Best Value in Publicly Funded Projects:
Contractor Selection in Two County GOB Projects

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Executive Summary

Miami-Dade County will invest more than $100 million in taxpayer-supported General Obligation Bond (GOB) dollars in the renovation of the Orange Bowl and the renovation and expansion of Jackson South Community Hospital. For this large and important public investment the county should get the best value possible from both projects. The choice of contractor makes a big difference in the overall value of each project. The county should use a performance-based contractor selection process, such as Best Value Contracting, to obtain the best value possible and achieve the goals of Building Better Communities GOB program: investing in the present and future residents of this county and making it a better place to work, live and play.

Why is Procurement Reform Needed? Our construction industry is plagued with construction delays and cost overruns, shoddy workmanship, and unsafe work-sites leading to injuries and death.

1. **Construction Delays and Cost Overruns:** Several key public construction projects throughout Miami-Dade County have been delayed for years, including the North Terminal at Miami International Airport, almost $1 billion over budget, years past due, and still adding layers of management; and the Performing Arts Center, reported to be at least $102.1 million over budget, years behind schedule, and lacking adequate quality control. Construction-related change orders are the most frequent reason for construction delays, and these are typically caused by contractors.

2. **Shoddy Workmanship:** Miami-Dade's school district wasted more than $288 million on delayed and substandard construction work, paid almost $8 million fixing leaks, mold and other problems in new schools, and charged contractors $2.9 million for the problems they created. The cost growth above the original price for many of these (counting litigation and repairs) is estimated to be at least 30%. In 2003, 77 recently built schools in Miami-Dade County had water leaks, and almost 40 had mold and mildew. County engineers had determined that in at least 14 cases sloppy construction was at fault and were still trying to figure out what happened in the rest.

3. **Worker Health and Safety:** Florida's construction industry is the most dangerous in the country for workers; we lead the nation in work-related deaths in the construction industry. In Miami-Dade County there have been calls for more regulation and inspections over large construction projects, where recently several workers have been critically injured or killed.

These Problems are Largely the Result of Low-Bid Contracting. Low-bid contracting is *false economy* as the initial savings from price-based competition are erased over the long-term because of inferior performance leading to additional costs. Low-bid contracting makes flawed assumptions, encourages cost-cutting and underperformance, and does nothing to screen out unscrupulous contractors.

Low-Bid's Flawed Assumptions

1. Low-bid contracting assumes that project plans and designs are perfect and unambiguous. But design plans are often riddled with errors and omissions.
2. Low-bid assumes that given perfect plans all that remains is to find the contractor that will build the project for the least amount money; all contractors yield similar performance. But contractor performance varies widely AND given *imperfect* plans it is especially prudent to get the best contractor possible.
3. Low-bid assumes that contractor performance can be controlled by project manager management and inspection. But research shows that government management and inspection of construction is inefficient and results in poor performance.

Low-Bid Encourages Underperformance

1. Price-based competition forces down the initial agreed price of a construction project as firms underbid to win the contract award, regardless of how poorly crafted the design plans are. Because they underbid, contractors seek to recuperate losses in various ways.
2. Because of imperfect design plans, contractors must later put in for change orders which add time and costs to the project.
3. Contractors also cut corners to ensure greater profits, which means using cheaper, lower quality materials, using insufficient materials, incorrectly applying materials, and taking serious health and safety risks on the job.
4. It would be irrational for contractors to perform at high levels in a price-based competition where cutting costs is the key to survival.

Low-Bid Fails to Filter Out Underperforming and Unscrupulous Contractors

1. Public agencies are reluctant to eliminate bidders due to past underperformance because of the fear of being sued by the disqualified firm.
2. The standard of "responsibility" that firms must meet is weak and firms can usually enter the bidding pool if they are at least bonded and insured, and certified to work.
3. Important factors that affect contractor performance, such as worker training, past safety record, and past work quality and timeliness, are not considered in selection.

Best Value Contracting gives the owner what it wants: the highest quality for the lowest cost.

1. In BVC contractors are chosen on the basis of technical merit, past performance, safety practices, local experience, worker training, *and price*, among others.
2. BVC's cooperative structure forces the early development of realistic overall project costs, dramatically reducing change orders and litigation.
3. Shifting the point of competition from price to quality ensures a top quality product as builders realize underperformance hurts their chances of winning future contracts.
4. In addition, best value contributes to the county's broader goals by improving the skills of the workforce and enhancing employment opportunities for local residents and/or racial and ethnic minorities.
5. Studies that have compared low-bid to best value contracting overwhelmingly find that BVC reduces cost growth, schedule growth, and increases customer satisfaction.

Introduction

Through the passage of the Building Better Communities General Obligations Bond Program in November of 2004, Miami-Dade County voters approved the use of tax dollars to support the sale of $2.9 billion in bonds to be used for capital construction projects throughout the County. More than 300 projects are planned over the next 15 to 20 years to address the County's "critical infrastructure needs"[1] and make it a "better place to live, work and play."[2] Raising almost $3 billion for capital improvement projects is an extraordinary and important use of taxpayer dollars. Two of the largest funding allocations under the General Obligations Bond (GOB) initiative are $50 million towards a $150 million renovation of the Orange Bowl stadium and $52 million in GOB dollars for the Jackson South Community Hospital expansion that will cost a total of $100 million. Since tax dollars are funding these projects, it is critical that GOB-funded projects are cost-effective and achieve the best value possible.

The choice of construction company makes a large difference in the overall, long-term value of public works projects. Traditionally (and commonly) in Miami-Dade County, public contracts are awarded to the lowest bidder in a competitive process. Although the County saves money initially by obtaining construction services at the lowest price, this process frequently fails to select the best contractor for the job. By choosing the lowest bid the County's initial savings are soon erased by construction delays, cost overruns, and a greater need for maintenance and repairs because of shoddy workmanship. These outcomes are built into the low-bid contractor selection method itself since it encourages cost-cutting and provides minimal and ineffective incentives for achieving quality and safety standards.

By contrast, Best Value Contracting (BVC) is a contractor selection method that shifts the point of competition among bidders from price to quality standards in addition to price. Under the BVC system, bidders compete on the basis of technical merit, past performance and safety practices, local experience, worker training, *and price*, among other possible factors. BVC ensures that the construction of publicly funded projects achieves the best value for Miami-Dade County taxpayers and BVC should be the method of choice for awarding contracts on GOB-funded construction projects.

This report examines the need for a Best Value Contracting policy in Miami-Dade County and the benefits of such a process compared to traditional low-bid contracting. The first section briefly examines some of the most serious problems in South Florida's construction industry: construction delays, shoddy workmanship, and unsafe work environments. The second section compares low-bid to best value contracting, and reviews the empirical evidence on the cost outcomes of both methods. Finally, some general selection criteria are suggested for implementing BVC on the Orange Bowl renovation and the Jackson South Community Hospital renovation and expansion.

