

Building Structure Reinforcement Design and Construction Technology Application Method

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Abstract: As the era of civil engineering gradually comes to an end, the housing reinforcement industry began to develop at a high speed. In order to better protect the overall effect and quality of housing construction, it is necessary to effectively apply the technology of building structure reinforcement. Based on this, this paper analyzes the problems such as improper reinforcement design and lack of construction technology at the present stage, and discusses the reinforcement methods and application measures of building structure, aiming at improving the emphasis on technology, the optimization of personnel allocation and the standardization of the industry in building structure reinforcement.

Keywords: Building Construction; Structure; Reinforcement Design; Measure

Introduction

At present, the design life of the general building is 50 years, with the rapid development of our national economy, many buildings have more than 30 years of service life, and in the actual use of housing construction, because of random changes in the house function and other factors, resulting in the building structure affected, resulting in cracks and other problems. Thus the stability of the building is greatly reduced. In order to avoid this kind of situation, we should attach great importance to the application of building structure reinforcement technology in the use and construction of building construction.

1. Inadequate building structure reinforcement at the present stage.

1.1 Improper building structure design

At this stage, some building structure design has a lot of inappropriate, this is because at this stage a lot of reinforcement design do not carry out drawing audit, reinforcement drawings do not have to cover the registration seal, which leads to the professional ability of many designers is insufficient, and the reinforcement design cost accounts for relatively small, can not retain outstanding talents, many times are issued by the successful reinforcement construction unit free design drawing, Design is led by construction. Many designers only analyze and study the relevant data and theoretical knowledge, and do not carry out the scheme design according to the site environment where the building is located and the actual needs of the project, which leads to the deviation of design and application.

1.2 Lack of professional skills of housing construction personnel

Although there are many people engaged in building reinforcement construction at the present stage, as reinforcement construction is a niche industry with special qualifications, it is quite different from traditional construction units, leading to the lack of professional technical ability and solid grasp of professional knowledge of most people. With the recent years, the development of advanced technology and the update of relevant standards also bring new requirements for the technical level of construction personnel, however, in the face of modern materials and equipment, the professional technical level of the construction personnel are not positive enough, most of the personnel are still used to the traditional construction technology, so that some construction personnel appear passive work, It is not a good control of construction progress, supervision of construction quality. In addition, many of the building construction personnel are farmers, who are not only lacking in professional and technical level and educational level, but can only engage in physical work. Therefore, it is extremely necessary to improve the professional and technical ability and cultural literacy of building reinforcement construction

personnel^[2].

2. Introduction to strengthening technology of building structure

2.1 Foundation reinforcement technology

With the implementation of the "General Code for Identification and Reinforcement of Existing Buildings" and the "Technical Code for Reinforcement of Existing Building Foundation" being included in the registration examination, it can be seen that the upper layer is paying more and more attention to the reinforcement of foundation, and the code has clear provisions on the reconstruction of additional floors, tilting reinforcement, displacement reinforcement, etc.

For the application of conventional reinforcement technology of existing foundation, grouting reinforcement technology and high pressure jet grouting technology are usually selected. Grouting reinforcement technology mainly uses hydraulic pressure, air pressure and other means to inject reinforcement liquid into the cracks of the foundation. This technology can use reinforcement liquid to bond the loose soil and sand at the bottom of the foundation, so that the stone and sand at the bottom can be integrated. This technology mainly uses clay, sandy soil, or artificial fill to strengthen the perimeter of the foundation, which can avoid the corrosion of the foundation caused by rainwater leakage, increase the strength of the foundation, and slow the rate of foundation settlement. This technology uses an electronic computer system to monitor the grouting construction process in real time. The data analysis function of the computer can effectively monitor the consistency of the grouting. In addition, it can also monitor the grouting volume to achieve accurate grouting operation, which greatly improves the effect and efficiency of building foundation reinforcement and reduces the cost of grouting. High pressure jet grouting technology mainly integrates chemical grouting technology and high pressure water jet cutting technology. This technology is mostly used in the reinforcement construction of soft building foundation. If the foundation is soft, its bearing capacity will be reduced, resulting in deformation, and this technology can be applied to implement reinforcement^[3].

2.2 Reinforcement technology of upper bearing structure

The reinforcement technology is mainly based on the "Code for Design of Concrete Structure Reinforcement", to strengthen the main columns, beams and so on, so as to increase the bearing capacity of the building. The main reinforcement methods include increasing section reinforcement method, replacement concrete reinforcement method, outsourcing steel reinforcement method, adhesive steel reinforcement method, planting reinforcement technology, etc.

Conventional reinforcement of masonry walls mainly involves reinforcement of cement mortar and reinforcement of steel mesh cement slurry. During the implementation of cement mortar operation, the thickness of surface layer reinforcement should be controlled within the range of 20 mm to 30 mm. In the process of implementing the cement mortar operation of steel mesh, its thickness needs to be controlled within the range of 25 mm to 40 mm, the thickness of steel reinforcement is controlled within 10 mm, the diameter of steel reinforcement is generally within the range of 6~10, and in the form of grid layout, the distance between the grids is not greater than 150 mm. Before the surface strengthening operation begins, it is necessary to check the wall comprehensively. If there are cracks, it is necessary to fill them and then rinse them. After the completion of all construction, but also the implementation of sprinkler maintenance construction, to avoid the occurrence of cracking and falling off.

