A Comprehensive Overview of the Commercial Construction Process for Clients

Part One: Pre-Construction

08/09/2023

Mikayla Wood

Overview

The commercial construction process can be loosely defined as the process by which commercial structures are conceptualized, designed, built, opened, and operated. Examples of commercial construction buildings include office buildings, manufacturing plants, medical centers, retail shopping centers, and more. This process consists of three phases, each with its own set of steps. These steps may vary depending on the purpose, size, and budget of the construction project.

The Three Phases

- Pre-Construction
- Construction
- Post-Construction

Every construction project has three phases, pre-construction where the conceptualizing and planning take place, construction where the building happens, and post-construction where final inspections and the grand opening occur.

The Pre-Construction Phase

The pre-construction phase is the beginning of the construction process and is a crucial part of any construction project.

Key Steps in the Pre-Construction Phase

During this phase, planning and design occur. The importance of careful planning and designing cannot be overstated as it can minimize delays and according to Gambatese et al. maximize worker safety. “Designing for construction safety entails addressing the safety of construction workers in the design of the permanent features of a project.” The steps involved in the pre-construction phase are as follows -

- Conceptualization, Design, and Feasibility Analysis
- Obtaining Permits
- Cost Estimation
- General Contractor Selection
- Material Procurement
    - Secure Funding
- Planning and Scheduling

Conceptualization, Design, and Feasibility Analysis

In order to begin the full-scale design process, a feasibility analysis, or feasibility study, should be performed. Often before the primary feasibility study can be conducted, a preliminary feasibility study is completed. A preliminary feasibility study, or pre-feasibility study “helps to “frame” and “flesh-out” specific business scenarios” (Iowa State University 2020) or, in terms of construction, helps to narrow down the list of potential projects. Following the preliminary feasibility study, the primary feasibility study is conducted. Feasibility studies are conducted by project coordinators to “determine the viability of their idea before proceeding and incurring upfront development costs” (Iowa State University 2020)’. Feasibility studies are also used to identify issues with the project or project site that need remedying and conduct environmental impact assessments (EIA).

Before there can be a structure, there must first be an idea. Many construction projects begin with a “needs assessment”. A needs assessment is the process by which the purpose, or function, of a construction project is identified. Need assessments can come in several forms. Even when someone looks in the refrigerator to determine what they need to cook a meal, they are performing a needs assessment. In the context of construction for example, a landowner looking to develop their property can perform a rudimentary needs assessment to determine what type of structure would be most successful at that location, or a skilled laborer looking to open a business front may complete a needs assessment to identify where their business would earn the most profit or contribute the most to the surrounding community. This process can also include establishing the basics of construction design and necessary facilities.

After determining the purpose of the structure architectural designing can begin. This is the step where architects and designers are introduced and begin working. The process begins with preliminary designs and models for the proposed project. Many things must be considered when designing a building. For example, purpose, users of the structure, available space and square footage, traffic (of people into, inside, and out of the structure), floor plans, plumbing and electrical (and other necessary utilities), as well as the architectural character. This is where design drawings come in.

Construction Design Drawings

These are detailed technical drawings created to display up-to-date and accurate information to the various professionals working on a construction project both on and off-site. Construction drawings can be produced by hand or digitally, and typically visually represent structural elements. Examples of construction drawings include

site plans, plot plans, floor plans, excavation drawings, architectural drawings, mechanical and electrical drawings, landscape drawings, plumbing and drainage drawings, elevation drawings, section drawings, and detail drawings. Each type of construction drawing serves its own specific purpose.

Site Plan: A site plan is a comprehensive overview of a property's existing features with all of the proposed construction and other changes. This includes things such as building locations, property lines, elevations, access points, pathways, and fire hydrant locations. Many site plans also show sewer lines, drainage facilities, lighting, and landscaping. The site plan is arguably the most important construction drawing for clients to be able to read and interpret. Understanding the title block is the first step to understanding a site plan. Also featured in section drawings, elevation drawings, and floor plans, title blocks are typically in the bottom right-hand corner. Title blocks usually provide the viewer with the client's name and information, the architect's name and contact information, the site address, the title of the plan, and the scale of the drawing. Other important information to know before trying to read a site plan is the orientation of the plan, the datum point, and the meaning of the various abbreviations that may be used. The orientation of the plan can be determined by locating the “north point”. This symbol often appears as a capitalized letter “N” with an arrow indicating which direction is north. The datum point is the place (on the plan) at which dimensions and elevations are referenced. Abbreviations are common on site plans and other construction drawings. For example, FA meaning floor area, COL meaning column, and KIT meaning kitchen. These abbreviations can vary based on location and architect.