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[1] George M Burgess, *County Manager's Report: Building Better Communities General Obligation Bond Program*, 2005. Accessed June 22, 2006, www.miamidade.gov/Build/pdfs/GOB_Report_0206_updated.pdf

[2] *Commissioner Dennis C. Moss at Work for You!* Statement of County Commissioner Dennis Moss published on GOB program web site (http://www.miamidade.gov/Build/Moss_at_work_for_you.asp).

Context: Serious Problems in South Florida's Construction Industry

> The word on the street is that the quality [of construction work in South Florida] is under par… When a guy spends [a lot] of money he doesn't want to see waves in the wall.
>
> — Chris Black, President and CEO, New Beach Construction

> [My clients] see that the market is just going downhill. They've been unhappy with the level of performance they've been receiving [in the low-bid system].
>
> — Sarah Goodridge, Coordinator of the Performance Information Procurement System (PIPS) program at Florida International University, speaking about her first two clients, the City of Miami Beach and Baptist Health South Florida

> The bar is so low that anybody gets through. If you breathe you can work in the construction industry here.
>
> — Carlos Hevia, Director of Project Management for Miami-Dade Public Schools, speaking about the need for more formally trained construction workers

The timeliness and quality of construction work, and the health and safety of workers in our construction industry—factors that significantly impact the overall cost of public projects—have been very poor in South Florida.

Timeliness and Work Quality

In 2002 researchers at Florida International University surveyed 35 general contractors throughout the state to learn about the prevalence of different types of construction delays.[3] The researchers asked contractors about the likelihood of encountering different types of problems. Table 1 shows the construction-related delays identified through Amhad and his colleagues' research.[4]

Of the six construction-related delays identified as having a greater than 50% chance of occurring, only one (subsurface soil conditions) is not the sole responsibility of the contractor. The contractor is responsible for the other five, including lack of inspections, material/fabrication delays, material procurement, lack of qualified craftsmen and poor

[3] Ahmed, Syed M., Salman Azhar, Mauricio Castillo, and Pragnya Kappagantula, 2002. *Construction Delays in Florida: An Empirical Study*, State of Florida Department of Community Affairs and Florida International University. It should be noted that the response rate for the survey was only 9.2%; they obtained responses from 35 out of 300 potential respondents.

[4] According to Amhed and his colleagues at Florida International University, the majority of "inexcusable, non-compensable" delays leading to cost and time overruns on construction projects in the state of Florida were caused by contractors. While there are more design- and code-related delays than construction-related delays, many of these are considered unavoidable and therefore "compensable," while contractor-related delays are usually considered to be avoidable and therefore not compensable.

subcontractor performance. This research suggests that the greatest opportunity for preventing time and cost overruns rests with contractor performance.

Table 1
Construction Related Delays by Chance of Occurrence
According to Survey Respondents

Type of Construction-Related Delay	Likelihood of Occurrence[1]					Total[1]
	1	2	3	4	5	
Inspections	0	4	12	4	5	3.4
Subsurface Soil Conditions	1	7	14	3	2	2.93
Material/Fabrication Delays	2	9	8	5	2	2.85
Material Procurement	1	13	6	5	1	2.69
Lack of Qualified Craftsmen	4	8	9	3	2	2.65
Poor Subcontractor Performance	5	9	6	2	3	2.56
Defective Work	5	8	9	4	0	2.46
Different Site Conditions	4	10	10	3	0	2.44
Labor Injuries	5	9	8	2	1	2.4
Damage to Structure	5	11	6	3	1	2.38
Construction Mistakes	7	9	7	2	1	2.27
Poor Supervision	9	8	6	2	0	2.04
Equipment Availability	14	8	3	0	0	1.56

[1] Chance of occurring out of five opportunities, i.e., 1 = 1 in 5 chances. The numbers in columns report the number of contractors indicating a given response regarding the likelihood of an event occurring.

Source: Adopted from Syed M. Ahmed, and Salman Azhar, Mauricio Castillo, and Pragnya Kappagantula. 2002. Construction Delays in Florida: An Empirical Study, State of Florida Department of Community Affairs and the Departments of Construction Management and Civil Engineering, Florida International University.

Miami-Dade County has not fared well with regard to keeping publicly funded construction projects on budget and on schedule. A special report by researchers at the Campbell Public Affairs Institute at Syracuse University and reporters at Governing Magazine graded the performance of U.S. County governments in 2002.[5] The study focused on five areas of governance: Financial Management, Human Resource Management, Information Technology, Capital Management, and Managing for Results.[6]

Miami-Dade received an overall grade of C+, mostly due to poor performance found in the areas of information technology (D+) and capital management (C). Capital management is the area of governance that deals with spending public money on capital

[5] *Grading the Counties: Report Card, Miami-Dade County*, Governing Magazine and the Campbell Public Affairs Institute, Syracuse University, February, 2002. Accessed online July 10, 2006, at http://www.governing.com/gpp/2002/gp2miam.htm. For more on the data behind the research see the Government Performance Project at http://www.maxwell.syr.edu/gpp/grade/county_2002/index.asp?id=1.

[6] The study "triangulated" or combined various research methods to achieve reliable and consistent results across geographic areas and governance focus areas. Information was gathered from original survey research, public documents, and interviews, and both qualitative and quantitative methods were used to analyze the data.

improvement projects. Among various problems noted in this area, the study cited a **"checkered history in keeping projects on budget and on schedule" and a "slow selection and construction contracting process."**[7] Only 14 counties were graded C or worse for capital management while 26 were found to have performed better than this.

The most notorious examples of poor contractor performance in Miami-Dade County are found in the construction of new schools. According to the investigative reporting of Debbie Cenziper and Jason Grotto, the **Miami-Dade County Public School district** (MDCPS) failed to evaluate contractors before they were hired, and awarded construction projects to contractors who had botched previous jobs.[8] MDCPS **gave "more than $228 million in repeat business to at least 21 contractors who delayed jobs, turned in bad work or failed to finish projects.**"[9]

The school system then **had to pay more than $7.8 million to finish abandoned projects** where many contractors had been paid in full.[10] In addition, by 2003 MDCPS had charged contractors a total of $2.9 million for delays or incomplete work on projects completed since 1988.[11] Carlos Hevia, Director of Project Management at Miami-Dade County Public Schools since 1993, recalls that "**we would end with a claim, almost on every job… I would say [on] 90% of the jobs. Generally, the contractor is suing the school system.**"[12]

In the end, however, those who lost the most were the school personnel and students. In 2003, **seventy seven recently built schools had water leaks, and almost forty had developed mold and mildew (a serious respiratory health risk for students and school staff)**. At the time County engineers had determined that in at least 14 cases sloppy construction was at fault and were still trying to figure out what happened in the rest of the leaky or moldy schools.[13]

