



# The Process Of Building Construction From Start To Finish.

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## **Abstract**

Building construction is an old human activity that started purely from a functional need to provide house from the elements. Over time, human beings have accommodated to a variety of climates. The first human shelters were primary structures that did not last many time. Building construction has since evolved to shape the built environment we know and love today, encompassing not only buildings but also essential infrastructure such as roads and bridges.

Now, more durable structures are available thanks to the development of durable construction materials, elaborate building techniques and processes, and improvements in construction labor, as well as a better understanding of a breadth of building components. Understanding different building types is crucial for ensuring safety procedures and optimizing design considerations across various construction scenarios. Additionally, new materials and innovative techniques are continually being developed to improve building resilience, sustainability, and efficiency.

## **Keyword**

Site preparation, Excavation, Foundation, Framing, Masonry, Electrical and plumbing work, Floors and Floor Coverings, Roofing, Exterior finishing, Heating and cooling work, Interior finishing, Woodwork and fixture fittings, Waterproofing, Painting, Safety considerations, Quality control , Handover

This article will discuss about the building construction process from start to finish.

The building construction process is a series of routine tasks completed by skillfull persons. This process can be divided into three phases: preconstruction, construction, and post-construction.

## **Step 1: Preconstruction process**

The preconstruction process is where the contractor and the design team develop detailed drawings, budgets, schedules, and labor projections.

## **Acquiring land**

The most important step in building construction is acquiring land for the project. The location should be well-suited for the project requirements. Timing also plays a important role in land acquisition as it relates to the building construction process. Certain projects (such as infrastructure and institutional educational projects), require construction to fall in a certain time period, season, or set of favorable weather conditions.

## Estimating and budgets

The construction estimator estimates the quantity and quality of materials needed. The contractor will then develop a budget that includes estimated costs of labor, materials, machinery, and other requirements. The budget will depend on the quality and quantity of materials needed.

If financial resources are limited, the contractor and the property owner must seek pre-approval loans before construction.

## Schedule

Once the project scope is laid out and the contractor has done a site visit, it is time to develop a project schedule. The schedule defines when certain aspects of the work will start and end.

The schedule is typically updated during the project lifecycle to paint a clearer picture of construction timelines. Project scheduling is crucial as it affects overall project costs and profit margins.

## Construction type

Selecting construction type of a building is a fundamental consideration in the building construction process. It ultimately determines the materials and methods used to create the structure. In the construction industry, there are five main types of building construction: fire-resistive, non-combustible, ordinary, heavy timber, and wood-framed. Each construction type offers distinct advantages and challenges, but it influences everything from fire resistance and safety to durability and maintenance needs.

Fire-resistive construction, often used in high rise buildings and school buildings, relies on materials like reinforced concrete and protected steel to maximize fire resistance and structural integrity. Non-combustible construction uses steel and concrete materials that do not contribute to fire spread. It's a popular choice for industrial construction and large commercial projects. Ordinary construction, sometimes known as brick and joist structures, combines masonry exterior walls with wooden interior elements in order to balance cost and performance. Finally, heavy timber construction features large wooden components and exposed wood, providing both strength and aesthetics, while wood-framed construction is commonly used residential projects due to its cost-effectiveness and ease of assembly.

Understanding construction type is essential for the entire project team including architects, engineers, and contractors, as it impacts compliance with building codes, safety standards, and project management decisions.

## Building Materials

After choosing the construction type, building materials selection will subsequently shape the structure's performance, appearance, as well as sustainability. In addition to construction type which will determine fire resistance, building materials is influenced by climate, budget, owner requirements, and the desired aesthetics of the finished building.

Combustible materials, such as wood, are often chosen because they are multi-use and cost-effectiveness, especially in residential and lightweight construction. On the other hand, non-combustible materials, including brick, stone, and steel, are preferred for their fire resistance and durability, making them ideal for more durable structures and industrial construction. The use of sustainable and eco-friendly building materials is on the rise, as the construction industry seeks to reduce carbon emissions and minimize the environmental impact of new construction.

