Effects of Supplemental Bid Documentation

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As the complexity of construction projects increases, more work is being subcontracted out by general contractors who oversee the construction of the project. Research suggests that a variety of factors are impacting subcontractors when putting together a bid. These factors were considered in determining a proposed solution for simplifying the bid process. This case study attempts to analyze the bidding process of construction projects in order to improve the accuracy of bids. Traditionally, bid documents include plans and specifications. This study analyzes the effects of adding a scope of work, as ascertained by the general contractor for each trade, to the bid documents. The scope of work is intended to provide a solution to the overly complicated bidding process. Bids were analyzed with and without the supply of a scope of work in order to determine if the proposed solution was appropriate. It was concluded that a scope of work is beneficial to subcontractors in simplifying the bidding process; however, it does not lead to more accurate bidding.

Key Words: Scope of Work, Bidding, Subcontractor, Bid Documents, Construction Project

Introduction

The rapid growth of the built environment finds subcontractors hard-pressed to keep up with the demand for trade work. The result of this booming economy is nonresponsive bids that fail to comply with the traditional contract documents, known as drawings and specifications. This case study attempts to find a solution to the problem of nonresponsive bidders by analyzing the supplementation of bid documents with a scope of work. This scope of work outlines the components in the drawings and specifications that pertain to the individual subcontractor in order to help navigate or narrow the search for responsive items. This case study goes beyond the analysis of bid responsiveness and includes the opinions of the subcontractors who participated.

The preliminary research shows the bidding relationship between a general contractor and subcontractor. It analyzes the current common bidding practices and highlights the opportunities for improvement. After researching bidding history, it was found that bidders often become more competitive after a loss of bid. As such, this study takes into consideration whether or not the bidders on the second project won the bid on the first project analyzed. From this information, the case study highlights one possible solution to the lack of responsive bidding and analyzes the effects of the solution.

The study developed analyzes two similar projects that were overseen by the same general contractor, in the same city. For the first project, subcontractors were provided the plans and specifications to bid. In addition to plans and specifications, the second project provided each subcontractor with a designated scope of work. A form developed to analyze bid accuracy was used to evaluate and rank each bid for the two projects. Once developed, the evaluation served as a medium for comparing the subcontractor’s bids on each project.

In addition to the evaluation forms, a survey was created to ascertain the subcontractor’s perception of the bidding process for each project. This survey served the purpose of determining whether or not the scope of work was used and to what extent. It also provided the subcontractor the opportunity to give feedback regarding the scope of work and its implementation.

This study was conducted in an effort to ascertain a solution to nonresponsive bids in which mistakes are found. Once a solution is found, bidding across trades should improve and scope gap should be eliminated within a project.
Literature Review

Construction is a prototype industry; rarely does one project parallel another. Even if the buildings are identical in structure, architecture, and infrastructure, it is uncommon to find identical site conditions or client relations. As such, the construction of buildings must consider differing budgets, schedules, site logistics, and other complexities.

In order to break down the complexities of each project, work is often subcontracted out for each trade. This allows for specialization with the work. Subcontracting also permits a review of each subcontractor to select the most responsive and responsible bid. General contractors “tender documents, [evaluate] bids, and [award] the contract” to the vetted subcontractor. While the process of evaluating bids is time consuming, it pales to the time spent putting together bids (Arslan, Kiyrak, Birgonul & Dikmen, 2007).

Subcontractor’s take much into consideration when putting together a bid. One consideration is the criteria for selection method utilized by the general contractor. Selection methods vary from project to project based on the prime contract between the client and general contractor. Although the criteria varies, the general process for selecting a subcontractor remains the same. This process has been outlined in the diagram below.

![Bidding Process Diagram](image)

**Bidding Process Diagram**  
(Arslan et al., 2007)

The merits for awarding a bid is fundamental in determining the criteria for subcontractor selection. Bids can be awarded based solely on price, quality, experience, ability, or a combination of these factors. Bid selection based on a combination of these factors can be referred to as case-based reasoning (CBR) (Luu & Sher, 2012). This ensures that the bidder is selected for more than a low-priced bid.

The factors of determining responsiveness are particular to the bid itself; however, the factors determining responsibility refer to the subcontractor who is bidding the work. In San Luis Obispo, the city requires that bidders for public projects submit five references from similar projects that exemplify their experience to handle the project. Failure to do so can result in dismissal of one’s bid (Dauer, 2012).