Plot Plan: A plot plan is very similar to a site plan and although often used interchangeably, they have their differences. A site plan, as described above, shows all existing structures as well as proposed structures allowing for a view of the entire site as a whole and all structures in relation to each other. A plot plan focuses on the location and layout of a single structure. When developing a project such as a single-family home that does not interact with or include surrounding structures, a plot plan may be utilized. However, when developing a larger project such as a commercial mall, site plans typically incorporate many different structures on several plots of land.

Floor Plan: A floor plan is a type of construction drawing that shows a birds-eye-view of a construction project or site without the roof. These drawings showcase and label specific elements such as the dimensions of walls, the wall/floor material, the location and direction of staircases. They allow the viewer to see where rooms will be located and the purposes of those rooms as well as the locations of closets and doorways. For multi-story structures, separate floor plans are typically made for each floor. Additionally. Each building in a multi-structure project would have its own floor plan construction drawing.

Excavation Drawings: An excavation construction design drawing shows the design and dimensions for earthwork (excavation) in a construction project. This includes the length, depth, and width of the building excavation.

Architectural Drawings: An architectural design drawing visually represents a structure, structures, or a structural element’s form and function. These drawings can be produced by hand or digitally, and like all other construction drawings are intended to convey accurate and up-to-date information to all parties involved. These drawings incorporate many elements of other design drawings including the floor plan, site plan, and section drawings.

Mechanical and Electrical Drawings: Mechanical and electrical drawings are an integral part of the design process. These drawings show the heating, cooling, ventilation, and electrical systems. Also referred to as HVAC (heating, ventilation, and air conditioning) drawings, they provide the viewer with the proposed locations of power outlets, light switches, and light fixtures as well as heating and cooling ducts, thermostat locations and wire paths.

Landscape Drawings: Landscape construction drawings show the intended locations designated for landscape features surrounding the structure or structures. These features vary based on the type of construction and include but are not limited to trees, grassy areas, flowerbeds, gardens, shrubbery, ponds, and pools.

Plumbing and Drainage Drawings: Like how an electrical drawing shows the locations of electrical wiring and elements, a plumbing and drainage construction drawing shows the intended locations of plumbing and drainage pipes and elements. This often includes sanitary and water pipes, the water drainage system, as well as the locations of water taps such as sinks, showers, and hose hook-ups.

Elevation Drawings: An elevation construction design drawing is a type of blueprint that shows a flattened view of the structure from a specific perspective. Sometimes said to show the "skin" of the building, these drawings show either the interior or the exterior surface of a building. Elevation drawings provide the viewer with a two-dimensional view of a three-dimensional object, or from an orthographic perspective. This means that they are usually drawn to scale, and do not show depth resulting in many elevation drawings being made for each project from different views. Typically drawn from a vertical plane, these drawings are a graphic representation of the present or intended architecture.

Section Drawings: Similar to how scientific samples are thinly sliced (or *sectioned*) for viewing under the microscope, section construction drawings depict a portion of the structure typically cut on a vertical plane. Unlike elevation drawings, section drawing can be from orthographic or three-dimensional views. Drawn to scale, these drawings show interior dimensions and proportions, allowing the client to see the locations of rooms and their relation to each other. For project workers, these drawings allow for more accurate communication and construction. Imagine a house, sliced in half so that someone can see inside the rooms, roofs, and walls.

Detail Drawings: Detail drawings depict specific elements of a construction project in greater detail. This typically means that these drawings are much larger in scale than other types of construction drawings. For example, a floor plan may be drawn to a 1" = 20' or 1" = 40' scale whereas a detail drawing may adhere to a 1" = 10' scale. This can include elements such as staircases, window and door frames, as well as decorative features.

Following the conceptualization, feasibility analysis, and design development is

Obtaining Permits

Obtaining the proper permits for a construction project is essential. There are several steps that must be completed before the carefully drafted design drawings can become official permitted construction drawing. This may prove to be a tedious process, but these permits help to ensure safety, efficacy, and efficiency. Any project is "dead in the water" if the necessary permits are not obtained. This process begins with completing the building permit application.

