An Analysis of the Best Value Approach for the Delivery of Roofing Systems: How the Best Value Approach Differs from Best Value Procurement

by

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of the Requirements for the Degree
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ABSTRACT

The overall purpose of this investigation is to examine the differences between the Best Value Approach and Best Value Procurement, and to test if the Best Value Approach can be used for the successful delivery of roofing systems. Best Value Procurement has been run on delivering roofing services for many years. However, in the last three years, it was discovered that Best Value Procurement was not sustainable and filled with risk. To examine if the Best Value Approach can be used for the successful delivery of roofing systems, the researcher identified a client in need of a new 70,000 sq. ft. industrial roof installation at their facility in the Phoenix Metropolitan area. The client willingly agreed to test the Best Value Approach as the project delivery method. The results of the project were documented, and they show that the Best Value Approach can be successfully implemented on an industrial roofing project with high performance results. The Best Value Approach's advantage over Best Value Procurement is it addresses risk using "level of expertise" and cost to select a vendor. This paper identifies the differences between the methodologies and shows how the Best Value Approach can be an optimal approach for other roofing projects.

Keywords: Best Value Approach, Roofing, Industrial Roofing System, Phoenix, Arizona

DEDICATION

To my mother Gina, my father Peter,
and my sisters Kali and Christina.

ACKNOWLEDGMENTS

This dissertation would have never been possible without the help of my committee of Dr. Sullivan, Dr. Badger, and Dr. Jacob Kashiwagi.

A special thank you is also owed to Dr. Dean Kashiwagi, Ph.D., P.E., and to Alfredo Rivera, Ph.D. for their steadfast guidance and support.

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CHAPTER 1

INTRODUCTION

The construction industry has had a problem of lacking performance improvement for the past two decades, which includes construction involving roofing systems (Egan, 1998; Lee, et al., 1999; Egbu, 2008). Roofing is one of the riskiest aspects of vertical buildings. To address these problems and risks in roofing projects and other construction projects, researchers at Arizona State University developed the Best Value Procurement/Performance Information Procurement System (BVP/PIPS). BVP/PIPS was a methodology that sought to improve the delivery of construction services through the minimization of management, direction, and control (Kashiwagi, 2014). However, in the last three years the creator of Best Value Procurement realized that the process did not fully utilize the expertise of vendors. This was a great risk to the sustainability of the methodology. BVP/PIPS used prequalification and did not have a method to ensure the mitigation of risk. To address these risks and deficiencies with BVP/PIPS, the creator of the methodology, Dr. Dean Kashiwagi, Ph.D., P.E., and his team of researchers at the Performance Based Studies Research Group (PBSRG) evolved BVP/PIPS into the Best Value Approach (BVA). The upgraded Best Value Approach uses the factors of "level of expertise" [the ability of an expert vendor to provide minimal, dominant information and minimize decision making for the project owner] and cost to select a vendor. The vendor then uses their expertise to minimize the risk on the project. In Best Value Procurement, project owners made the decision on what roofing systems were acceptable. The Best Value Procurement methodology did not consider all the variables in roofing installation projects, such as the type of deck, the type and amount of insulation, the climate of the project area, or the expertise of the installation crew itself. Unlike BVP/PIPS, which had been tested on multiple roofing projects, the BVA had

never been implemented on a roofing installation project before. The researcher sought to investigate the implementation of the BVA on a roofing project and see if the results reflected an improvement from BVP/PIPS. Through a comprehensive literature review and case study, the researcher will examine the proposal that the BVA can be used to deliver a high-performance roofing system.

Chapter 2

METHODOLOGY

The following methodology was adopted in this study to examine the differences between BVP/PIPS and BVA, and whether BVA could be successfully implemented on a roofing project:

1. Identification of the differences between BVP/PIPS and BVA methodologies through a literature review.
2. Identification a client who would allow the use of the BVA test, running a case study, and capturing the results. The parameters of this case study include:

    A) A budget of $560K

    B) Existing roof was 70K SF. Two different systems were used on the roof. The north side of the roof was a mechanically fastened reinforced PVC single ply membrane roof system [installed in 1995]. The south side was a glued down modified bitumen roof system [installed in 1998].

    C) No specific insulation or sloping requirement.

