

## Viewpoints for the site construction management of reinforcement formwork and concrete

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### Abstract

The reinforced concrete structure project consists of three parts: reinforcement engineering, concrete engineering and formwork engineering, not a single one of these parts can be dispensed with. Construction stage is an important stage of reinforced concrete structure from scratch. Any part of the quality problem will have a knock-on effect on subsequent construction, resulting in delays, economic losses, and even casualties. Therefore, site construction management is very important. This paper expounds the construction of reinforced engineering, concrete engineering and formwork construction management notes, hoping to provide some suggestions for site construction management.

### Keywords

**Construction management; Reinforcement; Formwork; Concrete.**

### 1. Introduction

Construction management as an indispensable part of the building management, plays a very important role. As the site management involves a wide range of content, many managers always skim the surface and ignore the specific things, Or stick to the spacing of bars, thickness of the protective layer and other common problems. If construction management is detailed to specific things, it is often not considered comprehensive. According to my years of construction management experience in the construction industry, the construction management of the three construction sections of reinforcement, formwork and concrete has been summarized as follows.

### 2. The site construction management of reinforced engineering

No matter which branch sub-item project is involved, it is indispensable to be familiar with blueprint, atlas and specifications. Special attention should be paid to the important information, such as the anti-seismic grade, the thickness of the protective layer, requirement of the reinforced connection mode. According to the latest specification to calculate the different diameter of reinforcement in different grade concrete to the anchorage length, lap length. According to the drawing requirements, determine the mode of reinforced connection to prevent reprocessing and the waste of materials due to the blanking error.

#### 2.1 The management of reinforcement before blanking

In daily inspection, before the reinforcement blanking, check the rebar bending schedule of the labor team to prevent the occurrence of the waste of reinforcement due to the blanking error. It is necessary to check whether the loading reinforcement of the frame beam, frame column is correct, the blanking length is sufficient, and to ensure that the reinforcement has enough anchorage length after reinforced banding. It is necessary to spot check the length of the semi-finished reinforcement, to prevent the semi-finished reinforcement from the size of rebar bending schedule. Finished reinforcement tend to appear short length of the hook, the anchorage length is not enough, the length of the hook is not enough or long lead to inconsistent with the specifications of the blueprint, affect the acceptance of backfilled works, even affect the structural safety.

## **2.2 The management of assembling reinforcement**

In the process of reinforcement binding, it is necessary to check the main tensioned bar of the beam, the plate and the column, the type, the size, the spacing of the stirrup, the mode of reinforced connection, the welding quality, and so on. In the case of the unqualified parts, the labor team should be asked to rectify the situation in time. The staff of the labor team can be required to use the paper to identify the reinforcement of the site in the corresponding position of beam, plate and column. On the one hand, it is convenient for workers to operate, on the other hand, it is convenient for managers to check at any time, to prevent detection of errors from assembling reinforcement is finished. At that time, the difficulty of rectification will be great, and it will easily lead to greater manpower, material loss, and some parts may not be rectified, and the consequences will be serious. Attention should be paid to the length of the encryption zone of the beam and the column, the spacing of stirrups in the encryption zone of the beam and the column, the number of stirrups in the column, etc. We must pay attention to the individual easily missing parts, for example, the geometric dimensions of columns, the relationship between the reinforcement of the main beam and the secondary beam, the relation between the upper and the lower steel bars of the long span and the short span, the rib reinforcement of the Pre-buried hole and the reserved casing, Stress steel bar of cantilever beam, etc. In order to prevent the team from making mistakes caused by omission, the team should be given a written statement of omission or ignorance.

## **2.3 The management of connecting reinforcement**

Besides the reinforcement assembling, the quality of rebar connection is also very important. It needs to be controlled strictly according to the specification. The overlapping length must be sufficient, the upper and lower reinforcement ribs of electroslag pressure welding are corresponding and not eccentric, don't mix welding bracts. After welding, the welding slag should be cleaned in time to avoid further construction. It is necessary for the labor team to re-manufacture the connection with insufficient lap length or unqualified welding quality.

