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Single vs. Separate Prime Contracting: A National Study

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Preface

Public policy shaping public sector building construction affects the interests of taxpayers, as well as those of construction authorities and contractors participating in the construction process. At the state level the debate as to the appropriate form such policies should take has been replayed repeatedly in an ongoing struggle among the competing interests of the parties involved. While in the end these policy decisions may well turn on political considerations, hopefully some part of those deliberations will be informed by systematic analyses of the issues involved. The purpose of this study is to contribute such an analysis and to recommend an approach that appears to improve upon both the traditional methods of single prime and separate prime contracting.



Introduction

Historically, an important and often contentious issue in public sector building construction is the structure of the contractual relationships among general contractors, specialty contractors and public construction authorities during the construction phase. The form of that relationship can and does vary significantly by public jurisdiction. The fact that these contractual relationships do vary arguably has important implications for the interests of the parties, as well as the public's interest in an efficient, timely, high-quality public construction program. As a result any discussion of contractor relationships and public building construction is a necessarily complex undertaking. This research, however, focuses on the interests of the parties only in so far as they help illuminate a more fundamental question: Does the form of the contractual relationships affect the direct cost of public building construction?

While there is some variation in the form of these contractual relationships, the single prime/general contractor model and the separate prime model are the two most common alternatives. The former is typically a competitively bid single-prime contract between the public construction authority and a general contractor, who in turn sub-contracts with major specialty contractors

(i.e. electrical, HVAC, plumbing). In the latter model, the public construction authority establishes competitively bid prime contracts with not only a general contractor, but also with the major specialty contractors on the project. The relative merits of the two approaches have been debated for nearly a century in some states, with the available evidence largely based on testimonials by the various interested parties.

The purpose of this study was to provide a more systematic analysis of some of the key issues in this debate. The analysis draws on a national sample of state experience that includes the full range of policy alternatives. These include states that mandate separate prime contracts for public construction, states with no mandate for any contractual form, states that provide for both forms in the bidding phase, and states with hybrid forms. In addition, each of these contract forms is represented by multiple state experiences and in several instances there are opportunities to compare the effects of different contract forms in the same state. In short, the sample on which this analysis is based provides a far broader picture of the national experience than any previous examination of this issue.

While there have been limited efforts to examine this question in those

states where the debate over single vs. separate prime contracting mandates is most contentious, there has been no systematic effort to evaluate these issues on a national basis. Are the benefits, problems, or costs associated with one approach in one state mirrored in the experiences of other states using similar approaches? Is there any consistent pattern showing that any one approach yields consistently lower costs in public building construction, or is there a mixed pattern of results that varies by individual jurisdiction and construction markets? This study is designed to provide a more comprehensive perspective to the debate over this issue. It does not rely on the experience of just one state, or one type of construction. Rather it is designed to provide an insight into the national experience with single and separate prime contracting in state building construction. While it by no means includes the experience of every state, the state experiences that are included represent a broad cross-section of state building construction, and generally provide multiple observations of the major variants on the single vs. separate prime continuum.

This report is organized along four dimensions:

1. An overview discussion of the major issues in the single vs. separate prime debate. The pros and cons of single and multi-prime contracts are evaluated from the perspective of general and specialty contractors, as well as public owners. The guiding focus for this discussion is the likely effects of either approach on construction costs.
2. Review of prior research on this issue. While there is relatively little systematic research on this subject, even this limited work provides some useful insight into elements of this debate.
3. Statistical analysis of differences in

construction costs between the two contracting methods. This analysis includes a substantial sample of the national experience in state public construction as well as several opportunities to evaluate the effects of these two contracting approaches within a single state.

4. Summary and conclusions. Finally, the report discusses the prospects for moving beyond the current antagonism on this issue, presents possible new approaches to this issue and provides several recommendations.

The Issues

During the course of this research scores of individuals on both sides of this debate were interviewed. While those who favor one approach or another do not always point to the same reason for supporting their preferred approach, or always provide a consistent criticism of the approach they find less appealing, a common set of themes emerge from these interviews. Not surprisingly these preferences seemed to be driven largely by the particular interests of the parties in question whether general contractors, specialty contractors or construction authorities.

POSITION FAVORING SINGLE PRIME CONTRACTS

The arguments in favor of single prime contracts are not always consistent among its proponents, nor is their necessarily agreement upon which features of separate prime contracts are the most burdensome. Perhaps the first issue is simply cost. Construction authorities using single prime contracts, or those now required to use separate primes which would prefer to change argue that multi-prime jobs result in higher bid costs, increased administrative expenses, more change orders, contractor claims and poor quality work. Bid costs are thought to be higher for

separate prime models because general contractors will raise their price as compensation for the risk of working with three other prime contractors who are unknown at the time of bid. Bid prices also increase because there is less competition as fewer responsible contractors are willing to get involved in the frustration of the multiple contract system.

Design and administrative expenses are higher under separate prime contracting because multiple sets of detailed plans and contracts must be developed and administered. Moreover, since these costs are relatively fixed, the effect is proportionately greater on small jobs. Proponents of single prime contracts argue that separately bid jobs necessarily result in more change orders, delays and litigation. The threat of litigation occurs when one contractor's problems affects the schedules of other contractors, who in turn sue the public owner rather than the offending contractor.

Proponents of single prime contracts also argue that under separate prime contracts many public owners are compelled to manage and coordinate construction projects when they do not have the staff or expertise to do so. This coordination is made more difficult by the existence of separate prime contractors who are interested only in their

portion of the job and have little concern for the project as a whole. In short, public sector owners would prefer that one party be responsible for the overall completion of the job, and in the absence of that management expertise in-house, they want the right to invest that responsibility in a general contractor through a single- prime contract. Public construction authorities want the same flexibility to choose the appropriate construction management approach that private sector owners enjoy.

The cumulative effect of these weaknesses in separate prime contracts, in the view of those who oppose this approach, is to substantially increase the cost of public construction. With the exception of New York, New Jersey, and just recently North Carolina, those interviewed relied on their experience and judgement as the basis for these cost conclusions, rather than more systematic studies designed to answer these questions.

POSITION FAVORING SEPARATE PRIME CONTRACTS

The proponents of separate prime bidding policies argue that such a policy results in lower costs and better quality projects. They claim that bid costs are lower because there is more competition for each prime contract. First, better specialty contractors are attracted to separate prime jobs because they will not have their bids shopped by a general contractor and they can count on prompt payment from the public owner when their work is completed. Second, the bidding is open to all qualified contractors rather than a few subcontractors favored by a particular general contractor. Furthermore, they point to evidence from states where both single and separate bids are taken on the same project, which indicates that separate prime bids were uniformly lower than single prime bids.

As for the cost of additional plans, the proponents of separate prime con-

tracts point out that the separate detailed plans for each contractor are in fact a positive feature of the system since it encourages more accurate planning at the design stage and prevents "short cuts" during the construction phase. Finally, they note that when change orders and claims do occur, they are more expensive on a single prime project since the cost includes a general contractor's markup. This is particularly true in cases where smaller general contractors are little more than brokers in a transaction between the public owner and the specialty contractors doing the real work on the job.

Those in favor of separate prime contracting agree that management and coordination of the construction process is a crucial issue in this debate, but it is the absence of capable management by public owners that is the problem, not the bidding process. On projects where problems develop, it is not the self-serving and litigious attitudes of the separate prime contractors that cause delays, but rather the inadequate design that requires construction through change orders or the absence of capable construction management by the public owner. The supporters of separate prime bidding argue that if public owners do not have such staff capability, they should contract for these services with a construction manager or architect who will not have the inherent conflict-of-interest posed by the general contractor in a single prime system.