1. Literature Review

The researcher identified that an optimal way to examine the differences between the BVP/PIPS and BVA was to conduct a literature review. The literature review focused on roofing performance measurement, published papers where BVP/PIPS and BVA tests had been run on construction projects and the installation of roofing systems, and papers where the results of the tests had been documented. The three databases for the literature review included the International Council for Research and Innovation in Building and Construction (CIB), the American Society of Civil Engineers (ASCE), and ASU Libraries [see Table 1 for additional details].

Table 1:

Number of Databases	3
Number of Articles	300+
Hours Spent on Review	200+

After reviewing several hundred publications in each of the databases, the researcher documented the differences that were apparent between the two methodologies. The following observations regarding the differences between BVP/PIPS and BVA were made:

BVP/PIPS

- In roofing systems implemented with BVP/PIPS, the owner decided what roofing systems were allowable.
- Only past performance about roofing systems were submitted.
- The variables of the roofing installation were not considered, resulting in owners making more decisions.
- The risk involved on installing a roofing system was considered to have multiple sources, such as the owner, contractor, system, weather, or other factors.
- Risk mitigation was not used in installing roofing systems.

BVA

- No papers documented the BVA being tested on the delivery of a roofing system.
- BVA uses "level of expertise" [minimal amount of information and minimized decision making] and cost to select and vendor and uses expertise to minimize the risk.
- The owner does not decide which systems are allowed.
- BVA uses the minimal amount of information.

- BVA does not disqualify any contractor due to rules infractions.
- BVA tests contain performance information that would apply to the actual roofing application. BVP/PIPS tests contained performance information on roofing systems that did not necessarily apply to the actual roofing application.
- The variables of the installation are all considered [clarification period].
- Definition of risk identifies the contractor as having no risk.
- A weekly risk report (WRR) is used to identify risk and risk mitigation in the BVA.
- The risk submittal in the selection phase is not the risk mitigation plan in the clarification and execution phase.

Because the researcher observed differences between the two methodologies for the delivery of roofing systems throughout the literature review, a case study would be used to test if the Best Value Approach could be successfully implemented in the delivery of an industrial roofing system.

Chapter 3

CASE STUDY AND RESULTS

2. Case Study: Best Value Approach in Delivery of Roofing Services

In January of 2017 the owner of a leaking 70,000 sq. ft. industrial roof was drafting a Request for Proposal (RFP) to procure the delivery of a new roofing system. Due to a lack in expertise in roofing systems, the owner sought an approach that would identify an expert vendor who could deliver a high performing roofing system. The researcher approached the client with the suggestion to test the Best Value Approach (BVA) as the project delivery method. The researcher had been exposed to BVA technology at Arizona State University and seen it used in the delivery of many projects that resulted in high customer satisfaction and finished on schedule and budget. The client agreed to bring in BVA experts from the Performance Based Study Research Group (PBSRG) to give a presentation on the methodology. The Best Value Approach was presented to a core team from the owner's Facilities Management and Environmental Health & Safety (EHS) departments. After the presentation, those two departments, who were representing the owner, bought into the BVA and agreed to run a test for the delivery of a new roofing system at the facility. The project would need to:

1. Finish before May 31st, 2017. This is due to rainy season that typically falls on the Phoenix Metropolitan area from June to September. Heavy winds are also common during monsoon season.
2. Align with the high-level business objectives of the client and facilities and EHS department, which are: minimizing safety risks for building occupants, having low or no business interruptions, and staying within the project budget.
3. Be a 20-year roofing system. The client did not want a system for less than 20 years and made this a requirement for the contractors bidding on the project.

Roofing Project

The client's Facilities Management department was aware that the health of the existing roofing system was not sustainable and deteriorating quickly. The roof was approaching 20 years old, and it is generally accepted that most roofing systems can begin to lose reliability around 20 years after initial installation. The client used a tracking system referred to as the "trouble call" system to document the reports by building occupants of roof leaks of the existing roof. Between 2013 and 2017, the employees who worked in the building that the roof covered submitted 30 unique trouble calls regarding leakage. Each time the roof leaked, the Facilities Management department had to allocate time and resources to change out damaged ceiling tiles, repair light fixtures, and dry out wet carpet. The client was worried that damages would worsen during Arizona's monsoon season, and the roof covered the offices of important populations (i.e. lawyers, C-suite executives, etc.) in the facility. Replacement of the roofing system was both urgent and important if the client wished to maintain achievement of its high-level business objectives.