The variables for awarding a bid are vital considerations for public projects. Public projects are often subject to heavy scrutiny of the variables previously described, which often move toward evaluating the Value for Money. Projects funded publicly tend to lose their Value for Money during the procurement process, which can last upwards
of a year (Kumar & Nair, 2015). This delay in procurement occurs for a variety of reasons often related to the owner. While the delay increases the total cost of labor during procurement, it allows the subcontractors more time to review the documents.

While criteria plays a role in the bid process, each unique project also comes with its own prestige and perceived status. This factor of the project contributes to the bidding strategy of contractors. Projects have the ability to convey a certain level of skill or fitness on a subcontractor’s resume. A study implied that a contractor will alter their bidding strategy according to the potential long-term effects on their reputation for earning the award (Oo, Lo, & Lim, 2012).

The same study also found that bidders respond to upcoming bids differently based on the results of previous bids. It found that a contractor who was recently awarded a project will not bid as aggressively on the following project. This occurs from the lack of scarcity or need for future work. The contractor’s bids before and after an awarded project tended to be less competitive with their strategy and pricing (Oo et al., 2012).

When presented with an opportunity to bid on a project, a subcontractor must determine the feasibility of taking on the project. A subcontractor must evaluate the technical, economical, and financial feasibility (Khan, 2006). This sets the stage for developing a scope of work. If the project is not feasible, the subcontractor may choose to bid the project regardless. This decision reflects back to the previous research which shows that subcontractors may choose to bid on a project to show a certain level of skill or capability. In order to avoid being awarded the bid, the subcontractor may choose to develop a surface-level scope of work and submit an extremely high bid price. This would cause the bid to be dismissed in the evaluation, but still put their name on the bidders list if the project is public. Publicly funded projects often require a full list of bidders to be published after the bids are awarded.

After determining feasibility, the subcontractor begins Scope Planning with a preliminary work breakdown structure. The work breakdown structure takes a task to be completed and breaks down the components required to complete it. The components include labor, equipment, and materials. Although there are many ways to conduct a work breakdown structure during Scope Planning, the takeaway or goal is the same. After completing a work breakdown structure, the subcontractor should have a more organized look at the work demanded by the project. Following Scope Planning, the subcontract dives deeper into the project details during Scope Definition and Scope Verification (Khan, 2006).

**Research Design – The Case Study**

Two projects, each of similar scope and definition, were studied in order to determine whether or not the incorporation of a scope of work with the bid documents is beneficial. The purpose of this study was to analyze the change in bids based on the additional scope of work and determine whether or not its incorporation improved the bidding accuracy and process.

The variable in this study was the bid documents. For the first project analyzed, the bid documents consisted of the plans and specifications. In the second project, the bid documents had an addition scope of work attached for reference. All other variables were controlled.

The variables controlled were the software used to bid the project, the general contractor overseeing the bidding, the city of the project, the type of construction project, the pool of subcontractors contacted for these projects, and more were controlled. As noted in the preliminary research, each project is a prototype. Though it is difficult to compare to projects that are exactly the same, this case study attempts to do so by controlling variables between projects.

Though the bid process was fundamentally the same, it is important to acknowledge factors that may have negatively affected the legitimacy of this study. These factors may have influenced the results of the study. Between the two projects the following discrepancies may result in inaccurate results: contract type, project owner, evaluation
criteria, and project design team. Any one of these factors may have greatly impacted the way in which the subcontractors put together their bid. As found in the preliminary research, much consideration goes into preparing a bid for a project.

The case study was developed around two projects of similar size contracted out by the same general contractor. The projects were bid by many of the same subcontractors. Subcontractors who bid on both projects were selected to have their bids analyzed in this study. The bids were obtained through the general contractor without knowledge of the subcontractor. The use of their bids was kept private so that their later participation in a survey would not be influenced by this knowledge.

Following the close of the bidding process, subcontractors were sent a survey for which to fill out. The objective of the survey was to determine whether or not the subcontractor utilized the scope of work when putting together their bid for the second project. The survey also asked questions concerning the subcontractors’ perceived validity of the scope of work and helpfulness in preparing their bid. Lastly, the survey asked the subcontractor for feedback regarding further implementation of scope of works within bidding documents.