The school district is not the only Miami-Dade County agency that has had difficulties keeping capital construction on schedule and within budget. Other well-known examples include the North Terminal at Miami International Airport, almost $1 billion over budget, years past due, and still adding layers of management,[14] and the Performing Arts Center,

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[7] *Grading the Counties.*
[8] See Cenziper, Debbie and Jason Grotto, *Builders Of Shoddy Schools Still Ok'd For Bids*, Miami Herald, June 23, 2003; Cenziper, Debbie and Jason Grotto, *New Schools Eat Up Funds for Repairs*, Miami Herald, June 22, 2003; and William O. Monroe, CPA. 2002. *Operational Audit Of Capital Construction Activities For Miami-Dade County District School Board, July 1, 2000, Through April 30, 2002*: State of Florida, Auditor General. Accessible online at www.state.fl.us/audgen.
[9] Cenziper, Debbie, *Water Leaks Plague Schools*, The Miami Herald, April 13, 2003, p. 1B.
[10] Savage, Charles. 2002. *State Audit Shreds Dade Schools*. Miami Herald, June 29, 1a.
[11] Cenziper, Debbie, and Jason Grotto, *Crumbling Schools*, The Miami Herald, February 9, 2003, p. 1A.
[12] Interview with Carlos Hevia, Director of Project Management, Miami-Dade County Public Schools, Wednesday, July 19, 2006.
[13] Cenziper, *Water Leaks Plague Schools*, 2003, 1b.
[14] See Harrison, Steve. 2006. Mia Bids Are Budget Busters. Miami Herald, May 17, 1a; and Harrison, Steve. 2006. Second Contractor Hired To Finish Mia Job. Miami Herald, July 22.

reported to be at least $102.1 million over budget, also years behind schedule, and lacking adequate quality control.[15]

Safety

In addition to timeliness and work quality, the health and safety of construction workers has been a major problem in Miami-Dade County and the state of Florida. An unsafe workplace is ultimately an expensive and unproductive one, as work-related safety and health problems translate into higher worker turnover, higher workers' compensation costs, and construction delays. However, the problem of poor safety practices on construction sites directly threatens the lives of workers and their families as well, and therefore extends its impact beyond issues of cost and schedule which are of concern to project owners and builders.

Florida is one of the most (if not the most) dangerous areas for construction workers in the United States. In 2000 occupational fatalities in the construction industry were on the rise in Florida, and the state had the third highest rate of work-related deaths in the country (trailing Texas and California).[16] **By 2004 the State of Florida**, with 115 occupational fatalities in the construction industry, had surpassed Texas and California to **become number one in construction work related deaths**.

In 2000 the new director of the South Florida office of the Occupational Health and Safety Administration (OSHA) warned contractors to improve their safety practices[17] and in recent years the escalating number of crane accidents has prompted calls from County Commissioners to reform safety standards and enforcement.[18]

These problems—time and cost overruns, and unsafe work environments—are largely the result of a flawed contactor selection process. As Carlos Hevia explains, "it's not the school system… it's the low-bid system. Wherever you use the low-bid system you have these problems, whether it's a grocery store, a private residence… or a school."[19]

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[15] See Chang, Daniel. 2006. Performing arts center gets millions -- and a new name. Miami Herald, July 19; and Weinstein, A.C. 2006. The Performing Arts Center. Miami SunPost, July 21.
[16] U.S. Department of Labor, Bureau of Labor Statistics, *Fatal Occupational Injuries in Florida by Selected Occupations and Major Events or Exposures*. Accessed July 10, 2006 at http://stats.bls.gov/iif/oshwc/cfoi/tgs/2004/iiffi12.htm#occ
[17] De Lollis, Barbara. *New OSHA Chief Warns Contractors*. Miami Herald, September 13, 2000, p. 1C.
[18] D'Oench, Peter. Crane Accidents Prompt Call for Action: Miami-Dade Commissioner Wants Safety Policy. Local10.com News, July 7, 2006. Accessed July 13, 2006, at www.local10news.com.
[19] Interview with Carlos Hevia.

The Role of Contractor Selection: Low-Bid versus Best Value Contracting

While many factors that affect the cost and quality of construction work are outside of our control (e.g., natural disasters or other environmental conditions), the problems mentioned above—safety, timeliness, and work quality—can be significantly improved through policy interventions, particularly the methods by which construction contracts are awarded. The traditional and commonly used "low-bid" contractor selection process is not effective in addressing these problems and its limitations lie in the inherent flaws of the low-bid system itself.

Low-bid Contracting uses price as the sole consideration for choosing construction companies,[20] at the expense of measures of competency and past performance. According to Gransberg and Ellicott, **the low-bid contracting system is based on flawed assumptions.**

> Awarding contracts to the lowest responsive, responsible bidder.... assumes that by carefully crafting a complete, unambiguous set of project plans and specifications, price remains the sole competitive factor… It makes a selection based solely on price, not quality or timeliness; it assumes perfect… plans and specifications; [and] it assumes that minimum requirements meet the customer's needs and that exceeding minimum standards does not enhance the project.[21]

In other words, as long as competent architects and engineers have crafted "perfect" plans and specifications for the project, it only remains to be built by the contractor that can do it for the lowest price. However, not only are project plans usually riddled with errors and omissions, not every contractor will carry out those plans in the same way.

Another assumption that can be inferred from the low-bid system is that (given perfect plans) the quality of construction can be controlled through adequate oversight and inspections. Under the low-bid system quality control is the responsibility of the project owner who hires managers and inspectors to reduce the risk of nonperformance. However, previous research has shown that these functions are inefficient and often result in poor performance.[22] Experienced project managers like Mr. Hevia of the Miami-Dade County Public School district know that the aforementioned performance problems are frequent and widespread, and impossible to eliminate through inspections alone. "There is so much to inspect, so many things to inspect, that it is impossible to review and adequately catch all the errors."[23]