Best Value Approach

One of the main reasons the Best Value Approach was utilized by the client was the claim that even though the client did not know what type of roofing system they wanted, an expert vendor could be identified (Kashiwagi, 2015; Sullivan 2007; Kashiwagi, 2013). Previously, only Best Value Procurement had been run on the delivery of roofing systems; this was the first Best Value Approach test on the delivery of roofing services. Roofing installation has so many variables that were impossible to consider in the Best Value Procurement. These variables include:

1. Climate
2. Type and amount of insulation

3. Type of deck
4. Expertise of installation crew

The Best Value Approach offered the client a non-traditional strategy for procuring and managing the new roofing system by increasing utilization of expertise and the minimization of management, direction, and control (Kashiwagi, 2016; Kashiwagi, 2013; Rivera et al, 2016). The client had previously only used traditional procurement methods for the delivery of roofing services at their facility. The traditional approach resulted in the following risks for the client:

- A need to be the roofing expert and identify full design specifications despite the client lacking expertise on roofing systems.
- Only focused on one roof system at a time during procurement, even if better options were potentially available.
- Made final decision based on specifications and price to hire the contractor.
- Managed, directed, and controlled the contractor who was hired (Lepatner, 2007; Kashiwagi, 2014; Kashiwagi et al, 2013; Kashiwagi et al, 2009).
- No project performance metrics or project report were generated.

The Best Value Approach differed from the traditional approach because it laid the framework for the client to do the following:

- Utilize the expertise of expert vendors to identify the best value.
- Not need full specifications of each roofing system upfront. All that the client needed was to provide conditions of the current roof and the contractor would have to show dominant performance information and level of expertise.
- Hire the vendor based on expertise and price, and in turn the vendor would create transparency for the client on the project from beginning to end [full details of roof system and weekly risk report].

Overall, the client was excited to test the Best Value Approach on the delivery of a new roofing system. The next step was securing funding and proceeding with project execution.

Project Planning and Budgeting

The client requested capital funding from the Finance department based off estimates from other similar roof installations that had been performed at the facility in the past. Once project funding was allocated to the new roofing system, the client and prospective roofing contractors met and were educated on the Best Value Approach [Performance Information Procurement System (PIPS) and Information Measurement Theory (IMT)]. The reason for this initial meeting between the vendors and the client was to clearly and firmly establish the client's project objectives with the new roofing system. Although most of the vendors had not previously run a project using the Best Value Approach, the general reaction to the methodology was positive. After the client received all necessary project funding and the BVA presentation was given to the client and vendors, a project schedule was developed. The actual timeline is listed in Table 2.

Table 2

Tender Process Schedule

Phase of the Process	Date
BVA information provided to client personnel	January 11th, 2017
Creation and distribution of the Request for Proposal (RFP)	February 6th, 2017
BVA education and roof walkthrough with client and contractors	February 7th, 2017
All proposals received by the client.	February 27th, 2017
Selection committee meeting and proposal review by client personnel.	March 1st, 2017
Interview and final selection	March 2nd, 2017
Clarification period	March 3rd, 2017
Roof installation	March 13th, 2017
Installation complete	June 9th, 2017
Final inspection	June 27th, 2017

Bid Process

The selection criteria was broken out with the following weights:

1. Level of Expertise, 35%
2. Risk and Risk Mitigation, 5%
3. Value Added, 5%
4. Price, 35%
5. Interview, 20%

Each vendor could submit for one or multiple roofing systems to the client. The administrative requirements for the vendors included an RFP cover page & declaration and checklist, and any additional license information or administrative forms. The

evaluation requirements for each roofing system submitted included a Key Personnel Proposal Form [included past references and number of years installing roofing systems], a Level of Expertise Plan, a Risk Management Plan, a Value Added Plan, a projected cost proposal that included the roofing system and dominant metrics about the system, and a project schedule. The client also requested pricing on the removal of some abandoned equipment on the roof, which the contractors were to include in the cost of their bids. In evaluating the proposals, the selection committee used the Best Value Approach rating system. This system would be used to grant vendors a score of 10 if that vendor's high-performance claim had metrics to support the claim. If the metrics given were insufficient, ambiguous, or required the client to make decisions, the vendor would receive a score of 5. If a low-performance claim was made and included performance metrics, a score of 1 would be given.