CONTRACTOR-SUBCONTRACTOR RELATIONSHIPS

While both the general and specialty contractors often frame their position in this debate with reference to the public interest, they are also very concerned about the different implications of single and separate bidding methods for their relationship before, during, and after the project is completed. At the bid stage, specialty contractors are con-

cerned about having their bids to a general contractor “shopped” to other subcontractors or being denied access to public jobs by a “murky network of friendships”. Specialty contractors charge that, when a subcontractor lowers his bid, the savings do not result in a lower project cost but simply go into the pocket of the general contractor. In some cases, this bid-shopping results in the selection of unqualified subcontractors when more qualified contractors refuse to lower their bids.

General contractors, on the other hand, want the right to select reliable sub-contractors with whom they are comfortable and defend competition among subcontractors as simply the benefits of the marketplace at work. They also point out that charges of bid-shopping by subcontractors are disingenuous since subcontractors are also guilty of attempting to undercut a fellow subcontractor’s bid when a single prime contract is awarded. In large part, this problem stems from the last minute crush of calls from subcontractors to generals before a bid deadline. The generals argue that these last minute numbers have to be clarified to accurately define the scope of work; however, subcontractors are reluctant to provide their bids earlier for fear of having them leaked to other subcontractors.

For example, some state construction authorities that use single prime bidding allow the general contractor with the lowest bid a specified period after the announcement of the award to name subcontractors. Public agencies and general contractors point out that this time period is necessary to work out the details of the subcontractor relationship given the last minute flurry that tends to accompany most bidding deadlines. Nevertheless, a common by-product of this practice is that generals use this period to shop the original subcontractor bids as well as clarify the scope of work. In light of the

last minute rush of bid numbers and the uncertainty involved, generals typically oppose efforts to require that subcontractors be named or “listed” at the time the general submits their bid.

Similarly, during the course of the project general contractors want control over payments to subcontractors since this provides leverage in their efforts to manage the project. This leverage is considered essential to effectively managing their contractual relationship with the subcontractor. Subcontractors, on the other hand, complain that when generals have the power of the purse, they too often delay payments to subcontractors even after the generals have been paid by the public owner.



Evidence From Prior Research

While there is generally little in the way of systematic research on this issue, there have been a handful of studies of varying quality that have attempted to provide some evidence regarding the cost implications of the two approaches. They generally focus on the experience of one state, typically New York state, and have generally not been comprehensive enough to be considered compelling evidence, one way or the other. Nevertheless, each of these prior studies has been reviewed and summarized in the degree to which it bears on the issues addressed in this national study. The prior research evaluated includes:

- New Jersey studies (late 1960's and 1970's)
- 1987 study by the New York State Division of the Budget
- 1993 study prepared for City of New York School Construction Authority
- 1993 study of New York Wicks Law prepared for Electrical Contracting Foundation
- 1994 North Carolina study

The essential results of each study are summarized individually along with

a brief discussion of their strengths and weaknesses. Finally there is an overview of the principal conclusions and questions, that can be drawn from this prior work.

NEW JERSEY STUDIES (LATE 1960'S AND 1970'S)¹

One of the first efforts to compare the costs of single and separate prime contracting methods in public construction was generated by specialty contractors in New Jersey. Arguably an ideal laboratory for such a study, New Jersey law provides for both single and separate bidding on the same project, where the approach with the lowest responsible bid must be selected. In response to claims surrounding the merits of both approaches, the Inland Chapter of the National Electrical Contractors Association prepared a report on 90 projects from across the country that had been bid both ways. Released in 1970, these data indicated that separate prime contracts produced lower bids in 85 of the 90 projects. On average, single prime jobs had 8.67 percent higher bid costs than separate prime jobs.

¹ This report's source is identified as the Mechanical Contracting Industry Council of New Jersey. The report is not dated but since the data are for projects through 1978, it is assumed the report was prepared at the end of that period.

Ten years later, the New Jersey Mechanical Contractors Association prepared a similar study based entirely on New Jersey construction experience. The study compared project bid cost data on New Jersey jobs bid both ways from mid-1968 through 1978. This report indicated that of 370 projects bid both ways over this period, separate prime bids were lower in 302 instances. On average, single prime bid were 9.54 percent higher than separate prime bids.

Assuming these projects are representative of the New Jersey experience, such comparisons support the choice use of separate prime contracts in public construction. The results are particularly compelling because both single and separate prime contracts were bid on *identical* projects. However, critics of these comparisons have argued that such results do not fully or accurately reflect the true cost differential. They argue that since the New Jersey study is limited to difference in bid costs, separate prime contracts may in fact result in higher total project costs because of higher change orders under separate prime contracts. They also contend that in cases where projects can be bid both ways, specialty contractors artificially inflate their prices to general contractors who in turn must pass them along in the form of higher single prime bids. These possible alternative explanations are considered later in the study.

1987 NEW YORK STATE DIVISION OF THE BUDGET

With various amendments and extensions, New York has had a policy of separate prime contracts in public construction since 1912. Known as the Wicks Law, this policy requires that most state and local public construction — excluding certain exempt construc-

tion authorities — be bid as separate packages to a general contractor and the major specialty contractors (electrical, HVAC and plumbing). While the original motivation for such a policy apparently was to expose more of the contract procurement process to public scrutiny, thereby avoiding corrupt bidding practices, there has been continuing debate almost since its inception regarding the merits of separate bidding procedures. For the most part, the same charges and counter-charges have been leveled on both sides of the issue for the last seventy years.

In 1987 as part of a review of the Wicks Law, the New York State Division of the Budget prepared a comparison of ostensibly similar projects, some of which were constructed under separate prime contracts and others under single prime contracts.² The study includes three types of projects (firehouses, prisons, and academic buildings), multiple agencies, and various geographical regions within and outside New York state.

The challenge in such a study is to ensure that the projects under one contracting approach are actually equivalent to those constructed under the other approach. To do this, the Division of the Budget study adjusted all project costs by R.S. Mean's *Historical Cost Indexes* (1986) to reflect regional and yearly cost differences. Beyond adjusting for square footage, the study largely assumed that all college science buildings were similar and that all medium security prisons of a certain size were equivalent. The overall conclusion of this study, across the three types of building construction studied, was that separate prime jobs (Wicks jobs) were 24-30 percent more costly than single prime jobs.

² New York State Division of the Budget, *Fiscal Implications of the Wicks Law Mandate*, (May 1987).

1993 STUDY PREPARED FOR NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

In 1988, the New York City School Construction Authority received a five year exemption from the state's Wicks Law. This hiatus from mandated separate prime contracts was intended to give the Construction Authority a chance to demonstrate that they could operate more efficiently if they were released from the "constraints" of the Wicks Law. As part of the enabling legislation, the Construction Authority was directed to prepare studies that would compare their experience under Wicks with the period during the exemption.

A study comparing the Wicks and non-Wicks experience was completed in 1993. The study focused on New York City area public construction, and compared projects that had been constructed under Wicks mandates and those that had not. The study was very comprehensive and made an effort to estimate Wicks and non-Wicks cost differences in direct construction costs as well as indirect administrative costs and those costs associated with delays.

Total construction costs (including administrative costs) were compared to estimates of project costs prepared by an independent cost consultant who was unaware of the Wicks or non-Wicks status of the project. Holding such differences as type of project (rehab or new), building type, predicted cost and year of construction constant, this study estimated that Wicks projects (separate primes) had 9 percent higher construction costs. Approximately half of this differential was due to higher administrative costs, a little more than one third was due to higher change orders and claims, and the remainder and the smallest part was apparently due to dif-

ferences in bid costs.³

The report also examined completion times and concluded that Wicks jobs averaged 15.6 months longer to complete than non-Wicks jobs, other things equal. This conclusion was based on a comparison of predicted completion times based on the same variables used to predict costs. Based on the higher interest charges associated with such delays, the study estimates the full cost difference to be about 13 percent in favor of non-Wicks jobs.