Tools like building information modeling (BIM) have revolutionized the way construction professionals estimate material quantities, manage costs, and ensure quality control. In turn, this will help project teams to optimize material selection, reduce waste, and improve overall safety and efficiency throughout the construction process.

## **Step 2: Design and permitting phase**

Design and permitting are the next phases of the construction process. During the design phase, the design team specifies the building elements such as walls, floors, and roofs, taking into account their fire resistance and material composition, as well as needed layout for functionality. Oftentimes, design and permitting are not completely linear after preconstruction. Sequencing could also vary depending on the project delivery method. The final design will guide how the building is constructed using the chosen materials and methods.

### **Design**

During this part of the construction process, the design team (architects, engineers, and other specialists) will typically meet with the property owner. Based on the project requirements and scope, the design team will work to create a detailed drawings of the project with specifications.

The design phase provides a foundation for a project moving forward. Accuracy and collaboration are thus critical in this phase to ensure designs meet any regulatory, safety, and other owner-specified requirements. When mistakes happen in design and are not addressed prior to the construction phase, they can have a big impact in schedule and budgets.

Knowledge and tools play an essential role in design phase success. Design teams need to be up to speed on relevant building codes, zoning requirements, and any sustainability requirements of the project. Computer-aided design (CAD), building information modeling (BIM), and other model coordination tools are all vital for modern architects and designers to use in this phase to efficiently and accurately produce drawings and specifications.

### **Permitting**

After designs are finalized, permitting and approvals are the next steps in the construction process. Drawings and specifications produced by the design team are submitted to relevant local agencies and authorities to ensure the project complies with any regulations or codes. At times, this phase may require community outreach from local groups or neighborhoods to ensure the project can proceed without roadblocks. Permitting is ultimately crucial for avoiding legal issues and keeping building teams as well as end users safe once operational.

## **Step 3: Building construction phase**

With the project plan and team in place, it is time to clear the site and start building. The building construction phase is where the project comes to life. It is a critical step because it involves multiple working parts and deadlines.

Each contractor and subcontractor must now execute the plan, from site preparation to construction.

### **Site preparation**

Site preparation is the clearing of the site in readiness for construction. Site preparation clears the way for other remedial or demolition work required before workers start constructing the building.

Site clearing involves removing rubbish, machinery, equipment, and unwanted materials. Some site preparation activities may require approvals. The workers must take care not to destroy any trees that are meant to be protected.

A site waste management plan (SWMP) is essential to ensure materials are managed and disposed of efficiently and legally. The SWMP also outlines the reuse and recycling of materials where possible. Only professional disposal experts should handle hazardous substances like asbestos and contaminated waste.

Site preparation is typically carried out under the main construction contract but can be carried out in advance. Site preparation can also be part of a wider enabling works contract, including soil stabilization, demolition, construction of access roads, and services diversion.

## **Construction**

The construction process begins at excavation and ends once the interior and exterior finishes are complete.

### **Excavation**

Excavation is the process of removing earth and rock to create a cavity in the ground, a critical first step in building construction for preparing foundations, basements, and other underground structures. The process involves site preparation and surveying, followed by digging with either manual tools or heavy machinery, and is essential for site development, utility installation, and creating a stable base for a new structure.

### **Foundation**

A building's foundation is the lowest structural element that transfers the building's weight to the ground, providing stability and support. It is crucial for preventing settlement and collapse by distributing the building's load evenly across the soil. Foundations are essential for the safety and longevity of a structure and are generally classified as either shallow or deep, depending on the soil conditions and the building's load.

### **Framing**

Framing in construction is building a structure's skeleton using interconnected members (wood, steel, concrete) to provide shape, support, and stability, transferring loads to the foundation, contrasting with mass wall construction; common types include wood light-frame (studs, joists, rafters) for houses and rigid/braced frames with beams/columns/slabs for larger buildings, all creating the essential support for walls, floors, and roofs.