Six total proposals were submitted by four different vendors to deliver a new roofing system for the client. Two out of the six proposal costs were below the project budget. One vendor's proposal was for a roof coating system that was warranted for only 10 years. PBSRG recommended that the option be deleted due to not meeting the 20-year roof requirement. That vendor also did not provide an option on the client's request for pricing on the second roof. After that vendor was deleted, three remaining vendors had five different proposals. Four out of the five options had a proposal for the second roof. One out of the five proposals submitted followed the RFP directions. No vendors submitted Level of Expertise, Risk Mitigation and Value Added documents that warranted a rating of 10 [all options received a 5 rating]. One vendor turned in roof performance numbers that verified the roofing system performance for the client's potential new roof. Despite this vendor having the most performance information, the

vendor did not follow the RFP directions. Two vendors turned in pricing on value added options that were requested [see Appendix B for submittals].

Results

After running the Best Value Approach test for the client, the vendor who was identified as the Best Value vendor by cost was $70,000 below the project budget and $127,000 below the closest competing PVC roof. The cost analysis by system is displayed in Figure 1. A more detailed cost breakout is listed in Figure 2. Interview scores are listed in Figure 3. All company names were kept anonymous for non-disclosure reasons.

Figure 1: Cost Analysis

Options	System $	within 10%	% from $580K	$ Amount from $580K	% against budget	$ value against budget
BUR (new) 25 years	$760K					
BUR (use existing insulation) 25 years	$658K	N	14%	$78K	18%	$98K
Reinforced PVC 20 years	$630K	Y	9%	$50K	13%	$70K
SPF 20 years	$528K	Y	-9%	$-52K	-6%	$-32K
Fibertite (PVC + KEE) 20 years	$503K	N	-13%	$-77K	-10%	$-57K
All options	$616K					
After eliminating BUR w/ all new insulation	$580K					

Figure 2: Detailed Breakout

Company	System	Cost	$ SF	Annual $	Age of Roofs	# of References	Warranty
Company A*	Tremco (BUR)	$761K	$10.74	$31K	Avg: 2 yrs. Max: 4 yrs.	3	25 years [QA]
Company A*	Tremco (BUR)	$659K**	$9.30	$27K	Avg: 2 yrs. Max: 4 yrs.	3	25 years [QA]
Company B*	GAF (PVC)	$630K	$8.53	$32K	Avg: 2 yrs. Max: 4 yrs.	5	20 years [NDL]
Company C*	GAF (SPF)	$528K	$7.54	$27K	Avg: 4 yrs. Max: 5 yrs.	Surveys: 94 Roof list: 47	20 years [NDL]
Company C*	**Fibertite (PVC)**	**$504K**	**$7.19**	**$26K**	**Avg: 5 yrs. Max: 15 yrs.**	**30**	**20 years [NDL]**

- The selection committee identified Company C's Fibertite system as the best value, and the Company B's PVC option as the two options that would move on to the interview stage.
- The BUR option and the SPF option were eliminated due to selection team discomfort with the heavier aggregate BUR, and the more expensive SPF roof system.

Interviews were done with the two remaining vendors, and the scores are documented in Figure 3 below.

Figure 3: Interview Scores

No	Criteria	Company B	Company C (Fibertite)
1	Level of Expertise rating	17.5	17.5
2	Risk Management Plan rating	2.5	2.5
3	Value Added rating	2.5	2.5
4	Interview rating	**18.3**	**19.5**
5	Cost	28.0	35.0
	Total Score	**69.0**	**77.0**

The Best Value vendor also had the most dominant performance information, with thirty references with an average of five years and a maximum of fifteen years. This was also the vendor who turned in pricing for most of the value-added items. The roofing project was completed before monsoon season struck. However, the client delayed the project by two weeks because of a request for a moisture scan and an additional proposal for a separate scope [another roof on a different building from the original roof being replaced]. The contractor began work as soon as they were awarded the contract and provided the client with a weekly risk report to document progress on the project and any issues that arose. Once the installation was completed, the client was surveyed and the results show they were highly satisfied with the contractor's performance, giving an average score of 9.3/10. [see client surveys in Appendix B for more information]. The contractor delivered on the customer's request to install a new high performance roofing system. The Best Value Approach was selected by the client as the higher performing approach than the traditional procurement model the client had been using, based on the results of the surveys [Appendix B].