1993 STUDY OF NEW YORK WICKS LAW PREPARED FOR THE ELECTRICAL CONTRACTING FOUNDATION

This study examined two aspects of cost differences for equivalently valued projects: bid costs and total costs. The study "equalized" projects by relying on cost estimates at the time of the bid request. This approach allowed for a wider data collection effort and greater cooperation from public agencies than attempting to identify matched pairs of projects using different bidding methods or recreating cost estimates after the fact. The study relied on two data sources: 1) bid and total cost data from three New York state agencies (one single prime and two separate prime) who have a long experience with their respective bidding procedure; and 2) bid cost data from F.W. Dodge.

Bid Costs: The results from 72 large projects (over \$5 million) in the state agency data indicated that single bid jobs had 2.8 percent higher bid costs than separately bid jobs with an equivalent estimated cost. The difference in the Dodge data (62 large projects) was much smaller with single bid jobs only 0.57 percent higher than separately bid jobs with an equivalent estimated cost.

³ *Impact of the Wicks Law on Public Construction in New York City*, prepared for the NYC School Construction Authority by Ashenfelter and Ashmore, March 1993, p. 42.

While not of the magnitude of the difference observed in earlier studies in New Jersey, this conclusion does not support the contention that separately bid jobs have relatively higher bid costs. In fact, both studies suggest that if any difference exists, it is single bid jobs that have higher bid costs.

Total Direct Costs: This analysis was based on the difference in final cost (including change orders and claims) between single and separately bid jobs after statistically controlling for the estimated cost, year of construction and type of project (rehab or new construction). These data were provided by the respective state agencies and include all of the projects completed during the particular time period. Based on this analysis, single bid projects had a 3 percent higher final cost than equivalent separately bid projects.

These results addressed a number of the questions surrounding this debate and earlier studies. First, critics of separate bidding procedures argue that studies showing lower bid costs for separately bid projects are misleading and incomplete "by failing to include the *final* costs of the projects, which are often considerably higher than the original bid amounts..."⁴ This study did not support such a criticism; the results indicated that separately bid jobs over this period not only had lower bid costs, but also lower final costs. Second, the results are also not consistent with claims that separately bid jobs are more expensive because of more change orders and litigation. Of the overall 3 percent cost difference between the two bidding methods, only two-tenths

of one percent would be attributable to differences (i.e. change orders and claims) other than differences in bid costs, and even that small difference favors the separate prime approach.

1994 NORTH CAROLINA STUDY

Prior to 1989, public construction authorities in North Carolina were required to use separate prime contracts for plumbing, HVAC, electrical, and general contracting. In 1989, North Carolina adopted legislation enabling public construction authorities engaged in projects exceeding \$100,000 to seek single prime bids in addition to separate prime bids. The enabling legislation required a study of single and separate prime bidding experiences, and outside consultants prepared a study for the North Carolina State Building Commission.

The North Carolina study examined differences in time to completion, bid prices, contract cost per square foot, administrative costs and change orders. While the study was plagued by data problems, the overall conclusion one draws from the study is that no meaningful difference existed between single prime and separate prime contracting approaches. With respect to time to completion the study finds "no measurable difference...in terms of completion within schedule."⁵ However, the data in Figure 1 and Table 1 appear to be in conflict.⁶ While Figure 1 indicates that a higher percentage of *separate prime* projects were completed early or on time, Table 1 indicates a slightly higher percentage of *single prime* projects were completed on time. These data

⁴ *Fiscal Implications of the Wicks Law Mandate*, New York State Division of the Budget May 1987, pg. 13.

⁵ Untitled report (Contracting Report) prepared for North Carolina State Building Commission, 1994, p. 10.

⁶ Untitled report (Contracting Report) prepared for North Carolina State Building Commission, 1994, p. 9-10.

are additionally confusing since the study goes on to note that “among the late projects,” multiple prime jobs suffered longer delays.⁷ This conclusion, however conflicts with the very clear data in Figure 1 showing that among late jobs single prime jobs were more heavily represented. Moreover, the difference appears to be greatest among the latest jobs (more than 100 days late).

On bid prices, the North Carolina study compared single and separate prime bids where both were available on the same project. Similar to the New Jersey experience, a substantial majority of the separate prime bid (76 percent) came in lower than the single prime bids, though by a relatively small cost difference (1.6 percent). Comparing actual construction costs per square foot for new construction, the study concluded that “single and [separate] prime projects showed an approximately equal construction cost.”⁸

The study also made an effort to evaluate differences in administrative costs, but concludes that the available data are not sufficiently reliable to provide the basis for any reasonable inferences. Finally the study examines change orders and finds a very slight and insignificant difference between the two approaches, with single prime jobs having about 1 percent higher change order costs than separate prime jobs. The study concludes that “the analysis of the data collected [in this study] does not provide an answer to the question of which method of contracting is best for North Carolina public agencies.”⁹

⁷ Untitled report (Contracting Report) prepared for North Carolina State Building Commission, 1994, p. 12.

⁸ Untitled report (Contracting Report) prepared for North Carolina State Building Commission, 1994, p. 21.

⁹ Untitled report (Contracting Report) prepared for North Carolina State Building Commission, 1994, p. 25.

Evidence Of Cost Differences Between Single And Separate Bidding Methods

ANALYTICAL APPROACH

While advocates on both sides of this issue are convinced from personal experience of the legitimacy of their position, the review of prior empirical research on the subject suggests limited availability of broad scale systematic research on the subject. This national study is not designed, nor did it have the resources, to completely evaluate every dimension of this debate. However, it does focus on what is the most salient element of this discussion: namely, the cost difference between the two approaches. The challenge for such an analysis, and no doubt the reason for the absence of much prior research on this topic, is that a complete study must overcome a number of problems. The first is that a cost comparison between single and separately bid jobs will likely reflect differences beyond simply the fact that the jobs were bid differently. Ideally one would want pairs of a large number of identical projects constructed throughout different states and construction authorities such that all other differences between the two experiences would average out. In practice such matched pairs do not exist.

The second analytical problem is that total job costs include both the actual construction costs as well as the indirect costs of coordination and management that are borne by the public owner. These latter costs are not easily quantified over a large number of projects and public authorities. The burden on public agencies of carefully calculating the exact magnitude of such costs makes these data nearly impossible to collect in a study that must rely on the voluntary cooperation of such agencies.

This current study is limited to a comparison of the direct contract costs of public construction under the two contracting methods. While it is recognized that any differences in administrative costs are important to public owners in particular, the estimation of such costs was simply beyond the scope of this study. It should be noted while this study does not focus on total construction cost, it does include the largest share of those costs. For example, the norm in the industry is that actual construction costs are *nine* times greater than administrative costs as a percentage of total capital costs.¹⁰

The analysis was an effort to mea-

¹⁰ Donald S. Barrie and Boyd C. Paulson, *Professional Construction Management*. (McGraw Hill: New York), 1992, p. 42.

sure cost differences between separate and single contracting methods, *for otherwise similar projects*. As mentioned above, the challenge of this type of study is to “equalize” projects that are constructed in different locations, in different labor markets, using different materials, based on different plans and dimensions during different time periods. The 1987 study by the New York State Division of the Budget compared the costs of comparable projects, such as classroom buildings and firehouses, and attempted to adjust for geographic differences in labor and materials costs and square footage after the fact. The 1993 New York City School Authority study commissioned independent estimates of project values as a basis of comparison.

In this study, an alternative analytical method was chosen for several reasons. First, in a preliminary study of this issue in New York state, discussions with state construction authorities made it clear they would not have the time and resources to assemble the data required for a detailed adjustment of physical and economic differences. Second, this study had insufficient resources and access to the necessary data to generate a separate independent data set on these construction details. Third, the number of “comparable” projects is necessarily limited and the sample would have been quite small. But most importantly, an alternative methodology was used because it seemed to be at least as good as, if not better than, these prior approaches.