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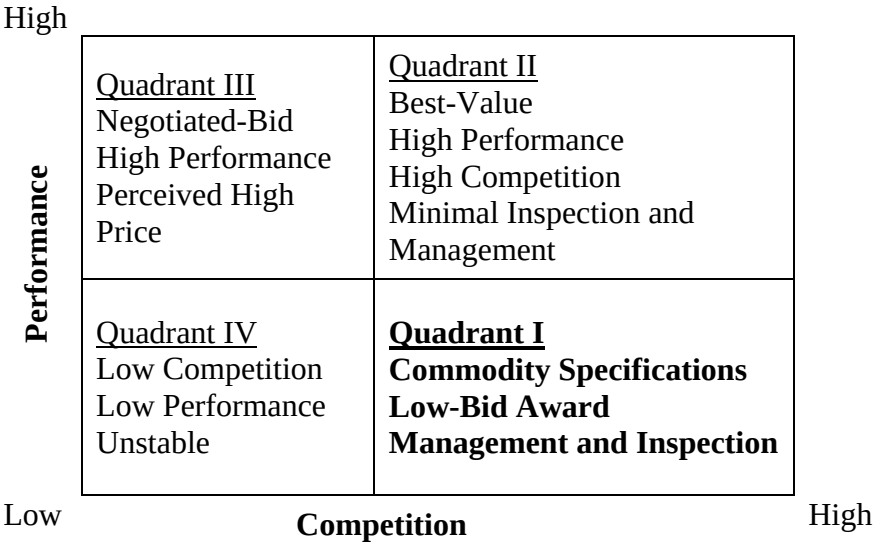
[20] Other factors are considered during the selection of architectural and engineering services.
[21] Gransberg, Douglas D, and Michael A Ellicott. 1996. Best value contracting: Breaking the low-bid paradigm. Transactions of AACE International: VEC51, p. 1.
[22] See, for example, Deming, Edwards W. 1982. *Out Of The Crisis*. Massachusetts: Massachusetts Institute of Technology; and Luffy, M. 2004. *Micromanagement: Necessary evil or just plain evil?* Business Know-How, Accessed March 8, 2006 at www.business.knowhow.com/growth/micromanage.htm.
[23] Interview with Carlos Hevia.

To better understand the differences between contractor selection methods it is useful to visualize their contrasting characteristics. Figure 1 below illustrates the characteristics of different contractor selection methods in terms of the presence of competition and the presence of performance in each system. Quadrant I depicts low-bid contracting. This scenario is much like the market of simple commodities; that is, like shopping for items where you are fairly certain that the lowest price yields the best value, such as gasoline for your car.

Figure 1
Construction Industry Stability



Source: Kashiwagi, Dean., John Savicky, Kenneth Sullivan, Jacob Kovel, David Greenwood, and Charles Egbu. (2005). Is Performance-Based Procurement A Solution to Construction Performance? 11th Joint Symposium: Combining Forces -Advancing Facilities Management and Construction through Innovation (pp. 172-182). Helsinki, Finland.

However, building a complicated structure suitable for people to live and work in is not the same as fueling your car. Competition for such services should not be reduced to the initial price paid if obtaining the overall best value is the aim of the purchaser. As the diagram shows, low-bid contracting is highly competitive but yields low performance levels despite requiring considerable management and inspection. Beyond the flawed assumptions mentioned above, **there are specific ways in which the low-bid system encourages cost-cutting and underperformance.**

When contractors prepare competitive bids they factor in only the bare minimum of necessary expenses. There is no incentive to work beyond the minimum level of quality. In fact, exceeding this would be irrational. Any work done beyond the bare minimum standards represents losses for the contractor or subcontractor and must be recuperated through legal disputes. Although owners and clients perceive the project plans as a bare minimum "floor" of quality standards, contractors see project plans as a maximum "ceiling" of quality.[24] It would be irrational for contractors to perform beyond the minimum required level which forms the basis for their budget.

[24] Kashiwagi, 2005, p. 4.

However, because project plans are imperfect, contractors are forced to perform beyond the minimum required level to accommodate for design flaws and omissions, and other unforeseen obstacles (or abandon the project). In fact, as Carlos Hevia explains, contractors recognize that designs and specifications are imperfect or incomplete but in order to win the project contractors routinely underbid projects or prepare their bid according to what the project plans specify. They hope or expect to be compensated later through change orders and legal disputes.

> These competitive contractors look at [the project plans] and they say, 'oh man, they made some mistakes in this thing. [But] I'm going to bid exactly what's there,' knowing full well that it can't be built that way.[25]

In the case of public school construction in Miami-Dade County, the adversarial nature of the low-bid system was so extreme that "contractors began to go to schools [to learn] how to milk this process, how to do better change orders. I had to go myself. We had all sorts of seminars—the opposite, how to prevent change orders."[26] Project managers like Mr. Hevia may in some cases skillfully and successfully defeat change orders but such victories are a double-edged sword for project owners. Blocking change orders means temporarily avoiding more costs, but those costs are passed on in the form of lower quality.

> So suppose they bid the project low and put all their eggs in a change order which we defeat… they're left with a problem that ultimately becomes ours because now they're going to be looking to cheat as much as they can to survive. They'll cut corners… Now the problem is we have to become even more vigilant.[27]

Mr. Hevia's statements clearly illustrate the adversarial nature of the low-bid contracting environment as well as the pressure on contractors and owners to keep costs low. Cutting corners ranges from using cheaper and lower quality materials than required to failing to apply materials properly to the practice of unsafe work habits in order to work faster.[28]

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[25] Interview with Carlos Hevia.
[26] Ibid.
[27] Ibid.
[28] Some anecdotal examples of cost-cutting provided by Mr. Hevia: "I had a project where we specified solid stainless steel drinking fountain heads. Instead of solid stainless steel like our specifications [we got] plastic painted with aluminum and it looked just like it. So how many of that was there?" "We say you have to have American steel made in the United States, they'll get Venezuelan steel or Japanese steel. We say you have to have a certain thickness of sheet rock, 5'8, two layers, for an egress corridor. They might put [in] instead a half inch, hoping nobody catches it." "You're [roof] fasteners are supposed to be in a certain pattern. Well they'll give you half as many." "The contractor puts certain demands on the schedule and budget of his own personnel, all the time talking quality, all the time talking first class. But the reality is that the business side of his operation is forcing the lowest guy who's keeping track of the time, say your job supervisor, superintendent, foreman, he's got pressure… that guy tells his worker, 'that's enough let's go to the next one.'" "The individuals performing the work take unnecessary risks and expose themselves to great risk… their appreciation of the risk is diminished [because they are not properly trained]." "We require a certificate… saying you'll do what you have to [do] to prevent suffocation and collapse-related

In addition to the pressure to cut costs that is imposed by price-based competition, the low-bid system enhances the likelihood of these behaviors by failing to select a project workforce that is highly trained and therefore less likely to engage in cutting corners.[29]

The low-bid system has no effective way of selecting higher quality contractors or screening out unscrupulous and incompetent contractors. The only built-in safeguard against awarding contracts to underperforming and/or unscrupulous contractors is the standard of "responsibility" used to pre-qualify prospective bidders. Contracts are awarded to the lowest responsive and responsible bidder. Responsiveness entails fully complying with the specifications and documentation requirements in the request for proposals. A responsible firm theoretically possesses "the business judgment, experience, facilities and capability in all respects to perform fully the contract requirements, and the integrity and reliability that will assure good faith performance."[30]