Chapter 4

CONCLUSION

Upon conducting both a literature review and a case study to test whether the Best Value Approach could be implemented on a roofing system installation, the researcher observed many conclusions. First, through the literature review, the researcher identified that there are differences between BVP/PIPS and BVA, and that the upgraded BVA addresses the risks in BVP/PIPS. BVA was the highest documented performing approach observed in the literature review. Second, the researcher identified through the literature review an indication that the Best Value Approach was a higher performing documented performing approach in the delivery of services, except for the delivery of roofing services, where only BVP/PIPS had been previously tested. Third, through the case study, the researcher observed that the Best Value Approach can be successfully implemented on the installation of industrial roofing systems with more dominant performance metrics than a traditionally procured roof. The client in the case study presented in this analysis was highly satisfied with their roofing system and the performance of the contractor. The Best Value Approach can and should be tested on other clients who wish to apply the highest documented performing approach to delivering roofing projects.

The BVA emphasizes that price alone should not be the only differentiating factor between vendors. However, in the case test, the only differences between the vendor ratings were price and interview score. The client surveys did show that the owner was more satisfied with the Best Value process compared to the traditional low-bid procurement strategy [Appendix B]. More tests would need to be run to validate whether a non-price based approach is more optimal in delivering goods and services more efficiently for less cost, better quality, and higher customer satisfaction for other clients.

