

# Good research paper about planning of construction of tall buildings

[Business](#), [Management](#)



## **Introduction**

Tall buildings have held the fascination of human beings for a long time now. As the fight for space increases and the land available for urban consumptions keeps decreasing the tall buildings have become a reality everywhere in the world. Tall building hold a sway over the human minds and higher the buildings go the feeling of being in the sky increases. There is now an attempt to build the world's tallest tower of 1 km in height is being made. The building when completed will be called the Kingdom Towers and is being constructed in Saudi Arabia. The construction is expected to cost over GBP 780 million in the coastal city of Jeddah. The time for construction is likely to be about 5 years. The building will have 200 floors. It will be furnished with 59 elevators including five double deckers! The building is owned by HRH Prince Al Waleed bin Talal.

Construction of tall buildings has its own set of challenges starting from the site preparation, multi-vendor coordination, foundation laying, superstructure construction, facading, outfitting and utilities. This paper aims to examine each of the areas of tall building construction and examine each of them in detail.

The most important aspect of a tall building construction happens even before the first step is initiated or even the site marked out on the ground. The most important step in the construction is the planning phase before even embarking on the ground breaking activity. Scheduling happens is the first phase and is used to determine the following aspects of construction,

like the distribution of capital, accomplishment of the jobs, all aspects of material, resource, equipment and human resource procurement.

### **The detailed planning of the buildings happen to highlight the following aspects:**

- Development of the building
- Creation of contracts
- Effort estimation
- Distribution of capital
- Details of main structure
- Determining impact on traffic close to the site
- Determining the impact on the close by work and residential locations
- General laying out
- Duration of the construction project
- Information of supply and source of material

### **Site Preparation for Tall building construction**

Site preparation is the first important and tangible step in the construction of tall buildings. The initial ground work will involve digging and filling with material more suitable for such activity. This phase also involve site levelling and grading. Temporary structures are put up and site offices established. Construction teams are put together and the site is fenced and secured. After this step the structure dimensions are marked on the ground foundations laid. The piles are driven and footings laid. Before the footings are laid the ground after digging is inspected for water logging. If there is waterlogging the water is pumped out using construction pumps and then

the ground is grouted using plain cement concrete that gel well with the foundation concrete.

Once this activity is done then the footings for the pillar foundations is laid and the pillars construction begins. Once the pillars are built to the first slab level, planning for scaffolding is done.

The first slab shuttering is initiated and then the slab concrete poured. It is at this stage that the definite plans for the next levels of construction are laid. It is at this juncture that the safety training becomes the most intense so that the culture of safety is set into the teams at site – both at the workers, monitoring and engineering staff on the site. Personal safety equipment like the helmets, jackets and boots are issued and detailed instructions for their use is issued. Some companies also believe in having morning exercises, stress management training for the staff and all these become part of the construction site routine.

Once the piles are driven and the footing is complete the structure begins to take shape. Unauthorised visitors from the site are kept out at this stage. The perimeter of the site becomes more secure. Extensive signage is displayed indicating dangers at the site.

## **Safety in tall building construction**

The most common accidents that happen in the construction of high rise buildings are related most often to:

- Usage of ladders
- Falling debris
- Falls from heights

- Electric shocks
- Trips
- Crane and hoist operations

**Each construction must have a safety management system that will relate to the following:**

- Safety policy
- Safety organization
- Safety plans and programs
- Hazard and risk analysis

**The safety organization must ensure the following: - Safety management/hierarchy/organization**

- PPE availability and use in proper condition
- Scaffolding
- Electro-mechanical activities and controls
- Temporary power supply and tools
- Health & welfare programs
- Storage conditions at the ground level and other levels
- Fire prevention at all levels
- Waste/pollution control
- Monitoring and control of working on height and use of appropriate safety mechanisms
- Aid/first aid and evacuation
- Emergency plan for unanticipated circumstances

## **Tall Building Construction**

The improvement in concrete technology has led to the building of tall buildings. It is usually a mix of concrete and steel that has led to the building of composite buildings and steel is predominantly used for compositing, outrigging and also the upper levels of the building.

The following diagram gives the total picture of the tall building construction in terms of its design. There is one important element in the building of high rise buildings – architecture. Architecture plays a very important role in the final layout of the building itself. Another important area is the distribution of utilities including elevators. Utilities like power, air conditioning, water are important aspects of the construction. Utilities must be laid out in a simple manner as well as in an accessible manner. Elevator use a good amount of floor space and the engineers face the task of balancing the elevator space usage with the increasing of levels in the building.

## **Innovations in High Rise buildings**

The Broad Sustainable Building (BSB) has created a set of prefabricated structures that are used in high rise buildings. The most important aspect of this is that it reduces the construction time exponentially. A 30-storey hotel was constructed using this method in 15 days in Changsha, China. In this system the factory manufactured system is used for on-site installation that use flanges and high strength bolts. This system also uses installable floor slabs, wallboards, and other pre-fabricated members.

The advantages with this method of construction is that it can resist a magnitude-9 earthquake, five times more energy efficient and has a

reduction in construction costs. It also produces just one percent of the waste when compared to conventional construction.

The next major invention in high rise buildings is the ultrarope. This ultrarope with its superior ultra light weight, has the potential of doubling the distance an elevator can travel in a single shaft to almost 1000 m. The ultra rope has a carbon fibre core and is coated with epoxy based high friction coating. It is so light that the size of the machine room significantly is reduced.

## **Project Planning and Management**

The major activities sequentially in a high rise construction are:

- Site setup: The activities necessary to establish temporary facilities at the workplace in preparing for the rest of the activities
- Piling: All the activities for groundwork upto the level of ground work slab but not including it, foundations, underslab drainage, basement etc
- Pile caps: activities to construct pile caps, raft foundation and the ground floor slab
- Super structure: All the activities for the load bearing frame, starting from ground floor column, wall elements, and façade installations
- Electrical and mechanical services: All activities necessary to install the E & M works, including electrical, fire, elevators, water pumps, water supply, waste water systems, gas, telephone systems, storm water drainage and finally the lightening protection system
- Finishes: Activities for completing the building including brick and masonry work, joinery, internal walls, plastering, ironmongery, glazing, painting, window installation and wall painting.

- External works: including underground cable ducting, drainage, walkways, planters, access roads, paving,, pavilions, play area etc.

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