Building permits are documents detailing a project's offical approval by the local government. To obtain a building permit, the project plan must comply with local, state, and/or federal laws and regulations depending on the project location. Several different types of construction require the issuance of a building permit. This includes but is not limited to:

- The construction of a new structure or building
- Addons or enlargements are being made to an existing structure
- The occupancy classification of a new or existing structure changes
- Structural changes interior or exterior of an existing structure are being made
- A structure is undergoing partial or complete demolition

Typically, a building permit is not required when making purely cosmetic changes to the interior of a structure. This can include changes such as new hardwood flooring, a new layer of paint, or installing new baseboards. Exterior work such as repairing or repainting siding may or may not require a building permit depending on the building location. Similarly, the installation of new appliances or plumbing fixtures may require a building permit but, in most cases, does not.

The permit acquisition process begins with completing the building permit application. This application may vary depending on the location of the construction project and the issuing agency. In general, a building permit application will require zoning permits and approved zoning site plans, and complete structural plans and design drawing signed off by a licensed professional engineer. To ensure the permit process goes as smoothly as possible for all parties involved, there are steps the applicant should take before submitting the building permit application. For new construction, applicants need to validate the project's address. Addresses are typically assigned by the foremost governing body depending on the project location, often the local planning and zoning committee, when applying for a residential or commercial building permit. This process is essential as it registers the structure and property with emergency services. However, it does not register the property with the United States Postal Service (USPS). Registering with the USPS typically requires a visit to the local post office. Some locations require the person registering to present the deed to the structure along with a valid form of identification such as a State ID, a Federal ID, or a driver's license. Before delivery to the new address can be established, the proper paperwork must be completed.

Following the registration with the USPS, some municipalities require a plan review deposit to be paid. This is a monetary deposit required before submitting the project plans for review and approval. Then, the design drawings and other documents should be uploaded to the required network. All necessary documentation should be completed and reviewed by the engineers, designer, and architects prior to the plan review deposit being made. Required files may vary depending on location and governing body. Double-checking the requirements before uploading the documents can help to avoid unnecessary and unintended complications that may arise from being ill-prepared or inattentive. Some locations may require additional documents along with the construction drawings such as specification documents, or documents that outline requirements for the construction process, materials, workmanship, equipment, and systems.

After uploading the necessary files, the applicant may be required to complete additional tasks depending on location and the submission system used. This could include assignments such as ensuring that the project files are in order and verifying contact information for all necessary parties: client, general contractor, structural engineer, architect, etc. Simple mistakes such as a mislabeled file, incorrect email, or wrong address can delay a project or result in application rejection requiring the entire application to be resubmitted and rereviewed. Finally, after completing all required tasks and uploading all necessary documents, the applicant can submit the application for review.

At the end of the review period the application will be returned to the applicant with notes, questions, and comments that need to be addressed before application approval. For example, changes to the design may be required for the structure to adhere to local building and health codes. This could include adding additional elements or removing certain elements to ensure compliance with local, state, or federal regulation. When these changes are made, the drawings should be submitted for final review and approval. The review and resubmission process can occur several times before the project is approved which is why it is incredibly important to do a comprehensive and thorough review before submitting the design drawings for review. Completing due diligence can make the review process smooth and efficient, whereas low quality and rushed work can make this process long and arduous.

One may think that once the project plans have been reviewed and approved that construction can begin but there are still several steps before ground can be broken.

Cost Estimation

Cost estimations are typically the responsibility of the general contractor (GC), which will be discussed in the next section. The cost estimation must be completed before the general contractor can make a bid for a construction project. According to *Construction Cost Estimating* by Len Holm and John E. Schaufelberger, "[c]construction estimates are prepared throughout the design process of a project beginning with the programming and conceptual phases followed by the schematic design, design development, and construction documents". Every aspect of the project is included in the cost estimate, from the subcontractor fees to the permit application deposits.

Accurate cost estimates are paramount. The success of any construction project relies heavily on this estimation. When these estimates are correct it can save contractors and clients time and money as well as reduce the risk of project delay or failure. Cost estimates often include the cost of equipment (rental, leasing, repair), a contingency fund, professional fees, material costs, labor, and indirect costs such as inspection and permit fees.

Typically, general contractors use a combination of cost research, expertise, and historical data to calculate an accurate estimate. There are many methods of calculating the estimated cost of a construction project. General contractors use different methods and different data to create their cost estimates, which is why it is so important that potential clients do their research on each offer and contracting firm before accepting a bid.