However, the typical interpretation of responsibility results in standards being set relatively low.[31] Standards of responsibility are set low and the enforcement of such standards (e.g., through prequalification) is weak in public sector contracting because public agencies are often reluctant to deny pre-qualification or issue findings of "non-responsibility" out of fear of being sued by the contractor.[32] It appears that this is also the case in Miami-Dade County. When asked about this, the Chief of Project Scheduling and Compliance for General Obligation Bonds projects admitted that denying certain firms the right to bid because of past performance is "difficult to do" because of the risk of being sued by a disqualified firm.[33]

Even where pre-qualification processes are most effective, they only succeed in filtering out the worst contractors. Marginally performing firms will "get in the door" if they are bonded, insured and at least have some experience.[34] Once a firm is approved to bid it must be awarded the contract *as a matter of law* if its bid is the lowest. As one legal analyst laments, "hiring low-grade or marginal contractors under the low-bid approach is unavoidable."[35]

These flawed assumptions and problems with the low-bid system have disastrous results for owners and end users. Low-bid contracting often yields "sub-standard or non-

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deaths in the trenches. But what happens is they lose in their bid for a change order later on… and then they're looking where they can cut corners. Dig the trench and don't put the sheet piling [in] and you just hope the dirt stays up and you put your guys in there and luckily nobody gets crushed."

[29] For research on the relationship between worker training and safety practices see the report by Bruce Nissen, *Training for the Workforce of the Future*, available at www.risep-fiu.org.

[30] City of Miami Procurement Ordinance, Ord. No. 12271, adopted August 22, 2002.

[31] Waites, Gerard M. 2004. *White Paper on Best Value Contracting: Contracting & Procurement Reforms To Improve Cost-Efficiency*. Washington, DC: O'Donoghue & O'Donoghue, LLP, p. 7.

[32] Ibid, p. 7.

[33] Interview with George Navarette, Chief of Project Scheduling and Compliance, General Obligations Bonds Program, Miami-Dade County Office of Capital Improvements.

[34] Mr. Navarette and Mr. Hevia confirmed that these basic requirements allow firms to bid in the low-bid contracting system. Factors such as worker training and safety record are typically not considered.

[35] Waites 2004, p. 6.

performing facilit[ies]" and "higher life-cycle cost and risk."[36] Awarding contracts to the lowest bidder is *false economy* since those initial savings result in more money being wasted than saved over a longer period of time.

Best Value Contracting (BVC) is a method of awarding construction contracts in which bidders compete on the basis of technical and managerial merit, past safety and performance records, qualification of craftsmen, technical innovation, financial health, or other factors, in addition to price. To understand the benefits of BVC compared to the low-bid system it is useful to consider again the four quadrants drawn by Dean Kashiwagi (see Figure 1 above). Quadrant II shows that BVC maximizes competition and performance, and reduces the administrative burden on the public sector of quality control and management by delegating such tasks to the appropriate authority—the builder.

BVC acknowledges that price is not the same as value. Price only accounts for the initial cost of construction services. Best value is based on an evaluation of the long-term or life-cycle costs of a project. As Doug Gransberg and Michael Ellicott point out, "best value procurements force the early development of detailed project and procurement plans and create solicitations containing *accurate* source selection criteria."[37] A substantial investment of time and resources is made at the beginning to evaluate all of the potential problems and the long-term costs, and come up with a *realistic* estimate of a project's cost. With a realistic cost estimate in hand, contractors can focus on quality and timeliness (i.e., getting the job done right) and not worry about fighting for every penny through change orders and cutting corners in order to make a profit.

According to Dean Kashiwagi, Director of the Performance Based Research Group at Arizona State University, the use of a performance-based contractor selection process—such as BVC—for awarding construction contracts is more efficient and yields higher quality work.[38] But despite the overwhelming evidence in favor of BVC, there are many who argue against it.

A common argument made against BVC is that it is too subjective and can be biased in favor of certain bidders. Unfortunately, bias may be involved in any selection process. One would expect that under the low-bid system, which focuses narrowly on price, favoritism and bias would be absent since the choice of contractor is straight-forward. But history shows that this is not the case. Miami-Dade County is a good example of the existence of favoritism and outright corruption in the contractor selection process despite operating within the low-bid framework. Public officials often use their discretion to choose someone other than the lowest bidder, sometimes recognizing the

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[36] Kashiwagi, D. and Al-Sharnnani, A., *Performance-Based Procurement System Used by the State of Wyoming*, Cost Engineering, Vol. 39, No. 12, Dec. 1997, p. 37.
[37] Gransberg and Ellicott, p. 12. Emphasis added.
[38] Kashiwagi, Dean., John Savicky, Kenneth Sullivan, Jacob Kovel, David Greenwood, and Charles Egbu. 2005. *Is Performance-Based Procurement A Solution to Construction Performance?* Paper in 11th Joint Symposium: Combining Forces -Advancing Facilities Management and Construction through Innovation (pp. 172-182), Helsinki, Finland.

inherent fallacy of the low-bid system and trying to choose the higher performing contractor, but other times it is nepotism pure and simple. As a result of the preferential treatment shown to politically well-connected contractors in the past, there have been several recent calls for reform of the county's procurement policies.[39]

The contractor selection method itself will not eliminate bias and favoritism since these problems are the result of poor choices made by people. However, the BVC structure goes farther in combating this problem than the low-bid framework.

First, since BVC selects for quality and performance, it is likely to screen out unscrupulous companies that were previously involved in unethical business practices. As explained by Gerard Waites, "since past performance plays a central role [in winning contract awards], the level of quality and customer satisfaction on one job impacts a contractor's ability to win the next job, thereby strongly promoting accountability and overcoming one of the critical shortcomings of the low-bid method."[40]

Second, contractor selection is made using a carefully designed point/scoring system where performance and price factors are weighted according to their importance for the project. The point system turns qualitative performance characteristics (past experience, worker training, strength of management system, etc.) into quantifiable measures and scores them, thus reducing the role of discretion in the selection process. None of this is possible without carefully designed selection criteria and selection process.[41]

The most popular argument made against BVC is that it stifles competition and drives up the price of construction services. This is simply not true; not in theory and not in practice. Theoretically, BVC shifts the basis of competition from price to measures of performance in addition to price. With properly developed selection criteria—of which there are many examples—the BVC process is highly competitive. Moreover, competition on the basis of quality and performance encourages innovations leading to higher quality rather than innovation for the purpose of cutting costs. As explained by the Office of Federal Procurement Policy (OFPP), "[w]hen the government demands high quality service as a requirement for future business opportunities as does the private sector, competition will intensify and result in higher quality service."[42]

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[39] See Herald Staff. 1998. *Take Manager's Advice*. Miami Herald, Editorial, May 19, 6A; Herald Staff. 1998. *Where Was Public's Interest*? Miami Herald, Editorial, September 18, 24A; and Herald Staff. 2005. *Reform Slips Away*. Miami Herald, Editorial, June 8, 20A.

[40] Waites 2004, p. 11.

