY

The MDOT's performance-based contractor prequalification program revolves around a system of combining administrative prequalification calculations and declarations with a program of contractor performance evaluation on a project-by-project basis. MDOT evaluates each contractor in the following four areas:

- Organization and Management
- Resources
- Work Performance
- Subcontractor Management

The first area includes the managerial effectiveness and technical competence of the contractor's personnel. It also covers scheduling, timeliness, and completeness of submittals, quality control plans, and prompt payments. The "resource" area judges the contractor's ability to provide and maintain the requisite number of equipment and workers, as well as the efficiency of those resources. Work performance entails the effectiveness of safety programs, maintenance of traffic, the contractor QC program, its cooperation with third-party stakeholders (such as utilities), environmental compliance, and timely project closeout. The last area grades the contractor's ability to manage the work performed by its subcontractors.

TABLE 15
CASE STUDY AGENCY ASSESSMENT OF THE IMPACT OF
PERFORMANCE-BASED CONTRACTOR PREQUALIFICATION
ON VARIOUS PROJECT ASPECTS

Project Aspect	Florida DOT	Michigan DOT	Ontario DOT
Number of bidders	N	W	N
Material quality	N	B	B
Workmanship quality	B	B	B
Safety	B	B	B
Maintenance of traffic	B	B	B
Level/amount of agency inspection required	B	W	B
Timely project completion	B	B	B
Timely construction submittal completion	B	B	B
Timely punchlist completion	B	B	B
Personnel experience	B	B	B
Personnel competence	B	B	B
Number of contractor-initiated change order requests	B	N	N
Number of claims/disputes	B	B	N
Responsiveness on warranty call-backs	B	B	B
Achievement of DBE goals	B	B	O
Environmental compliance	B	B	B
Contractor cooperation with agency	B	B	B
Contractor cooperation with property owners	B	B	B
Contractor cooperation with third-party stakeholders	B	B	B
Contractor cooperation with public concerns	B	B	B

B = better; N = no change; W = worse; O = no opinion.

Michigan Performance Tiers

MDOT's performance-based contractor prequalification program is governed by the State Office of Administrative Hearings and Rule (SOAHR) 247, entitled "Classification and Rating of Bidders" (SOAHR 2002). That authority establishes a "prequalification committee" that will "determine and award or renew numerical ratings, an overall financial rating, and work classifications for the bidder. The prequalification committee shall review the bidder's contractor performance evaluations for at least the last 2 construction seasons, if available, before awarding or renewing prequalification" (SOAHR 2002). Supporting this effort

is an entity called the "contractor performance evaluation review team," which conducts the physical review of all contractor performance evaluations, looking for trends of unsatisfactory performance by each individual contractor. If a trend is identified, the team takes one of the following actions:

- Tier one: If the performance trend is considered insignificant, no action is taken.
- Tier two: If the performance trend is considered important but not critical, the review team will note this and continue to monitor that contractor for further evidence that the trend is getting worse.
- Tier three: If the performance trend is considered significant and critical, the review team will issue a "tier-three letter" that notifies the contractor that it is not performing satisfactorily, the details of the trend, and directing the contractor to respond to the team detailing its plans to correct the unsatisfactory performance.

If the contractor is either unresponsive or fails to make the promised corrections, the review team then issues a "tier-four" letter to the prequalification committee recommending action be taken to adjust the contractor's ability to bid on MDOT projects. The prequalification committee has the authority to reduce a contractor's bidding capacity with MDOT (and hence the amount of work it can bid on), suspend a contractor's prequalification for a specific period, or revoke the contractor's prequalification entirely.

Adverse Action Process

The connection between the contractor's project performance evaluation record and its prequalification is made through the two administrative bodies. The scope of the impact of poor performance is determined on a judgmental basis with the prequalification committee deciding an appropriate adverse action on a case-by-case basis. This system allows MDOT to have a great deal of flexibility in the mechanics of connecting the project performance evaluation with the ability of a contractor to bid its maximum capacity of work. Thus, some of the subjective issues that often arise in contractor evaluation programs, such as personal bias of a particular state employee or assigning fault for acts of *force majeure*, can be addressed qualitatively in the prequalification committee before a decision is made to affect a contractor's ability to bid.

FLORIDA DEPARTMENT OF TRANSPORTATION PREQUALIFICATION PROGRAM CASE STUDY

Unlike Michigan's system, the FDOT uses a performance-based contractor prequalification program with a direct mathematical link between contractor evaluations and a

contractor's ability to bid. As with MDOT, however, FDOT combines administrative prequalification calculations and declarations with a program of contractor performance evaluation on a project-by-project basis. FDOT evaluates each contractor's projects in the following nine areas:

- Work pursuit
- Maintenance of traffic
- Timeliness of submittals
- Timely project completion
- Coordination and cooperation
- Mitigation of cost and time overruns
- Environmental compliance
- Conformance with contract
- DBE utilization (if applicable to the given project)

Evaluation and Rated Performance Areas

Most of these rated areas are self-explanatory. FDOT's emphasis is on rating how well the contractor "partners" with the agency in its coordination, cooperation, and mitigation areas. According to the Florida contractor interview, these are the most effective portions of the FDOT evaluation system. FDOT has an explicit definition for each area and prescribes the number of points to be awarded based on achievement of the definition. For example, the "pursuit of work" area is defined as follows:

Contractor diligently and systematically pursues the work with sufficient labor, materials, and equipment at all times. Active progress is made on critical path items each day in accordance with the approved schedule. The contractor schedules the subcontractors so that they are pursuing their work as well. Contractor worked five (5) days a week unless the contract states otherwise, excluding weather days. Percent is based on allowable contract time (minus weather days) and on a five (5) workday week unless otherwise stated in the contract (FDOT 2005).

And in the first area, a contractor can earn 12 points if it meets the following definition:

The contractor aggressively pursued the work 90% of the days. Documentation in the project files by the CEI [construction engineering and inspection] reveals that the progress of the work was unsatisfactory no more than 10% (FDOT 2005).

The definition furnishes an element of objectivity by prescribing that the contractor have no more than 1 day in 10 of unsatisfactory work progress, and this standard is something that can be measured. Although it contains subjective wording such as "diligently and systematically pursues the work," the project-specific understanding of these can easily be discussed and agreed upon between FDOT and the contractor at the project's preconstruction meeting, which would enhance understanding of the system's application on the given project.

Performance Deficiency Letter

FDOT uses an administrative technique called the "performance deficiency letter" to communicate its concerns to the contractor regarding issues that arise in the rated areas. It can be preceded by a "performance deficiency warning letter" that notifies the contractor of "shortcomings/noncompliances" and gives it a chance to correct the issue before a formal "performance deficiency letter" is issued. Once a formal performance deficiency letter has been issued, it is then recorded and the number of these received in a prorated "year" is used to calculate a "deficiency letter factor." The deficiency letter factor is used to determine the grade in those rated areas for which deficiency letters are applicable. For instance, a contractor with no deficiency letters will receive the maximum score in "maintenance of traffic," and one that has six or more letters regarding maintenance of traffic deficiencies receives a score of zero (0).

FDOT has incorporated incentives for exceeding the standard in the areas of timely project completion, environmental compliance, and DBE utilization. A contractor that exceeds the minimum requirements and goals in these categories can receive bonus points on its performance rating. The maximum number of total points without bonuses is 98 and with bonus points is 110. In 2007, FDOT had an average score of 94.6 with a range of 26 to 110 (Sadler 2007). Importantly, a contractor does not have to finish early to receive a bonus score in the timely completion area. The instruction for that category indicates that a bonus point is in recognition "that a contractor may have to work through weather, utilities, added work, or other unforeseen conditions or delays" (FDOT 2005). Therefore, FDOT recognizes the contractor's efforts to maintain the schedule despite difficulties encountered on the job.

Computing Ability Factor

The accumulated record of a given contractor's rated performance is termed the "contractor's past performance record" and is used to determine an "ability factor" for each contractor in the database (Sadler 2007). This ability factor is used to determine the "maximum capacity rating" of a contractor that seeks to be deemed qualified to bid on FDOT contracts. Figure 25 shows the conversion of the "contractor's past performance record" to "ability factor." The change in the slopes of the lines between the lower and upper portions of the acceptable range illustrates the incentive to stay on the high end of the rating spectrum—for example, a three-point rating difference from 93 to 96 yields an ability factor increase of 2 points, whereas the same three-point difference from 76 to 79 yields an ability factor increase of only 1 point.

Once the ability factor based on past performance ratings is determined, it is used in the following formula (Eq. 1) to determine a contractor's "maximum capacity rating," which

is the “aggregate dollar volume of uncompleted work a firm is allowed by the Department to have under contract at one time” (FDOT 2004). This, in turn, determines the amount of work that it can be awarded:

Adverse Action Process

Presumably to keep their qualified bidders list as large as possible, while ensuring that only qualified contrac-

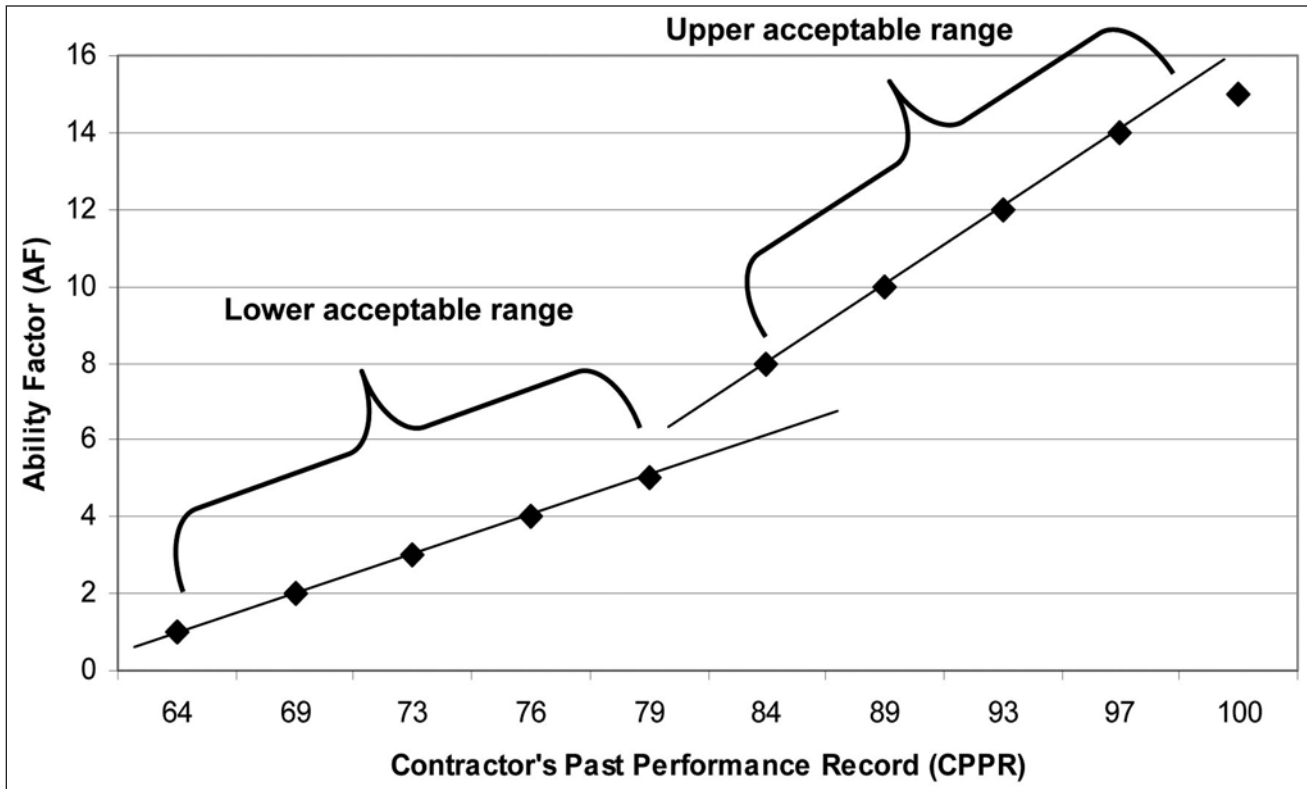


FIGURE 25 FDOT ability factor conversion from contractor's past performance record (Sadler 2007).

$$MCR = AF * CRF * ANW \quad (1)$$

Where:

MCR = maximum capacity rating,

AF = ability factor,

CRF = current ratio factor (current assets/ current liabilities), and

ANW = adjusted net worth.

Table 16 shows how this formula is used to determine the *MCR* for differently sized companies with different past performance rating histories. The “contractor’s past performance record” has a significant impact within the same company on its ability to pursue FDOT projects. The positive impact of staying in the upper range of the ability factor calculation is also evident.

tors are allowed to bid, FDOT also has a process to deal with contractors whose performance records are marginal or unsatisfactory. First, if a given contractor receives two or more evaluations less than 76 related to workmanship, cooperation, or environmental issues, it is issued a “letter of concern” that discusses the specific issues FDOT has found to be lacking. This generally leads to a meeting in which FDOT personnel explain the issues and corrective actions necessary. If a contractor has the same problems that led to a letter of concern as well as projects that are in liquidated damages, has continuing quality concerns, or has problems with specific types of work, FDOT may choose to restrict that company’s bid capacity until the situation is remedied. If the problems continue, the contractor can be removed from the bidders list for a specific period of time. Finally, if major performance concerns continue or the contractor is found to be in default, FDOT can revoke the company’s qualification for periods allowed by the Statute and Administrative Rule. The typical revocation period has been three years.

TABLE 16
IMPACT OF FDOT ABILITY FACTOR ON MAXIMUM CAPACITY RATING

Contractor's Past Performance Record	Ability Factor	Current Ratio Factor	Adjusted Net Worth (in \$Millions)	Maximum Capacity Rating (in \$Millions)
<i>Large Company—ANW > \$100 million</i>				
98–100	15	1.3	\$334.1	\$6,515
74–76	4	1.3	\$334.1	\$1,737
64 or less	1	1.3	\$334.1	\$434
<i>Medium Company—ANW \$20 Million to \$100 million</i>				
98–100	15	1.3	\$52.7	\$1,028
74–76	4	1.3	\$52.7	\$274
64 or less	1	1.3	\$52.7	\$69
<i>Small Company—ANW < \$20 million</i>				
98–100	15	1.3	\$1.5	\$29
74–76	4	1.3	\$1.5	\$8
64 or less	1	1.3	\$1.5	\$2

Source: Sadler (2007).

Two-Way Communications

All in all, one can see that the FDOT performance-based contractor prequalification program is quite robust. It is made further so by the way it is implemented. Contractors are given interim evaluations on a monthly basis throughout the life of the project. This enhances communications regarding contractor performance and effectively eliminates an argument regarding performance evaluations at the end of a project by forcing the issue at a time when corrections can still be made, if the contractor is indeed willing. The interview with the Florida contractor showed that these monthly evaluations were valuable and provided a means of focusing attention on overall performance as well as production.