The approach used in this study was equivalent to attempting to evaluate the best approach to buying a new car. If one finds that Person A paid \$15,000 and Person B paid \$25,000, it’s impossible to say who got the better deal because they may have purchased different kinds of cars. One way to “equalize” these two experiences would be to compare the physical features of the car such as engine size, interior

room, comfort features, etc. However, a simpler approach would be to compare the price paid with the retail price of the car, or perhaps the dealer cost. These figures would capture all of the relevant physical details far more accurately than a physical re-creation after the fact.

In short, if Person A paid \$15,000 for a \$16,000 four door sedan with air conditioning and 110 inch wheelbase, he or she probably used a less successful approach than Person B who paid \$22,000 for a \$30,000 car with the same characteristics. Alternatively, paying \$55,000 for a luxury sedan with a dealer invoice cost of \$52,000 is “better” than paying \$12,000 for an economy compact car with a dealer invoice of \$8,000. In effect, by focusing on price paid relative to underlying value it is possible to compare two “approaches” when the commodities in question are not directly comparable (like school construction vs. prison construction).

Rather than focusing on physical details of the construction project as a basis of comparison, this study used the estimated cost of the project at the time of bidding. This estimate should not only take into consideration all of the unique physical elements of the projects, but also local practices and prices for materials as well as labor. Any alternative that attempts to identify “similar” projects after the fact by evaluating their structural characteristics, location, etc. can at best only hope to approach the accuracy of cost estimates developed for each particular project, at the time of the bid requests, based on the unique characteristics of that project.

This valuation concept was discussed with representatives of the construction industry, as well as state construction authority representatives. While they all agreed that such estimates are never 100 percent accurate, there was no reason to believe that estimation error was related to the project being single or separately bid. Therefore, since the

objective of this national study was to develop an accurate estimate of the *differences* between two contracting approaches, the methodology was appropriate.

Finally, a determination had to be made whether to include all projects of any size or establish a minimum size. The lower the minimum size the wider the representation, but the greater the burden on public agencies to provide the data. In an attempt to minimize the data preparation burden, yet maximize the dollar volume of projects in the data set, only projects with an estimated cost of \$1 million dollars were included.

MEASURE OF COST DIFFERENCE

The cost analysis used the estimated cost of a project at the time bids were requested as the standard of comparison for different projects. The reasons for this choice are described above. Single and separately bid projects were then compared based on their *bid cost*, and where available, *total contract cost* relative to the original estimated cost. Both cost measures are important. First, the advocates of each position claim that their approach fosters more competition and will result in lower bid costs. To quote a representative of the Nassau County Department of Public Works (New York), "give us an opportunity...to bid it both ways...then we'll have the real proof of what is cheaper".¹¹

This study cannot compare the same job bid both ways, but it can compare the bid values of equivalently valued jobs. The important point, however, is that differences in bid cost are an important issue in this debate. Second, the total contract cost when the project is completed is used simply because it is the bottom line figure on the project. Moreover, by examining differences in

total cost after adjusting for differences in bid cost, the analysis will provide an estimate of whether one method results in significantly more change orders and legal claims than the other.

PROJECT SAMPLE

This study is designed to move beyond the local and single state analyses of this issue in an effort to evaluate the national experience with single and separate prime contracting methods. Ideally, such a study would include the experience of all states at all levels of government and would require enormous time and manpower and was beyond the resources available to this study. Therefore, this study focuses on one level of government — states — where data on projects of reasonable size and reasonable number are available. Using this approach an attempt was made to secure the cooperation and data from state construction authorities in the largest states using single, separate and hybrid forms of contracting approaches.

Unfortunately not every state was able to participate (see Table 1). The primary reason for a state's reluctance to participate was their inability to provide the data in a form required for the study. Many apparently do not maintain project cost data in machine readable form or physically in the same location. In some cases states were offered the option of simply recording the necessary data on currently active projects and providing the data over the course of a the subsequent twelve months. Even these efforts were considered too burdensome in states experiencing significant budget constraints and recent staff cutbacks.

COST DATA

Each participating agency was asked to provide data for building construction

¹¹ Testimony before the Committee on Local Governments Public Hearing—Wicks Law, 270 Broadway, New York, NY. March 12, 1987 pp. 46-47.

Table 1

Participating and Non-Participating States and Agencies by Contracting Policies

Participating	Approached but declined to participate
<p>Separate Prime</p> <p>Office of General Services (New York) Department of Corrections (California) Dept. Of Administrative Services (Ohio) Department of General Services (Pennsylvania) Capital Development Board (Illinois)</p> <p>Single Prime</p> <p>University Construction Fund (New York) Department of General Services (California) State System of Higher Education (Oregon) State Finance and Investment Commission Construction Division (Georgia) General Services Commission (Texas)</p> <p>Hybrid</p> <p>State Construction Office (North Carolina) Div. of Building and Construction (New Jersey) Division of State Building and Construction(Minnesota)</p>	<p>Separate</p> <p>Dept. of Administrative Services (Oregon)</p> <p>Single Prime</p> <p>Division of Capital Planning (Massachusetts) Division of Building Construction (Florida) Department of Public Works (Connecticut) Division of Public Works (Indiana)</p> <p>Hybrid</p> <p>State Facilities Management (Wisconsin)</p>

projects completed in recent years. The time frame was in large part dependent on the accessibility of data. Several states had well developed MIS systems that contained project data for ten years, but most required manual efforts that made more than three or four years of data collection a significant hardship. Each agency was asked to provide the following data on each project:

- project start date
- project completion date
- estimated cost at the time of bidding (total cost)
- total dollar value of accepted bid (total cost)
- total dollar cost of completed projects, including total change orders and litigation
- whether new construction or rehab
- whether the project used single or separate prime contractors.

The dates were used to approximate the time period to adjust for changes in construction markets over time. The most difficult piece of data for most agencies to provide was the estimated cost of the project at the time of the bid because it was often filed in separate locations from the materials relating to the actual construction phase. As a result, several of the state construction authorities were unable to provide this particular piece of information; the experience of those agencies was, therefore, available for only parts of the analysis.

All project data supplied by the states were included in the analysis, except where data were not internally consistent or did not conform to the project descriptions required for the study. The most common reason to exclude projects was their narrow scope. For example, a comparison of single and separate prime contracting approaches implies an inherent compar-

Table 2

Number of Projects by State, Contracting Method and Data on Estimated Project Costs

Contracting Method and State	Total Projects Available	Total Projects with Data on Estimated Costs
Separate Prime	166	104
New York	53	53
California	6	6
Ohio	37	0
Pennsylvania	48	23
Illinois	22	22
Single Prime	123	63
New York	19	19
California	23	23
Oregon	49	0
Georgia	22	21
Texas	10	0
Hybrid*	67	53
New Jersey	53	39
Minnesota	14	14
Total	356	220

*These states included both single and separate prime contract data.

ison projects that require multiple trades to complete. Projects limited to replacing windows, new roofs, or new electrical systems, for example, were not considered appropriate comparisons among for the study and therefore were excluded from the data when provided by the agencies.

ANALYSIS

The cost data were analyzed in two ways. The initial analysis is based on the overall experience represented by the national sample. The second analysis focuses on individual states (New York, California, Minnesota) where within-state comparisons are possible. In both cases, the analysis is based on a comparison of single and separate prime contracting methods by three ratios:

- bid cost/ estimated cost
- final cost/estimated cost
- final cost/bid cost.