### **Masonry**

Masonry in building construction is the technique of building structures by laying individual units (like bricks, stone, concrete blocks) and binding them with mortar to create strong, durable walls and elements, offering excellent fire resistance, insulation, and aesthetic appeal for both load-bearing (foundations, walls) and non-load-bearing (cladding, partitions) uses. It's a timeless method valued for its longevity and versatility in architecture, from basic structures to decorative facades.

## Electrical and plumbing work

Electrical and plumbing work in building construction involves installing essential systems for power (wiring, panels, fixtures) and water/waste (pipes, fixtures, drainage) to make a building functional, comfortable, and safe, requiring detailed MEP (Mechanical, Electrical, Plumbing) design, adherence to codes, and professional installation for water supply, sanitation, and electricity distribution, often done concurrently with other construction phases like framing and concrete pouring

## Floors and Floor Coverings

Floors in building construction involve a base layer (subfloor/base course) and a finish (floor covering) for support, aesthetics, and durability, with common materials ranging from cheap mud/brick to durable concrete, stone, wood, and modern options like vinyl, laminate, and tiles (ceramic, porcelain). Selection depends on cost, durability, maintenance, and the specific room's use, balancing practical needs with visual appeal and comfort.

## Roofing

Roofs in building construction are crucial top coverings that protect structures from weather, providing insulation, stability, and aesthetics through various shapes (flat, pitched, domed) and materials (tiles, metal, shingles, green systems). A complete roofing system includes a structural frame (trusses, beams), sheathing, underlayment, and the final covering, working together for weatherproofing, energy efficiency, and durability. Common types range from simple gables and hips for drainage to modern solar or green roofs, chosen based on climate, cost, and design

## Exterior finishing

Exterior finishing in building construction involves applying protective and decorative layers (like paint, stucco, siding, cladding) to a building's outer walls to shield it from weather, improve energy efficiency, and enhance aesthetics, with common materials including brick, stone, wood, metal, fiber cement, and glass, all crucial for durability and curb appeal.

## Heating and cooling work

Heating and cooling in building construction, known as HVAC (Heating, Ventilation, and Air Conditioning), involves designing systems to control indoor temperature, humidity, and air quality by managing heat gain/loss through the building envelope (walls, roof) and distributing conditioned air/water via ducts, pipes, and fans for occupant comfort and energy efficiency, using components like furnaces, chillers, heat pumps, and controls, with system choice depending on climate, budget, and building design

## Interior finishing

Interior finishing in construction involves applying final surfaces to floors, walls, and ceilings to protect structures, enhance aesthetics, and add functionality, encompassing steps like plastering, installing drywall/ceilings, painting, flooring (tile, wood), installing fixtures, and adding trims, all occurring in the final stages before a building is occupied, following strict codes for materials like fire-rated gypsum boards, paints, and decorative elements.

## Woodwork and fixture fittings

Woodwork in construction involves structural (rafters, beams) and finishing elements (doors, windows, cabinets), using various wood types, requiring joinery with nails/screws, while fittings are smaller hardware (hinges, handles, locks, pipe joints, electrical connectors) and larger movable items (curtains, appliances) that complete a space, differentiating from permanent fixtures (sinks, lights) by their removability, all crucial for functionality, safety, and aesthetics, adhering to standards like IS for quality.

## Waterproofing

Waterproofing in building construction is the process of making a structure resistant to water penetration using membranes, coatings, and sealants. This essential practice protects against moisture, preventing damage like mold growth, structural weakening, and costly repairs by creating a waterproof barrier on areas such as roofs, basements, and bathrooms.

## Painting

Painting in building construction is a crucial process that serves both aesthetic and protective purposes, enhancing a structure's appearance while shielding it from environmental damage like moisture, UV rays, and corrosion. It involves applying coatings to surfaces such as walls, ceilings, and metalwork, requiring careful surface preparation, proper application techniques using tools like brushes and rollers, and the selection of appropriate paint types for the specific material and location.