[41] For examples of BVC methods and practices see Gransberg, Douglas D. 1997. *Evaluating Best Value Contract Proposals*. AACE International Transactions: p. 60.; Palaneeswaran, Ekambaram, and Mohan Kumaraswamy. 2001. *Recent advances and proposed improvements in contractor prequalification methodologies*. Building and Environment, Vol. 36, p. 73-87; Request for Proposals: Joint Development of Railroad Square Property. 2006. Sonoma-Marin Area Rail Transit District. Retrieved June 2006 at http://www.sonomamarintrain.org/documents/SMART-Railroad-Square-RFP-1-24-06.pdf.

[42] OFPP Guide to Best Practices for Past Performance, May 1995, p. 7. Retrieved June, 2006, from http://www.whitehouse.gov/omb/procurement/pbsa/guide_pbsc.html.

In practice, the evidence from case histories of BVC projects speaks for itself. According to a 1997 study by the National Association of State Purchasing Officials (NASPO) that compared state practices between 1996 and 1991, "lifecycle costing" (a critical component of BVC) was used more frequently by 19 states and less frequently by only two.[43] The NASPO survey also found that 28 states reported giving more consideration to criteria other than initial price.[44] By 2001 Best Value Contracting was being applied to 70% of U.S. federal construction dollars[45] and as of 2004 nine states in the union had adopted legislation to authorize this contractor selection method for various types of public works.[46] Thus it appears that some degree of best-value contracting is present in almost all states, and its use is increasing.

The U.S. Military[47]

In 1992 the U.S. Army Corps of Engineers Europe District (EUD) were struggling with cost growth ranging from 10 to 30 percent in several different projects. The EUD took the opportunity of these setbacks to solicit bids to address remaining construction work using a best value contracting process. In 1992 EUD issued an RFP containing best value criteria for a $3.5 million military grocery store in Belgium and received 5 proposals in less than a month. The project was completed on schedule, and experienced negligible overall cost growth.

In Turkey the U.S. Air Force authorized the construction of a dormitory in a location experiencing civil unrest and severe weather. Although the maximum construction time allotted in the design specifications was 18 months, the successful bidder gained an edge by proposing to complete the work in 9 months, while also meeting other performance and capacity standards. The project was completed in 9 months as promised with less than a one percent cost growth. A second U.S. Air Force project in Turkey—the construction of a water treatment plan—had to be completed very rapidly to restore potable water to the surrounding population. The request for proposals emphasized project schedule and construction quality and did not consider price. The Air Force selected one of fourteen initial bidders and the project was completed on schedule at 60% of the originally estimated budget.

A 2003 report by the U.S. Navy compared low-bid and BVC project outcomes. BVC was found to have delivered quality facilities faster and reduced cost growth from 5.7% to 2.5%, and produced $81 million in project savings over a five-year period. Construction claims were also reduced by 86%, further reducing costs and the administrative burden

[43] National Association of State Purchasing Officials (NASPO). 1997. *Survey of State & Local Government Principles & Practices* (5th edition), Lexington KY: NASPO, vol. 1, p. 51.
[44] Ibid, p. 53.
[45] See Mechanical Contractors Association of America Reporter. *Best Value Contracting: A Growing Federal Trend*, July/August 2001.
[46] Waites 2004, p. 2.
[47] U.S. Army Corps of Engineers cases studies from Gransberg & Ellicott, 1996.

on agencies. [48] The data in the Navy's report considered projects built before and after it switched almost all of its facilities construction to BVC in the late 1990's.

Waites analyzed data from the U.S. General Accounting Office (GAO) and found that bid protests decreased in the federal sector by over 60% in the 1990's, which is consistent with the Navy's 2003 report. The 1990's was also when BVC became predominant in federal construction.[49] The GAO data reported by Waites also infers that "the federal contracting community has easily adapted to BVC procurement since bid protests, which are the primary legal vehicle for challenging unfair contract awards, have fallen dramatically."[50]

State of Texas

A 1995 court decision allowed school construction in Texas to be procured using BVC and this led to the rapid expansion of the method after school boards were able to cut a year or more off project schedules.[51] By 1997 Texas authorized BVC for education, cities, counties, and the Texas Legislature, among others. Steve Nelson, author of a law journal report on BVC, concluded that:

> Public procurement in Texas is likely never to be the same again . . . . Never before have safety, quality and minority outreach experience been given the weight they are given now. Never before have government agencies had not only the choice, but also the responsibility, to make informed and intelligent choices about how their construction projects will be procured.[52]

Performance Information Procurement System (PIPS)

A form of BVC that was developed by the Performance Based Studies Research Group (PBSRG) at Arizona State University, known as the Performance Information Procurement System or PIPS, has proven superior to low-bid contracting. PIPS awards projects based on merit, emphasizing past performance, risk management and pre-planning in the contractor selection process, in addition to price. Dean Kashiwagi, Director of the PBRG, has analyzed the results of PIPS in different states and the case by case results for four owners are provided in the appendix in tables 1 through 5.

The overall outcome of PIPS thus far has been outstanding. In over 380 tests and $230 million worth of construction projects developed through the PIPS system there is no

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[48] See Naval Facilities Engineering Command, *NAVFAC Capital Improvements Program, Acquisition Strategy Overview*, July 17 2003, pp. 6, 9-10, cited in Waites, 2004, p. 15.
[49] See Waites, 2004, p. 15, and footnote 33, where he writes: This data is reflected in correspondence from GAO to Congressional Representatives dated January 31, 1994 (Doc. No. 158766) and December 21, 2000 (Doc. No. 158766), which shows that bid protests dropped from 3,109 in 1994 to 1,152 in 2000, amounting to a reduction of approximately 63%. Additional information available upon request.
[50] Waites 2004, p. 15.
[51] Nelson, Steve. 2002. *A Legal Perspective: "Best Value" Procurement For Cities And Counties*. Texas State Bar Journal, January. Available at http://www.texasbar.com/globals/tbj/jan02/construction.asp.
[52] Ibid.

evidence that the initial cost (accepted bid price) of the performance-based awards were more than that of low-bid awards.[53] Moreover, PBSRG researchers found that PIPS projects showed a 98% rate of performance (meaning that projects were delivered on time, with no contractor generated change orders after the pre-award phase, and high customer satisfaction), and that the performance of contractors under the PIPS system increased over time compared to the low-bid system.[54] Dr. Kashiwagi concludes that "the process-based approach of PIPS… seems to be far more effective in minimizing construction performance issues than the project specific, low-bid approach."[55]

