

## Analysis #1: Incomplete Document Management

### Introduction

A recent trend in the construction industry has been increasingly more incomplete construction documents. Incomplete construction documents can encompass a large number of areas. It is nearly impossible to have flawless drawings and specifications. If the documents were perfect there would be no requests for additional information. To further analyze the risks and management techniques of incomplete documents I first must state what I am considering incomplete documents. It is expected that a project will have requests for clarifications. A clarification implies that the construction manager understands the architect's intent but would like to verify that their assumptions are correct before proceeding. What I look to address is the larger issues such as a major coordination bust that will require a complete redesign of that area and the use of "similar" details to represent all situations as well as areas that were never designed in the first place.

### Recent Trends

#### *Shortened Design Time*

One of the main causes of incomplete documents is that the designer is not given enough time to thoroughly design the building. Once an owner has decided they want something they typically would like it as soon as possible. This forces architects to design the buildings quickly to meet the building completion date. By accelerating their design many items are often accidentally overlooked. Less time is spent paying attention to the smaller details but instead they focus on the overall design to get it complete on time.

Design time given is directly related to the quality of the construction documents. In a competitive market contractors often compete to offer the owner their building faster. This accelerated construction leads to a shortened design time for any incomplete design for two reasons. First the sheer number of days is reduced. The second is that fast track construction will generate more issues that will require more design attention. These issues are more frequent and urgent because of the acceleration. These issues consume what little design time is remaining. This is something that is very important to consider when considering accelerating the project.

#### *Smaller Fees*

Another issue contributing to incomplete documents is the fee that the architect is able to charge for a job. To be competitive an architect is forced to have a very low fee. The owner is often concerned with the fee from the architect. The fee an architect is able to charge is often negotiated very low because the architect wants the project. This creates a problem once they have successfully won the project. With a reduced fee the architect must reduce the number of hours they spend on the design to avoid losing money. The reduced fee no longer allows them to pay attention to the smaller details that could turn into larger problems in the future. They also seek ways to save time such as the use of similar details and standard specifications.

## The Problems

### *Smaller Fee + Shorter Design Time = Not Enough Time to Complete Design*

Ultimately the smaller fee and shorter design time equals insufficient time to complete the construction documents. This is an issue the owners have forced upon the industry. By demanding their building sooner and for a cheaper fee many problems arise. These problems create friction and poor relationships. This push to save money and time ultimately costs all parties involved more than it could have. Everyone often consumes additional costs incurred. The owner has additional scope items, which are added to the budget. The owner may choose to hold the architect responsible for some of these items. The contractor ends up paying for some of the issues that could be considered the intent of the architect.

## Design

### *Less Coordination*

A direct result of the shorter design time and smaller fee is less coordination. Shorter design time requires the architect and the engineers to work very quickly. This gives the one designer less time to know what the other designers are doing. This creates gaps and conflicts in the design.

This does not allow a lot of time for coordination between the groups. This leads to changes being overlooked such as an missing that the engineer no longer has an additional column in the building because the size of the members were increased. So the architectural drawings still show a column with a column wrap when there is no longer a column.

This is also impacted on an intra-discipline level. The change to one system often impacts other systems. If this is not properly coordinated these issues could create future problems during construction. For example a buildings structural system was designed as a steel structure with a light gauge metal truss roof. The steel structure consists of bolt connections. At the roof level there are bolted connections on the top face of the beams. These plate and bolt patterns are in some cases over two feet in length. The roof trusses are required to be two feet on center. Because the truss could not sit on top of the bolt and nut a channel was welded to the cover the bolts and create a flat surface for the truss. This is an example of a problem that could have been avoided if spotted during design coordination. The connection types for top members could have been changed leaving a flat surface instead of a problem. This problem not only cost a lot to fix but also more importantly took a long time for the redesign to occur greatly reducing the construction schedule time.

### *Similar Details and Standard Specifications*

The use of “similar” details as mentioned previously also is becoming popular. By using standard details the architect saves time by not having to draw unique details. This saves on design time and costs, which were sacrificed to get the project.

The use of standard specifications is the same as the “similar” details. By using a standard spec from one project to the next an architect is able to save time and money by not recreating specifications. This is also a vehicle used to recuperate time and money lost to be competitive in winning the project.

### *Unclear Organizational Chart = Poor Communication*

The accelerated design time requires considerable communication between all members involved. Communication is directly related to how successful a project is. It is critical that the architect know the changes that the engineer is anticipating and vice versa. A poor chain of command structure amongst the architect and engineer team is a recipe for disaster.

### *Lack of Constructability of Construction Knowledge*

Another reason for poor construction documents is the lack of understanding of the constructability of many of these systems. Many designers do not think about or understand how the systems they are designing are actually assembled. This often leads to designs that are not practical and require redesign once they are encountered during construction. This leads to lost schedule time as the system is being redesigned. It also could impact the schedule even further if the redesign requires additional fabrication or new items to be manufactured.

### *Friction Created between A/E and CM*

Creating a good working team is critical to success on any project. This is especially important on more complicated projects as well as projects with incomplete documents. To create a good team atmosphere the architect, contractor, and owner all must be willing to share information as soon as they are aware of a problem or a change. Often conflict is created when the parties involved try to shift blame from the problems that occur. An example of this is errors and omissions insurance. An owner may seek to go after the architect for his errors and omissions insurance and request the contractor's assistance in locating design changes that should have been encompassed in the original design. This will create a negative relationship between the contractor and the architect. This can create unnecessary friction during an already complicated project. This is especially true when the owner's only concern is with saving money. This creates excessive friction between all members protecting themselves from blame.