## Safety considerations

Safety is a constant priority for construction teams. When it comes to safety, the construction industry faces unique challenges, as building sites are dynamic environments with inherent risks, including falls, electrical hazards, and heavy equipment accidents. To protect workers and future occupants, construction companies must prioritize safety at every stage of the construction process.

Part of this involves strict adherence to building codes and safety regulations to ensure that all construction activities meet established standards for fire safety, structural integrity, and emergency preparedness. Regular safety training, the use of personal protective equipment (PPE), and ongoing site inspections help minimize risks and foster a culture of safety on the jobsite. Underpinning all safety programs is clear communication and well-defined emergency procedures and construction site safety plan that are critical for responding effectively to any incidents that may arise.

By integrating safety considerations into every aspect of the construction process, from planning and material selection to execution and final inspection, teams can deliver buildings that are not only functional and attractive but also safe for everyone who uses or works within them.

## Quality control

Construction quality control and management is a vital activity of the building construction process. This ensures that every aspect of the project meets the required standards and specifications. In the construction industry, quality control involves systematic inspections, testing, and documentation of building materials, components, and workmanship throughout the construction process.

Effective quality control starts with the careful selection and evaluation of building materials, ensuring they meet performance and safety requirements. Regular site inspections and the use of quality control checklists and punch lists help identify potential issues early. When contractors implement comprehensive quality

control protocols, they can deliver buildings that are safe, durable, and compliant with all relevant regulations and owners' expectations. This commitment to quality not only protects the investment in the building but also enhances the reputation of everyone involved in the construction process.

#### **Step 4: Post-construction phase**

The post-construction phase is the final process before the building is handed over to the client or owner. The post-construction phase includes completing the punch list items and the final walk-through. A punch list is a document that lists all the contract items a contractor must fulfill to be paid.

#### **The walk-through**

Once the construction is complete, the team must walk through the building to confirm that all the project specifications have been met. The contractor and the architect must certify that the building is fully functional.

If the architect is satisfied, they will issue a certificate of satisfactory completion. The relevant supervisors must confirm that the building meets the local authorities' requirements, and the local government will issue a certificate of occupancy.

#### **Closeout / handover**

During construction project closeout, the contractor can now hand over the building to the owner. The owner is given substantial time to confirm that they are comfortable operating every aspect of the new building. The contractor can provide training and support as necessary.

The contractor also must hand over all the plans, models, and operation manuals to the owner.

#### **Maintenance and Repairs**

Even after construction is complete, ongoing maintenance and timely repairs are essential for preserving the long-term value and functionality of any building. In the construction industry, proactive maintenance helps extend the lifespan of building materials and systems, reduces long-term operation costs, as well as ensures the safety and comfort of occupants.

The maintenance process involves regular inspections of building components, such as roofing, HVAC, plumbing, and electrical systems, as well as routine tasks like cleaning, lubrication, and replacement of worn parts. Digital tools, like digital twin software, have made it easier to schedule, track, and document maintenance activities.

By investing in preventive and predictive maintenance strategies, building owners and operation teams can identify potential issues before they become major problems, minimize downtime, and control repair costs. Not only does this approach support the long-term performance of the building, but it also aligns with best practices in construction project management and sustainability.

#### **Summary**

The building construction process is essential to the success of any construction project. It consumes a lot of time and resources but ensures no stone is left unturned.

The building construction process can be split into three main phases, preconstruction, construction, and post-construction. The three main phases of construction involve many systematic activities.

The preconstruction phase includes acquiring land, strategic design, preparing budgets and estimates, acquiring licenses and permits, and hiring experts. The construction phase involves site preparation, excavation, foundation, framing, masonry work, roofing, interior finishes, and exterior finishes.

Finally, post-construction involves the final walkthrough and the handover of the completed building.

Here is diagram of building construction.



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