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APPENDIX A

FULL SCHEDULE OF CASE STUDY

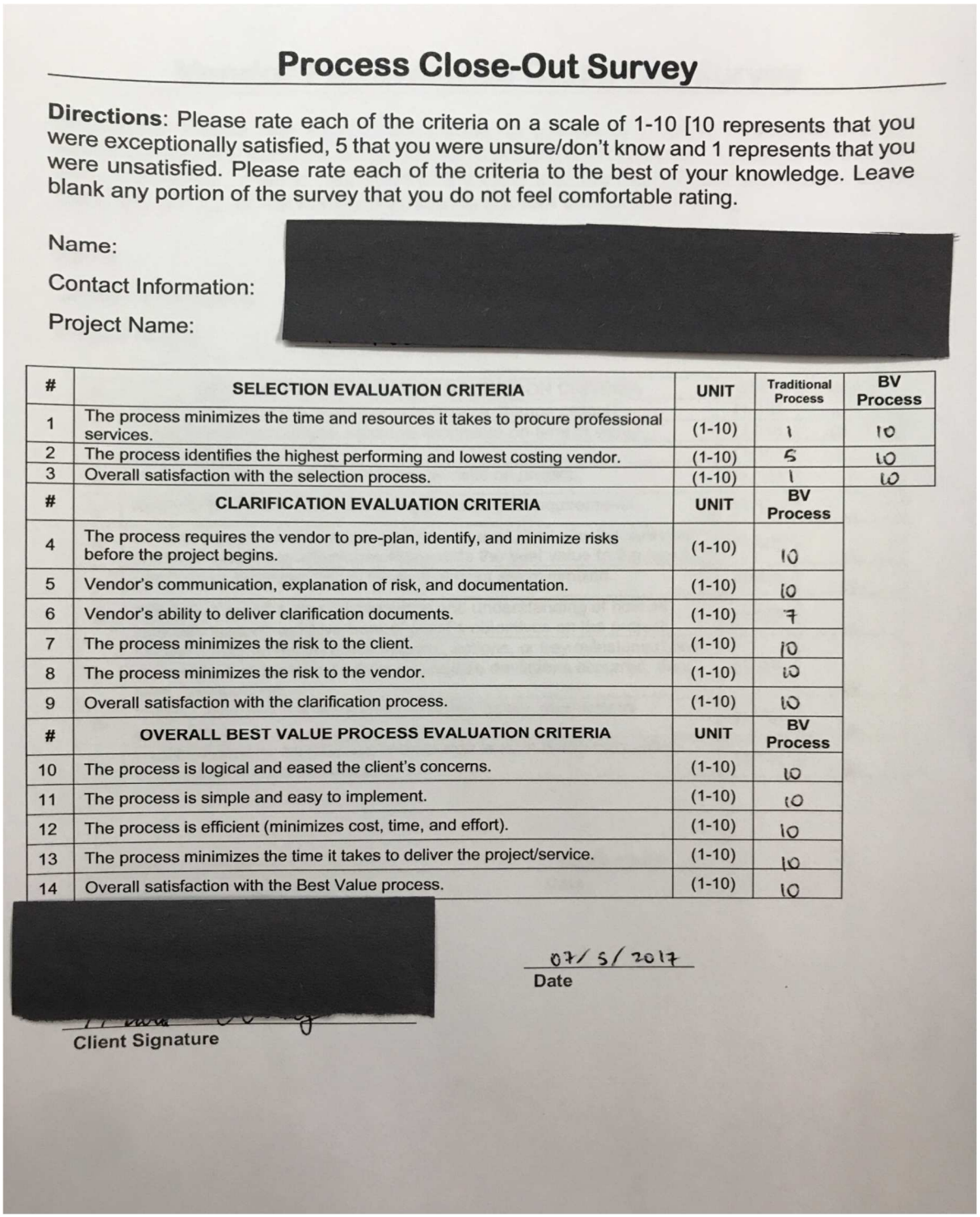
Full schedule

- January 11th: The roofing project funding is received by the client.
- January 11th: The BVA presentation is given to client personnel.
- January 28th: The project schedule is set.
- February 2nd: The pool of contractors bidding on the project is identified.
- February 6th: The Request for Proposal (RFP) for a new roofing system is created.
- February 7th: A pre-bid presentation and roof walk takes place with the client, PBSRG, and the prospective contractors. This presentation is to educate the contractors on the approach.
- February 8th: PBSRG agrees to do 4 roof cores and a moisture scan upon request by the client [schedule slips by 7 days].
- February 13th: A moisture scan and roof core are accomplished.
- February 20th: The client personnel request pricing on a second roof and roof walk on Feb 22nd [schedule slip by 5 days (12 days total)].
- February 21st: The moisture scan and roof core information is distributed to the client and prospective contractors.
- February 27th: All the proposals are received by the client.
- March 1st: A review of proposals is done by client personnel.
- March 1st: A selection group meeting takes place.
- March 2nd: An interview is held with the remaining contractors and final selection is made.
- March 3rd – 10th: The clarification period
- March 13th – May 31st extended to June 9th: Execution phase
- June 27th: Final inspection

APPENDIX B

CLIENT SURVEYS

*Note: These are scans of the original copies. Names and project information were redacted upon the client's request for confidentiality. The researcher retained copies of the original surveys for proof of validity.



Process Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information:

Project Name:

#	SELECTION EVALUATION CRITERIA	UNIT	Traditional Process	BV Process
1	The process minimizes the time and resources it takes to procure professional services.	(1-10)	1	10
2	The process identifies the highest performing and lowest costing vendor.	(1-10)	5	10
3	Overall satisfaction with the selection process.	(1-10)	1	10
#	**CLARIFICATION EVALUATION CRITERIA**	**UNIT**	**BV Process**	
4	The process requires the vendor to pre-plan, identify, and minimize risks before the project begins.	(1-10)	10	
5	Vendor's communication, explanation of risk, and documentation.	(1-10)	10	
6	Vendor's ability to deliver clarification documents.	(1-10)	7	
7	The process minimizes the risk to the client.	(1-10)	10	
8	The process minimizes the risk to the vendor.	(1-10)	10	
9	Overall satisfaction with the clarification process.	(1-10)	10	
#	**OVERALL BEST VALUE PROCESS EVALUATION CRITERIA**	**UNIT**	**BV Process**	
10	The process is logical and eased the client's concerns.	(1-10)	10	
11	The process is simple and easy to implement.	(1-10)	10	
12	The process is efficient (minimizes cost, time, and effort).	(1-10)	10	
13	The process minimizes the time it takes to deliver the project/service.	(1-10)	10	
14	Overall satisfaction with the Best Value process.	(1-10)	10	

[redacted]

07/5/2017
Date

Client Signature

Vendor Performance Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information:

Project Name:

#	VENDOR PERFORMANCE EVALUATION CRITERIA	UNIT	Rating
1	Ability to manage the project cost (minimize change orders).	(1-10)	10
2	Ability to maintain project schedule (complete on-time or early).	(1-10)	9
3	Quality of workmanship.	(1-10)	10
4	Professionalism and ability to manage risks on project.	(1-10)	10
5	Ability to follow the users rules, regulations, and requirements.	(1-10)	10
6	Vendor discussed alternative actions and explained why the selected process/monitoring/alternative represents the best value to the client.	(1-10)	10
7	Vendor has prepared the SOW so that risks are minimized.	(1-10)	10
8	Vendor provided a clear explanation and understanding of how all activities support achievement of client's objectives on the project.	(1-10)	10
9	Vendor's project deliverables (reports, actions, or key milestones) are delivered on planned schedule; if schedule deviations occurred, they were fully justified.	(1-10)	10
10	Weekly Progress Report is clear, concise, timely, and easy to understand.	(1-10)	10
11	Overall customer satisfaction and comfort level in hiring the vendor again based on performance.	(1-10)	10