Another issue that often plagues the relationship between the "team" is a lack of understanding of the contractual obligations. On many projects there are only a few people and possibly only one person who knows what is expected of them by contract. This can lead to gaps in responsibility and can cost additional time and money to fix. For example who is responsible for maintaining a record set of submittals for the owner. Is it the owner's representative who is copied on all submittals? Is it the architect? Or is it the construction manager?

### *Construction Management Competition*

In a competitive market there is often much competition for projects. In bidding incomplete documents the contractor is expected to make assumptions on the intent of the architect. In a competitive market many assumptions of the architect's intent are often ignored so that the bid can remain competitive. If the bid is successful these intents are later argued. The contractor then must claim that there were "holes" in the drawings and request a change order for the work.

## The Analysis

To further understand the issues facing contractors today with incomplete documents I conducted an investigation to obtain both the industry's opinions on incomplete documents as well as common methods of dealing with incomplete documents. To find these opinions and recommended solutions I posted the question to the thesis discussion board. I also met with and discussed this issue with the Turner staff that is currently managing these documents on Redifer Commons and Eastview Terrace projects. After speaking with Turner and reading the replies from other companies I created a list of key ideas to minimize risk and problems often associated with incomplete documents.

### Keys to Minimizing Risk Associated With Incomplete Documents

1. **Detailed Cost Estimate.** Do not trust schematic estimates performed by the architect. A detailed estimate will provide much more accuracy and reduce risk. Utilize input from subcontractors and market forecasts to increase bidding accuracy.
2. **Only Take on a Project You Can Handle.** Risk is Proportion to the Complexity of the Job. The “complexity” is dependent on the percent completeness of the documents as well as your confidence in the architect. Risk is also mainly dependent upon the contract type you have i.e. GC, CM, or CMA as well as damages for not meeting the completion date. Is the Risk worth the Reward?
3. **Establish a Contingency for All Unforeseen Conditions.** Contingency should be based on completeness of documents, complexity of job, and overall risk with the project. Determine if contingency can be used to minimize risk and who has control of how the money is spent. Establish subsurface clauses with unit prices prior to signing a contract if possible.
4. **Have the Subcontractors Bid Only the Plans and Specifications.** This will ensure a Reasonable Bid. Change Orders and Contingency can absorb Cost of Additional Changes. This eliminates sub markup because of uncertainties.
5. **Document all Assumptions When Bidding (Bid Clarifications).** Make sure all assumptions of the architects intent are clearly identified in writing and agreed upon prior to signing the contract. Also do not except qualifications or assumptions from subcontractors bidding their work. Make sure all of their questions are answered prior to bid. Also conduct a scoped review meeting to ensure that the successful bidder is on the same page.
6. **Establish Open Communication Between All Members Involved.** Communication is critical to success. There should be open communication between EVERYONE including the subcontractors, the architect, the engineers and the owner. Communication with the architect and owner will allow for design changes to be considered and accounted for before they become too costly. Increased costs only makes the project that much hard. If the architect knows your schedule they will know where to concentrate their design time so you will not be waiting as long for a new drawing. Knowing what aspects of the building

- are especially important to the architect will prevent you from value engineering or eliminating their main architectural features or signatures. Communication with the subcontractors will help in fix both field as well as design issues before they become major issues. Who knows the systems better then the subcontractors?
- 7. Experience is Critical.** Put the right people on the job. Often times the people that are available are the ones that are put on the job. It is critical that the staff have experience with the complicated aspects of the project. Training can also help eliminate some lack of experience.
  - 8. Defend the Architect.** A good working relationship with the architect is a necessity for success. Do not assist the owner in abusing the architect if possible defend the architect to promote a positive relationship. A close family is much more productive than a distant family. Remember the architect relationship is part of your risk.
  - 9. Design Management.** This is important especially early on when your estimate does not match the owner's budget. It is very helpful to convince the architect and owner to design to your estimate instead of fight for costs later. The total cost on project typically does not decrease as the project progresses. Value engineering after the fact becomes reactionary leaving the owner feeling they have been cheated or not getting something promised to them.
  - 10. Constructability Review.** A constructability review is huge. As a bare minimum it should be conducted for all aspects of the critical path. If the critical path is delayed the project will be behind. Do not delay the project for a design issue that could have been caught in advance. Key on areas such as foundations, structures, and enclosures. Most jobs that start off bad usually end badly.
  - 11. Lessons Learned.** Learn from your past. It is one thing to make a mistake but it is another if you continue to make the same mistakes. This can be applied to both your positive and negative experiences. Check for typical problems that you have seen or heard about in the past before they can become critical. For example during the structural phase check all shafts to makes sure they line up and agree with the architectural drawings as well. Compiling a list of common problems such as this company wide would be very advantageous.

## **Conclusion**

As stated earlier, incomplete documents are a major risk that construction managers take on. This makes it critical that construction managers learn to manage them effectively and minimize their risk. The list of keys to managing this risk is a list compiled from a number of different people and companies and shows what the industry is currently doing to manage this risk. If this list is thoroughly followed I feel that the risk from incomplete documents can be acceptably managed.