The study begins with simple compar-

isons, then estimates these differences controlling for other characteristics such as state differences other than contracting method, whether the project was a new build or rehab, and the changes in the construction market conditions that vary by year. The latter results are similar to answering the question: *What are the differences in cost ratios between single and separate prime bid jobs of the same project type (new or rehab), built in the same state, in the same year?*

NATIONAL SAMPLE

Table 3 reports the cost ratios for each of the individual state data sets. These data indicate reasonably wide variation in the project cost ratios. It is beyond the scope of this project to explain the reason for this variation, but the later analyses explain how this state by state difference in cost experience is distinguished from the differences associated with single vs. separate prime

Table 3**Cost Ratios for Total Sample, by State and Contracting Approach**

State and Contracting Approach	Cost/Estimated Cost	Bid Cost/ Estimated Costs	Final Cost/ Bid Cost
Separate Prime			
New York	.94	.91	1.03
California	5	8	0
Ohio	1.03	.92	1.12
Pennsylvania	7	2	5
Illinois	N.A	N.A	1.05
	1.01	.95	9
Single Prime			
	6	1	1.07
New York	0	1	1.06
Oregon			1
Georgia			
Texas			
	1.02	.96	
Hybrid			
	5	2	1.06
	N.A	N.A	1.08
New Jersey	1.13	1.08	1.03
Minnesota	9	4	9
	N.A	N.A	1.05
			3
			1.03
			6
	1.13	1.00	
	8	5	
	1.15	1.05	
	2	5	1.14
			7
			1.09
			4

contracting approaches. The magnitude of these numbers, and their pattern from bid costs to final cost ratios, is consistent with what would be expected in public construction over this period.

The first very simple comparison of single and separate contracting approaches based on these cost ratios is simply to aggregate across all states. This comparison is reported in Table 4. It shows a very clear pattern that projects bid with separate primes have lower costs, relative to their estimated

costs, than projects bid with a single prime. For example, the ratio of final cost to estimated cost is approximately 8 percent (.077) *higher* in single prime contracts compared to separate prime contracts.¹² Comparing across the ratios, the pattern suggests that most of the difference in the final cost/estimated cost ratio is due to separate primes having relatively lower bid costs. The bid cost/estimated cost ratio is .0621 *higher* in single prime jobs while final cost/bid costs, though also higher in single prime

¹² This .077 difference is statistically significant at conventional levels. The t-value is 2.496 with p=.0134 (two-tailed test). The sample size for this comparison was 212. It excluded data on 8 projects constructed under a new policy in Minnesota that was a hybrid of both single and separate contract approaches.

Table 4

**Simple Comparison of Average Cost Ratios
by Contracting Approach (Full Sample)**

Contracting Approach	Cost/Estimated Cost	Bid Cost/ Estimated Costs	Final Cost/ Bid Cost
Single Prime	1.09 90	1.01 36	1.08 51
Separate	1.02 27	.95 22	1.07 74

jobs, have a difference of less than 1 percent.¹³ These differences, of course, provide only the broadest of comparisons between the two approaches because they do not control for other differences (type of construction, time period, geographic location) that in some way may be associated with both the contracting method and the cost ratios.

A more appropriate method to answer the questions posed in this study is multiple regression analysis. Regression analysis makes it possible to eliminate that part of the average difference in cost ratios between single and separate contracting approaches that is attributable to variables other than contracting method. These other variables are called statistical controls. For example, if compared to separate prime jobs, single prime jobs were more often rehab rather than new builds, and if rehabs were inherently more likely to exceed original cost estimates, then a simple comparison of average cost ratios such as those above would in part reflect the disproportionate incidence of rehabs among single prime jobs. Or, if a disproportionate share of separate prime jobs in this

sample were based on data from years with very strong construction markets, the cost ratios on those jobs would probably be higher in part because of the years in which the construction took place. A simple comparison of average cost ratios would make separate prime jobs appear to be relatively more expensive simply because they had been disproportionately drawn from years with strong construction markets.

Unfortunately, analysts can only control what they can measure. This study was able to measure year of construction, state, and type of project (new or rehab).

Table 5 reports the multiple regression analysis for the national sample, for all three cost ratios. The results of the regression analysis show a pattern similar to that in Table 4, but not surprisingly the magnitudes are slightly different. The coefficients in the row indicated by the variable *Single Prime* are the "adjusted" average differences in cost ratios for single and separate prime contracting approaches, controlling for the other differences that may have been attributed to the other variables mentioned above (type of construction, etc.).

¹³ The difference in bid cost/estimated cost between the two approaches was .0621. This difference was statistically significant at conventional level with a t-value of 2.85 and p=.85 and p=.005 (two-tailed test). Note also the mean differences from bid cost/estimated and final cost/bid cost do not sum to the difference in final cost/estimated costs in part because the second of these ratios is based on a different sample size (see Table 5).

Table 5

**Multiple Regression Analysis of Cost Ratios
National Sample
(standard errors in parentheses)**

Independent Variables	Dependent Variables (cost ratios)		
	Bid Cost/ Es. Cost	Final Cost/ Bid Cost	Final Cost/ Est. Cost
Single Prime Jobs (1 if Yes, 0 if No)	.04 32 (.02	.00 10 (.02	.05 16 (.04
Rehab (1 if Yes, 0 if No)	99)	91)	19)
Trend (1979=0, 1994=15)	.00 18 (.02	.04 95 (.02	.06 77 (.03
Minnesota (1 if new program in Minnesota, 0 if No)	24)	15)	14)
States (1 if named stated, 0 if not)	- .00 73 (.00	.00 83 (.00	- .00 14 (.00
New York	53)	49)	74)
Minnesota	- .11 70 (.08	.02 83 (.08	- .14 66 (.11
Illinois	22)	65)	53)
California		.92 00 (.67	.95 37 (.10
New Jersey	1.01 15 (.07	45)	06)
Georgia	19)	1.00 52 (.07	1.22 37 (.10
Pennsylvania	74)	91)	85)
Sample Size	1.01 07 (.05	.98 89 (.05	1.01 58 (.07
Adjusted R ²	29)	16)	42)
	.99 55 (.07	1.02 58 (.06	1.02 28 (.09
	04)	83)	87)
	1.07 02 (.05	1.05 28 (.05	1.12 40 (.07
	59)	02)	92)

A positive number indicate that single prime contracting had higher costs; a negative number indicates that separate prime contracting had higher costs. For example, .0432 in the bid cost/estimated cost column indicates that single prime jobs averaged .0432 *higher* bid costs relative to estimated costs than separate prime jobs. Reading across the same row indicates that single prime jobs averaged .001 and .0516 higher final costs/bid costs and final costs/estimated costs, respectively. The pattern is similar to the unadjusted numbers as well. *Comparing final project costs to estimated costs, separate prime jobs were more than 5 percent cheaper than single prime jobs, and the overwhelming share of that difference (83 percent) was due to relatively lower bid costs.*

While the difference in cost ratios reported in the simple model are statistically significant at conventional levels, those in the multiple regression equation are not. This does not, however, mean that those differences in bid cost/estimated cost and final cost/estimated cost should be dismissed out of hand. Several factors should be kept in mind. First, statistical significance is a term commonly used to reflect the level of confidence, the probability that one is making an incorrect inference from the data in question. The risk is that because we have a sample of projects, rather than the entire population of projects, that the sample is not representative in some way. However, the project data provided for this sample is such a relatively large percentage of available project data in these agencies, for the period in question, that this sample does in fact represent a very substantial portion of the population of projects

that could have been sampled.

Second, the conventional risk that researchers are willing to accept is 5 percent; namely, that there is a 5 percent chance that the observed difference is due to chance (that in fact the true difference is zero). The probabilities for the two cost ratios mentioned above are 15 and 22 percent, respectively.¹⁴

Third, the typical hypothesis test is to compare the results against the standard of no difference. That is, if one finds the coefficients on Single Prime in Table 5 to be “insignificant,” this is the same as saying that there is no difference in cost ratios for single prime and separate prime contracting methods. At the same time one can say that these results are “significantly” different from the prediction that single prime jobs have notably lower cost ratios (say, 10 percent) than separate prime projects. In other words, one can reject the hypothesis, with less than a 1 in 1000 chance of error, that the final cost/estimate cost ratio of .0516 in favor separate primes is simply observed by chance when in fact the true difference is that Single prime jobs have a 10 percent lower cost ratio.