PIPS is now beginning to be implemented in Miami-Dade County through Sarah Goodridge, Coordinator of the PIPS program based at Florida International University's Department of Construction Management, and the clients she assists, Baptist Health of South Florida and the City of Miami Beach. Although still only in the preliminary stages, Goodridge has begun analyzing the outcomes of Miami's first PIPS projects. She found that one project that is scheduled to be completed in 113 days would have taken at least 196 days to complete under the low-bid system. The difference is mainly accounted for by the extra time consumed in filing and contesting change orders. The extent of the delays under the low-bid system would have been 73% more than under the PIPS program. These results are for a very small project but nevertheless are indicative of the time and cost savings achieved through PIPS.[56]

Miami-Dade County Public Schools

As a result of the failure of low-bid contracting for the Miami-Dade County Public School (MDCPS) construction program, the school system eventually reformed their procurement policies and adopted Construction Manager At-Risk (CM at-risk), an alternative project delivery method. CM at-risk selects contractors according to an examination of past performance by obtaining references from previous projects, and changes the bid preparation process by allowing the construction manager to work closely with architects to ensure that accurate cost estimates are developed before construction starts. The accepted bid is then considered a "guaranteed maximum price" to which the construction manager must adhere. CM at-risk is like BVC in that it is cooperative instead of adversarial, forces the early development of long-term project costs, and measures the competency and integrity of bidders in addition to price considerations. In addition, under CM at-risk the school district examines the methods

[53] Kashiwagi, Dean., John Savicky, Kenneth Sullivan, Jacob Kovel, David Greenwood, and Charles Egbu. 2005. *Is Performance-Based Procurement A Solution to Construction Performance?* Paper in 11th Joint Symposium: Combining Forces -Advancing Facilities Management and Construction through Innovation (pp. 172-182), Helsinki, Finland, p. 6.
[54] Ibid, p. 6.
[55] Ibid, p. 9.
[56] Interview with Sarah Goodridge, PhD candidate in construction management and coordinator of the PIPS program at Florida International University, Department of Construction Management, July 18, 2006.

that will be used to select subcontractors and a list of prospective contractors, thus allowing them to eliminate those with poor performance records or other problems.[57]

A MDCPS cost analysis prepared in 2001 found that CM at-risk significantly reduced the average cost and schedule growth of school construction projects compared to conventionally low-bid projects.[58] The average cost growth from 13 low-bid projects was 6.5% over the initial contract price while **the average ultimate cost of 7 CM at-risk projects decreased by 1.71%.** In addition, the average construction delay on low-bid projects was about 373 days while that of CM at-risk projects was only about 274 days. A greater number of change orders per project apparently accounts for the difference in costs and schedule, as low-bid projects average nearly $100,000 more per project worth of change orders ($126,112 versus $27,887).

These figures do not include the **costs of any litigation or maintenance and repairs** that may have occurred during or after a project's construction. Carlos Hevia estimates that factoring in these extras **could "easily" add 30% to the cost growth of low-bid projects, while CM at-risk projects have had no claims thus far**. Since under the CM at-risk system past performance weighs heavily on present and future success, contractors are unlikely to cut corners and produce low quality work. If they do it will be reflected in performance records and they will be eliminated from future bidding pools.

The evidence from the above examples shows that BVC is superior to low-bid contracting in cost and schedule growth, and the quality of workmanship. Future research should examine the differences in worker health and safety outcomes, as BVC is likely to be superior in this area as well.

Given the different strategies used in the above examples:

What selection criteria should Miami-Dade County agencies use to acquire construction services for the Orange Bowl renovation and the Jackson South Community Hospital expansion?

Although exact criteria used in selection and the relative weight given to each factor may vary among different projects, owners or agencies, there are some key factors that should always be considered to truly obtain a best value purchase. The following gives an example of key criteria that should be used for evaluating competitors.[59] The factors listed here should be considered in addition to price, and the relative weight each carries must be developed through a careful examination of the priority goals and needs in a given project.

[57] In 1999 the State of Florida required school districts to pre-qualify contractors, thereby also giving them the statutory authority to eliminate non-responsible bidders and reducing the chances of subsequent litigation.
[58] Contract analysis data, dated 8/22/01, provided by Carlos Hevia on July 26, 2006.
[59] Adopted from Waites, 2004, p. 9, and Table 3 in Palaneeswaran, 2001 (reproduced in appendix).

1. **Past Performance**
   This may be evaluated through consultation with past project owners or project managers, like professional references. Past performance is a good indicator of future performance and including this in selection encourages contractors to produce high quality work in order to win future projects.
2. **Human Resources/Training**
   Points may be given to reward companies with a more highly educated workforce, and who will also select subcontractors according to the skills and training of their workers. The only way to be sure a firms' workforce is highly skilled is if they were trained through a registered apprenticeship program. Rewarding firms that have a registered apprenticeship training program helps to increase worker skill levels and ensure top quality workmanship.[60]
3. **Local Hiring**
   Rewarding local hiring efforts helps to develop and sustain a future workforce with superior skills and training, it supports the broader community development goals of local government, and provides an economic boost as money from workers wages circulates through the local economy, boosting local business and generating sales tax revenue.[61]
4. **Safety Plan and History**
   The state of Florida has more work-related deaths in the construction industry than any other state in the union. Rewarding those contractors that have practiced good safety habits is sorely needed to improve health and safety outcomes in the industry, which also reduces construction costs and delays.
5. **Schedule**
   Points may be given to bidders who demonstrate an ability to complete work faster, if schedule is an important outcome for the particular project.
6. **Management Plan and Organization**
   Evaluation of the overall management plan and the organizational structure and style will shed light on the company's ability to deliver on their promises, such as schedule, maximum price, local hiring, etc.
7. **Additional Criteria May Be Added** if they enhance the overall value of public projects for Miami-Dade County. Examples of other criteria that may help meet the county's goals and priorities include rewarding the hiring of racial and ethnic minorities,[62] rewarding firms that provide healthcare,[63] or other practices and policies that benefit the county. These additional criteria are not directly related to the county's interest in obtaining the best value from public investments. However, if used wisely, these additional criteria can lead to "best value" outcomes for Miami-

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[60] Fore more on the importance of training for work in the construction industry see the report by Bruce Nissen, *Training for the Workforce of The Future*, at www.risep-fiu.org.
[61] For more on the impacts of local hiring see Bruce Nissen and Yue Zhang, *Hiring Our Own*, at www.risep-fiu.org.
[62] For an analysis of the importance of minority contracting for Miami-Dade County see the report by Emily Eisenhauer, *Promoting Diverse Work: The Benefits of Using Minority Contractors on Two County GOB Projects*, at www.risep-fiu.org.
[63] For an analysis of the importance of providing insurance for construction workers on public projects see the report by Emily Eisenhauer, *Uninsured Workers on Two Miami-Dade GOB Projects: Cost and Consequences*, at www.risep-fiu.org.