That interviewee indicated that the evaluated areas that were focused on partnering between the two organizations were effective. However, two major concerns with the system were cited. First, in spite of the efforts to make this evaluation as objective as possible, there is still an element of subjectivity, and the contractor felt that FDOT needed to better reinforce consistency between contracts and different evaluators. In an effort to address this issue, the FDOT state construction engineer's office reviews every Contractor's Past Performance Record (CPPR) score for conformance with procedure as well as posted guidance regarding an interpretation of the CPPR rating process. If a particular evaluator is found to be too aggressive or too lax, that evaluator is directly counseled in an effort to bring the individual's evaluations back into

the norm for the state. If these evaluations in question were detrimental to the contractor, they are changed. The bottom line for this issue is that there will always be an element of subjectivity in the most carefully devised contractor performance evaluation system. Therefore, the agency must have a review process like the one FDOT uses that demonstrates a tangible commitment to fairness and includes a remedy for undeserved contractor evaluations.

Connection with Contractor Quality Control Program

Additionally, the contractor expressed frustration with an apparent conflict between the performance evaluation system and the contractor QC program. The example cited was one in which the contractor's QC program identified and reported a quality issue that, because of the timing, was corrected by the contractor after the monthly evaluation report was issued but within a reasonable period of finding the deficiency. In this case, the evaluation was scored down because of the quality issue and no mechanism was available to raise the contractor's score after the quality issue was satisfactorily resolved. Thus, this conflict could create an unintended bias for the contractor to "manage" or, worse, under-report the flow of adverse contractor QC information to retain as high a performance score as possible. Again, FDOT is aware of the issue and is working to address it through its contractor QC specifications. This perceived conflict may only occur on that particular contractor's project as a result of an individual interpretation of the FDOT program. Nevertheless,

it is an excellent cautionary notice to review performance-based contractor prequalification programs in the context of the entire environment in which they must be implemented to ensure that they do not create an unintended impact on another vital program, such as quality management.

Thus, it can be concluded that the FDOT performance-based contractor prequalification program does furnish the two aspects mentioned in the introduction to this chapter: an evaluation system with *teeth* and a means to restrict poor-performing contractors' ability to win work. Considering the fact that it has been in constant use for a significant period of time, it is an excellent case study example for agencies that might wish to implement a full-scale performance-based contractor prequalification program.

ONTARIO MINISTRY OF TRANSPORTATION PREQUALIFICATION PROGRAM CASE STUDY

The MTO's performance-based contractor prequalification program is perhaps the most interesting example because this agency does not require performance/payment bonds or bid deposits from prequalified contractors. Thus, the program that was started in the late 1950s not only provides an incentive for contractors to perform well, but also allows the agency to accrue a tangible monetary benefit. With an annual construction program of roughly CDN\$1.4 billion and average Ontario performance/payment bond costs of 5% of contract cost (Tunistra 2008), the estimated savings to the province is roughly \$70 million per year in bond costs. Thus, this system certainly bears analysis.

The Ontario program essentially integrates the following three major components:

- An administrative qualification system that determines financial and experiential capabilities used to compute the "contractor's basic financial rating."
- An "integrated construction performance rating system" system that rates a contractor's performance on a given project and is accumulated with all other projects on an annual basis to calculate an "approved contractor performance index" each year for the most recent three consecutive years. It is used to calculate a "contractor's maximum workload rating," which effectively reduces the amount of work that a marginally performing, but prequalified, contractor is allowed to bid.
- An "integrated infraction system" that allows the owner to reduce a "contractor's basic financial rating" by up to 100% for serious breaches of the contract.

Contractor Exclusion Policy

The ministry has a "contractor prequalification exclusion" provision that provides for excluding a contractor from

being allowed to bid on any work in which that contractor is engaged in specifically defined legal proceedings against the owner. Essentially, any firm that is actively engaged in legal proceedings against the MTO may not be allowed to tender a bid for its projects for an "exclusion period" of up to three years. The provision is decided by the qualification committee on a case-by-case basis. Quoting from the provisions:

It is prudent for the Ministry to avoid the additional costs associated with extraordinary time required of the contract administrator and Ministry staff in the management of projects with contractors, who have been or are engaged in a legal proceeding. It is therefore prudent for the Ministry to avoid awarding contracts to those contractors and related persons whose past performance demonstrates a significant increase in the level of management effort demanded by the Ministry and its representatives (MTO 2007).

The entire qualification system is overseen by the qualification committee made up of ministry executives who establish the policies and procedures and decide on sanctions.

Components of the Integrated Prequalification System

The interview with the agency stressed that the success of the system lies in the interrelationships of all the components with one another. Although certain components of the system can be used independently (the Contractor Performance Index was implemented about eight years ago), the program works best when all the components are integrated. An agency should be cautious if an attempt to implement any single component without the support of the others is considered.

The Integrated Infraction Report System is related to the issuance of an infraction, which is a serious breach of contract and includes but is not limited to the following specific reasons:

- Failing to abide by tendering requirements
- Tender declarations that are incomplete or inaccurate
- Failing to abide by General Conditions of Contract
- Serious issues affecting safety or the environment
- The [unsatisfactory] timeliness of the completion of the work and services
- The issuance of any Notice of Default
- The manner of the [unsatisfactory] resolution of any disputes and whether such disputes were resolved in accordance with the prescribed provisions of the Contract
- When an Infraction Report is issued, the Qualification Committee may take no action, issue a warning letter, or reduce the Contractor's available financial rating for a specified period (MTO 2007)

Obviously, these are critical issues for contractors that wish to compete for work in Ontario, and the imposition of

sanctions may create a severe hardship for an Ontario-based company that must leave the province to seek work. In the case of the contractor exclusion provisions, the policy creates a distinct disincentive to immediately seek redress in the court system because the MTO may not do business with a contractor that is suing it. It creates an incentive to complete MTO projects in a timely manner and in a fashion that is satisfactory to the MTO.

Mechanics of the Prequalification System

Contractors are rated in five work classifications: general road, structures, electrical, structural coating, and general maintenance. Both rated and new contractors must demonstrate satisfactory experience in a given classification to be awarded their full “basic financial rating.” If they do not have MTO experience, their experience with other public road agencies is considered and their “basic financial rating” may be reduced in accordance with a published formula (MTO 2007). Additionally, a fully qualified contractor’s “basic financial rating” is reduced by the amount of its ongoing work to determine an “available financial rating.” This parallels the same theory as that used in determining bonding capacity in the United States.

The contractor’s “available financial rating” is determined when a bid is tendered and it must equal or exceed the contract rating. Contractors that have a low performance index may be required to equal or exceed the “maximum workload (MWL) rating” of the project.

The “contractor performance index” (CPI) is calculated from the contractor’s previously approved “contract performance ratings” (CPR) for each project and is used to determine whether a contractor needs to satisfy the contract rating and the contract MWL. The CPI is calculated as follows (see Eq. 2):

- Annual average CPR in current year minus 1, times a weight of 3
- Annual average CPR in current year minus 2, times a weight of 2
- Annual average CPR in current year minus 3, times a weight of 1
- All divided by 6

If no contracts are rated in one of the three years, then the denominator is adjusted accordingly.

$$CPI = \frac{((CY - 1) * 3) + ((CY - 2) * 2) + ((CY - 3) * 1)}{(3 + 2 + 1)} \quad (2)$$

Where:

CPI = contractor performance index for a given contractor,

CY = current year,

CY - 1 = last year,

CY - 2 = year before *CY* - 1, and

CY - 3 = year before *CY* - 2.

Based on the CPI, a contractor is found to be in one of the three following zones:

- Green Zone: CPI = 70 to 100
- Yellow Zone: CPI = >55 to <70
- Red Zone: CPI = 35 to 55
- Not Qualified to Bid: CPI = <35

Green Zone contractors are allowed to bid on work up to their “financial basic rating” without adjustment for performance. Yellow Zone contractors may have to meet the contract MWL and also may have their MWL reduced by a factor of up to 20%. Finally, Red Zone contractors will have their MWL reduced by a factor “calculated linearly 20% and 100% depending on their position in the zone (20% at 55 and 100% at 35).” Table 17 shows how five contractors that fell in each of the three zones with the same “basic financial rating” and MWL would be affected by this system.

Computing Maximum Workload Rating

A contractor’s MWL is defined as the highest annual total dollar value of work awarded to a contractor in one of the five fiscal years (April to March) preceding the current fiscal year as shown in the following example (MTO 2007):

Year 1 = \$2,000,000

Year 2 = \$5,000,000

Year 3 = \$10,000,000 (Contractor’s MWL)

Year 4 = \$3,000,000

Year 5 = \$6,500,000

Thus, for this specific project, each of the contractors in Table 17 must meet or exceed both the contract “financial and maximum workload” ratings to prequalify. The financial basic rating is reduced by the amount of any and all ongoing work the contractor has and the MWL is reduced, if applicable, by the total value of all awarded MTO work. Contractors not meeting these requirements will not be allowed to submit a bid. Contractor B was penalized for its environmental infraction, but the penalty was not enough to keep it from prequalifying for this particular project. Additionally, Contractor C, which was in the Yellow Zone, did not have its MWL reduced even though MTO could have

chosen to reduce it by up to 20%. However, the imposition of the MWL of \$6 million and that it already had \$1.5 million in MTO work disqualified it from further work, because this contract had a minimum MWL of \$5 million. The impact on Contractor D, the Red Zone contractor, was even more severe. Finally, Contractor E, which was in the Green Zone, was excluded from bidding because of its ongoing lawsuit against MTO.

Table 17 shows that a contractor in this system that is financially sound but does poor quality work has its ability to bid on MTO projects severely restricted by the effect of the CPI. Thus, both aspects of contractor performance-based prequalification discussed in the opening section of this chapter (i.e., a system with “teeth” and the ability to reward good performance and restrict poor performance) are satisfied in the MTO system. This conclusion becomes even more signifi-

TABLE 17
EXAMPLE OF SEVERAL MTO QUALIFIED CONTRACTORS UNDER A MAXIMUM WORKLOAD (MWL) RATING ADJUSTMENT

<i>Table 5.6 Part 1</i>						
Contract financial rating = \$8,000,000; Contract maximum workload rating = \$5,000,000						
Contractor	Basic Financial Rating (MWL Rating) (1)	Contractor Ongoing Work (MTO work) (2)	Available Rating (3)	Infraction Sanctions (4)	Contractor Performance Index (5)	Impose Maximum Workload Rating? (6)
A	\$12,000,000 (\$6,000,000)	\$2,000,000 (\$1,500,000)	\$10,000,000	0	85 = Green Zone	No
B	\$12,000,000 (\$6,000,000)	\$2,000,000 (\$1,500,000)	\$10,000,000	5% (Environmental infraction)	74 = Green Zone	No
C	\$12,000,000 (\$6,000,000)	\$2,000,000 (\$1,500,000)	\$10,000,000	0	*65 = Yellow Zone	Yes: MWL = \$6,000,000
D	\$12,000,000 (\$6,000,000)	\$2,000,000 (\$1,500,000)	\$10,000,000	0	**50 = Red Zone	Yes: MWL = \$6,000,000
E	\$12,000,000 (\$6,000,000)	\$2,000,000 (\$1,500,000)	\$10,000,000	15% (Safety infractions)	72 = Green Zone	No

<i>Table 5.6 Part 2</i>					
Contractor	MWL Reduction Adjustment (7)	Exclusion? (8)	Adjusted Financial Rating (9)	Adjusted Maximum Workload Rating (10)	Prequalified? (11)
A	N/A	No	\$10,000,000	N/A	Yes \$10 million > \$ 8 million
B	N/A	No	\$9,500,000 (5% infraction = \$500K reduction)	N/A	Yes \$9.5 million > \$ 8 million
C	*0	No	\$10,000,000	\$4,500,000 (MWL \$6.0 million less MTO work \$1.5 million)	No \$4.5 million < \$ 5 million
D	**40%	No	\$10,000,000	\$2,700,000 (60% of MWL \$6.0 million less MTO work \$1.5 million)	No: \$2.7 million < \$ 5 million
E	N/A	Yes (ongoing lawsuit)	Excluded	N/A	No: Excluded due to ongoing lawsuit

*Yellow zone penalty is discretionary. MOT can impose a reduction of the MWL of up to 20%. For this example no penalty is assessed, but MWL is imposed.

**Red zone = automatic 40% penalty.

cant when one considers that fact that Ontario does not require performance or payment bonds or bid deposits from prequalified contractors and thus is totally dependent on this system to protect itself from contractor default. The fact that this system has been in use for some years testifies to its efficacy.

Barriers to Use in the United States

The major barrier to implementing this type of system in the United States will be the issue of disqualifying contractors for bringing legal action against the agency. U.S. contractors, as verified by the contractor interviews, would argue that not all the lawsuits are the fault of the contractor and that standard construction contracts are crafted with the idea that the courts are the final recourse when the means provided by dispute resolution clauses fail to bring a satisfactory result. The MTO also considered these same arguments when implementing the exclusion policy, and for that reason, contractor exclusions are decided by the qualification committee on a case-by-case basis. Tweaking that one aspect is both doable and justifiable, and a system similar to the Ontario one could be implemented by a U.S. DOT whose enabling policies allowed it to rate contractor performance and utilize that output to adjust a given contractor's ability to bid on its work.

MTO's system spans both general prequalification and project-specific prequalification. This is necessary because it substitutes for the bonding component of most agencies' procurement systems. In an agency that requires bonds, the prequalification can be general, because the surety industry will regulate the amount of work a given contractor can bid on by withholding bonding when the contractor reaches its bonding capacity. In Ontario, the agency must perform the calculations shown in Table 17 to determine a given contractor's financial capacity to be awarded a given project without undue risk of financial collapse. Thus, the computation of the basic financial rating, the MWL rating function as the general prequalification factor, and the remaining calculations that determine a contractor's eligibility for a given project based on past performance act as a de facto bonding capacity for the project.

MINNESOTA DEPARTMENT OF TRANSPORTATION PREQUALIFICATION PROTEST CASE STUDY

The Minnesota DOT (MnDOT) case lays down a number of rules for an agency that wants to implement performance-based contractor prequalification to abide by while developing the details of its proposed system. Although this case revolved around project-specific prequalification, its results are generally applicable to any type of contractor prequalification. In this case, MnDOT chose to use a two-step best-value procurement to select a DB contractor for a \$110 million project (Shane et al. 2006). The first step of

this method is to evaluate the qualifications of interested DB contractors and develop a short-list composed of the best qualified group—that is, to prequalify the field. The RFQ stated, “The selection team shall evaluate the design-build qualifications of responding firms and shall compile a short-list of no more than five most highly qualified firms in accordance with qualifications criteria described in the request for qualifications” (Shane et al. 2006). To accomplish this task, it established a set of evaluation criteria and a method for scoring each potential competitor (shown in Table 18). These factors are almost identical to the performance-based contractor prequalification factors reported in the previous chapters of this report.

