

Examining The Role Of Construction Documentation In Managing The Projects

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Abstract

Introduction

In Construction Projects, Construction Documentation is t considered as the 'Bible for the whole process. These documents are integral parts of the project contract, which is agreed on between all parties. It typically contains drawings and specifications. Even though the information in drawings and Specs are essential it's not sufficient to construct the project solely. There is more supporting documents are required to explain the construction and justify its sequences. The drawings are accomplished in a variety of ways, from the use of computer drafting programs like AutoCAD to BIM (Building Information Modeling) software such as REVIT or even hand drawings if needed. The purpose of construction drawings is to carefully show the quantity and locations of the individual elements of each design.

Purpose of Construction Documents

The documents that are part of the whole thing are building plans, specifications and supporting documents. There are many purposes that these documents serve, for instance, they help in making sure that the needs of the owner and the developer can be translated into the format that is buildable. The other thing that they do is that they allow the requirements to be understood in a format that is comprehensible for project managers. They also help gain permits from the local authorities.

The proper construction documentation is considered the main tool to maintain the healthy relation between time, budget & scope through defining the level of required quality either on specs or a quantity as mentioned in the BOQ as shown in Figure 2.



Figure Healthy Relation between Project Aspects

Starting of the Construction Documents

The creation process starts with the selection of the developer. It might be a school district or any sort of construction. When one of the owners comes up with the concept of the new building, the architect will be brought on board to lead the design process. Several sets of drafts and the building plan would be made by the architect. It would then be approved and modified in each of the respective states. The final plan is referred to as the 100 % completion documents or the CDs they are commonly referred to.



Figure Design Development Steps

Composition of the construction documents

It has to be noted that the set of the completed documents is made of two or three components. The largest component is the building and the drawing. It might range from a single sheet to a hundred pages, and it constitutes the floor plans to the eventual finished selections. It has to be noted that the plans for the project that are of an average size are broken down into many sections. The architected drawings, as well as elevations, are all part of the structural and mechanical drawing process most of the time.

Another major part of the documentation is the construction document, also known as the spec book. The spec book is the project manual that covers the materials and the methods that would be employed during the course of the construction of the project. These are text-based documents in MS Word or any word processing software. The key purpose of these specifications is to make sure that the quality of the work is well-defined as making sure that the performance requirements are made specific, to say the least.

The spec book should not be ignored as it is a vital component of the way the construction process is carried out.

Construction Drawings Components

Most of the time, the construction drawings comprise the following elements.

1. Perspective Drawings
2. Plot Plans
3. Floor Plans
4. Exterior Elevations
5. Roof Plans

6. Sections
7. Foundation Plans
8. Framing Plans
9. Interior Elevations
10. Charts and schedules
11. Other related details

Changing in Construction Documentation

Most of the time, the set of documents that are completed would be changed in some manner by the owner or the architect. Official changes are then brought in the form of a bulletin, press release, supplement or other directives that illustrate the change. These written changes then become part of the document and become part of the component of the set.

Issued for Construction term definition

Once the complete set of documentation has been issued by the architect, the key thing that needs to be done is that it should be approved by the owner and must be ready for the bid. The owner has to submit the drawings to the prospective contractors. They will then estimate the cost that goes into the completion of the job. Most of the time, the one with the lowest bid is awarded the project.

The benefit of having Comprehensive Construction Documentation

The only way to make sure that the scope of the problems is lowered is by making sure that all the relevant documentation related to the project is done in the right manner during the course of the construction of the building.

The documents can be tracked with a project documentation tracker as below attached sample photo below to ensure its compatibility.



Figure Construction Documents Tracker

Approved Construction Documentation

Approved Construction documentation (issued for construction drawings) is considered as the pre-signed agreement between the three main parties of the project (contractor, owner, consultant)

Figure Construction Documentation

Construction Documentation Role in the Constructing Process

First, it demonstrates the client's requirements and needs on drawings and specs and also transfers this information to the consultant and the contractor; the contractor and the contractor's role is to find a reasonable way to construct this requirement with the required quality in a specific time. At the same time, the designer role was found to describe this requirement in the type of specs and drawings that exactly match the client's requirement.