STATE LEVEL ANALYSIS

A second, and in some ways more persuasive analysis, is to compare separate and single prime projects *within the same state*. The advantage of this approach is that it controls for differences in construction markets, economic conditions, customs, etc. that might differ by state. In general this a more compelling method of analysis, and this study has tried to collect as many paired state data sets as possible. “Pairs”

¹⁴ The regression estimates are certainly more accurate estimates than the simple averages of the true differences in cost ratios between single and separate cost ratios. However, the statistical controls come as a price because there is not a great deal of independent variation in the single/separate dummy variable after controlling for state location. The resulting multicollinearity is reflected in the standard error of the Single variable increasing by nearly 30 percent in the regression model.

means project data from single and separate contracts in the same state, typically from different agencies.

Unfortunately it was only possible to replicate the national analysis in two states: New York and California.

However, Minnesota has adopted a relatively unique approach to this issue and it was possible to test the success of that approach using before and after data.

NEW YORK

The New York state construction cost data were provided by two state agencies with long experience with their respective contracting approaches. The Office of General Services provided the separate prime data and is largely responsible for the state prison system. The University Construction Fund provided the single prime data and focuses entirely on new building and renovations in the state university system. This analysis is particularly interesting because the issue of separate vs. single contracting continues to be a major political issue in the state. New York now has mandated separate prime contracting, with some exceptions; the University Construction Fund (UCF) is one of the exempted agencies.

Much like the New York City School Construction Authority, UCF can be viewed as an experiment that tests the value of allowing a public construction authority to choose a single or separate method of contracting. However, unlike the New York City experience, the UCF experiment has been running for more than twenty-five years. A prior study of New York (described above), using the same agencies over an earlier time period and limited to larger projects (more than \$5 million), found that separate prime contracting was slightly cheaper than single prime contracting per dollar of estimated cost. The difference was about 2.8 percent.

In this current study, using the same agencies, the sample has been broad-

ened to include projects costing more than \$1 million. The projects also included a more recent time period.

The result of this analysis was that separate prime projects were again found to be less expensive per dollar of estimated cost, but the difference was substantially larger than in the earlier study. Table 6 shows that New York state construction projects with separate primes were nearly 8 percent cheaper. Moreover, the source of the difference is similar to the pattern in the national sample; that is, the largest share of the cost differential in favor of separate prime jobs is their lower bid cost. In the New York state sample, this difference accounts for nearly two-thirds of the overall difference in the final/estimated cost ratio.

New York state is well known for the Wicks Law and the state is often held up as the archetypical manifestation of separate prime mandates. The results in this analysis and prior analyses of state agency experience in New York state are at odds with the claims by opponents of separate prime contracting, as well as the earlier analysis of the Wicks and non-Wicks experience in New York city. The difference in results in large part reflects the difference between separate prime contracting in general and the way it is applied under Wicks and subsequent court decisions. Typically, those most concerned about what they see as the burden of Wicks are local agencies, school boards, and fire districts which point to the coordination problems of separate contracts.

However, the coordination problems of separate contracting under the Wicks law are not representative of the national experience. Nationally, when state and local authorities face mandated separate prime contracting they are able to contract with general contractors, construction managers, or even the dominant trade on the job to provide coordination. In New York, however, the Wicks Law has been interpreted by the courts as mandating that the govern-

mental entity assume complete coordinative responsibility for all construction work. Specifically, in *General Building Contractors of New York State, Inc. v. County of Oneida* (282 NYS 2d 385, 1967) and other cases, State courts have held that a public entity could not assign the coordination responsibilities as a public works project to a general contractor without specific legislative authorization. The courts held that this delegation is not expressly authorized and therefore would be inconsistent with the intent of the Wicks statute. Accordingly, full responsibility for on-site construction coordination and supervision falls upon the governmental entity which has full liability for timely, coordinated completion of each project.¹⁵

For this reason, taking the Wicks Law experience as a representation of the general experience with separate prime contracting would be misleading. The comparisons between the two state agencies on which this current study is based, however, avoid the New York brand of self-imposed hardship. Both agencies have long experience with their own approach (single or separate); and in the case of the Office of General Services, the agency using separate prime contracts is not faced with an occasional construction project for which they lack professional management capability. This comparison therefore is the more accurate evaluation of separate vs. single prime contracting in New York state, because it does not confuse this issue with an unusual legal hardship that is not a necessary condition of separate prime contracting.

CALIFORNIA

The second state for which a limited comparison is possible is California. Table 6 reports the regression results

for 29 projects, 23 of which are single prime. These results are generally consistent with those reported in both the national sample and New York, but the differences in favor of separate prime contracting are quite small (about 3 percent) and do not approach conventional levels of statistical significance. Once again, however, there is no evidence consistent with the hypothesis that single prime contracting provides dramatically lower construction costs for equivalent projects.

MINNESOTA

Minnesota was analyzed separately because in the last few years the state has developed a "hybrid" approach that in some respects incorporates the best of both single and separate prime contracting. While Minnesota never had a legally mandated bidding method, until the late 1980s the administrative policy was to incorporate a significant proportion of multiple prime contracts into state construction. Given a mix of both single and separate prime contracting, there were problems of bid shopping and bid-peddling on the single prime jobs and lack of coordination and litigation on the separate prime jobs.

In an effort to improve this environment and forestall possible legislative battles, the key parties in state construction spent nearly a year developing a negotiated solution to these problems. The negotiations included the state Building Construction Division (BCD) and Materials Management Division (MMD), the Minnesota Associated General Contractors, and organizations representing specialty contractors including the Minnesota Electrical Association and the Minnesota Mechanical Contractors Association. The resulting agreement includes the

¹⁵ *Fiscal Implications of the Wicks Law Mandate*, New York State Division of the Budget, May 1987, pg. 4.

Table 6

**Multiple Regression Analysis of Cost Ratios
New York and California Sample
(standard errors in parentheses)**

Independent Variables	Dependent Variables (cost ratios)		
	Bid Cost/ Es. Cost	Final Cost/ Bid Cost	Final Cost/ Est. Cost
New York			
constant	1.13 57 (.19)	.83 48 (.21)	.99 74 (.28)
Single Prime Jobs (1 if Yes, 0 if No)	.05 29 (.02)	.02 39 (.03)	.07 95 (.04)
Trend	- .02 30 (.02)	.05 34 (.03)	.02 03 (.04)
Sample Size	87)	10)	18)
Adjusted R ²		.01 43 (.01)	- 45 (.02)
	.01 66 (.01)	72	21)
	72	.02 91	72
	.01 67		.01 53
California			
constant	1.00 99 (.24)	.80 14 (.18)	.94 14 (.26)
Single Prime Jobs (1 if Yes, 0 if No)	.02 82 (.07)	.03 42 (.06)	.03 06 (.08)
Rehab (1 if Yes, 0 if No)	.07 98)	.19)	.85)
Trend	- .01 22 (.05)	.06 62 (.04)	.06 30 (.06)
Sample Size	98)	63)	62)
Adjusted R ²		.02 55 (.01)	.00 75 (.02)
	.00 69 (.01)	44)	07)
	86)	29	29
	29	.05 76	- .06
	- .09 92		03

following elements:

- The BCD will use only single-prime contracts on state projects under its jurisdiction.
- The two AIA sections for mechanical and electrical contracts are bid two *days prior* to the single prime due date and submitted directly to the MMD.
- General contractors have two days to review the scope of work with participating subcontractors, and are free to choose among any of the subcontractors which have submitted a bid proposal to MMD.
- The posted price of the selected subcontractor cannot be changed by either the prime contractor or the subcontractor.
- Subcontractors must submit a joint bid bond payment to the state and the award prime contractor, but subcontractors can identify in writing individual general contractors with whom they will not work.
- The state will select the lowest responsible bidder among the prime contractors.
- The bid-posting policy applies to all projects valued in excess of \$100,000.