TABLE 18
MnDOT PREQUALIFICATION EVALUATION CRITERIA

Prequalification Evaluation Criteria	Possible Points
Legal and Financial Qualifications	Pass/Fail
Organization and Experience	15
Key Personnel	30
Project Understanding	10
Project Approach	25
Project Management	20
Total	100

Within the “Organization and Experience” category, the prequalification criteria were further defined to include the following:

- Effective project management authority and structure
- Design and construction management structure
- Effective utilization of personnel
- Owner/client references
- Experience on projects of similar scope and complexity
- Experience with timely completion of comparable projects
- Experience with on-budget completion of comparable projects
- Experience with integrating design and construction activities
- Experience of DB team members working together

These subcategories align nicely with the specific information contained on most agencies' administrative and performance-based prequalification forms. The RFQ asked the contractors to both describe their specific DB experience by listing at least one completed DB project and to list other projects “with scope comparable” to the project upon which they were competing. It went on to state that DB experience would be considered but was not required.

Issues at Stake in the Protest

Five contractors responded to the RFQ, submitting their qualifications in accordance with the RFQ and were evaluated as described in that same document. Scores ranged from 69.4 to 85.7, with three contractors being rated above 80. Those three were then announced as the “most highly qualified firms” and deemed to be qualified to continue in the competition. The fourth-ranked firm with a score of 71.9 filed a protest citing the following reasons:

- MnDOT violated the state DB statute by requiring that the evaluation would rely on and emphasize previous DB experience, which would restrict competition [as this was MnDOT’s first DB project and therefore, no local firms had DB experience],
- MnDOT engaged in unpublicized rule making, and
- The judgment regarding which agencies were short-listed was arbitrary and capricious fact-finding and the conclusions were not substantiated by the evidence (Shane et al. 2006).

The court overturned the protest and upheld the validity of MnDOT’s prequalification system for this specific project. First, it found that considering DB experience for MnDOT’s first DB project was entirely reasonable and, because it was considered but not required, it did not restrict competition. Second, it found that as MnDOT published the details of its qualification evaluation plan and as those rules applied only to a single project, the process did not constitute “unpublicized rule making” as alleged. Finally, it found that MnDOT had followed its procedures exactly as they were published and had a rational basis for justifying its prequalification decision. Therefore, the process was not “arbitrary and capricious.”

Lessons Learned for Implementing Prequalification Programs

This court test yielded some excellent information for agencies that plan to use performance-based contractor prequalification on a general scale. MnDOT won this case for three major reasons:

- The prequalification evaluation criteria were transparent to all offerors.
- The owner followed its prequalification plan as published.
- The owner could defend its decision logically.

Transparency in prequalification programs is a key element of success. Parvin, a lawyer who defends construction contractors, wrote an insightful article regarding DB evaluation planning for highway construction projects (Parvin 2000). The article discussed the legal view of the need for fair and open evaluation processes in the transporta-

tion industry. In it, he highlighted the following two points that are of interest in this case: “Clearly state the evaluation criteria and weight given for each item and ensure that the evaluation team uses them,” and “[l]eave no doubt about the honesty and integrity of the public agency’s evaluation team” (Parvin 2000).

He argued that, without a transparent evaluation plan, the owner would find itself constantly defending award protests. In this case, MnDOT clearly articulated the definition of qualification. It helped its case by stating that it would narrow down the field to a short-list of the “most highly qualified firms in accordance with qualifications criteria described in the request for qualifications.” The requirements for prequalification were clear, and each potential competitor could compare itself to the competition and make an informed decision as to its ultimate competitiveness in the known field of players. This transparency serves to reduce the element of subjectivity that is inherent to best-value award evaluation systems by spelling it out rather than hiding it.

Second, as the requirements for prequalification were clear, it was easy for the courts to find that MnDOT had followed its own evaluation plan. This speaks to the second part of the Parvin quote. Once an owner publishes its prequalification program, it loses all flexibility in applying it to the competitors that respond. If it wants to defend against a protest, it must follow its own rules. If it does, the second part of the Parvin quote about leaving “no doubt about the honesty and integrity ... of the evaluation team” is satisfied.

Finally, the use of the terms “most highly qualified” gave MnDOT great latitude about determining the final size of the short-list. The resultant scores showed that three competitors fell within a range of three points of each other, whereas the plaintiff was 10 points below the third highest score. This created a solid argument that the three competitors on the short-list were indeed the most highly qualified. MnDOT was unintentionally doing the plaintiff a favor by not being conservative in forming the short-list with four firms. The cost of preparing a technical and price proposal for a \$110 million project would probably be in the range of \$300,000 to \$500,000 (Shane et al. 2006). If MnDOT had arbitrarily set a minimum point score of 70 to be considered “qualified” (i.e., minimally qualified), then three instead of two firms would have had to invest a significant amount of money in a losing effort. Thus, the logic of short-listing only the “most highly qualified” instead of all the minimally qualified firms is compelling in an economic sense and in the long run is fair to industry.

Thus, several lessons can be learned from this case and applied to a broad-based prequalification program. First, the owner must publish transparent prequalification criteria along with its procedures for using the output of contractor performance evaluations in determining prequalification.

This puts all the contractors on an even footing and makes the defense against a possible protest stronger. Second, once published, the owner must follow its prequalification procedures to the letter, collecting documentation along the way to prove that the decisions made for the project flow directly from the published evaluation plan and its attendant criteria. Finally, the performance-based contractor prequalification program must be logical and the decisions that flow out of it must also be based on defensible logic.

SUMMARY

The study of the three agency performance-based contractor prequalification programs and the MnDOT protest case lead to a number of conclusions about implementing these types of processes. First, a direct link of some sort between the contractor evaluation system and prequalification is essential. Two of the three case study agencies (FDOT and MTO) made that link automatic via a mathematical adjustment based on the contractor's record of rated performance. The third one (MDOT) used the evaluations to trigger an investigation and potential adjustment to the contractor's prequalification status. In chapter three, the interviewed contractor indicated that the state in which it did business assembled evaluations but that those ratings did not affect its ability to pursue new work with that DOT. Thus, the interviewee indicated that the process was "tedious" and provided little incentive to perform above minimum requirements. Therefore, a successful prequalification program should include an evaluation system that results in a positive or negative impact that is commensurate with contractor project performance.

Next, that all three cases used their evaluation program to restrict the amount of work a contractor could effectively pursue by adjusting their financial capacity, demonstrates that this approach furnishes a good means to limit poor contractors and reward good contractors. Thus, manipulating the amount of work a given contractor can be awarded in proportion to its performance record seems to be an effective means to influence contractor behavior. Additionally, FDOT showed it was also possible to create incentives to exceed the minimum requirement by awarding bonus points in its evaluation system and by varying the calculated "ability factor" between a lower and upper level of acceptable performance.

Finally, the MnDOT protest case showed that no matter how an agency decides to implement performance-based contractor prequalification, it must do so with an eye to being able to defend its process in court. MnDOT won its case because of the following three reasons:

- They published their entire system, thus making it transparent to all competitors,
- They followed their system exactly as it was published, and
- They could justify and defend the logic of their decision making process.

Therefore, no matter what the mechanics of a given performance-based contractor prequalification program, it should be transparent, applied consistently as published, and follow a defensible train of logic in the decisions it makes.

CONCLUSIONS AND SUGGESTED RESEARCH

INTRODUCTION

The objective of this synthesis was to answer the following question:

Can performance-based construction contractor prequalification be implemented in a manner that rewards good contractors, encourages poor contractors to improve their performance to remain competitive in the industry, and adds value to the completed construction project?

This question can be subdivided into three questions and answered individually:

- Can performance-based construction contractor prequalification be implemented?

This report found that prequalification has been implemented successfully by both the MTO and FDOT, as well as by another 12 U.S. DOTs and two Canadian MOTs that responded to the survey. Although chapter four discusses potential barriers to those that have not yet implemented performance-based construction contractor prequalification, the contractor interviews and the survey responses indicated little perceived opposition to the idea. No U.S. DOTs indicated that they had laws or regulations that would preclude implementation and only three believed that the construction industry would oppose it, which was validated by the contractor interviews in which 9 of 10 interviewees felt their industry supported the idea.

- Can performance-based construction contractor prequalification be implemented in a way to reward good contractors and encourage poor contractors to improve performance?

The FDOT ability factor shown in Figure 25 and Table 16 is designed to reward a contractor's past performance by giving a higher ability factor for those that have exceeded the minimums than those that have met the minimums. The MTO has successfully implemented and sustained a system that encourages good performance by granting a workload rating based on its contractor performance index shown in Table 17.

- Can performance-based construction contractor prequalification add value to the completed construction project?

Both the survey and the contractor interviews found that implementing performance-based contractor prequalification was perceived as having a positive impact on the quality of various project aspects, thereby enhancing the value of that project. Some of the potential perceived benefits that are indicated by both the agency and contractor responses include enhanced quality, safety, timely completion, and cooperation with the agency (see Table 11). MTO is so rigorous with its prequalification process that it is able to do away with the performance bond requirement for the contractor.

CONCLUSIONS

Given the answers to the above questions, the following conclusions were reached in the synthesis based on the procedure for establishing conclusions cited in chapter one.

- **Conclusion 1—Transition to performance-based prequalification**

When comparing the results of the survey and the prequalification form content analysis, many factors used in performance-based prequalification were identified in the administrative prequalification process. Figure 26 maps the results of the two systems and graphically illustrates this conclusion. Therefore, the transition from a system of administrative prequalification to performance-based prequalification will not be difficult. This is due to the fact that the agency is already adept at evaluating many of the factors and the contracting industry is familiar with furnishing the necessary information. Additionally, many contractors work in more than one state and, thus, many already have experience with performance-based qualification.

By comparing the two systems in Figure 26, it is clear that there are slight differences to what is asked in administrative and performance-based prequalification systems, but the main conceptual relationship is clearly evident. The difference between the two prequalification systems lies with how deeply the data for each factor are processed. In administrative prequalification, the data are the governing issue and they are collected to determine responsiveness. For instance, a contractor is deemed qualified to bid by merely submitting the required past project experience information. Conversely, performance-based prequalification looks to see

how well the contractor performed on their past projects to determine whether a contractor can be allowed to bid. This is the fundamental difference between the two types of factors, but the factors are very much alike, both requesting roughly the same information but looking at it in different lights. That being said, in those cases in which administrative prequalification asks for the same information as performance-based prequalification it is safe to conclude that the transition between the two would be relatively smooth.

- **Conclusion 2—Role of bonding**

Bonding did not carry the weight in both prequalification processes as the other factors listed in this research. Chapter two presented the criteria breakdown chart for the administrative prequalification form, the administrative prequalification survey results, and the performance-based prequalification survey results. Respectively, the percentages for bonding, sureties, and insurance were 6%, 9%, and 12%, which is much less than the sum of managerial criteria and performance criteria, at 76%, 60%, and 75%, respectively. Given the plausible explanation that agencies are expecting the bonds, sureties, and insurance to be furnished on a project-specific basis lead to the conclusion that bonding, sureties, and insurance criteria should be used in administrative rather than performance-based prequalification. This is validated because four U.S. and three Canadian respondents indicated that they do not currently require performance bonds on their contracts. Additionally, 23 U.S. and five Canadian survey respondents indicated that a performance bond was not sufficient evidence of contractor prequalification. Additionally, as most contractors' bonding capacity is finite, it would also serve as a final project-specific prequalification standard when the low bidder must furnish the necessary bonds, sureties, and insurance to be awarded the final construction contract. These results also lead one to question what value performance bonds add to construction projects.

- **Conclusion 3—Simplify performance-based prequalification**

A rigorous post-project performance evaluation system can be used in place of most, if not all, the minor factors of performance-based prequalification. Chapter two presented

the major factors of performance-based contractor prequalification as identified by the survey respondents. However, a number of commonly used minor factors received survey responses (See Appendix B for details). When the minor factors are compared with the post-project performance evaluation factors, a correlation is evident between the two sets. This leads to the conclusion that the post-project performance evaluation system can be used to cover those minor factors and simplify the performance-based prequalification system to only the major factors found in this study. In Figure 27, the correlation between the two factors is mapped in the same manner as the previous figure.

The first eight factors of performance-based prequalification directly correlate with the first nine factors of post-project performance evaluation. After careful analysis of the remaining performance-based prequalification factors, one can move "Performance Evaluations," the crux of this study, to become classified as a major factor. "Capacity Factor" and "Ability Factor" can remain in the performance-based prequalification process because they are mathematical determinates calculated to quantify the contractor's attributes and are key targets for adjustment based on the output from the contractor post-project performance evaluation system.

Another aspect of simplification is standardization of the information required for prequalification across the nation. This would make it easier and less costly for contractors that work in more than one state to develop and furnish the required information. This idea was expressed by several national contractors in the structured interviews. One regional contractor mentioned the effort required to keep up with various states' administrative prequalification, terming it "tedious." Chapter five reports the concern of a national contractor that objected to being required to furnish information that seemingly had no impact on the prequalification decision but could disqualify a company if it failed to furnish all the required data. Therefore, standardizing the way highway agencies approach performance-based contractor prequalification, perhaps as detailed in conclusion 5, would accrue benefits not only for contractors by reducing the administrative burden but also for agencies by making comparisons across states possible and meaningful for contractors that are new to a given state.

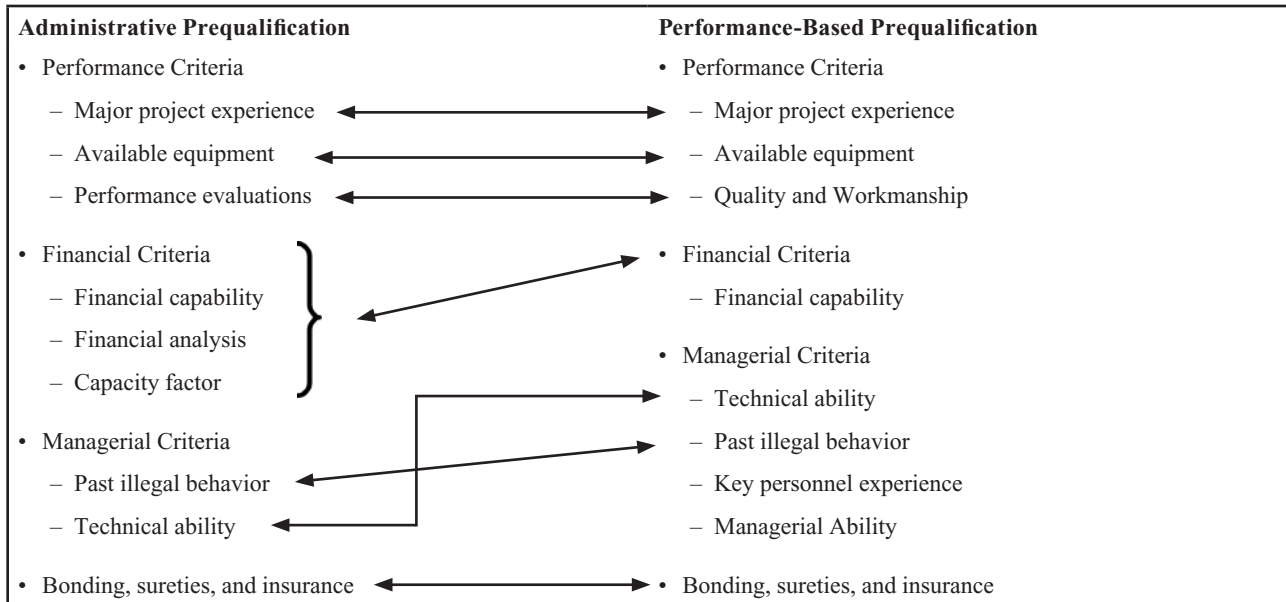


FIGURE 26 Comparison between the eight major factors of administrative and performance-based prequalification.