[redacted]

07/5/2017
Date

Client Signature

performance based studies research group @ arizona state university www.pbsrg.com

Process Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information:

Project Name: H ROOF

#	SELECTION EVALUATION CRITERIA	UNIT	Traditional Process	BV Process
1	The process minimizes the time and resources it takes to procure professional services.	(1-10)	7	9
2	The process identifies the highest performing and lowest costing vendor.	(1-10)	6	10
3	Overall satisfaction with the selection process.	(1-10)	6	10
#	CLARIFICATION EVALUATION CRITERIA	UNIT	BV Process	
4	The process requires the vendor to pre-plan, identify, and minimize risks before the project begins.	(1-10)	9	
5	Vendor's communication, explanation of risk, and documentation.	(1-10)	8	
6	Vendor's ability to deliver clarification documents.	(1-10)	10	
7	The process minimizes the risk to the client.	(1-10)	10	
8	The process minimizes the risk to the vendor.	(1-10)	9	
9	Overall satisfaction with the clarification process.	(1-10)	8	
#	OVERALL BEST VALUE PROCESS EVALUATION CRITERIA	UNIT	BV Process	
10	The process is logical and eased the client's concerns.	(1-10)	9	
11	The process is simple and easy to implement.	(1-10)	9	
12	The process is efficient (minimizes cost, time, and effort).	(1-10)	10	
13	The process minimizes the time it takes to deliver the project/service.	(1-10)	8	
14	Overall satisfaction with the Best Value process.	(1-10)	8	

[redacted]

Client Signature

7-5-17

Date

Vendor Performance Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information:

Project Name:

#	VENDOR PERFORMANCE EVALUATION CRITERIA	UNIT	Rating
1	Ability to manage the project cost (minimize change orders).	(1-10)	10
2	Ability to maintain project schedule (complete on-time or early).	(1-10)	8
3	Quality of workmanship.	(1-10)	9
4	Professionalism and ability to manage risks on project.	(1-10)	9
5	Ability to follow the users rules, regulations, and requirements.	(1-10)	10
6	Vendor discussed alternative actions and explained why the selected process/monitoring/alternative represents the best value to the client.	(1-10)	10
7	Vendor has prepared the SOW so that risks are minimized.	(1-10)	10
8	Vendor provided a clear explanation and understanding of how all activities support achievement of client's objectives on the project.	(1-10)	9
9	Vendor's project deliverables (reports, actions, or key milestones) are delivered on planned schedule; if schedule deviations occurred, they were fully justified.	(1-10)	10
10	Weekly Progress Report is clear, concise, timely, and easy to understand.	(1-10)	8
11	Overall customer satisfaction and comfort level in hiring the vendor again based on performance.	(1-10)	8

[redacted]

Client Signature

7-5-17

Date

performance based studies research group @ arizona state university www.pbsrg.com

Process Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information: [redacted] .com

Project Name:

#	SELECTION EVALUATION CRITERIA	UNIT	Traditional Process	BV Process
1	The process minimizes the time and resources it takes to procure professional services.	(1-10)	5	10
2	The process identifies the highest performing and lowest costing vendor.	(1-10)	5	10
3	Overall satisfaction with the selection process.	(1-10)	5	10
#	CLARIFICATION EVALUATION CRITERIA	UNIT	BV Process	
4	The process requires the vendor to pre-plan, identify, and minimize risks before the project begins.	(1-10)	10	
5	Vendor's communication, explanation of risk, and documentation.	(1-10)	9	
6	Vendor's ability to deliver clarification documents.	(1-10)	9	
7	The process minimizes the risk to the client.	(1-10)	10	
8	The process minimizes the risk to the vendor.	(1-10)	10	
9	Overall satisfaction with the clarification process.	(1-10)	9	
#	OVERALL BEST VALUE PROCESS EVALUATION CRITERIA	UNIT	BV Process	
10	The process is logical and eased the client's concerns.	(1-10)	10	
11	The process is simple and easy to implement.	(1-10)	8	
12	The process is efficient (minimizes cost, time, and effort).	(1-10)	10	
13	The process minimizes the time it takes to deliver the project/service.	(1-10)	9	
14	Overall satisfaction with the Best Value process.	(1-10)	10	

[redacted]

Client Signature

7/5/2017

Date

Vendor Performance Close-Out Survey

Directions: Please rate each of the criteria on a scale of 1-10 [10 represents that you were exceptionally satisfied, 5 that you were unsure/don't know and 1 represents that you were unsatisfied. Please rate each of the criteria to the best of your knowledge. Leave blank any portion of the survey that you do not feel comfortable rating.