This survey complimented the evaluation form used to determine the accuracy of bids on each project. The evaluation form, shown below, provided a foundation for quantitative and qualitative analysis of each bid. By setting a standard for evaluation, the bids were able to be evaluated fairly. The number of bid mistakes, questions, revisions, and items included with the bid were the primary factors used to determine bid accuracy. A lower number of bid mistakes, questions, and revisions indicated an improvement in bid accuracy. All other variables in the evaluation template were used to determine the complexity of the bid items and identify outside factors that may have influenced the subcontractor while bidding.

If the contractor was awarded the bid, it may have influenced their bid on the other project, as noted in the preliminary research. This influence could be reflected in the competitiveness of the bid even if the project was not awarded. For this reason, the rank of the bid was noted as compared to the other bids submitted. A bid ranked second was considered more competitive than a bid ranked fifth. The general contractor reliance on bid aims to ascertain whether or not the general contractor relied on the accuracy of the bid when determining the bid award.

Once the bids were evaluated and the survey conducted, an analysis of the data was conducted. This analysis looked for changes in bid accuracy with the addition of the scope of work to the bid documents.

### Results

The bids were evaluated based on a series of components: bid mistakes, requests for information (RFIs) submitted, revisions submitted, number of items included, number of bidders in trade category, result of bid, and general contractor reliance on bid. These factors were used to determine whether or not the bid accuracy improved with the addition of a scope of work. See Appendices D through H for the template and data recorded. This data was
compiled with the perceived results as determined by the surveys sent out, see Appendices A through C. As only two of the surveys were completed by the subcontractors, the results will focus primarily on those two bidders.

When comparing the number of bid mistakes between projects, an overall decrease in accuracy was noted. Bids submitted for the first project, which did not include a scope of work, did not contain any errors. Across all bids, the number of bid items increased on the second project where the number of bid mistakes also increased. The increase in mistakes was between two to five mistakes.

Additionally, there were no bid revisions submitted on the project that did not include a scope of work. Two bid revisions were submitted in total across the four bidders with the addition of the scope of work. Each revision was submitted by a separate subcontractor. Only one bidder submitted additional RFIs with the inclusion of a scope of work. All three remaining bidders did not submit RFIs for either project. These two data sets ascertain the clarify of each subcontractors’ bid.

Each of these trades, with the exception of one, were competitively bid against other bidders. The number of bidders for each trade is documented, with more bidders present for the project which included the scope of work. The difference between these two values is two to six more bidders to compete against.

Lastly, the bid evaluation form noted whether or not the subcontractor won the second project in lieu of the scope of work. One of the four subcontractors was awarded the second project, which included a scope of work, but did not win the first project.

The surveys submitted by both the door supplier and door installer suggested a perceived improvement in bid accuracy when provided a scope of work. Both bidders indicated the scope of work was beneficial and useful, despite the results determined above. The surveys contained positive notes regarding the incorporation of scope of work with the bid documents.

**Analysis**

The increase in bid mistakes, examined without outside consideration, would indicate that providing a scope of work did not benefit the subcontractors. However, the remaining variables suggest a greater problem exists with comparing the bids number of bid mistakes. This problem is emphasized by the contracting survey responses, which show an appreciation and benefit from the inclusion of a scope of work.

The results of the total bid items suggests that this decrease in accuracy, as shown in the increase in bid mistakes, may have been prompted by an increase in project complexity. The proportion of the increases indicates that the increase in bid mistakes may be due to the increase in project complexity – not a correlation with the inclusion of the scope of work. This is one factor that may have negatively influenced the accuracy of this study.

The changes noted regarding bid revisions and RFIs indicates a lack of clarity amongst the bid documents for the second project, despite being provided a scope of work. The need for clarification could have been influenced by the differing design teams, or it could be a direct correlation with the scope of work. For this reason, the factors regarding bid revisions and RFIs would need to be further investigated.

As mentioned above, it is difficult to draw a direct correlation between bid accuracy and scope of work given the differing variable between the two projects. Although both projects used in the case study are located in San Luis Obispo, the first project was privately funded and the second project occurred on state property at a California university. This discrepancy may have negatively impacted the bidding process. Public projects, as noted in the preliminary research, require the bid results to be publicly reported. As the second project was publicly funded, a list of bidders and their bid results was published.
In this study, the projects studied came with their own level of prestige and visibility. The first project is located in the heart of the city and the second project is located on a university campus. Although the projects were initially assumed to be of equal prestige, the increase in bidders indicates something different. With more bidders, it is likely that the second project carried more prestige. However, this cannot be stated with certainty because the projects were bid nearly a year apart from each other. It is difficult to determine whether or not the increase in bidders impacted the accuracy of the bidders reviewed. Research would suggest that the increased number of bidders would prompt the bidders reviewed to put forth a bid whether or not they intended or desired the bid award.