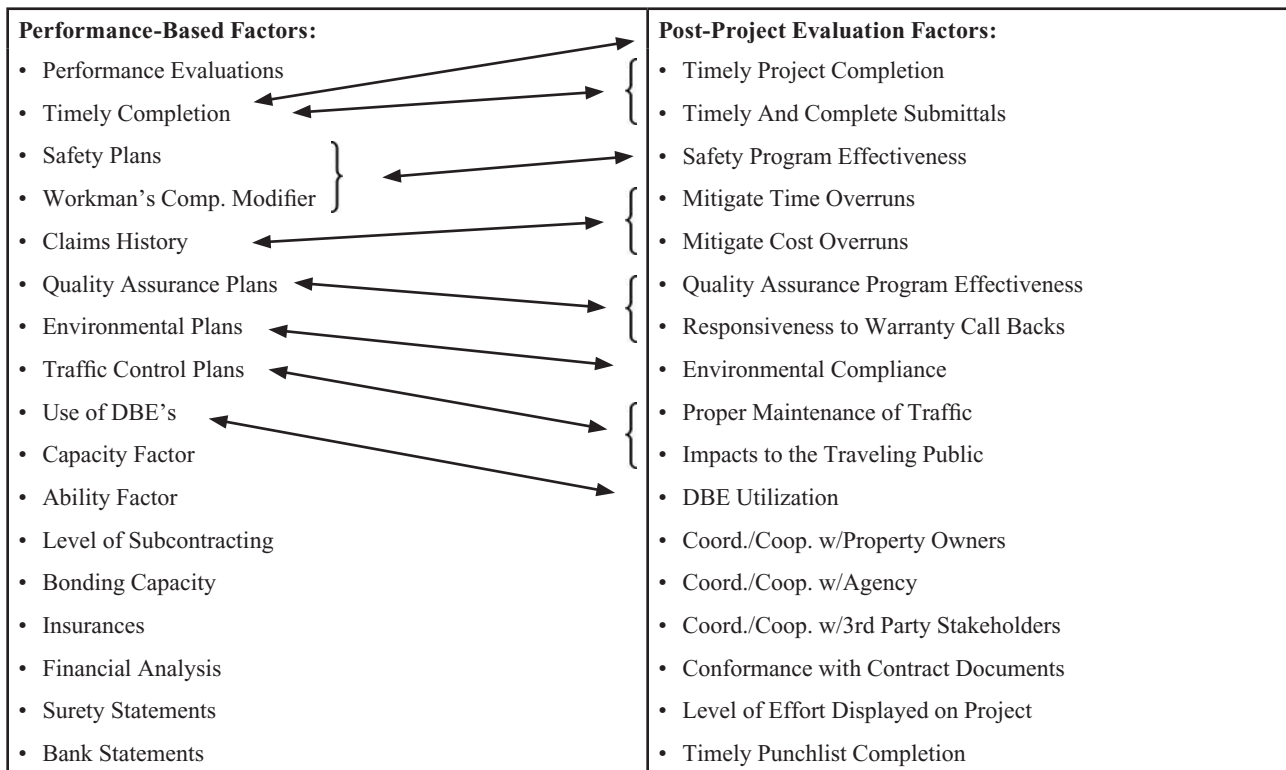


FIGURE 27 Comparison between minor factors of performance-based prequalification and the factors of post-project performance evaluation.

• Conclusion 4—Both bidding and bonding capacity could be adjusted

The performance-based contractor prequalification programs detailed in the case studies all used a method that reduced a marginal contractor’s bidding capacity in various ways. The idea is to avoid “subsidizing” poor performance

as reported in the literature and the contractor interviews. MTO’s program is rigorous enough that it has done away with performance bonding altogether. The survey found that four states (Illinois, Iowa, Maryland, and New Mexico) do not require performance bonding as well. Because the cost of bonding is included in the contractor’s bid, it seems that a performance-based contractor prequalification system also

could adjust the amount of the project for which a performance bond is required. This would create an incentive for top performers by literally reducing their bid price. In this system, the marginal contractor's "quality subsidy" would be offset by the requirement to fully bond the project. Using the same logic, the good contractor's bonding requirement could be adjusted to something less than the full amount. With U.S. performance bond rates running from 1% to 3% on the total (Keith 2008), it could change the low bidder. Best of all, the savings would accrue directly to the owner in lower construction costs. The states of Florida, Maine, Virginia, and Washington have all experimented with bonding less than the entire contract amount and this fact shows that bonding less than 100% of the contract may add value to the project.

Conclusion 2 found that "Bonding" was the least important prequalification criterion. Many agencies perceive bonding as protecting the state against contractor default. However, 23 U.S. and five Canadian survey respondents indicated that a performance bond was not sufficient evidence of contractor prequalification. With a rigorous performance-based prequalification system in place, contractors failing to complete a project can be penalized with a reduction of their performance rating or, ultimately, with removal from the bidders list.

A rigorous performance-based prequalification system has more bite than a soft bonding system. As further proof of this conclusion, the MTO case study is significant because MTO has had a history of not requiring bonds from its contractors. MTO's annual construction program is about CDN\$1.4 billion and the average MTO performance or payment bond covers 5% of contract cost (Tunistra 2008). Therefore, the estimated savings to the province is roughly \$70 million per year in bond costs. MTO uses a three-component system: "Administrative Prequalification," "Performance Prequalification," and "Infraction System." The agency stresses that the success of the system lies in the interrelationships of all the components with one another. Although certain components of the system can be used, the program works best when all the components are integrated. This system has saved the province construction costs, which can then be diverted to further enhance its infrastructure.

- **Conclusion 5—Three-tiered prequalification framework**

Figure 28 synthesizes the findings of the entire study. It graphically portrays a framework for performance-based contractor prequalification and shows how Conclusions 2, 3, and 4 might be implemented in a generalized fashion. Based on the results reported in chapter two, the last five prequalification factors listed in Figure 27, "Bonding Capacity," "Insurances," "Financial Analysis," "Surety Statements," and "Bank Statements," can be removed from the

performance-based prequalification system and placed in an administrative prequalification system that is focused strictly on the contractor's financial condition. This would be the first tier of a three-tiered system. By eliminating any duplication of required information, it strengthens the post-project performance evaluation process and streamlines the performance-based prequalification system.

The first tier includes the general evaluation of the given contractor's bonding capacity. The factors come from the grouping used in Figure 7. Including bonding capacity in this manner furnishes an external check of contractor financial capability without solely relying on it for prequalification. As concluded in chapter two, there is value to the agency to know a given contractor's overall ability to furnish the requisite bonds and other legal instruments. Including it in the first tier constitutes the first qualification filter against past incompetence. A contractor with a record of default or that is undercapitalized will have that record reflected in the amount of bonding it can bring to a given project. Finally, this process is different than the project-specific bonds, sureties, and insurances that will be evaluated in the third tier. This difference is necessary because a contractor whose bonding capacity is committed to ongoing work at the time of award will not be able to furnish the necessary bonds, sureties, and insurance regardless of how excellent its record of past performance.

The second tier, shown in Figure 28, would consist of those performance-based prequalification factors shown in Figure 26 and would include the contractor performance evaluation system described in chapter three. The factors shown below "Managerial Ability" come from Figures 8 and 10 and represent the intersection of the major managerial factors found in the two analyses. Integrating the evaluation of the managerial factors with the past project performance evaluation data creates the performance-based prequalification component. It is consistent with the conclusion that the "soft" factors used to rate a contractor's technical and managerial ability are more important in evaluating contractor performance than the "hard" factors such as bonding capacity and financial condition. Finally, if an agency needs specific qualifications for a given project, it can then move to tier three (shown in Figure 29).

The third and final tier is project-specific prequalification, which would be used if the agency deemed it would add value to the selection process for a given project. In most cases, this would occur only on those projects being delivered by alternative project delivery methods. The factors shown in this tier spring from managerial and performance factors found in the RFQ prequalification content analysis discussed in chapter two and shown in Figure 14. The third tier furnishes the ability to apply performance-based prequalification to all projects regardless of delivery method. It also shows the flexibility inherent in the various performance-based prequalification systems found in the study.

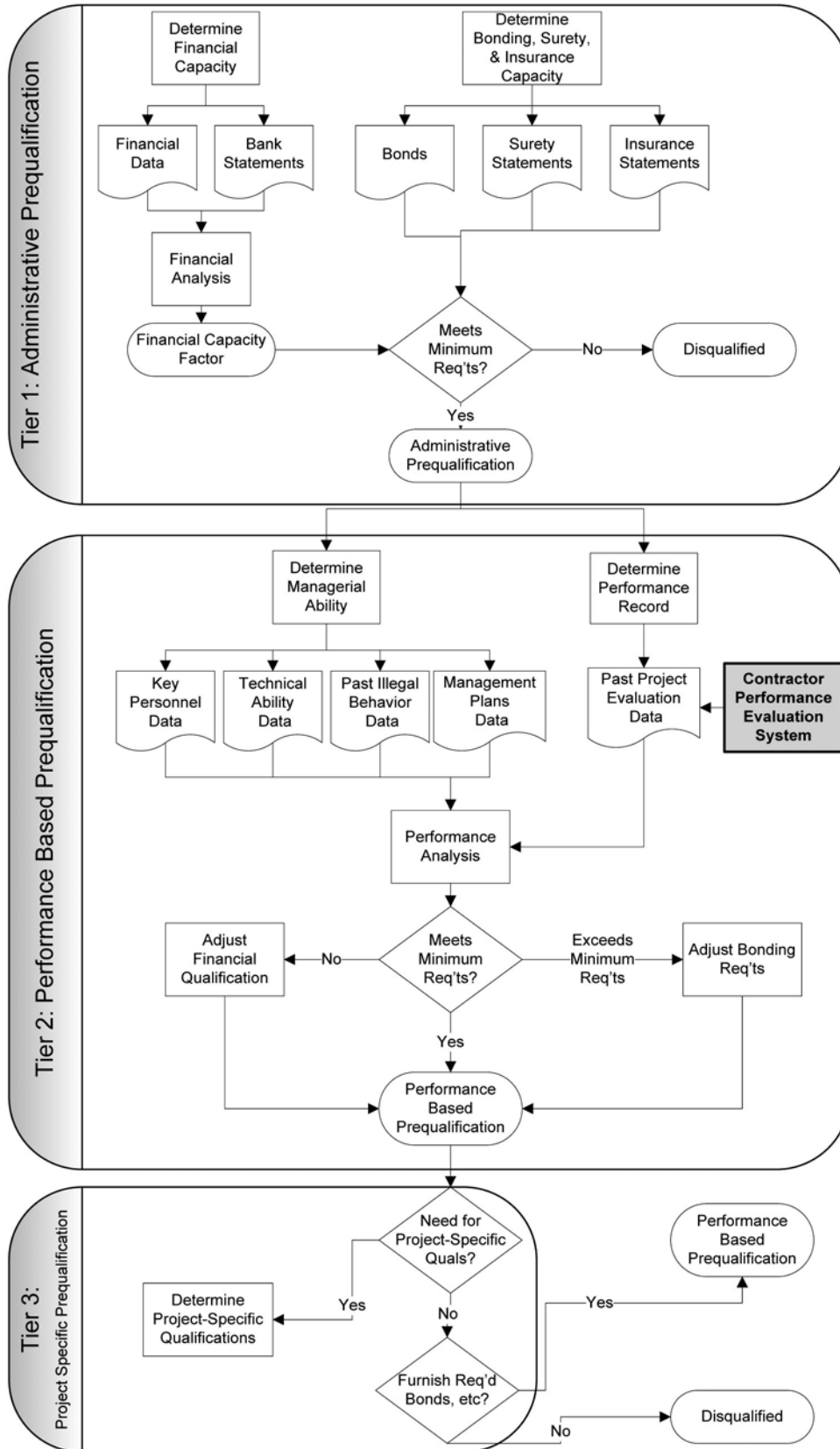


FIGURE 28 Three-tiered performance-based prequalification process.

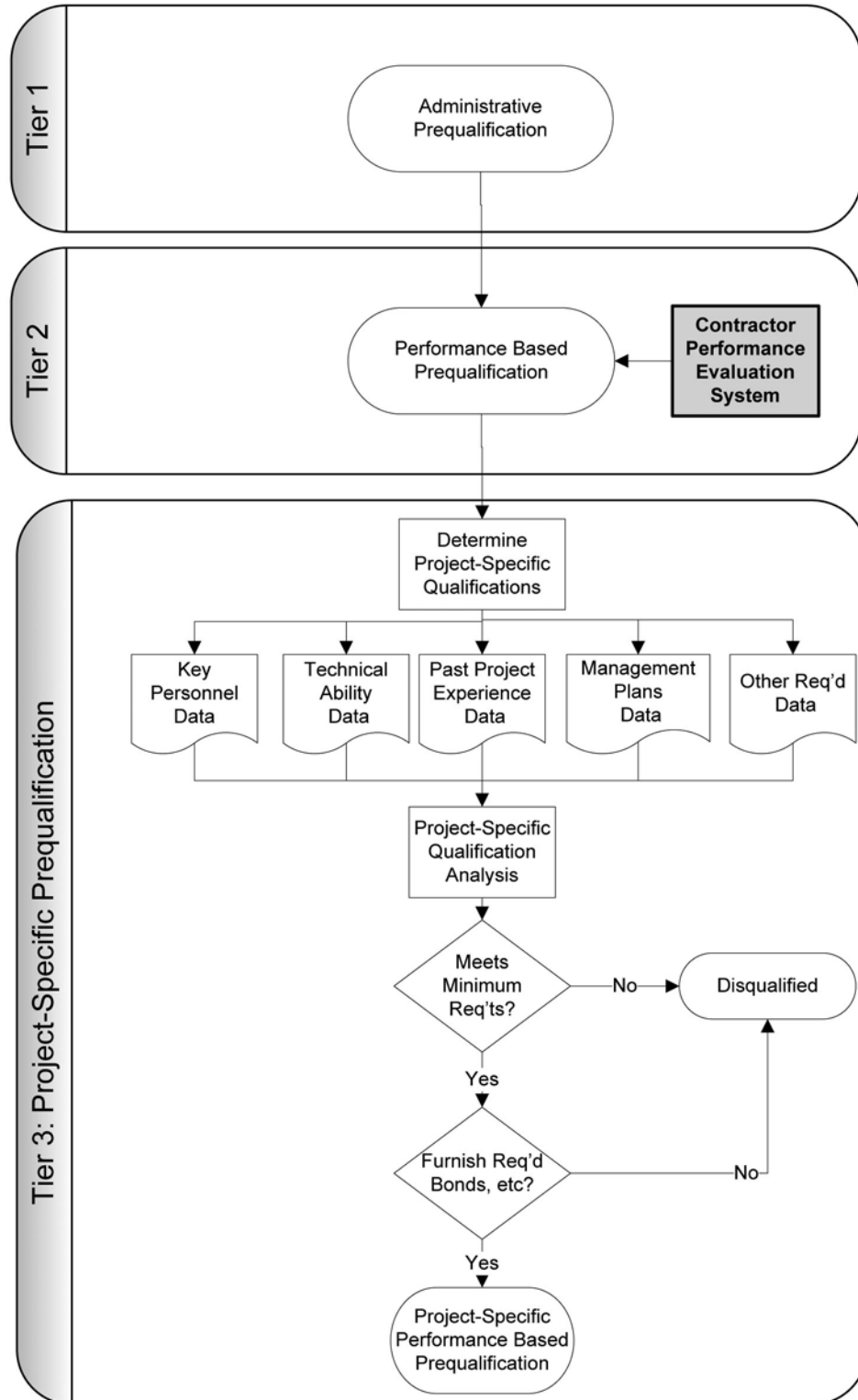


FIGURE 29 Three-tiered framework with Tier 3 details.

