

# Analysis of Basic Design in Architectural Structure Design

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**Abstract:** In recent years, with the rapid development of urban development and the continuous improvement of people's living standards, China's construction industry has also achieved remarkable development. In order to meet the needs of urbanization, many large buildings and high-rise buildings have been built up. These buildings are usually large, so they put forward higher and higher requirements for the technical level of engineering construction. Whether it is for the stability or safety of buildings, it must be continuously improved. Basic design is a key part of the structural design of a building. For the safety of buildings, natural disasters or accidental injuries can have extremely bad effects on urban development and people's life. This paper briefly discusses the basic design analysis in architectural structure design, and seeks the key technology in this process to provide a guarantee for the safety of the building.

**Keywords:** Architectural structure; structural design; basic design analysis

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## 1. Introduction

Complexity is the basic feature of architectural design for buildings. Therefore, when designing related structures, it is necessary to fully consider the engineering needs, and the design of the basic part should be placed first in the overall design<sup>[1]</sup>. The basic design of the building is closely related to the overall quality of the building. In the later period of construction, all construction must be carried out in accordance with the design drawings. No matter what kind of construction technology is adopted or what kind of development the construction industry has achieved, the safety performance of the building must be fully guaranteed.

## 2. The selection principle of basic design of building structure

Architectural structure design mainly refers to the design of the building infrastructure and superstructure. The design of the structure will receive multiple gravity and static effects. Normally, the static load of the building is transmitted in a vertical direction. When a natural disaster occurs, for example, the force of an earthquake is just the opposite of the static load. In order to fully satisfy the foundation conditions of the upper and lower parts of the structure during the construction process, it is necessary to adopt an effective way to select the foundation structure. The

structural design of a building is not just a design operation, it also involves many other pieces of work. This requires the designers in the process of design and operation, not only to be flexible, but also to set up the line as much as possible and to make small efforts to get through the construction links. On such a basis, relevant personnel must be arranged to conduct reconnaissance and inspection of the construction site in advance. Engineering design combined with different conditions at the construction site to meet engineering requirements as much as possible.

At present, in the foundation design of the building, the selection of the design method is based mainly on the interaction between the foundation, the foundation and the superstructure, and takes these as the criteria for the decision of the foundation design. However, there are some disadvantages to this approach. In many cases, the design of construction units starts from the aspect of architectural demand, and ignores the actual situation of the construction site. Without understanding the actual situation of engineering construction, the design of many aspects can only be carried out by assumption. This is one of the main reasons for the gap between the actual situation and the engineering design. Therefore, for most architectural design, it is mainly based on mechanical structure. Not only is the structure stable, but also simple and convenient, so as to fully meet the needs of more buildings.

### **3. Common basic forms of building construction**

#### **3.1 Strip footing under wall**

For the construction of the strip foundation under the wall, concrete is usually used to lay the foundation. Concrete is stronger both in durability and in plasticity. The use of concrete to carry out the building blocks under the wall can better play the anti-pressure effect<sup>[2]</sup>. After a period of application, we found that the foundation under the wall is more suitable for some buildings with lower floors. Its main advantage is low cost, and construction operation is more convenient. For the construction of the project, the overall stiffness must be improved according to the actual conditions.

#### **3.2 Independent foundation**

The independent foundation can be divided into two categories: rigid independent foundation and flexible independent foundation. The independent foundation is often applied to the construction of the underlying foundation. Specifically, the basic sections can be classified into two categories: square and rectangular. The method is determined according to the eccentric distance of column load. When there is a large gap between the two columns, the superiority of the independent foundation is also revealed. In addition, in the multi-storey building, if the frame is selected as the foundation, the foundation is the most suitable. In terms of current usage, independent foundations are usually used in the construction of civil buildings and have achieved good results.

#### **3.3 Strip foundation and cross base under column**

When the construction conditions are difficult to meet the construction requirements of the independent foundation, it can be used as the strip foundation. For example, if the foundation foundation of the construction site is poor, it can be used as the strip foundation. Compared with the independent foundation, the strength of the strip foundation is greater, which can be controlled by the amplitude and uniformity of the settlement. However, when compared with the independent foundation, when the distance between the two columns is large, but the column spacing is large, the bar foundation under the column shows many disadvantages. In addition, if engineering construction needs to reduce the pressure on the foundation, cross - crossing foundation is a more reasonable choice. However, the criss-crossing foundation has obvious drawbacks, that is, its space rigidity is strong.

#### **3.4 Reinforced concrete raft foundation**

As with other basic forms, the reinforced concrete raft also has its advantages. This base is often used in small spaces and is suitable for use in smaller spaces. In addition, the raft foundation is often used in the floor construction of the basement. The choice of raft foundation should be carried out according to the different load size. The main advantage of the raft foundation is that its overall stiffness is large, which can effectively control the evenness of settlement. In addition, the foundation of reinforced concrete raft can not be applied to all kinds of conditions at will, but must be fully combined with various specific situations to carry out operation.