Name: [redacted]

Contact Information:

Project Name:

#	VENDOR PERFORMANCE EVALUATION CRITERIA	UNIT	Rating
1	Ability to manage the project cost (minimize change orders).	(1-10)	**10**
2	Ability to maintain project schedule (complete on-time or early).	(1-10)	**10**
3	Quality of workmanship.	(1-10)	**9**
4	Professionalism and ability to manage risks on project.	(1-10)	9
5	Ability to follow the users rules, regulations, and requirements.	(1-10)	9
6	Vendor discussed alternative actions and explained why the selected process/monitoring/alternative represents the best value to the client.	(1-10)	10
7	Vendor has prepared the SOW so that risks are minimized.	(1-10)	10
8	Vendor provided a clear explanation and understanding of how all activities support achievement of client's objectives on the project.	(1-10)	10
9	Vendor's project deliverables (reports, actions, or key milestones) are delivered on planned schedule; if schedule deviations occurred, they were fully justified.	(1-10)	10
10	Weekly Progress Report is clear, concise, timely, and easy to understand.	(1-10)	**10**
11	Overall customer satisfaction and comfort level in hiring the vendor again based on performance.	(1-10)	10

[redacted]

Client Signature

7/5/2017

Date

APPENDIX C

LEVEL OF EXPERTISE FORM

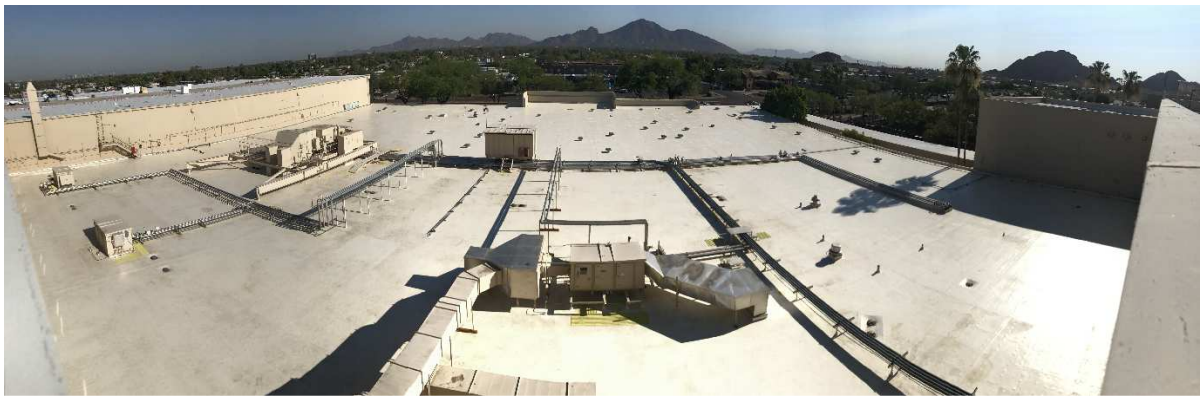
No.	Owner	Job Name	Roof Type	Tear off?	Roof Deck	Underlayment	Type of Roof Installed	Manufacturer	Warranty Type	Roof Area	Date Installed	Warranty Length	Leaked? (Y/N)	# of Leaks Fixed	Still Leaks? (Y/N)	Traffic? (Y/N)	Customer Satisfaction	Contact Name	Phone	Email
x	ABC	G Building	R	N	C	BUR	SPF	Neogard	XXXX	60,512	9/6/1983	10	Y	10	N	N	9	John Doe	4802030935	john@email.com
1																				
2																				
3																				

Appendix D

ROOF IMAGES

1. Before BVA testing on roofing installation

2. After BVA testing on roofing installation



BIOGRAPHICAL SKETCH

Andrew Bills is a Master of Science graduate student in the Ira A. Fulton School of Engineering at Arizona State University. Andrew previously earned a Bachelor of Science degree in Finance with an International Business Certificate from the W.P. Carey School of Business. During his undergraduate degree program, Andrew was exposed the Best Value Approach by his Barrett Honors College thesis director, Dr. Dean Kashiwagi and his son Dr. Jacob Kashiwagi. After graduation, Andrew plans to move to Southern California to work for Hensel Phelps Construction.