• **Conclusion 6—Low barriers to implementation**

The analyses conducted in this study found that there are very few actual barriers to implementing performance-based contractor prequalification. Many highway agencies already

have some form of contractor evaluation in their system. Many have some form of performance-based prequalification as well. The contractor’s perspective seems to welcome implementation of this type of system because it reduces or removes the number of marginally qualified contractors

against which it has to compete. Thus, it appears that both the highway agencies and their industry partners might be receptive to this change if some of the administrative and perceived hurdles found in chapter four can be eliminated or surmounted.

SUGGESTIONS FOR FUTURE RESEARCH

One purpose of a synthesis is to identify the gaps in the body of knowledge so that they can be filled by future research. The study uncovered four areas for which more work is needed to furnish the necessary information for highway agencies to thoughtfully implement performance-based contractor prequalification. These are as follows:

- Determine the cost-effectiveness of a performance-based contractor prequalification system
- Determine the cost-effectiveness of performance bonds
- Determine the components of a performance-based contractor prequalification system that could be standardized across the nation
- Relate performance-based contractor prequalification to the impact on quality assurance programs

Cost-Effectiveness of a Performance-Based Contractor Prequalification System

The MTO case study demonstrated a significant tangible benefit of using performance-based contractor prequalification in lieu of performance bonding. Dropping performance bonds in favor of a rigorous prequalification process, however, is a drastic paradigm shift for most highway agencies. The 29 U.S. DOT respondents that currently do not use performance-based contractor prequalification will need to present hard facts to their executive managers before they can implement such a system, if they so desired. The best information to induce change is financial information that demonstrates benefits accrued by other agencies and the costs associated with achieving those benefits. The survey found that 12 U.S. DOTs are using performance-based contractor prequalification.

The research would focus on quantifying both the costs and the potential benefits discussed above. Particular attention would need to be given to personnel requirements to administer the program. For example, MTO has a dedicated group of three public employees who administer its prequalification program. Additionally, the impact on the number of bidders could be quantified based on the survey respondents' and contractor interviewees' perception that implementing this system probably would reduce the size of the qualified bidders list. The research would differentiate between large and small state agencies regarding costs, administrative personnel requirements, and the effort needed to con-

duct and maintain the contractor evaluations. It could do this by using targeted case studies of both large and small states that have implemented some form of performance-based contractor prequalification to identify trends in each population. Finally, the research could seek to quantify the impact on claims and contractor-initiated change orders to determine whether those risks to the owner on every project are reduced by implementing performance-based contractor prequalification.

• Performance bond cost-effectiveness analysis

The Miller Act requires performance bonding on all federally funded projects, which the secretary of transportation can waive in certain instances (*The Miller Act 2008*). Therefore, solid evidence will need to demonstrate that this requirement is not adding value to public construction projects to alter the requirement. The proposed research would quantify the cost of performance bonding on a national basis and compare it with the potential benefit of replacing it with a rigorous performance-based contractor prequalification process based on the Ontario model. The research would specifically look at contractor default rates on a state-by-state basis and seek to identify those types of public transportation projects that were at the most and least risk of default. This would allow highway agency officials a base of knowledge to selectively apply performance bonding as a risk management tool on those types of projects with the greatest risk of default while not adding unnecessary costs to those types where defaults are rare.

This research could develop an algorithm to adjust a good contractor's performance bonding requirements in the event the agency chooses to implement the system discussed in conclusion 4. The study would start with the current systems that adjust a contractor's bidding capacity based on performance and warp that over to one in which its bonding requirements are reduced to reward those contractors that consistently furnish projects that exceed the minimum requirements for cost, schedule, and quality. Thus, the two-pronged adjustment shown in Figure 28 could be implemented in cases in which a poor-performing contractor's bidding capacity is reduced for failing to achieve the minimum requirements and a well-performing contractor is rewarded for exceeding the minimums by a reduction in the amount of bond it must furnish in its bids.

• Standardize administrative prequalification

Conclusion 3 found that the prequalification process could be simplified by eliminating redundancies among the administrative, performance-based, and post-project performance evaluation components of the three-tiered performance-based prequalification framework shown in Figure 28. Conclusion 5 indicated the potential benefits of creating a standard national administrative prequalification system that could be

used by all U.S. highway agencies in tier one. The proposed research would focus specifically on determining the appropriate components of the administrative prequalification in the first tier. It would seek to quantify the benefits that would be associated with fielding a standard one-tier system. These might be achieved in terms of reduced administrative burden to both contractors and agencies. The research would also determine the overhead costs that regional and national contractors realize to ensure that they are able to bid in their chosen markets. As these costs are passed on to the highway agencies, they would furnish the motivation for developing and implementing such a system. The research could use the input aspects of the federal CCASS as a parallel system that has been fielded and used on a national basis for several decades. Additionally, as a large proportion of highway construction projects are awarded to be constructed in a single season, it would look specifically at the length of the project schedule and determine whether different levels of prequalification need to be done for multiyear projects.

- **Performance-based prequalification impact on quality assurance program**

The surveys of both the agencies and contractors indicated that implementing performance-based contractor prequalification would have a positive impact on project quality. However, one of the contractor interviews reviewed in the FDOT case study indicated that a potential conflict exists between contractor evaluations and proactive contractor QC programs. Therefore, more research is needed to determine how performance-based contractor prequalification can be implemented in a fashion that realizes the perceived benefits reported in this synthesis. Additionally, because the level of subcontracting in current highway projects is high, this research needs to drop down to the subcontractor level to ensure that the potential benefits perceived at the general contractor level are not lost because a large amount of the actual construction is being completed by subcontractors.

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GLOSSARY OF TERMS

Ability factor: A qualification component based on a contractor's past performance, as well as technical and managerial experience.

Administrative prequalification: A set of procedures and accompanying forms and documentation that must be submitted to gain entry to an agency-approved bidders list. These may include evaluation of financial statements, dollar amount of work remaining under contract, available equipment and personnel, and previous work experience. This information may be requested on a project-by-project basis or on a specified periodic basis, such as annually.

Bonding capacity: A qualification component, determined by a surety, representing the financial capabilities of a contractor to perform a project. A firm has a maximum capacity that is reduced by each project's award value to a point at which a firm must stop bidding when this capacity is reached.

Capacity factor: A qualification component, determined by a highway agency, representing the financial capabilities of the contractor to perform a project. It is usually an aggregate factor for the firm rather than a single project.

Construction manager/general contractor (CM/GC): A project delivery method in which the owner selects the GC to act as the CM on a basis of qualifications and awards a preconstruction services contract to assist the engineer-of-record during the design phase. Once the design is complete, the subcontractor work packages are bid out and the CM becomes the GC to complete the construction on a guaranteed maximum price basis. This delivery method is also commonly called CM-at-Risk.

Design-bid-build (DBB): A project delivery method in which the design is completed either by in-house professional engineering staff or a design consultant before the construction contract is advertised. Also called the "traditional method."

Design-build (DB): A project delivery method in which both the design and the construction of the project are simultaneously awarded to a single entity.

Performance-based prequalification: A set of procedures that must be followed by a construction contractor to qualify to submit a bid on a construction project based on quality, past performance, safety, specialized technical capability, project-specific work experience, key personnel, and other factors. This may be on a project-specific basis or on a specified periodic basis such as annually. The project could be delivered using traditional DBB or alternative project delivery methods.

Performance bond: A financial instrument furnished by a surety that guarantees the contract will be performed and the owner will receive the facility built in substantial accordance with the contract documents.

Project-specific prequalification: Contractor prequalification requirements that exist only for a single project. These normally address project technical and procurement factors that are considered essential for the success of a given project. They may include criteria that require the contractor to have had past experience building a certain technology (i.e., seismic retrofit, intelligent transportation systems, etc.) or a given project delivery method such as DB. They may extend to cover specific experience for key project personnel and specific types of plant and equipment.

Public-private partnership (PPP): A project delivery method based on DB in which the contractor furnishes financial equity and may also operate and maintain the project after construction.

Surety: A party that assumes liability for the debt, default, or failure of duty of another.

ABBREVIATIONS AND ACRONYMS

CCASS	Construction Contractor Appraisal Support System
CM/GC	construction manager/general contractor
CPI	contractor performance index
CPR	contract performance rating
CPPR	Contractor's Past Performance Record
DB	design-build
DBB	design-bid-build
DBE	disadvantaged business enterprise
DOH	Kentucky Department of Highways
DOTs	departments of transportation (U.S. state)
GAO	U.S. Government Accounting Office
MOTs	ministries of transportation (Canadian)
MTO	Ontario Ministry of Transportation
MWL	maximum workload [rating]
NCHRP	National Cooperative Highway Research Program
NSW	New South Wales (Australia)
PPP	public-private partnership
QA	quality assurance
QC	quality control
RFQ	request for qualifications
SOAHR	State Office of Administrative Hearings and Rule
SOQ	statement of qualifications

APPENDIX A

SURVEY AND SURVEY RESULTS

SURVEY

NCHRP Synthesis 39-04 **Performance-Based Construction Contractor Prequalification**

INTRODUCTION:

The purpose of this questionnaire is to identify how state highway agencies use performance-based contractor prequalification and, from that baseline, identify effective practices for dissemination and use by state highway agencies to implement as part of their procurement procedures for future projects.

DEFINITIONS:

Administrative prequalification: A set of procedures and accompanying forms and documentation that must be followed by a construction contractor to qualify to submit bids construction projects using traditional project delivery. These include evaluation of financial statements, dollar amount of work remaining under contract, available equipment and personnel, and previous work experience. This information may be requested on a project-by-project basis or on a specified periodic basis.

Performance-based prequalification: A set of procedures and backup documents that must be followed by a construction contractor to qualify to submit a bid on a construction project based on quality, past performance, safety, specialized technical capability, project-specific work experience, key personnel, and other factors. This information may be requested on a project-by-project basis or on a specified periodic basis and the project could be delivered using traditional design-bid-build or alternative project delivery methods such as design-build, construction manager/general contractor, or any other methods.

Design-bid-build (DBB): A project delivery method in which the design is completed either by in-house professional engineering staff or a design consultant before the construction contract is advertised. Also called the “traditional method.”

Design-build (DB): A project delivery method in which both the design and the construction of the project are simultaneously awarded to a single entity.

Construction manager/general contractor (CM/GC): A project delivery method in which the owner selects the GC to act as the CM on a basis of qualifications and awards a preconstruction services contract to assist the engineer-of-record during the design phase. Once the design is complete, the subcontractor work packages are bid out and the CM becomes the GC to complete the construction on a guaranteed maximum price basis.

Public-private partnership (PPP): A project delivery method based on DB in which the contractor also furnishes financial equity and may also operate and maintain the project after construction.

General Information:

1. U.S. state or Canadian province or country (if not from North America) in which the respondent is employed:

2. You are employed by what type of organization?

- State/Province Department of Transportation
 Other public transportation agency; name of agency:
 Federal agency; name of agency:
 Other; please describe:

3. What group/section do you work in?

<input type="checkbox"/> Design group/section <input type="checkbox"/> Construction group/section <input type="checkbox"/> Operations group/section <input type="checkbox"/> Maintenance group/section	<input type="checkbox"/> Design-build group/section <input type="checkbox"/> Materials group/section <input type="checkbox"/> Contracts/procurement group/section <input type="checkbox"/> Other, please specify:
---	--

4. What project delivery methods is your organization allowed to use?

- DBB CM/GC DB PPP Other; please specify:

5. Please check those factors that are used in each type of prequalification program that is used by your organization in the matrix below.

Program Factors	Prequalification Type	
	Administrative	Performance Based
Prequalification required for all projects	<input type="checkbox"/>	<input type="checkbox"/>
Prequalification required for selected projects only	<input type="checkbox"/>	<input type="checkbox"/>
Prequalification standards are the same for all projects	<input type="checkbox"/>	<input type="checkbox"/>
Prequalification standards are different by project class	<input type="checkbox"/>	<input type="checkbox"/>
If the standards are different, check all the below classes that apply to your program		
Project Classes Project monetary size	<input type="checkbox"/>	<input type="checkbox"/>
Project technical complexity	<input type="checkbox"/>	<input type="checkbox"/>
Project technical content (i.e., ITS, seismic features, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Project delivery method (DBB, DB, CM/GC, etc)	<input type="checkbox"/>	<input type="checkbox"/>
Project location (urban vs. rural)	<input type="checkbox"/>	<input type="checkbox"/>
Project environmental issues	<input type="checkbox"/>	<input type="checkbox"/>
Project third-party interface issues	<input type="checkbox"/>	<input type="checkbox"/>
Project traffic control issues	<input type="checkbox"/>	<input type="checkbox"/>
Project quality assurance requirements	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>
If "Other," please specify:		

Please use space below to elaborate on any of the above responses:

Administrative Contractor Prequalification Policy Information:

6. Does your organization require some form of administrative contractor prequalification?
 Yes No If you answered "No," skip to question 10.

7. Please check those prequalification factors that are used in your organization's administrative contractor prequalification program in the matrix below. Check all that apply.

Administrative Prequalification Factor		Administrative Prequalification Factor	
Financial capability	<input type="checkbox"/>	Equipment and plant	<input type="checkbox"/>
Calculated capacity factor from financials	<input type="checkbox"/>	Technical ability	<input type="checkbox"/>
Bonding capacity	<input type="checkbox"/>	Calculated ability factor from financials	<input type="checkbox"/>
Surety statements	<input type="checkbox"/>	Past project experience	<input type="checkbox"/>
Detailed financial analysis	<input type="checkbox"/>	Performance evaluations	<input type="checkbox"/>
Bank statements	<input type="checkbox"/>	Claims history	<input type="checkbox"/>
Managerial ability	<input type="checkbox"/>	Past illegal behavior	<input type="checkbox"/>
Insurances	<input type="checkbox"/>	Other; please specify below	<input type="checkbox"/>

Please use space below to elaborate on any of the above responses:

8. Does your organization require administrative prequalification of subcontractors?
 Yes, Always Project by Project No If you answered "No," skip to question 11.
9. Please check those prequalification factors that are used in your organization's administrative subcontractor prequalification program in the matrix below. Check all that apply.