In theory, the Minnesota policies provide something for everybody. State authorities get the coordination and management of a single prime contract, yet retain the greater bid competition of a separate prime method. General and subcontractors avoid the practice of bid-shopping and bid-peddling, yet both have the right to refuse work with particular contractors.

Beyond resolving bidding problems, Minnesota has also adopted a policy intended to resolve the second major problem between generals and subs: the problem of timely payment. The state has therefore adopted the following policy with respect to payments to sub-contractors on state projects:

- The prime contractor is required to make payments to the subcontractor(s) in the same manner that the

State is required to make payments to the prime contractor.

Prompt Payment: The contractor shall pay all valid subcontractor invoices within 30 days from the receipt of the invoice, merchandise, or service, whichever is later. Payments not made within the limits described above shall be subject to interest at a rate of 1.5 percent per month or part thereof. Any such interest shall be paid by the prime contractor.

Retainage: The prime contractor may withhold as retainage from subcontractor(s) progress payments an amount not to exceed five percent of the payment. The prime contractor shall reduce or eliminate the retainage for a subcontractor in the same manner that the state reduces or eliminates the retainage for the prime contractor.

Enforcement: The enforcement of these conditions shall be the responsibility of the subcontractor(s) working through the prime contractor and the prime contractor's surety. To facilitate the resolution of any problems relating to these provisions, the prime contractor shall furnish the subcontractor(s) with the name, address, and telephone number of the prime contractor's surety within 10 days of the date on which the prime contractor signs a contract with the state.

In addition to the apparent satisfaction with the procedure by all parties, this experience raises the question of whether the "Minnesota plan" results in lower construction costs. That hypothesis was tested by collecting data on projects constructed both before and after the new approach was implemented. The before sample included projects constructed under both single and separate prime contracting methods. The

data are included in Table 5 with the post-plan projects denoted separately (Minnesota Plan). Minnesota BCD provided data on 14 projects, of which 8 were constructed under the new approach.

The results reported in Table 5 suggest that compared to the original estimated costs, final costs for projects constructed during this new approach to contracting relationships were more than 14 percent lower than under the older approach. Moreover, the greatest share of this cost reduction (more than 11 percent) was attributable to lower bid costs. Once again, these estimates are not statistically significant by conventional standards; but their direction and magnitude, combined with the apparent acceptance by all parties suggests that the Minnesota approach should be considered very carefully as an alternative to the separate prime or single prime only approaches.

Evidence From The Private And Federal Sectors

PRIVATE SECTOR

A common issue in the public sector debate over separate vs. single prime contracting is the prevalence of these approaches in the private sector. Critics of mandatory separate prime bidding argue that public sector construction authorities should be given the same right to choose that private sector owners enjoy. As part of a study of the Wicks Law in New York, the Executive Director of Construction for the Business Roundtable Construction Users Council and the Executive Directors of the Users Council in the three New York regions were interviewed.¹⁶ The Users Councils represent large private sector companies involved in major building construction projects.

Not surprisingly, the general philosophy of the private sector construction users was to use the bidding method that is appropriate for both the project and their particular company. The decision to regularly use either of the two approaches is typically a function of their own corporate construction management capability which tends to coincide with other strategic policies toward investing in-house corporate staff vs. outside contractors.

For example, some companies have large corporate staffs with a wide range of expertise. These companies were likely to have staff qualified to manage company's own projects and tended to prefer separate prime bidding. Separate prime contracts provided them with

direct control over the contractor actually doing the work and eliminated an additional layer of overhead from the project. Other companies without this in-house capability in effect contract-out the management function either by awarding a single prime contract or hiring a construction manager. The bottom line is that no one approach is dominant in the private sector, though in certain companies and industries one or the other may be largely the rule.

If owner flexibility and choice are the key elements of private sector policy, is it appropriate that public sector owners have this same choice? Choice and flexibility are desirable attributes in most management decisions because the decision maker is presumably close to the problem and motivated to make the best decision possible. Private sector managers are provided with maximum flexibility because both individually and organizationally those decisions are guided by the discipline of the market. Both individually and organizationally, private sector owners have an incentive to make the right decision because they are risking their own money. This, of course, is not the case in the public sector.

This is not to deny that choice and flexibility might still be the more desirable approach in the public sector, but that policy decision is not as unambiguous as the opponents of mandated separate prime bidding suggest. Mandated separate prime bidding is not the only restriction on public construction agen-

¹⁶ *Single and Separate Bidding*, The Electrical Contracting Foundation, Bethesda, MD, 1993.

cies that recognizes an inherent difference between public and private sectors. For example, there are essentially two ways to avoid problems associated with unqualified and irresponsible contractors: prequalification and bonding. Prequalification requires the owner to pre-select a subset of responsible contractors based on their prior experience and financial position. The other method, bonding, requires contractors to post a bond as security against default. The assumption is that the unqualified contractors will be unable to qualify for such bonding, or in the case of a problem, the owner will be compensated.

In contrast to the private sector where *prequalification* is the preferred choice, public sector owners rely almost exclusively on bonding. This is apparently motivated by concerns over legal exposure if they exclude a contractor from the bidding process, as well as the desire to avoid any limits on competition that might result from initially pre-screening the bidders. Again, the question of motivation influences the differences between private and public sector contracting practices. Private sector managers have an economic motivation to select the best qualified contractors. The history of corruption in public construction understandably raises the prospect that if such private flexibility were extended to the public sector, the results might be less than merit-based. Unfortunately, public agencies' near-total reliance on bonding often leads to problems associated with the use of unqualified contractors.

Another example is the growing interest in "partnering" in the private sector where the owner and contractor (either general or specialty) agree to a longer relationship than one project.¹⁷ Contractors are brought in earlier in the design phase, there are mutual efforts at value engineering with a fair distribu-

tion of any savings, and in general an attempt is made to build a relationship based on trust rather than the adversity that characterizes the typical owner-contractor relationship.

However, such an approach means that contractors for a particular project may not be chosen through competitive bidding. On balance the gains from partnering must be considered sufficiently large since these practices are gaining wider acceptance in the private sector. It is not clear, however, that the public trust is consistent with such a policy for public construction projects. Unfortunately, while long-term relationships in the absence of competitive bidding may be considered innovation in the private sector, they represent a possible source of corruption in the public sector.

Finally, the difference in motivation between public and private sector managers also plays a role in the greater incidence of litigated disputes in the public sector. This is in part due to the fact that private sector owners take a much more hands-on approach to managing construction projects because, in the words of one of those interviewed, they "want their contractors to be successful." A qualified contractor that is treated fairly is not only more likely to give the private sector owner a better job on the current project, but will be more likely to participate in future projects. Both parties have an interest in establishing a reputation for performance and good management. By contrast, public sector owners have less at stake in such repeat business, and with the dominance of competitive bidding can do little to influence the choice of contractor(s). The limited involvement of public owners is one of the reasons the advocates of separate bidding give for many of the problems associated with public construction.

¹⁷ Partnering has a different meaning in the public sector and is discussed below.

THE FEDERAL SECTOR

As part of this study, individuals from the Army Corps of Engineers and the General Services Administration (Public Building Service) were interviewed as agencies representative of the federal construction practices. These interviews focused on these agencies' policies with respect to the issues being considered in this study, and any new approaches that they may be undertaking or have planned in the area of contractor relationships.

Both federal agencies rely primarily on single prime contracts; they do not have the necessary staff to coordinate multiple building construction contracts and do not wish to have such responsibilities. The advantages ascribed to the single prime approach were single-point accountability (in the words of one federal representative, "one contract building, one contractor"), better coordination and integration on the job, and the avoidance of disputes between the general contractor and the subcontractors.