Dade County Building Better Communities program given its stated goals of investing in the quality of life of present and future residents and making the county "a better place to live, work and play."[64]

Conclusion

Miami-Dade County is investing more than $100 million in General Obligations Bond dollars in two large capital construction projects: the Orange Bowl Renovation and the expansion of Jackson South Community Hospital. Given this substantial investment it is important that taxpayers get the best value possible. More important than the initial price of these projects is their overall value or long-term cost. The best overall value is achieved by minimizing the presence of several serious problems that have plagued South Florida's construction industry.

Problems with timeliness and performance, and worker health and safety in our construction industry are largely the result of a flawed contractor selection process. Low-bid projects acquire construction services on the basis of price at the expense of schedule, workmanship, and worker safety. By contrast, in Best Value Contracting bidders compete on the basis of technical merit, past performance and safety practices, local experience, worker training, *and price*, among other possible factors. This results in not only a better overall value for taxpayers but other positive outcomes for the community, such as training residents for careers in construction and good paying jobs with benefits. BVC is a "win" for all parties involved and should be the contractor selection method of choice for the Orange Bowl renovation and the Jackson South Community Hospital renovation and expansion projects.

[64] See Miami-Dade County Building Better Communities home page www.miamidade.gov/build/

APPENDIX

Table 1
United Airlines Performance Based (PIPS) Results

Total number of projects	32
Total award cost	$12,750,000
Total budget cost	N/A
Percent +/- budget	N/A
Percent of projects that finished on time	**100%**
Percent of projects that finished within budget	**100%**
Number of contractor-caused change orders	**0**
Percent satisfied with PIPS /PBPS	98%
Percent that would hire the contractor again	98%
Number of companies that were surveyed on Past Performance	70
Low-bid system of contracting (1-10)	3
Performance Based system of contracting (1-10)	9
Performance Based system of contracting (1-10)	9

Source: Reproduced from *Past Users: Performance Information Procurement System (PIPS)*, Performance Based Studies Research Group, Arizona State University. Accessed online at www.eas.asu.edu/pbsrg/pips, July 20, 2006.

Table 2
State of Utah (PIPS) Project Results

Total number of projects	5
Total award cost	$80,506,376
Total budget cost	$85,770,000
Percent +/- budget	**-7%**
Percent of projects that finished on time	**80%**
Percent of projects that finished within budget	**80%**
Number of contractor-caused change orders	**0**
Percent satisfied with PIPS /PBPS	90%
Percent that would hire the contractor again	100%
Average post project evaluation (1-10)	N/A
Number of companies that were surveyed on Past Performance	357
Low-bid system of contracting (1-10)	4
Performance Based system of contracting (1-10)	9

Source: Reproduced from *Past Users: Performance Information Procurement System (PIPS)*, Performance Based Studies Research Group, Arizona State University. Accessed online at www.eas.asu.edu/pbsrg/pips, July 20, 2006.

Table 3
Dallas Independent School District (PIPS) Project Results

Total number of projects	9
Total award cost	$4,205,208
Total budget cost	$4,824,357
Percent +/- budget	**-13%**
Percent of projects that finished on time	**100%**
Percent of projects that finished within budget	**100%**
Number of contractor-caused change orders	**0**
Percent satisfied with PIPS /PBPS	100%
Percent that would hire the contractor again	100%
Average post project evaluation (1-10)	9.57
Number of companies that were surveyed on Past Performance	36
Low-bid system of contracting (1-10)	1
Performance Based system of contracting (1-10)	10

Source: Reproduced from *Past Users: Performance Information Procurement System (PIPS)*, Performance Based Studies Research Group, Arizona State University. Accessed online at www.eas.asu.edu/pbsrg/pips, July 20, 2006.

Table 4
State of Hawaii (PIPS) Results

Total number of projects	9
Total award cost	$12,954,392
Total budget cost	$12,382,518
Percent +/- budget	**5%**
Percent of projects that finished on time	**100%**
Percent of projects that finished within budget	**100%**
Number of contractor-caused change orders	**0**
Percent satisfied with PIPS /PBPS	100%
Percent that would hire the contractor again	100%
Average post project evaluation (1-10)	N/A
Number of companies that were surveyed On Past Performance	372
Low-bid system of contracting (1-10)	1
Performance Based system of contracting (1-10)	10

Source: Reproduced from *Past Users: Performance Information Procurement System (PIPS)*, Performance Based Studies Research Group, Arizona State University. Accessed online at www.eas.asu.edu/pbsrg/pips, July 20, 2006.

Table 5
University of Hawaii (PIPS) Results

Total number of projects	12
Total award cost	$2,222,942
Total budget cost	$2,860,000
Percent +/- budget	**-22%**
Percent of projects that finished on time	**100%**
Percent of projects that finished within budget	**100%**
Number of contractor-caused change orders	**0**
Percent satisfied with PIPS /PBPS	100%
Percent that would hire the contractor again	100%
Average post project evaluation (1-10)	9.89
Number of companies that were surveyed on Past Performance	372
Low-bid system of contracting (1-10)	1
Performance Based system of contracting (1-10)	10

Source: Reproduced from *Past Users: Performance Information Procurement System (PIPS)*, Performance Based Studies Research Group, Arizona State University. Accessed online at www.eas.asu.edu/pbsrg/pips, July 20, 2006.

Table 6
Construction Contractor Prequalification Criteria

Grouping	Criteria	Indicators
Responsiveness	Promptness	Meeting deadlines.
	Realism	Correctness and valid information.
	Completeness	Totality in providing information.
Responsibility	Conformance	Complying with local government regulations, standards and bylaws, such as enforcement on employment of illegal immigrants by the Works Bureau, Hong Kong.
	Performance	Past performance (in the frameworks of time, finance and quality), performance in the ongoing contracts, history of punishments/penalties for poor performance, performance ratings.
	Other	Quality system (such as ISO 9000, TQM, quality policy, quality control, quality audit); safety system (such as safety policy, safety audit, occupational health); environmental concerns (such as past history, present approach); partnering (such as past history, willingness for partnering arrangement); specific requirements (in cases of project specific prequalification such as prequalification for design-build projects).
Competency	Resources	Finance (in the frameworks of stability and capacity Ð measuring indicators such as net worth, turnover, liquidity, solvency, gearing, credit rating, bonds and bank guarantees/warrantees); human resources (managerial, supervisory and operational-indicators such as experience, qualifications, track record); machinery, plant and equipment (indicators such as numbers available for the work, leased/hired/owned, working condition).
	Experience	Past experience; project specific knowledge.
	Constraints	Resources; current workloads; subcontracting; joint ventures.
	Management & Organization	Management (indicators such as policy, system, recording, communication, information technology); organization (such as structure, style).

Source: Adopted from Table 3 in Palaneeswaran, Ekambaram., and Mohan Kumaraswamy. (2001). *Recent advances and proposed improvements in contractor prequalification methodologies*. Building and Environment, Vol. 36, p. 73-87.