Administrative Prequalification Factor		Administrative Prequalification Factor	
Financial capability	<input type="checkbox"/>	Equipment and plant	<input type="checkbox"/>
Calculated capacity factor from financials	<input type="checkbox"/>	Technical ability	<input type="checkbox"/>
Bonding capacity	<input type="checkbox"/>	Calculated ability factor from financials	<input type="checkbox"/>
Surety statements	<input type="checkbox"/>	Past project experience	<input type="checkbox"/>
Detailed financial analysis	<input type="checkbox"/>	Performance evaluations	<input type="checkbox"/>
Bank statements	<input type="checkbox"/>	Claims history	<input type="checkbox"/>
Managerial ability	<input type="checkbox"/>	Past illegal behavior	<input type="checkbox"/>
Insurances	<input type="checkbox"/>	Other; please specify below	<input type="checkbox"/>

Please use space below to elaborate on any of the above responses:

10. Please list those aspects of your administrative contractor prequalification program that you think are particularly effective.

Point of contact for clarification on this question, if required (name/email/phone):

Performance-Based Contractor Prequalification Policy Information:

11. Does your organization require performance bonds from construction contractors?
 Yes No
12. If the answer to question 9 is yes, do you view the contractor's ability to furnish the requisite performance bond as adequate to demonstrate its qualifications to successfully complete the project?
 Yes No

Please use space below to elaborate if you wish:

13. Does your organization require some form of performance-based contractor prequalification?

Yes No

If you answered “No,” skip to question 16.

14. Please check those prequalification factors that are used in your organization’s performance-based contractor prequalification program in the matrix below. Check all that apply.

Performance-Based Prequalification Factor	<input type="checkbox"/>	Performance-Based Prequalification Factor	<input type="checkbox"/>
Financial capability	<input type="checkbox"/>	Past illegal behavior	<input type="checkbox"/>
Calculated capacity factor from financials	<input type="checkbox"/>	Performance evaluations	<input type="checkbox"/>
Bonding capacity	<input type="checkbox"/>	Claims history	<input type="checkbox"/>
Surety statements	<input type="checkbox"/>	Past project experience	<input type="checkbox"/>
Detailed financial analysis	<input type="checkbox"/>	Timely completion of past projects	<input type="checkbox"/>
Bank statements	<input type="checkbox"/>	Quality of material and workmanship	<input type="checkbox"/>
Insurances	<input type="checkbox"/>	Workman’s compensation modifier	<input type="checkbox"/>
Managerial ability	<input type="checkbox"/>	Quality assurance plans	<input type="checkbox"/>
Resumes for key personnel	<input type="checkbox"/>	Safety plans	<input type="checkbox"/>
Professional licensing for key personnel	<input type="checkbox"/>	Environmental plans	<input type="checkbox"/>
Key personnel past project experience	<input type="checkbox"/>	Traffic control plans	<input type="checkbox"/>
Equipment and plant	<input type="checkbox"/>	Level of subcontracting	<input type="checkbox"/>
Technical ability	<input type="checkbox"/>	Use of disadvantaged business enterprises (DBEs)	<input type="checkbox"/>
Calculated ability factor from financials	<input type="checkbox"/>	Other	<input type="checkbox"/>

15. Please list those aspects of your performance-based contractor prequalification program that you think are particularly effective.

Point of contact for clarification on this question, if required (name/email/phone):

Contractor Performance Evaluation Policy Information:

16. Does your organization develop post-project performance evaluations for construction contractors?

Yes No

If you answered “No,” skip to question 24.

17. Please check those factors that are used in your organization's post-project contractor performance evaluation program in the matrix below. Check all that apply.

Performance Evaluation Factor		Performance Evaluation Factor	
Level of effort displayed on the job	<input type="checkbox"/>	Conformance with contract documents	<input type="checkbox"/>
Proper maintenance of traffic	<input type="checkbox"/>	Quality assurance program effectiveness	<input type="checkbox"/>
Impacts to the traveling public	<input type="checkbox"/>	Safety program effectiveness	<input type="checkbox"/>
Timely and complete submittals	<input type="checkbox"/>	DBE utilization	<input type="checkbox"/>
Timely project completion	<input type="checkbox"/>	Mitigate cost overruns	<input type="checkbox"/>
Environmental compliance	<input type="checkbox"/>	Mitigate time overruns	<input type="checkbox"/>
Coordination/cooperation with agency	<input type="checkbox"/>	Timely punchlist completion	<input type="checkbox"/>
Coordination/cooperation with property owners	<input type="checkbox"/>	Responsiveness to warranty call-backs	<input type="checkbox"/>
Coordination/cooperation with third-party stakeholders	<input type="checkbox"/>	Other	<input type="checkbox"/>

Please use space below to elaborate on any of the above responses:

18. When the post-project contractor performance evaluation is completed, what is it used for? Check all that apply.

<input type="checkbox"/> Administrative prequalification	<input type="checkbox"/> It is reviewed and filed, but only used informally thereafter
<input type="checkbox"/> Performance-based prequalification	<input type="checkbox"/> I don't know
<input type="checkbox"/> Release of retainage/final payment	<input type="checkbox"/> Other; please explain:

19. Does the contractor receive a copy of the completed performance evaluation?

Yes No

20. Are you required to notify the contractor before submission if the performance evaluation is considered negative?

Yes No

21. Is there an appeals process for a contractor that receives a negative performance evaluation?

Yes No

22. How long do performance evaluations remain on the record?

1 year 2 years 3 years more than 3 years

23. Does a negative performance evaluation automatically disqualify a contractor?

Yes No

Legal and Political Barriers to Implementing Contractor Prequalification:

24. Does your organization operate under laws that prohibit construction contractor prequalification?
 Yes No Don't know If yes, please explain:
25. Does your organization operate under procurement regulations that prohibit construction contractor prequalification?
 Yes No Don't know If yes, please explain:
26. Does your organization have internal policies that prohibit construction contractor prequalification?
 Yes No Don't know If yes, please explain:

27. Is the construction industry in the area in which you operate opposed to:

Administrative contractor prequalification?
 Yes No Don't know If yes, please explain:

Performance-based contractor prequalification?
 Yes No Don't know If yes, please explain:

Post-project performance evaluation?
 Yes No Don't know If yes, please explain:

28. What is the single largest barrier to implementing performance-based contractor prequalification by your organization?

<input type="checkbox"/> There isn't one; we are already doing it.	<input type="checkbox"/> Public opposition
<input type="checkbox"/> State/local laws	<input type="checkbox"/> Political opposition
<input type="checkbox"/> Organizational procurement regulations	<input type="checkbox"/> Don't know
<input type="checkbox"/> Internal organizational policies	<input type="checkbox"/> Other; please specify:
<input type="checkbox"/> Industry opposition	

29. In your opinion, how does the construction industry in your area of operations view performance-based contractor prequalification?
 They support it They are neutral to it They oppose it No opinion

30. In your opinion, how do the subcontractors in the construction industry in your area of operations view performance-based subcontractor prequalification?
 They support it They are neutral to it They oppose it No opinion

General Questions:

31. Does your organization utilize contractor quality assurance acceptance testing on any of its projects?
 Yes No

32. If the answer to question 31 is “Yes,” do you use a performance-based prequalification process in conjunction with the contractor acceptance testing program?
 Yes No
33. If the answer to question 31 is “No,” would you use it if you could prequalify contractors and/or their quality assurance personnel on a performance basis?
 Yes No
34. **Regardless of your experience with contractor prequalification**, in your opinion, what impact would performance-based contractor prequalification have on the following project aspects?

Project Aspect	Better	No Change	Worse	No Opinion
Number of bidders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Material quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Workmanship quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance of traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level/amount of agency inspection required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timely project completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timely construction submittal completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Timely punchlist completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel competence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of contractor initiated change order requests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of claims/disputes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsiveness on warranty call-backs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Achievement of DBE goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor cooperation with agency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor cooperation with property owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor cooperation with third party stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor cooperation with public concerns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

35. Do you have an experience with either the success or failure of performance-based contractor prequalification that the researcher could use to develop a case study?
 Yes No
36. If the answer to question 35 is “Yes,” please provide the point of contact name, phone number, and email:
37. Please furnish us with contact information for a point of contact to whom any follow-up questions can be addressed, if necessary. We will also send an electronic copy of the final research report to this individual:

Name: _____ Telephone: _____ Email: _____

SURVEY RESULTS

The charts below are consolidated responses received to the online survey.

ONLINE SURVEY RESULTS

NCHRP Synthesis 39-04: Performance-Based Construction Contractor Prequalification

General Information:

1. U.S. state or Canadian province or country (if not from North America) in which the respondent is employed:

50 Responses

2. You are employed by what type of organization?

State/Province Department of Transportation		50	100%	
Other public transportation agency		0	0%	
Federal agency		0	0%	
Other, please specify		0	0%	
Total		50	100%	

3. If you answered "Other public transportation agency" or "Federal agency" to the above question, please indicate the name of your agency.

4. What group/section do you work in?

Design group/section		2	4%	
Construction group/section		28	56%	
Operations group/section		0	0%	
Maintenance group/section		0	0%	
Design-build group/section		0	0%	
Materials group/section		0	0%	
Contracts/procurement group/section		15	30%	
Other, please specify		5	10%	
Total		50	100%	

5. What project delivery methods is your organization allowed to use? Check ALL that apply.

DBB		48	96%	
CM/GC		6	12%	
DB		27	54%	
PPP		14	28%	
Other, please specify		8	16%	

6. Please check those factors that are used in your ADMINISTRATIVE prequalification program that is used by your organization in the matrix below.

Prequalification required for all projects		30	71%	
Prequalification required for selected projects only		9	21%	
Prequalification standards are the same for all projects		14	33%	
Prequalification standards are different by project class		17	40%	

7. If you checked “the standards are different by project class” above, check ALL the below project classes that apply to your administrative prequalification program.

Project monetary size		15	65%	
Project technical complexity		10	43%	
Project technical content (i.e., ITS, seismic)		6	26%	
Project delivery method (DBB, DB, CM/GC, etc)		7	30%	
Project location (urban vs. rural)		2	9%	
Project environmental issues		1	4%	
Project third-party interface issues		2	9%	
Project traffic control issues		2	9%	
Project quality assurance requirements		2	9%	
Other, please specify		7	30%	

8. Please check those factors that are used in your PERFORMANCE-BASED prequalification program that is used by your organization in the matrix below.

Prequalification required for all projects		8	33%	
Prequalification required for selected projects only		14	58%	
Prequalification standards are the same for all projects		4	17%	
Prequalification standards are different by project class		9	38%	

9. If you checked “the standards are different by project class” above, check ALL the below project classes that apply to your performance-based prequalification program.

Project monetary size		3	25%	
Project technical complexity		6	50%	
Project technical content (i.e., ITS, seismic features, etc.)		6	50%	
Project delivery method (DBB, DB, CM/GC, etc.)		7	58%	
Project location (urban vs. rural)		1	8%	
Project environmental issues		1	8%	
Project third-party interface issues		0	0%	
Project traffic control issues		2	17%	
Project quality assurance requirements		1	8%	
Other, please specify		1	8%	

10. Please use this text box to elaborate on your answers to questions 6 through 9 if you need to.

16 Responses

Administrative Contractor Prequalification Policy Information:

11. Does your organization require some form of administrative contractor prequalification? If you answered “No,” scroll to the bottom of this page and click submit to get to question 19.

Yes		36	72%	
No		14	28%	
Total		50	100%	

12. Please check those prequalification factors that are used in your organization's administrative contractor prequalification program below. Check all that apply.

Financial capability		28	74%	
Calculated capacity factor from financials		20	53%	
Bonding capacity		14	37%	
Surety statements		4	11%	
Detailed financial analysis		19	50%	
Bank statements		3	8%	
Managerial ability		15	39%	
Insurances		9	24%	
Equipment and plant		29	76%	
Technical ability		21	55%	
Calculated ability factor from financials		8	21%	
Past project experience		28	74%	
Performance evaluations		18	47%	
Claims history		5	13%	
Past illegal behavior		23	61%	
Other, please specify		6	16%	

13. Please use this text box to elaborate on any of the above responses:

8 Responses

14. Does your organization require administrative prequalification of subcontractors? If you answered "No," skip to question 17.

Yes, always		6	15%	
Sometimes on a project-by-project basis		6	15%	
No		29	71%	
Total		41	100%	

15. Please check those prequalification factors that are used in your organization's administrative subcontractor prequalification program below. Check all that apply.

Financial capability		5	42%	
Calculated capacity factor from financials		3	25%	
Bonding capacity		1	8%	
Surety statements		1	8%	
Detailed financial analysis		5	42%	
Bank statements		1	8%	
Managerial ability		4	33%	
Insurances		0	0%	
Equipment and plant		11	92%	
Technical ability		10	83%	
Calculated ability factor from financials		1	8%	
Past project experience		9	75%	

Performance evaluations		5	42%	
Claims history		1	8%	
Past illegal behavior		6	50%	
Other, please specify		0	0%	
16. Please use this text box to elaborate on any of the above responses:				
6 Responses				
17. Please list those aspects of your administrative contractor prequalification program that you think are particularly effective.				
21 Responses				
18. Point of contact for clarification to question 17 question, if required (name/email/phone):				
Performance-Based Contractor Prequalification Policy Information:				
19. Does your organization require performance bonds from construction contractors?				
Yes		41	85%	
No		7	15%	
Total		48	100%	
20. If the answer to question 19 is “Yes,” do you view the contractor’s ability to furnish the requisite performance bond as adequate to demonstrate its qualifications to successfully complete the project?				
Yes		21	44%	
No		27	56%	
Total		48	100%	
21. Has your organization ever required less than the full contract amount to be bonded?				
Yes		7	18%	
No		31	82%	
Total		38	100%	
22. If the answer to question 21 is “Yes,” how did that impact the number of qualified bidders for those projects?				
Increased the number		0	0%	
No effect		3	33%	
Decreased the number		0	0%	
Don’t know		3	33%	
Other, please specify		3	33%	
Total		9	100%	
23. Does your organization require some form of performance-based contractor prequalification? If you answered “No,” then scroll to the bottom of this page and click submit to get to question 28.				
Yes		14	35%	
No		26	65%	
Total		40	100%	
24. Please check those prequalification factors that are used in your organization’s performance-based contractor prequalification program. Check all that apply.				
Financial capability		7	44%	
Calculated capacity factor from financials		5	31%	
Bonding capacity		4	25%	
Surety statements		2	12%	
Detailed financial analysis		4	25%	
Bank statements		2	12%	
Managerial ability		7	44%	

Resumes for key personnel		8	50%	
Insurances		3	19%	
Equipment and plant		8	50%	
Technical ability		10	62%	
Calculated ability factor from financials		2	12%	
Performance evaluations		6	38%	
Claims history		6	38%	
Past illegal behavior		8	50%	
Past project experience		10	62%	
Timely completion of past projects		5	31%	
Quality of material and workmanship		7	44%	
Workman's compensation modifier		3	19%	
Quality assurance plans		6	38%	
Safety plans		6	38%	
Environmental plans		5	31%	
Traffic control plans		3	19%	
Level of subcontracting		1	6%	
Use of DBEs		4	25%	
Other, please specify		0	0%	

25. Please use this text box to elaborate on any of the above responses:

12 Responses

26. Please list those aspects of your performance-based contractor prequalification program that you think are particularly effective.