Also, the set of knowledge and abilities that usually the designer should have is a critical item for the development process of client needs or requests.

Peer Review of Construction Documentation

As previously described in Ernest. L Grispy that the design and construction documents represent the best-described solution for the client problem or mission statement, but the items they didn't consider as effective are as follows:

Documentation of Creating the Construction Documents

The research didn't mention if the developers of the design and construction documentation are the same firm or a different firm. If they are not the same firm, there is some consideration that has to be transferred.

Transferring the information between different firms

These considerations transference are the only way to make sure that both of them are aligned with the client's needs, which should match the project goal & mission statement.

Documenting for information recalling

Although most researchers may consider this transferring information is not important, later on in the construction phases, this log would play an important role in making decisions This should lead to a

proper system of documentation for affecting changes.

Peer Review for Drafting Systems

The missed point between most of the research is the documentation of client needs or requests in a type of construction documentation that is different than Drawing and Specs. In this thesis, it is considered as the project management methodology output, which is usually missing from any constructed project, such as project scope statement, project charter etc. It is one of the most critical required items that should be best described in construction documentation.

Drafting system used for producing Construction Documentation

Also, one of the affecting factors is the CADD system (Computer Aided Design and Drafting) system that is used in developing the project construction documentation. (Project Management Institute, 2021)

The CADD system has been discussed and fully covered by a lot of research and papers, which all conclude that using the proper system is related to the project type and complication, as the more project complications, the more details are required. Also, the more detailed CADD software is used that help in producing the project document faster and more accurately. This software gives the firm the ability to communicate with each other and merge the data between them.

Required Drafting Skills and its effect on Construction Documentation

The skills that are required in the CADD team, from detailing and architectural knowledge, usually affect the project process and in the construction phase as the less detailed drawings lead to project changes due to the unavailability of the information or not being matched to other disciplines. These changes can be predicted early before the project starts if the construction documentation is coordinated and well described.

Client usage of Construction Drawings & as-built drawings

The client's use of construction documentation is not limited to describing his needs; it's related to using and maintaining the project after construction. However, the accuracy of using the construction

documentation after construction is related to the number of changes that happen on delivering the site due to any circumstances

These changes, which are documented and described during the construction, are reflected on the as-built set of drawings, which is considered part of project close-out documents

Unplanned Items that Have an Effect on the Construction Phase

During the construction, there are some items that, if it's not planned & estimated properly, have an effect on the construction phase, such as:

Material availability and its effect on the construction process

One of the aspects that are not predicted is the material availability, which depends on the project start date and the material delivery, as well as the long lead item schedule.

This factor, if it is not considered as early as possible, usually leads to a change in the project to use the available material in the specified time frame.

Equipment and machinery effect on the construction process

Also, the machines and equipment used in the construction phase are affecting the project in one way or another, which should be described in the construction method statement that, at some times, affects the project and leads to a change. When entering the equipment or the machine maneuver is affected by the project steps.

The Equipment and machinery work should be mentioned in construction documentation in one way or another, either on split drawings to stages or on a set of detailed drawings developed by CADD systems. However, the problem appears when the CADD systems describe the final phase without any mentioning or imagining how these steps will be constructed, and they can affect each other.

Team Staffing and its Effect on the Construction

Process

Team consideration is mainly one of the critical items in project delivery time, as team assembly and grouping are affecting the project time frame. Also, the nature project differs from one project to another in its resource needs. For example, some projects that have a hard constructability nature require structural team members more than others that have an architectural detailing nature.

In conclusion, the site staffing and requirements should be part of the construction documentation that best describes the project and the client's needs together in one document. Also, no. of staff and classification should be specifically as per the project requirement.

Archiving system for project development steps

In the previous papers and research, most of them concentrate on finding the best documentation describing the client requirement which is the bid component, but the best-described document steps to achieve the client requirement are not usually archived.