General Contractor Selection

Once the construction drawings have been approved and the building permit issued, the bidding can begin. The bid represents the estimated total cost of the project. This includes the cost of materials, construction, along with the contractor's cost, overhead, and profit. A reliable, and efficient general contractor (GC) is essential to a successful construction project. If the construction of commercial structures was a play, the general contractor would be the stage manager, ensuring that the project is on time, the workmanship is quality, everyone is working with accurate and up-to-date information, the production is staying on budget, and all required materials are procured. Along with these responsibilities, the general contractor also hires and manages the various necessary subcontractors, handles equipment acquisition, and oversees site safety.

Often clients will select the bid with the most competitive price. In other words, the lowest bid wins. This is why proper cost estimation is crucial. However, other factors may be at play when selecting a general contractor, especially in commercial construction. Clients should consider factors such as -

- General contractor safety record
- Recommendations and reviews
- The statement of qualifications
- References
- The contractor's insurance
- The contractor's relationship with the construction community and local community

Prior to searching for a general contractor and accepting a bid, the client should define the project. Determining the type of project helps to narrow down the list of potential contractors as some contractors specialize in specific types of construction. For example, the contractor one hires for a renovation or an addon may not be the same contractor one hires for a new construction. Additionally, performing due diligence such as consulting reviews and recommendations, obtaining the contractor's statement of qualifications, checking references, confirming that the potential contractors have insurance, a good safety record, and a strong relationship with the local and construction communities, can give insight on the quality and efficiency of the potential general contractors.

After a bid is selected, the general contractor works with the owner to form a detailed contract that will be agreed upon and signed by both parties. This contract should be reviewed by both parties before signing. Compromises may be required but clients should not let the general contractor pressure them into signing a contract that they do not fully understand or agree with. That being said, the client should not pressure the general contractor into signing a contract that they do not agree with. It is important for both parties to be clear and concise with their requirements and to ask questions. Confusion and miscommunication can kill a project with lethal efficiency. Clients should do careful research before entering into a contract with a general contractor and are encouraged to ask questions and for great clarification for any potential confusion.

A general contractor agreement becomes a legally binding contract once it is signed by both parties. The contents of the contract may vary depending on the location and the general contractor. Generally, these contracts contain the following -

- The general contractor's information: This can include the GC's name, contact information, license number, proof of insurance, and place of business.
- A detailed account of the intended work: The work that the client is hiring the general contractor for must be described in full detail, including any and all tasks expected of the general contractor. This is a legal document; no detail is too minor. The importance of clarifying all responsibilities of the general contractor cannot be overstated.
- The schedule: The contract may not detail the exact schedule, but a general idea of how long the work will take, with start and completion dates, should be included.
- Building permits and other necessary authorizations: All permits and municipal authorizations should be completed and approved prior to signing a general contractor agreement, or this section should include who is responsible for obtaining these permits. Typically, if the permits have not been acquired by the time a general contractor contract is signed, the responsibility falls to the general contractor. Proof of the general contractors required insurance and licenses can either be at the beginning in the general contractor information section or in this section.
- Costs and compensation: This should include the contract sum – the total amount the contractor will be paid. Additionally, this section needs to include a detailed list of what is planned to be purchased and their estimated costs. The compensation section also outlines how and when the client will make payments to the general contractor.
- Policy and instruction on potential project changes: It is vital that the general contractor agreement includes a section dedicated to detailing in what circumstances and under which stipulations contract alterations can be made and how these changes will be negotiated.
- Termination clause: The termination policy can be a separate agreement known as a general contractor termination agreement, or the process can be simplified by including a termination policy in the general contractor agreement. This section should include the specific conditions under which the client or the general contractor can terminate the contract.

Other sections often included in a general contractor's agreement: waivers of liability, warranty, lien waivers, project cleanup. After the general contractor is selected, the bid is accepted, and the contract is written and signed, the general contractor can begin the process of material and equipment procurement.

Contract and Material Procurement

There are two types of procurement in construction. The first is contract procurement. Procurement specialists, also referred to as procurement managers, evaluate vendor bids, analyze and award vendor contracts, manage vendor contracts and ensure that contracts are fulfilled successfully and on schedule. Each offer needs to be interpreted and understood so that the general contractor can determine the amount of product being supplied, the quality of the product, contract deadlines, and when the product will arrive onsite. Procurement specialists use a variety of different methods including but not limited to Design-Bid-Build (traditional), Design-Build, Design-Build-Finance, and Management Contracting to attain projects and materials.