9 Responses

27. Point of contact for clarification on question 26, if required (name/email/phone):

Contractor Performance Evaluation Policy Information:

28. Does your organization develop post-project performance evaluations for construction contractors? If you answered "No," scroll to the bottom of this page and click submit to get to question 38.

Yes		31	65%	
No		17	35%	
Total		48	100%	

29. Please check those factors that are used in your organization's post-project contractor performance evaluation program. Check all that apply.

Level of effort displayed on the job		19	61%	
Proper maintenance of traffic		28	90%	
Impacts to the traveling public		19	61%	
Timely and complete submittals		28	90%	
Timely project completion		31	100%	
Environmental compliance		29	94%	
Coordination/cooperation with agency		29	94%	

Coordination/cooperation with property owners		18	58%	
Coordination/cooperation with third-party stakeholders		16	52%	
Conformance with contract documents		29	94%	
Quality assurance program effectiveness		26	84%	
Safety program effectiveness		24	77%	
DBE utilization		18	58%	
Mitigate cost overruns		10	32%	
Mitigate time overruns		12	39%	
Timely punchlist completion		14	45%	
Responsiveness to warranty call-backs		7	23%	
Other, please specify		3	10%	

30. Please use this text box to elaborate on any of the above responses:

8 Responses

31. When the post-project contractor performance evaluation is completed, what is it used for? Check all that apply.

Administrative prequalification		21	68%	
Performance-based prequalification		7	23%	
Release of retainage/final payment		0	0%	
It is reviewed and filed, but only used informally thereafter		6	19%	
I don't know		1	3%	
Other, please specify		7	23%	

32. Does the contractor receive a copy of the completed performance evaluation?

Yes		25	81%	
No		6	19%	
Total		31	100%	

33. Are you required to notify the contractor prior to submission if the performance evaluation is considered negative?

Yes		12	39%	
No		19	61%	
Total		31	100%	

34. Is there an appeals process for a contractor that receives a negative performance evaluation?

Yes		22	71%	
No		9	29%	
Total		31	100%	

35. How long do performance evaluations remain on the record?

1 year or less		1	3%	
2 years		2	6%	
3 years		7	23%	
More than 3 years		15	48%	

Don't know		4	13%	
Other, please specify		2	6%	
Total		31	100%	

36. Does a negative performance evaluation automatically disqualify a contractor?

Yes		1	3%	
No		30	97%	
Total		31	100%	

37. Please use the text box to elaborate on any of your responses in this section:

8 Responses

Legal and Political Barriers to Implementing Contractor Prequalification:

38. Does your organization operate under laws that prohibit construction contractor prequalification?

Yes		0	0%	
No		39	83%	
Don't know		3	6%	
If yes, please explain		5	11%	
Total		47	100%	

39. Does your organization operate under procurement regulations that prohibit construction contractor prequalification?

Yes		1	2%	
No		39	83%	
Don't know		5	11%	
If yes, please explain		2	4%	
Total		47	100%	

40. Does your organization have internal policies that prohibit construction contractor prequalification?

Yes		1	2%	
No		39	83%	
Don't know		3	6%	
If yes, please explain		4	9%	
Total		47	100%	

41. Is the construction industry in the area where you operate OPPOSED to:

Top number is the count of respondents selecting the option. Bottom number is percent of the total respondents selecting the option.	Yes	No	Don't know	
Administrative contractor prequalification?	6 13%	31 67%	9 20%	
Performance-based contractor prequalification?	5 11%	15 33%	26 57%	
Post-project performance evaluation?	4 9%	24 52%	18 39%	

42. What is the single largest barrier to implementing performance-based contractor prequalification by your organization?				
There isn't one; we are already doing it		7	15%	
State/local laws		1	2%	
Organizational procurement regulations		1	2%	
Internal organizational policies		5	11%	
Industry opposition		4	9%	
Public opposition		0	0%	
Political opposition		1	2%	
Don't know		14	30%	
Other, please specify		14	30%	
Total		47	100%	
43. In your opinion, how does the construction industry in your area of operations view performance-based contractor prequalification?				
They support it		4	9%	
They are neutral to it		9	19%	
They oppose it		13	28%	
No opinion		21	45%	
Total		47	100%	
44. In your opinion, how do the subcontractors in the construction industry in your area of operations view performance-based subcontractor prequalification?				
They support it		3	6%	
They are neutral to it		5	11%	
They oppose it		9	19%	
No opinion		30	64%	
Total		47	100%	
General Questions:				
40. Does your organization have internal policies that prohibit construction contractor prequalification?				
Yes		30	70%	
No		13	30%	
Total		43	100%	
46. If the answer to question 45 is "Yes," do you use a performance-based prequalification process in conjunction with the contractor acceptance testing program?				
Yes		7	22%	
No		25	78%	
Total		32	100%	
47. If the answer to question 45 is "No," would you use it if you could prequalify contractors and/or their quality assurance personnel on a performance basis?				
Yes		11	41%	
No		16	59%	
Total		27	100%	

48. Regardless of your experience with contractor prequalification, in your opinion, what impact would performance-based contractor prequalification have on the following project aspects?				
Top number is the count of respondents selecting the option. Bottom number is percent of the total respondents selecting the option.	Better	No change	Worse	No opinion
Number of bidders	3	16	18	5
	7%	38%	43%	12%
Material quality	21	17	0	5
	49%	40%	0%	12%
Workmanship quality	30	6	0	7
	70%	14%	0%	16%
Safety	23	10	1	9
	53%	23%	2%	21%
Maintenance of traffic	18	16	1	7
	43%	38%	2%	17%
Level/amount of agency inspection required	10	25	2	6
	23%	58%	5%	14%
Timely project completion	21	15	0	6
	50%	36%	0%	14%
Timely construction submittal completion	18	17	0	8
	42%	40%	0%	19%
Timely punchlist completion	19	16	0	8
	44%	37%	0%	19%
Personnel experience	14	21	0	6
	34%	51%	0%	15%
Personnel competence	19	17	1	6
	44%	40%	2%	14%
Number of contractor initiated change order requests	9	25	0	9
	21%	58%	0%	21%
Number of claims/disputes	13	22	0	8
	30%	51%	0%	19%
Responsiveness on warranty call-backs	16	14	0	13
	37%	33%	0%	30%
Achievement of DBE goals	13	18	0	12
	30%	42%	0%	28%
Environmental compliance	16	19	0	8
	37%	44%	0%	19%
Contractor cooperation with agency	23	13	1	6
	53%	30%	2%	14%
Contractor cooperation with property owners	13	23	0	6
	31%	55%	0%	14%
Contractor cooperation with third-party stakeholders	14	22	0	7
	33%	51%	0%	16%
Contractor cooperation with public concerns	15	20	1	6
	36%	48%	2%	14%

49. Please use the text box to elaborate on any of your above responses as necessary:

3 Responses

50. Do you have an experience with either the success or failure of performance-based contractor prequalification that the researcher could use to develop a case study?

Yes		3	7%	
No		40	93%	
Total		43	100%	

APPENDIX B

ADMINISTRATIVE PREQUALIFICATION AND PROJECT-SPECIFIC REQUEST FOR QUALIFICATION CONTENT ANALYSIS

Administrative Prequalification Form Content Analysis

The findings of the formal content analysis of the administrative prequalification form for each state are shown below in six sections. Each section contains three to five questions.

SECTION 1: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	Obtain Prequalification	Renewal of Prequalification	Type of Business
Alabama	Yes		Requested
Alaska	Register with the state as business and contractor 50% Payment Bond 50% Performance Bond 5% Bid Bond		
Arizona	Yes	Every year or significant change in organization	Requested
Arkansas	Yes	Every year	
California	Register with the state as well as online survey		
Colorado	Yes	Yearly; any organizational changes	Requested/DBE
Connecticut	Yes		Requested
Delaware	Yes		
Florida	Yes		Requested
Georgia	No		
Hawaii	Register with state, and division of labor and industrial relations, cert. of good standing w/ department of commerce and consumer affairs, tax clearance		
Idaho	Yes	Yearly	Requested
Illinois	Yes		Requested
Indiana	Yes		
Iowa	Yes	Every 2 years	Requested
Kansas	Yes		
Kentucky	Online		
Louisiana	Register with the state 100% Payment Bond 100% Performance Bond		

State	Obtain Prequalification	Renewal of Prequalification	Type of Business
Maine	Yes	Yearly	Requested
Maryland	Doesn't qualify at all		
Massachusetts	Yes		
Michigan	Yes	Yearly	
Minnesota	Doesn't qualify at all		
Mississippi	Register with the state		
Missouri	Yes		Requested
Montana	Register with state	Every 2 years	Requested
Nebraska	Yes	Yearly	Requested
Nevada			
New Hampshire	Yes		Requested
New Jersey	Yes	Yearly	Requested
New Mexico	Yes	Yearly	Requested
New York	Yes; post qualify letter	Yearly; any organizational changes	Requested
North Carolina	Yes	Requalify every 3 years; renew yearly	
North Dakota	Yes	Yearly; before July 1	Requested
Ohio	Yes		
Oklahoma	Yes	Requalify every 2 years; renew yearly	Requested
Oregon	Yes	Yearly	Requested
Pennsylvania	Yes		Requested
Rhode Island	Yes; post qualify letter	Submit docs 5 days after bid opening	
South Carolina	Yes	Needed but not found	Requested
South Dakota	Yes		Requested
Tennessee	Yes	Yearly	Requested
Texas	Yes	Yearly	Requested
Utah	Yes		Requested
Vermont	Yes	Yearly	
Virginia	Yes	Yearly	Requested
Washington	Yes	Yearly	Requested
West Virginia	Yes	Yearly	
Wisconsin	Yes		Requested
Wyoming	Yes	Yearly	Requested

SECTION 2: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	Financial Statement	Work Classifications/ Type of Work Sought	Conflicts of Interest	Any Subsidiaries? %?
Alabama	Required by CPA	Requested		
Alaska				
Arizona	Requested	Requested	Requested	
Arkansas	Requested			Requested
California				
Colorado	Requested	Requested		Requested
Connecticut	Requested	Requested		Requested
Delaware		Requested		Requested
Florida	Requested	Requested	Requested	Requested
Georgia				
Hawaii				
Idaho	Requested	Requested		Requested
Illinois	Requested	Requested		Requested
Indiana	Requested	Requested		Requested
Iowa	Gross quarterly wages			
Kansas	Requested	Requested		Requested
Kentucky				
Louisiana				
Maine		Requested		Requested
Maryland				
Massachusetts	Optional	Requested		
Michigan	Requested	Requested		Requested
Minnesota				
Mississippi				
Missouri		Requested		Requested
Montana				
Nebraska	Requested	Requested	Requested	Requested
Nevada				
New Hampshire	Requested	Requested	Requested	Requested
New Jersey	Requested	Requested		Requested
New Mexico	Asks for annual gross receipts of firm	Requested		Requested

State	Financial Statement	Work Classifications/ Type of Work Sought	Conflicts of Interest	Any Subsidiaries? %?
New York	Requested			Requested
North Carolina	Requested	Requested	Requested	Requested
North Dakota	Requested	Requested		Requested
Ohio				
Oklahoma	Requested	Requested	Requested	
Oregon		Requested	Requested	
Pennsylvania	Requested	Requested	Requested	Requested
Rhode Island	Requested			
South Carolina				Requested
South Dakota	Requested	Requested	Requested	
Tennessee	Requested with gross annual receipts	Requested	Requested	Requested
Texas	Requested	Business Classification/ Work Category	Requested	Requested
Utah	Requested	Requested	Requested	
Vermont	Requested	Requested	Requested	Requested
Virginia		Requested	Requested	Requested
Washington	Requested	Requested		Requested
West Virginia	Requested	Requested		
Wisconsin	Requested	Requested	Requested	Requested
Wyoming	Requested	Requested	Requested	Requested

SECTION 3: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	Workman's Compensation Modifier	Previous Experience with Organization	State Licensure	Experience as a Contractor (prime and sub)
Alabama	Requested			Requested
Alaska				
Arizona		Requested	Requested	Requested
Arkansas			In lieu of organizational and financial information	Requested; both
California				
Colorado				Requested; both
Connecticut				Requested
Delaware			Required	
Florida				Requested; both
Georgia				
Hawaii				
Idaho				Requested; both
Illinois				Requested
Indiana		Requested		Requested; both
Iowa	Requested		Yes	
Kansas				Requested; both
Kentucky				
Louisiana				
Maine				
Maryland				
Massachusetts				
Michigan		Requested		Requested
Minnesota				
Mississippi				
Missouri	Requested	In the last five years		Requested; both
Montana	Requested			
Nebraska		Requested		Requested; both
Nevada				
New Hampshire	Requested		Requested	Requested; both
New Jersey				Requested; both
New Mexico		Requested	Requested	Requested; both
New York				Requested
North Carolina			Requested	
North Dakota				Requested; both
Ohio				
Oklahoma				
Oregon			Requested	Requested; both
Pennsylvania				Requested

State	Workman's Compensation Modifier	Previous Experience with Organization	State Licensure	Experience as a Contractor (prime and sub)
Rhode Island				
South Carolina	EMR requested	Requested	Registered with	Requested; both
South Dakota				Requested; both
Tennessee				Requested; both
Texas				
Utah		Requested	Required	Requested; both
Vermont				Requested; both
Virginia				
Washington				Requested; both
West Virginia		Requested	Required	Requested; both
Wisconsin				Requested; both
Wyoming				Requested; both

SECTION 4: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	Any Project Failures by Company or Principals	Any Illegal Behavior, Disbarment, or Suspension for You or Principals?	Major Projects for X Years?	Projects Currently Working?	Quality Control Plan
Alabama	Requested		3	Requested	
Alaska					
Arizona	Requested		All		
Arkansas	Requested		3	Requested	
California					
Colorado	Denial of prequal. in last 5 years; failures requested too	Requested	5		
Connecticut	Requested; 5 years	Requested; for 5 years	5		
Delaware					
Florida	Requested	Requested		Requested	
Georgia					
Hawaii					
Idaho	Requested		All		
Illinois	Requested		3		
Indiana	Requested	Requested	3	Requested	
Iowa					
Kansas	Requested		2		
Kentucky					
Louisiana					
Maine	Requested; for 5 years	Requested; for 10 years	Last 6 projects	All	Requested
Maryland					
Massachusetts	Requested	Requested; Last 3 years	Last 3 projects		
Michigan	Requested				
Minnesota					
Mississippi					
Missouri	Requested	Requested	5	Requested	
Montana					
Nebraska	Requested				
Nevada					
New Hampshire	Requested	Requested	3	Requested	
New Jersey	Requested	Requested	4		
New Mexico	Requested; last 10 years	Requested			
New York	Requested	Requested	Last 10 projects	All	
North Carolina		Requested	3	All	
North Dakota	Requested	Requested	5	All	