### **3.5 Pile foundation**

The main advantage of the pile foundation is that it has a high bearing capacity and a small settlement. If the requirements cannot meet the requirements of construction, the deep foundation of pile foundation can be adopted. The pile foundation is usually more suitable when the following situations are present: Firstly, the upper part of the structure is relatively large, and the stability of the foundation is poor, and the upper load capacity is small. Secondly, the settlement of the shallow foundation on the natural foundation is large<sup>[3]</sup>. Even if it can process the foundation, it is difficult to achieve the building requirements. Thirdly, the bearing capacity of foundation is good, but settlement is difficult to control.

## **4. The problems that should be paid attention to when designing the basic design of building structure**

### **4.1 When carrying out the basic design of building structure, the designer must take full account of the influence of various factors on the design plan. In one case, the designer needs to conduct geological exploration prior to the construction design.**

Collect as much information as possible in the construction site, and investigate the natural environment around the site, including soil environment, climate, natural disasters, etc. Under the premise of full understanding, relevant structural design is carried out to minimize the impact of external factors on construction. On the other hand, it is necessary to carry out geological exploration around the construction site in advance and fully understand the soil under the earth surface. Through the investigation result, the thickness of the cushion soil is calculated, and the thickness and width of the cushion layer can be both safe and economic benefit. It is worth noting that, when choosing bedding soil, the soil layer that is too soft is less stable, so it should be used with higher hardness and strength.

### **4.2 Pay attention to the influence of the ambient temperature on the building structure**

In many cases, the temperature influence which we easily overlook is very important for the construction and implementation of the project. Therefore, it is necessary to take into account the influence of temperature on the concrete structure when designing the building structure. As far as possible, according to the relevant design standards for the expansion joint design, the expansion joint design has certain complexity. In many cases, in order to ensure the engineering efficiency, reduce the complexity of the construction, often require the design unit to replace this part with the post-pouring belt, which is not feasible. In addition to fully considering the influence of temperature on the construction structure, it is necessary to calculate the influence degree. Based on this, the width of the expansion joints in the design is calculated and controlled in a certain ambient temperature range. At the same time, the installation plan for the expansion joints should also be set in advance. Combined with previous experience, it can be used to combine welding and rivet, which is more stable. Finally, the selection of the filler material, all of which need to be clearly marked in the construction design plan. Sometimes in order to avoid the impact of temperature conditions, insulation panels can be installed in the top part of the building. A small diameter temperature bar is installed for parts which are easily affected by temperature.

### **4.3 Emphasis on the design of side beams for building structures**

For the design of side beam of building structure, it can be carried out by way of twisting longitudinal reinforcement at the waist or bottom of beam. The part that needs special treatment in this part is that the torque is likely

to have a certain effect on the side beam. It is necessary to control the torque in a certain range, and fully ensure that the building structure is always in a state of internal force distribution equilibrium. In addition, the torsion of the side beams is closely related to the torsional rigidity and bending stiffness of the side beams. Therefore, when calculating the calculator, it may be difficult.

## 5. Related Suggestions on the basic design of building structure

For designers, designers must take the height of building as a starting point for building foundation design. Inspect the construction site in advance to understand the soil conditions and fully consider the relationship between the foundation and the superstructure in the concrete design. For some uncertainties, it is necessary to take into account several types of situations that may arise in advance and use this as a basis for scientific design. Usually, the first part of the structure is designed, and then the concrete basic design is carried out. This requires that a series of effective measures should be taken to reduce the error caused by the lag of the upper structure, and fundamentally guarantee the design level of the building infrastructure.

In the current situation, the basic design of architectural structure is mainly based on different mechanical structures, and its most obvious advantage is that it is easier to operate and more accurate and reliable. In recent years, with the continuous improvement of various technical levels, many traditional building materials have been unable to meet the needs of contemporary construction. Reinforced concrete such as the more advantageous building materials have been widely used. Compared with the traditional structure, the reinforced concrete structure is a little bit, but the reinforced concrete structure also has higher requirements for the foundation. If subsidence occurs in the foundation, the effect on reinforced concrete is great. With the acceleration of urbanization, the number of high-rise buildings has increased significantly. The load on the building is naturally increased[4], and so is the pressure on the foundation. In this case, the settlement problem is more likely to occur. Therefore, for high-rise buildings, it is necessary to reduce the foundation stiffness as much as possible.

## 6. Conclusion

In summary, in recent years, the construction industry occupies a large proportion in China's economic development. The basic design of the building structure is a part that must be carried out before the construction. We should not be confined to the paper, but should go deep into the construction site, combine theory with practice, eliminate the problem one by one. In the specific work, through scientific and reasonable basic design, to guarantee the quality and efficiency of the later construction. While ensuring security, reduce construction capital expenditures as much as possible. In the future development, there are many places that need to be improved in the design of the building structure. This requires the relevant staff to continue to explore and study for the development of China's architectural design industry to play a role in promoting.

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