Generally these two agencies appear satisfied with their current approach and are not looking for new contracting arrangements. They have, however, devoted considerable attention to limiting the traditional tensions in the construction process by emphasizing partnering among the major stakeholders (architects, agencies, contractors, etc.). Unlike the partnering described above in the private sector, where the focus was on building longer term relationships with contractors, here the focus is on a better contract relationship once the parties have been selected through traditional bidding procedures. A complete discussion of the approach is beyond the scope of this study, but the emphasis is to create a team approach among the stakeholders in the construction process and to limit the antagonism and distrust that can characterize a con-

struction project. While the approach seems to vary somewhat at the federal level, subcontractors are not always included in the partnering process. Other approaches, such as those developed in Arizona, recommend that subcontractors should always be included in this effort.¹⁸

¹⁸ Thomas Warne, *Partnering for Success*, American Society of Civil Engineers Press, 1994, pg. 30.

Discussions And Recommendations

The results from the national sample as well as the individual states show a consistent pattern: public construction projects organized with separate prime contracts have lower direct construction costs, *for equivalent projects*, than projects using a single prime contractor. Moreover, the overwhelming share of this saving is attributable to lower bid costs for separate prime projects. What is it about separate prime contracts that would result in relatively lower bid costs? The evidence suggests that these results are a simple illustration of the benefits of efficient risk allocation. Small firms, like many specialty contractors, with limited resources and relatively few projects can be expected to act prudently to avoid risk. An efficient contract between a risk-neutral party, such as a government agency, and a risk-averse party should allocate the risk to the risk-neutral party (the government). This contracting arrangement will tend to reduce the overall cost of the contract since the risk-averse party will not require a risk “premium” to bear unwanted risk. In other words, contractors will work for less when they bear less risk.

Construction business contracting, particularly public construction, often tends to ignore this basic economic principle. Instead, particularly in single prime contracts, the government entity attempts to shift as much risk as possible to the general contractor, who in turn attempts to shift as much as possible to the subcontractors. Two of the risks that subcontractors frequently bear under single prime contracts are risks

associated with bid-shopping and payment delays. In sum, these risks are imposed on the party to the contract least able to bear them. Not surprisingly, when a risk-averse party like a subcontractor bears this additional risk under the single prime contract method, they charge a risk premium to compensate themselves for that risk.

Alternatively, separate prime contracts minimize the risks that subcontractors must bear; accordingly they forego their risk premiums and as a result will accept a lower price (bid) for their work.

There is a rationale for shifting risk to the various members of the construction team: shared risk serves to tie their success to the success of the construction project. Presumably, this is particularly true of the more ambiguous elements of the contract relationship that require coordination and integration among contractors. In other words, a legitimate reason for public owners to shift risk to the contractors is simply to motivate them to do their job, including their role as a member of a larger construction team, as effectively as possible.

As part of the risk shifting under single prime contracting, public construction authorities also shift the power of the purse. Unfortunately, the motivational benefits of risk shifting are at least in part offset by the costs of inefficient risk allocation described above. Public construction authorities that favor traditional single prime contracting methods apparently have concluded that the benefits of risk shifting exceed the costs. The results of this research, which indicate relatively lower bid costs

among separate prime contractors, suggest that the costs associated with the inefficient allocation of risk are significant.

These two contracting approaches—single prime or separate prime—are really the two ends of a continuum. The single prime approach places all the attention on the “motivational” benefits of risk bearing in order to enhance the coordination and accountability on the job. The associated costs of inefficient risk allocation are hidden costs; with the single prime approach, the public owner does not directly observe the risk premiums charged by subcontractors because there is no record of what the subcontractors *would have charged* in the absence of that additional risk. These risk premiums only become “visible” in those few states where both single and separate prime bidding approaches are used on the same job and separate prime contracts are disproportionately the low bid. In summary, under single prime contracting the *benefits are visible* (low risk and ease of coordination for the public agency), while the *costs are hidden*.

The visibility of benefits and costs is reversed with separate prime contracts. The relative advantage of separate prime contracting is lower risk premiums from subcontractors (lower bids), but also greater risk for the public construction authority that coordination and accountability will not be as strong as in the single prime contract, or will require investments in staff and management capability on the part of the public construction authority itself. Therefore with mandated separate primes, the *costs are visible* every day in greater efforts required to coordinate the job, but the *benefits are hidden*. When separate prime contracting is mandated, the public agency never observes the higher bids that would be received under single prime contracting. Thus it is not surprising that from the point of view of public construction authorities, traditional single prime con-

tracting would seem overwhelmingly appealing. This does not imply however that such an approach is the best option available, or the best choice for the taxpayers.

One of the goals of this study was to identify any new and innovative approaches to resolving this tension in the contract relationship. Discussions with a wide range of representatives from state and federal construction authorities, and the private sector, as well as an exhaustive review of the literature on the subject, suggest that there are no innovations in this area. Ideally a better approach than either the traditional single or separate prime models would be one that provided the coordination and accountability of the traditional single prime approach while avoiding the inefficient risk shifting that occurs when subcontractors are exposed to bid-shopping and payment delays. The only model that provides a balanced effort to address these two interests simultaneously, and one that has a proven record of acceptance by all parties, is the Minnesota model.

From discussions with state and federal construction authorities one gets the impression that, if change is being contemplated, it is typically in those states with mandated separate prime policies. Given the relative visibility of the costs and benefits of the two approaches, this is not surprising. The Minnesota model with its reliance on a single prime contractor for coordination and accountability should naturally appeal to those construction authorities facing mandated separate primes. But it should also appeal to the vast majority of states who rely solely on traditional single prime contracting.

This study has suggested the possibility of significant savings when subcontractors are freed from the risk of bid-shopping and unnecessary payment delays by general contractors. Four to five percent savings in states doing \$200-\$300 million worth of construction

per year (and many states do much more) is a minimum of \$10-\$15 million savings each year. It would not require one-tenth of this savings to develop the staffing and technical infrastructure necessary to implement the Minnesota model. In sum, this is an approach that represents a better alternative whether a state is currently using mandate separate primes or a single prime policy.

Summary And Conclusion

This study was an effort to evaluate the relative merits of single prime contracts vs. separate prime contracts in public construction. The debate on this issue includes a wide range of charges and counter-charges from the proponents of each approach. Typically the debate includes such issues as coordination problems, cost differences (including bid costs, change orders, litigation, delays), and project quality, as well as disputes between general and specialty contractors over bid-shopping and payment schedules. While this entire range of issues is discussed, the major objective has been to focus on that part of the debate that should be of most concern to public policy makers — whether one approach is more or less costly than the other.

The study was conducted on three levels of analysis:

1. Review of the limited prior research
2. Statistical analysis of a multi-state sample representing the national experience on this subject
3. Within-state comparisons for three individual states.

The results from prior research are mixed. Some earlier state studies show that separate prime contracting results in lower bid costs, and as a result lower total construction costs. Other studies report evidence indicating that separate prime contracting has higher direct and indirect costs. Based on a statistical analysis of project bid and final costs from a national sample of state construction projects, this study finds *sepa-*

rate prime contracting to have lower direct project costs. Comparing final project costs to estimated costs, separate prime jobs were *more than 5 percent cheaper* than single prime jobs, and the overwhelming share of that difference (83 percent) was due to relatively lower bid costs. This same pattern of results was observed in individual state analyses in both New York and California.

This study concludes by noting that traditional single or separate prime contracting approaches are two ends of a continuum that favors one set of interests over another. From the point of view of good public policy (as opposed to the interests of public construction authorities) a better approach would be to develop alternatives that do a better job satisfying the interests of all parties, including taxpayers.

An example of such an alternative is a Minnesota state “hybrid” construction contracting policy that apparently resolves many of the general vs. specialty contractor problems in single prime contracts, yet provides public agencies and taxpayers with the competitive bidding and efficient risk allocation of a separate prime approach. Not only do the parties involved report satisfaction with this approach, but the limited statistical evidence reported in this study indicates substantial economic savings. It is a model with equal relevance to states that currently have either single prime or separate prime policies.

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