State	Any project Failures by Company or Principals	Any Illegal Behavior, Disbarment, or Suspension for You or Principals?	Major Projects for X years?	Projects Currently Working?	Quality Control Plan
Ohio					
Oklahoma	Requested	Requested	2	All	
Oregon	Requested	Requested	5		
Pennsylvania	Requested	Requested	5	All	
Rhode Island					
South Carolina	Requested	Requested; past 6 years	Last 10 projects		
South Dakota	Requested	Requested; past 10 years	2		
Tennessee	Requested	Requested; 5 years	All	Requested	
Texas		Requested	All		
Utah	Requested		5		
Vermont	Requested	Requested	5		
Virginia		Requested	3	Requested	Use a formula w/this and safety
Washington	Requested	Requested	3	All	
West Virginia	Requested		5		
Wisconsin	Requested		3		
Wyoming	Requested		3	All	

SECTION 5: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	Safety Program	Experience of Principal Individuals	List All Equipment	List of Banks Used for the Last X Years?	List Places of Credit for X Years?
Alabama		Requested	Requested as part of financial statement	Requested; 3 years	Requested; 3 years
Alaska					
Arizona		Requested	Requested		
Arkansas		Requested			
California					
Colorado		Requested	Requested		
Connecticut		Requested	Requested		
Delaware					
Florida		Requested	Requested		
Georgia					
Hawaii					
Idaho		Requested	Requested		Requested
Illinois		Requested	Requested		
Indiana		Requested	Requested		
Iowa					
Kansas		Requested	Contained in financial submittal		
Kentucky					
Louisiana					
Maine	Requested; really in-depth	Requested			
Maryland					
Massachusetts		Optional	Requested	Primary bank	
Michigan		Requested	Requested		
Minnesota					
Mississippi					
Missouri		Requested	Requested		
Montana					
Nebraska		Requested			
Nevada					
New Hampshire		Requested	Requested	Primary bank	
New Jersey		Requested	Requested	Current	Current
New Mexico	Last 10 years; OSHA ratings				
New York	Any OSHA violations				
North Carolina	Submit NCDOT Safety Index Rating	Requested	Requested	Requested	Requested
North Dakota		Requested	Requested		
Ohio					

State	Safety Program	Experience of Principal Individuals	List All Equipment	List of Banks Used for the Last X Years?	List Places of Credit for X Years?
Oklahoma		Requested	Requested		
Oregon		Requested	Requested		
Pennsylvania		Requested	Requested		Requested
Rhode Island		Requested	Requested		
South Carolina		Requested	Requested		
South Dakota		Requested	Requested		Credit amount
Tennessee		Requested	Requested		
Texas		Requested	List 6 largest		
Utah		Requested			
Vermont		Requested			Letter of credit
Virginia	Use a formula w/ this and quality		Requested		
Washington		Requested	Requested		
West Virginia		Requested	Requested		Line of credit letter
Wisconsin		Requested	Requested		Loan capacity
Wyoming		Requested	Requested		

Note: OSHA = Occupational Safety and Health Administration.

SECTION 6: ADMINISTRATIVE PREQUALIFICATION FORM CONTENT ANALYSIS

State	List All Authorized Signers	List All Surety Companies for the Last X Years	Bonding Agent and Amount Bonded for	Affidavit
Alabama	Requested	Requested; 3 years		Requested
Alaska				
Arizona				Requested
Arkansas	Requested			Requested
California				
Colorado	Requested			
Connecticut	Requested			Requested
Delaware	Requested			
Florida	Requested			Requested
Georgia				
Hawaii				
Idaho			Requested	Not called affidavit but has to be notarized
Illinois			Guaranty agreement	Affidavit for equipment availability; affidavit for total prequal. form
Indiana				Requested
Iowa				
Kansas				Requested
Kentucky				
Louisiana				
Maine	Requested		Requested	
Maryland				
Massachusetts		List largest bond granted	Requested	
Michigan	Requested			Requested
Minnesota				
Mississippi				
Missouri		Requested; surety bond	Requested	Requested
Montana				
Nebraska		Ever have to pay a loss to a surety		Requested
Nevada				
New Hampshire			Requested; 100% contract bond	
New Jersey				Requested
New Mexico			Requested	Requested
New York		Has surety been called in the last 5 years	Requested range	
North Carolina			Requested	Noncollusion affidavit and debarment cert.
North Dakota				Requested

State	List All Authorized Signers	List All Surety Companies for the Last X Years	Bonding Agent and Amount Bonded for	Affidavit
Ohio				
Oklahoma	Requested	Ever defaulted surety		Requested
Oregon	Requested		Performance and payment; total and agent	Requested
Pennsylvania				Requested
Rhode Island			Original letters needed and total amount	
South Carolina	Requested	Current		Requested
South Dakota		Cert. of surety	Requested	Requested
Tennessee	Requested		Maximum amount	Requested
Texas			Lost a bond in last year	Requested
Utah				Requested
Vermont	Requested		Both company and limit	Requested
Virginia	Requested	Requested		Requested
Washington	Requested			Requested
West Virginia	Requested			Requested
Wisconsin	Requested		Requested; both	Requested
Wyoming				Requested

PROJECT-SPECIFIC RFQ CONTENT ANALYSIS

The findings of the formal content analysis of the administrative prequalification form for each state are shown below in two sections: transportation projects and nontransportation projects.

SECTION 1: TRANSPORTATION PROJECTS

RFQ #	Agency	Project	Type	Past Performance	Key Personnel Experience	Management Plans	Subcontracting Plan	QA/QC Plan	Current Workload	Safety Record	Financial	Bonding
1	Alaska DOT	Glenn - Parks Interchange	DB	x	x	x	x	x		x	x	x
2	Florida DOT	Bridge Replacement	DB	x	x							
3	Colorado DOT/RTD	Southeast Corridor Multi-Modal	DB	x	x	x	x	x	x	x	x	x
4	Arizona DOT	Cortaro Interchange	DB	x	x	x		x	x	x	x	x
5	Nevada DOT	Reno Trans Rail Access Corridor	DB	x	x	x	x	x		x	x	x
6	Minnesota DOT	T.H.100 Duluth ST.	DB	x	x	x		x			x	x
7	Washing-ton DOT	SR 500 Interchange	DB	x	x			x		x	x	x
8	North Carolina DOT	US 64	DB	x	x	x	x	x		x	x	x
9	Florida DOT	Bridge Replacement	DB	x	x			x			x	x
10	USACE	Lock & Dam	DBB-BV	x	x	x	x	x		x	x	x
11	USACE	Range Road Upgrade	DBB-BV	x	x			x		x	x	x
12	USACE	Range Roads	DB	x	x	x		x		x	x	x
13	USACE	Airfield Improvement	DB	x							x	x
14	NAVFAC	Storm Drainage	DB	x							x	x
15	FHWA EFLHD	DC Highways	DB	x	x	x	x		x		x	x
16	FHWA EFLHD	Parkway	DB	x	x		x				x	x
17	USACE	Dam	DBB-BV	x	x	x	x			x	x	x
18	North Carolina DOT	I-380	DB	x	x	x	x	x		x	x	x
19	City: Jamestown, VA	Shore Protection	DB	x	x		x	x	x	x	x	x
20	USACE	Railroad Extension	DB	x	x	x	x	x		x	x	x
21	USACE	Runway Extension	DB	x	x	x	x	x	x	x	x	x
22	USACE	Paving	DBB-BV	x	x	x		x	x		x	x
23	NAVFAC	Runway Extension	DB	x	x	x	x				x	x
24	USACE	Paving	DBB-BV	x	x	x	x	x	x			x

RFQ #	Agency	Project	Type	Past Performance	Key Personnel Experience	Management Plans	Subcontracting Plan	QA/QC Plan	Current Workload	Safety Record	Financial	Bonding
25	USACE	Pave Aprons	DB	x	x	x	x	x		x	x	x
26	USACE	Railroad Complex	DB	x	x	x	x	x			x	x
27	USACE	Runway Extension	DB	x	x		x			x	x	x
28	USACE	Floodway Extension	DB	x			x			x	x	x
29	USACE	Water line	DBB-BV	x				x		x	x	x
30	City: Berkeley, CA	Water line	DB	x	x			x			x	x
31	City: Raleigh, NC	Street Improvement	DB	x	x		x	x	x	x	x	x
32	Utah DOT	Paving	DB	x			x				x	x
33	City: Raleigh, NC	Storm Drainage	DB	x	x	x	x		x		x	x
34	Denver Intl. Airport	Regional Jet Facility	DB	x	x	x	x	x				
35	Vancouver, BC Transport-Authority	Bridge	DB	x	x	x		x			x	x
36	Minnesota DOT	TH 10/32	DB	x	x	x	x			x	x	x
37	Utah DOT	SR 201	DB	x	x	x		x			x	x
38	Minnesota DOT	TH 52	DB	x	x	x	x	x		x	x	x
39	City: Phoenix, AZ	Traffic System	DB	x	x	x		x	x		x	x
40	Alberta MOT	Highway Maintenance Contract	DB	x		x		x		x	x	x
41	Nevada	Upgrade	DB	x	x						x	x
42	Indiana Toll Road	Fiber Optic System	DB	x	x	x	x				x	x
43	Mass DOT	Improvement	DB	x	x					x	x	x
44	Missouri DOT	I-64	DB	x	x	x	x				x	x
45	Texas DOT	SH45 Southeast Turnpike	DB	x	x	x			x		x	x
46	Virginia DOT	Road Improvement	DB	x	x	x	x	x			x	x
47	Virginia DOT	Rest Area	DB	x	x	x	x	x			x	x
48	Virginia DOT	Mobility Corridor	DB	x	x		x		x		x	x

RFQ #	Agency	Project	Type	Past Performance	Key Personnel Experience	Management Plans	Subcontracting Plan	QA/QC Plan	Current Workload	Safety Record	Financial	Bonding
49	Virginia DOT	Rte 713 Bridge	DB	x	x	x	x	x		x	x	x
50	Utah DOT	SR 265	DB	x	x			x		x	x	x
51	City: Tempe, AZ	Multi-Modal Facility	DB	x	x	x		x			x	x
52	City: Lake Oswego, OR	Storm Drainage	DB	x	x				x	x	x	x
53	Florida DOT	Miami Inter-Modal Center	CMR	x	x	x	x	x	x	x	x	x
54	City: Oakland, CA	Intermodal Center Development	DB	x	x	x					x	x
55	Corpus Christi Port, [ST?]	Terminal Development	DB	x	x	x				x	x	x
56	West Virginia DOT	WV2 Upgrade	DB	x	x		x	x	x		x	x
57	Mississippi DOT	US 90 Bridge Replacement	DB	x	x	x	x	x		x	x	x
58	Washington DOT	Ferry Terminal	DB	x	x	x					x	x
59	Port of NY & NJ	Wireless System	PPP	x	x		x		x		x	x
60	Utah DOT	Precon/ Construction services	PPP	x	x	x					x	x
61	City: Tempe, AZ	Tempe Trans Center	CMR	x	x	x				x	x	x
62	South Carolina DOT	Bridge Replacement	DB	x	x	x					x	x
Total				62	56	41	34	36	16	30	59	60
Percent of Total				100%	90%	66%	55%	58%	26%	48%	95%	97%

SECTION 2: NONTRANSPORTATION PROJECTS

RFQ #	Agency	Project	Type	Past Performance	Key Personnel Experience	Management Plans	Subcontracting Plan	QA/QC Plan	Current Workload	Safety Record	Financial	Bonding
1	NAVFAC	FY02 MCON PROJECT P4	DB	x	x	x	x	x		x	x	x
2	USACE	Laboratory Building Extension	DB	x							x	x
3	University of Nebraska	Project Number TBD	DB	x	x	x		x			x	x
4	NAVFAC	Modernization Naval Station	DB	x	x	x	x				x	x
5	NAVFAC	Replace 70 Units Hale Moku	DB	x		x	x				x	x
6	University of Nebraska	Walter Scott Engineer Center	DB	x	x	x		x			x	x
7	FT. Lauderdale County	Pet Crematory	DB	x							x	x
8	NAVFAC	FY 2001 Dormitory	DB	x		x	x	x			x	x
9	City: Wheat Ridge, [ST?]	Monument DB	DB	x		x		x			x	x
10	University of Colorado	Steam and Chilled Water Plant	DB	x		x		x			x	x
11	City: Santa Monica, CA	Bus Campus Expansion	DB	x		x		x			x	x
12	Federal Bureau of Prisons	USP Tucson	DB	x	x	x		x			x	x
13	Dept. of Veterans Affairs	VA Medical Center Projects	DB	x		x		x			x	x
14	GSA	Post Office/ Courthouse	DB	x	x	x		x			x	x
15	USACE	Pentagon Renovation	DB	x		x		x			x	x
16	Colorado School of Mines	Dormitory	DB	x	x	x		x	x		x	x
17	University of California	Dormitory	DB	x	x			x	x	x	x	x
18	University of North Carolina	Dormitory	DB	x	x		x		x		x	x
19	Madison County, Texas	Courthouse	DB	x	x					x	x	x

RFQ #	Agency	Project	Type	Past Performance	Key Personnel Experience	Management Plans	Subcontracting Plan	QA/QC Plan	Current Workload	Safety Record	Financial	Bonding
20	State of Florida	Radio Station Renovation	DB	x	x	x					x	x
21	City: Mesa, AZ	Warehouse	DB	x	x	x					x	x
22	Plumas County, CA	Courthouse	CMR	x	x	x		x		x	x	x
23	USACE	Housing FL	DB	x	x	x	x			x	x	x
24	USACE	Lab NY	DB	x	x	x			x		x	x
25	USAF	Housing TX	DB	x	x			x		x	x	x
26	USACE	Training Facility KS	DB	x	x	x	x	x	x	x	x	x
27	USACE	School NM	DB	x	x				x		x	x
28	USACE	Range complex ME	DB	x	x	x			x		x	x
29	USACE	Building Texas	DBB-BV	x	x	x			x		x	x
30	USACE	Arizona Airfield Building	DB	x	x		x				x	x
31	USACE	Support Facility CA	DB	x	x						x	x
32	USACE	Dormitory AZ	DBB-BV	x	x	x		x		x	x	x
33	USAF	Building HI	DBB-BV	x	x	x	x		x		x	x
34	USAF	Dormitory NC	DB	x	x	x					x	x
35	GSA	Building Office	DB	x	x	x	x		x		x	x
36	USACE	Building TX	DBB-BV	x	x		x			x	x	x
37	USACE	Army Depot	DBB-BV	x	x	x	x	x	x	x	x	x
38	USACE	Launch Complex NM	DB	x	x		x	x	x	x	x	x
39	USACE	Building Ft. Bliss, TX	DBB-BV	x	x	x	x		x	x	x	x
40	USACE	Construction Services TX	DBB-BV	x	x	x	x	x		x	x	x
41	USACE	Bexar County Construction Services	DBB-BV	x	x	x	x	x		x	x	x
42	USACE	LA Construction Services	DBB-BV	x	x	x	x	x	x	x	x	x
43	Virginia State	Steam Plant Renovation	DBB-BV	x	x	x	x	x	x		x	x
44	Texas Tech	Dormitory	CMR	x	x	x	x	x		x	x	x
45	East Carolina University	Dormitory	CMR	x	x	x	x		x		x	x
Total				45	36	34	20	24	16	16	45	45
Percent of Total				100%	80%	76%	44%	53%	36%	36%	100%	100%