- Design-Bid-Build (traditional): The Traditional Contract, or Design-Bid-Build method begins with the design. In this method, the general contractor is not involved in the design process, which is carried out by the owner and an architect or design team. Then, the completed design drawings are bid on by general

contractors. The winning general contractor enters into a contract with the client assuming responsibility for the construction project including the subcontracts, material procurement, and scheduling.

- Design-Build: The Design-Build method starts with the client picking a contractor. This contractor is responsible for both designing and constructing the project. Many clients choose firms that specialize in this method because it allows them to work with only one entity, or firm, as opposed to many different firms or independent experts. This method also puts the responsibility of material procurement such as labor, equipment, and building supplies onto the contractor. General contractors are also responsible for what some companies call "value engineering". Value engineering involves designing and constructing a high-quality project that meets the budget constraints.
- Design-Build-Finance: The Desing-Build-Finance process is a method of project delivery and acquisition where the client enters into a contract with a general contractor. The general contracting firm then designs, constructs, and at least partially finances the project.
- Management Contracting: Management Contracting is a method where the client appoints a manager (management contractor) and employs a team of designers

General contractors or procurement specialists must determine what materials are necessary and select reliable, high-quality vendors to supply the required materials. Like how the client receives bids from several different general contractors, general contractors may receive bids from several vendors vying to supply the construction project. After the general contractor's agreement is signed, the GC can begin the material procurement process. The client may be involved in this step, but material procurement is typically the responsibility of the general contractor. Material procurement is the process by which the general contractor or responsible party obtains the material necessary for the completion of the construction project. This does not just refer to the physical materials such as lumber and steel, but also securing the required funds and labor.

The material procurement stage of the pre-construction phase can be heavily influenced by the general contractor's connection to the construction sector. A general contractor with strong relationships with members of the construction community such as manufacturers, suppliers, subcontractors, banks, and delivery drivers may be less likely to experience delays and setbacks in the long run. Inquiring about the general contractor's procurement process before signing the contractor's agreement can provide important insight into the strength and stability of their supply chain. Some companies use third-party material procurement specialists while others have in-house procurement specialists which can affect the efficiency and reliability of material procurement.

Planning and Scheduling

The planning and scheduling stage of the pre-construction process can make or break a construction project. No amount of brilliant design, eco-friendly materials, funding, or permits can compensate for a poorly planned project. The pre-construction phase is sometimes called the "prep" or "getting ready" phase because it metaphorically lays the foundation for the future of the project.

The schedule for a project should break down the specific tasks that are to be completed, when they are to be completed, who is to complete them, how long the tasks should take to complete, and what materials are needed to complete the tasks. These schedules should also list the tasks in order of completion or priority. The creation of schedules is typically the responsibility of the general contractor.

The tasks included on a construction schedule generally align with the key steps of the construction phase of the commercial construction process. Broadly, these tasks include but are not limited to:

- Site Preparation and Groundwork
- Foundation

- Framework
- Exterior Work
- Rough Interior Work
- Interior and Exterior Finishing
- Landscaping

Each of these steps can be broken down into smaller, more specific tasks that are allocated to qualified subcontractors and other professionals by the client's general contractor. Depending on the general contractor, the completion of the construction schedule concludes the pre-construction phase, and the project is ready to break ground.

Conclusion

Following the completion of the pre-construction phase, the construction phase can begin. In order to ensure a safe, quality, and efficient construction phase, the key steps of the pre-construction phase must be completed carefully, and accurately completed. A rushed pre-construction phase can only lead to problems later in the construction process.

References

Gambatese, J. A., Behm, M., & Hinze, J. W. (2005). Viability of designing for construction worker safety. Journal of Construction Engineering and Management, 131(9), 1029–1036. https://doi.org/10.1061/(asce)0733-9364(2005)131:9(1029)

What is a feasibility study? - Iowa State University Extension and outreach. (n.d.). https://www.extension.iastate.edu/AgDM/wholefarm/pdf/c5-65.pdf

Holm, L., & Schaufelberger, J. (2021). *Construction cost estimating*. Routledge/Taylor & Francis Group.