Both projects employed CBR, as discussed in the preliminary research, in the process of determining the awarded bids. Although the second project was bound by a guaranteed maximum price, work that a small percentage of the budget was not required to be competitively bid based on price. Regardless of the requirement for competitive bidding, the bids must be responsive and responsible.

The factors determining responsibility and responsiveness were therefore set forth by the general contractor and owner. It is important to note that the second project was formally bid after a series of preliminary bids for the purposes of establishing a rudimentary budget. The subcontractors had exposure to general project prior to receiving formal bid documentation. It is likely that this is the cause of the increase in awarded bids. Despite being evaluated similarly, this previous exposure to the project impacted the outcome of the bid awards.

In the case study, the scope of work provided by the contractor in the second project achieved the preliminary goal of Scope Planning. Each scope of work highlighted the main tasks to be later broken down by the subcontractor in their bids. The scopes did not contain a thorough work breakdown structure of the trades; however, the surveys indicated that the scopes were effective and beneficial to the subcontractor. The positive feedback and interest in future scopes of work by the subcontractors indicate that the general outline of the scope was sufficient.

**Conclusion**

Overall, this study found data to suggest that providing subcontractors with a scope of work does not improve the accuracy of their bids. The measurements used to quantitively evaluate bid accuracy showed a decrease in accuracy with the inclusion of a scope of work. However, providing a scope of work to subcontractors may provide qualitative value to the bidders when putting together their bid. The qualitative measurements provided in the survey indicate a benefit to providing subcontractors with a scope of work.

The items used to quantitively analyze the bids had negative outcomes that can likely be traced back to the irregularities and differences between the two projects. The preliminary research supplied factors that influence the behaviors of subcontractors and may have caused the decrease in accuracy. Upon analyzing the results and determining outside factors that influenced the results, it is possible that further study of the results would yield positive feedback for the future incorporation of scope of works.

The use of these results should be limited given the lack of a strong correlation between scope of work and bid accuracy. Further case studies should be reviewed, in addition to further examining these cases, to determine whether or not a strong correlation exists.

**Areas of Further Research**

Although this case study controlled many variables between the two projects, there is room for improvement. Future studies should strive to control all variables for a more accurate comparison. These variables have been outlined in the methodology.
In addition to controlling variables more precisely, further supplemental documentation or solutions to bidding should be analyzed. This study does not suggest that the only solution to the problems found in the preliminary research is to supply the subcontractor with a scope of work. The reader should be aware that there are other solutions that may improve the bidding process even more.

References


Dauer, J. (2012). Responsiveness or responsibility? That is the question when rejecting a bidder for failing to provide references demonstrating minimum experience standards. The Procurement Lawyer, 48 (1), 14-19.


Appendix A

Bidding Process Survey

Subcontractor Name: Template
Subcontractor Trade: ________________________________

The purpose of this survey is to determine whether or not receiving a Scope of Work within the bidding documents is beneficial for the bidder. Project 1 included a Scope of Work; however, Project 2 did not.

Did you use the Scope of Work when developing your bid for the Cal Poly project?

Yes    or    No  circle one

Did you find the Scope of Work to be accurate for your trade?

Yes    or    No  circle one

Did you find new information (not found in bid documents) in the Scope of Work?

Yes    or    No  circle one

How helpful did you find the Scope of Work?

Not Helpful    Somewhat Helpful    Very Helpful  circle one

Rate your perceived change in your bidding performance when provided the Scope of Work:

____________________________________________________

1          2          3          4          5          6          7          8          9          10

declined                                     neutral                                     improved

Do you want a Scope of Work to be included in future projects?

Yes    or    No  circle one

Additional comments regarding Scope of Work?
Appendix B

Bidding Process Survey

Subcontractor Name: DoorWays
Subcontractor Trade: Doors, Frames, Finish Hardware

The purpose of this survey is to determine whether or not receiving a Scope of Work within the bidding documents is beneficial for the bidder. Project 1 included a Scope of Work; however, Project 2 did not.