In spite most the researchers found that archiving the method or the way to find the goal is not necessary as long as the client's need is described well in a proper set of drawings & specs that considered the goal, in this thesis, we found that archiving client needs along with the way followed to achieve his needs and retrieving it when it's needed is one of the required methodologies to avoid further client changes.

Archiving will avoid duplication of requests. This archiving also has to be with a proper way with a proper methodology that allows easy retrieving; thus will be described later on. The short iteration connected with the user stories that the client needs based on it. The provided archived steps prevent the need for duplication.

On the other hand, the process used to produce the construction documents also describes for the contractor the best way to construct the project.

Project Short Iteration Deliverable Quality Checks

The process of producing the drawings usually has several checkpoints, starting from the quality checks in the production phase and continuing to the development stage, which has a systemic review process to ensure the coordination between all discipline packages.

This review includes confirmation of the implementation of standards and specifications in the project documentation. Usually, every discipline reviews and rechecks his drawings and makes sure that they adhere to the common standards and specs. At the same time, the whole project team should meet regularly to coordinate with each other about the construction drawings.

Project Meeting Reviews

This meeting is one of the communication methods that have to be followed to make sure that the information is transferred from one discipline to another. Also, mails, MOM (Minutes of Meetings) and RFIs can be considered as one of the communication record methods.

Documentation of Project Communication

In every project, there is probably a communication management plan, but the documentation of the communication itself and changes that usually happen that result in the end product are not properly documented. The process of documenting the design development steps in most of production firms is not important, however in the construction phase the availability of scenarios of development is affecting decision making in construction changes. (Bright & Cortes, 2019)

The documented scenarios represent to the contractor why the designer chose that specific solution and also clarify the project vision for every participant in the project. This clear vision gives the constructor the ideal solution that should be selected that matches the previous design methodology if the constructor has to make a decision in the absence of the designer.

On the same page, this documentation keeps the designer on track while preparing the design as he has to justify his selections and design to the client and the constructor later on.

Benefit of Documentation of Communication

Although this process of documentation will definitely slow down the development process and may also affect the delivery time of the end product, by using this method, we can guarantee that the outcome matches the client's needs, specs, site obligations and location standards. (Association for Supply Chain Management, n.d.)

This slowdown should include the approval of the client on every deliverable, and our sub-deliverable, which is considered a step on the way of producing the final product.

Also the scenarios should be based on the client or the user stories that explain his intentions in using the project or the project land. Documentation of the user stories is also a must as it's the emitter for the deliverable, and it's the only parameter that can be used to judge if the final outcome matches the client's need or not.

Peer Review of Project Estimation

As described in research, estimation is one of the important factors that make an early judgment for the project's success as the rough estimated time and cost are considered later on as the judgmental tool used to find out if the project succeeds.

When estimation goes inaccurate, In spite of the proper procedures that have been taken to put the project on the right path, the wrong estimate may cause a project to fail before it starts as long as the project comparing base is wrong, that puts the whole project process in a critical situation to try to achieve the wrong commitment that has been taken based on inaccurate estimation.

The nature of progressively elaborated planning is usually not taken into consideration while doing the first project estimation. However, the developing process should not affect the base estimate too much.

Estimation and planning are considered the best tools that can forecast the project timeline and needs as they support making decisions and reducing uncertainty.

However, the project estimation is usually used as a commitment to be followed. The base of the estimate is usually not documented. As the base of the estimate and the data collected, the project projection based on it needs to be accurately documented. Also, the basis of the estimate followed method is not documented in the tender construction documentation.

Peer Review of Project Changes

In the research, the changes are considered as part of the project process, which has to happen. The project manager and project team have to find a way to manage these changes, which is usually called the change management process. Some researches talked about how to reduce the change and others concentrated on how to put a proper methodology in dealing with change and validate it. Although in normal practice, they considered a project with zero changes almost impossible due to unexpected items, what is targeted for the zero changes is managing the project and forecasting all unseen items in a way that never allows for any changes. This possibility is related to covering all aspects that could result in changes.

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