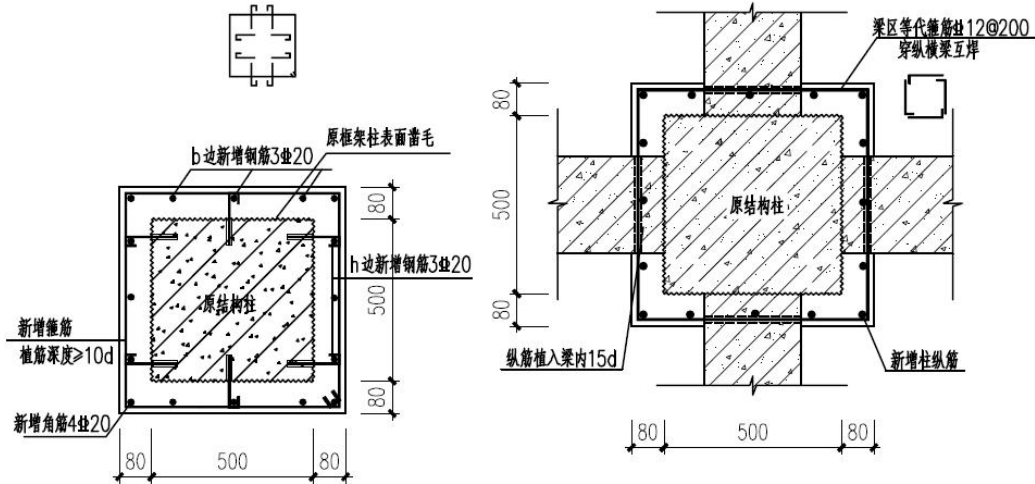
3. Project overview and application

The renovation project belongs to an exhibition hall on a management building in Luqiao District, Taizhou City. Among them, the total area of the existing building is 1651.07 square meters, the main building belongs to the three-storey frame structure, the overall height of the building is 10.85 meters. The main implementation of the reconstruction of additional floors (573.92 square meters). After the renovation, the total area of the building is 2224.99 square meters, the number of main floors of the building is rebuilt to 4, and the height of the building is increased to 15.95 meters. Building base area, main structure type and roof waterproof grade are not changed.

The original reinforcement plan was to use a steel structure with additional layers, but the client did not like the steel structure and insisted on using a reinforced concrete structure type. The feedback was that the load of the fourth floor was considered in the original design, and the original design drawings were provided. After checking and calculating the bearing capacity of the cast-in pile in the original drawing, the length of the original pile meets the requirements after adding layers,

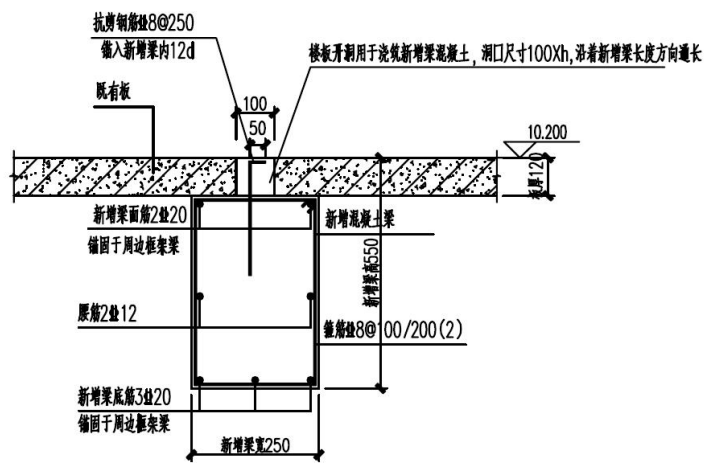
so only the existing roof layer beams, plates and partial columns are reinforced.

First, after calculation, the axial compression ratio of a column in the original stairwell exceeded the limit when it was at the bottom, so the expanded section method was adopted. The original 500x500 structural column was expanded by 80mm on each side, and the steel bar was made of three-level steel with a diameter of 20.



Detailed drawing of column expanded section method detailed drawing of column and beam junction

Second, the new functional needs should be added. The new concrete secondary beams under the existing floor slabs are made of reinforced concrete and connected to the existing building panels with shear reinforcement bars of diameter 8@250.



新增混凝土梁XZL1做法详图

Third, the existing floor is reinforced with steel plate at the support. The steel plate is 5mm thick and anchored with M10@300 chemical bolts.

Fourthly, the existing local main beam is reinforced by sticking steel plates. The reinforced steel plates are made of U-shaped hoop with a width of 200.

4. Effective measures to enhance construction technology of building structure reinforcement

First, improve the technical level of professionals. Only by improving the technical level of the early design and late construction personnel can we make qualified products, in order to fundamentally solve various reinforcement problems for the owners.

Second, optimize the configuration of construction personnel. In the optimization of construction personnel allocation,

the reasonable division of labor can be combined with the types of work and professional technology, so as to give full play to the actual value of human resources, to achieve the scientific allocation of resources.

Third, strengthen the standardization of building reinforcement. There are many small reinforcement projects that are almost integrated in design and construction and lack of supervision personnel, so it is difficult to implement the standardization of the site. Therefore, it is necessary to ensure the scientificity and standardization of the project from the early stage to the later stage ^[5].

5. Closing Remarks

In a word, with more and more reinforcement projects, in the actual process, we must improve the professional level of technical personnel, optimize personnel allocation, strengthen the standardization of the reinforcement industry, in order to ensure the high quality and efficient development of the housing construction reinforcement engineering industry.

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