Did you use the Scope of Work when developing your bid for the Cal Poly project?

Yes or No circle one

Did you find the Scope of Work to be accurate for your trade?

Yes or No circle one

Did you find new information (not found in bid documents) in the Scope of Work?

Yes or No circle one

How helpful did you find the Scope of Work?

Not Helpful Somewhat Helpful Very Helpful circle one

Rate your perceived change in your bidding performance when provided the Scope of Work:

1 2 3 4 5 6 7 8 9 10 declined neutral improved

Do you want a Scope of Work to be included in future projects?

Yes or No circle one

Additional comments regarding Scope of Work?

The SOW was very valid for the Winery & Viticulture because it was supported with a good set of plans and a specification manual. I can't say the same documents exist for 1101 Monterey. Our apprehension with the SOW is, for example, a comment like "i.e.: to include additional door and frame prep to accommodate electrified hardware as shown on security plan sheets."

We don't cross reference security plans or low voltage. Electrified hardware needs to be specified on door schedules or hardware groupings. If not, the security contractor would be responsible for furnishing hardware requirements based on their trade needs.

Because we supply materials only, the installation is always a separate sub-contract for JW when dealing with DoorWays.
Appendix C

Bidding Process Survey

Subcontractor Name: Less: Construction, Inc.
Subcontractor Trade: Doors, Frames, & HARDWARE

The purpose of this survey is to determine whether or not receiving a Scope of Work within the bidding documents is beneficial for the bidder. Project 1 included a Scope of Work; however, Project 2 did not.

Did you use the Scope of Work when developing your bid for the Cal Poly project?
  Yes or No (circle one)

Did you find the Scope of Work to be accurate for your trade?
  Yes or No (circle one)

Did you find new information (not found in bid documents) in the Scope of Work?
  Yes or No (circle one)

How helpful did you find the Scope of Work?
  Not Helpful Somewhat Helpful Very Helpful (circle one)

Rate your perceived change in your bidding performance when provided the Scope of Work:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
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<td>neutral</td>
<td>8</td>
<td>improved</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Do you want a Scope of Work to be included in future projects?
  Yes or No (circle one)

Additional comments regarding Scope of Work?

My scope is usually pretty obvious. However, when the scope details specific hardware (such as in a spec), as well as the doors & frames, the time I spend bidding a project is greatly decreased.
Appendix D

Bid Evaluation Form

Subcontractor Name: Template
Subcontractor Trade: __________________________

The criteria for this evaluation are based on a scale of 1-10, a score of 1 implying negative effect and a score of 10 implying a positive effect.

<table>
<thead>
<tr>
<th>Measure of Evaluation</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Rating Conclusion</th>
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<tbody>
<tr>
<td># of Bid Mistakes</td>
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<tr>
<td># of RFI's Submitted by Subcontractor</td>
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<tr>
<td># of Revisions Submitted</td>
<td></td>
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<tr>
<td># of Items Included in Bid</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Competitive Bid (Rank Amongst Bids)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awarded Bid (1 = yes, 0 = no)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>General Contractor Reliance on Bid</td>
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<td></td>
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</tr>
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</table>
Appendix E

Bid Evaluation Form

Subcontractor Name: DoorWays
Subcontractor Trade: Doors, Frames, and Hardware Supply

The criteria for this evaluation are based on a scale of 1-10, a score of 1 implying negative effect and a score of 10 implying a positive effect.

<table>
<thead>
<tr>
<th>Measure of Evaluation</th>
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<td># of Revisions Submitted</td>
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<td># of Items Included in Bid</td>
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<td>Awarded Bid (1 = yes, 0 = no)</td>
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<td>good bids</td>
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<tr>
<td>General Contractor Reliance on Bid</td>
<td>Yes</td>
<td>Yes</td>
<td>good reputation</td>
</tr>
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</table>
## Bid Evaluation Form

**Subcontractor Name:** Lessi Construction  
**Subcontractor Trade:** Doors, Frames, and Hardware Install  

The criteria for this evaluation are based on a scale of 1-10, a score of 1 implying negative effect and a score of 10 implying a positive effect.

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<td>good reputation</td>
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The criteria for this evaluation are based on a scale of 1-10, a score of 1 implying negative effect and a score of 10 implying a positive effect.

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<td>good reputation</td>
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