## **3. The site construction management of formwork engineering**

### **3.1 The preparation work of formwork project**

First of all, familiar with construction drawings, combined with construction drawings and structural drawings. Secondly, familiar with the geometry size and elevation of each beam, plate, column, special construction scheme of the formwork, the support way and reinforcement method of column. According to the support mode and methods of reinforcement of the beam, the plate and the column, making a technical disclosure to the workers, combined with the drawings and the specific circumstances. The technical disclosure should pay attention to the following questions: 1. Specifying the spacing of the hooping of wall and column; 2. How high beams can be used without reinforcement, and how high beams need to be fixed, more than how high the beam needs to be reinforced, and how to reinforce them safely and reliably? 3. What is the height of the beam that needs to be strengthened with the split bolt? What is the vertical spacing and horizontal spacing of the reinforcement? 4. What is the spacing between the split bolt of the shear walls?

Only familiar with the specification and drawing can the template of the beam, plate, column, node and other positions be correct. In addition, we should know how to control the size of the formwork joint, how to ensure the perpendicularity and the surface roughness of the formwork, how to maximize the use of the formwork, so as to reduce the loss of the formwork.

### **3.2 Erection formwork**

One of the most important work in template engineering is the erection of all-round scaffold. Technical disclosure and daily inspection should be based on the program and regulatory requirements, and pay attention to the space between upright tubes of scaffold, and setting of horizontal brace, sweeping bars. The program needs to calculate the space between upright tubes. In actual construction site, scaffolding works according to the program calculation results. The horizontal brace can be properly separated from each other, but it should be noted that the setting of

horizontal brace at the top scaffold and bottom sweeping bars is not limited; If the scaffold height is large, it is necessary to set the bridging, the horizontal bar of the foundation beam and the all-round scaffold. They can guarantee the stability of the formwork-supported structure.

The beam height is within 700mm and can be set up by the two sides of the formwork to complete the binding reinforcement. When the beam height exceeds 700mm, it is necessary to require the labor team to reserve the formwork without sealing, which is to be embedded in the side of the beam, the beam and steel of the steel bar, and the pre-buried of the power and water pipe. All these will be decided according to the plan and the specific situation of the site. When the technical disclosure, it is best to form a combination of images and text, in the drawings marked clearly some complex or controversial parts of the specific practices, so that the labor team can vividly master technical disclosure content.

### **3.3 Construction inspection of formwork**

The formwork should be focused on the sectional dimension of the beam and the column, the vertical degree of the shear wall and the column, vertical gap joint. If not meet the requirements, we need to issue a rectification notice, so that the supervision team in time for rectification. When the template project is completed, before entering the next procedure, the surface of the sawdust and garbage should be cleaned up. If the conditions permit, the separation agent can be brushed, and the system of check and acceptance of procedure should be paid attention to. After acceptance, the next step can be entered. The next step is still necessary to review the previous process. If it is found that the length of the steel bar does not correspond with the size of the formwork, it is necessary to study carefully and find out which step is the problem. After the problem is found, it should be promptly improved.

In the formwork engineering, walls, plates, columns are the focus of attention. In addition, we should pay attention to the important information in the drawing consciously. Such as the size and elevation of the reserved hole, the elevation of the local floor slab, the elevation of the rest platform of the stairs, the number and size of the steps. These details are often easily overlooked. If there is no direct size on the drawings, we can make a comprehensive calculation through the detail drawing of nodes and elevation, and draw the size we need, then mark it on the drawing. Therefore, it is convenient to check during the construction process, while avoiding rework of formwork because of failure of drawings size. The housing construction project should pay special attention to check the flatness of the floor formwork, and check the elevation of each formwork, especially the four corners and intermediate points. If the deviation is too large, it will result in the difference between the clear height range and the standard, which will make up for the later use of the thickness of the floor. What is more, may affect the completion of the housing.

## **4. The site construction management of concrete engineering**

### **4.1 The preparation work before concrete casting**

For concrete construction, the first is still familiar with the drawing. Determine the strength grade of the concrete for each layer of the beam, the plate, the column. According to the construction scheme, the choice of concrete casting methods are direct, concrete pump, pump car, tower crane and so on. Before pouring, it is necessary to calculate the square amount of concrete, hand in the casting plan, take part in the concealed acceptance check, and sign the pouring order.

Before concrete casting, it is necessary to make concrete casting safety technical disclosure to the labor team. Focus on the following questions: what grade of concrete are cast by the wall, the column, the beam, the plate. What is the amount of concrete casting? What is the order of casting? Does the column and wall need to be filled several times to prevent formwork burst? How to make sure the concrete of the column, wall, beam and plate is vibrated in place? How can we guarantee the quality after molding?

It is required to specify the control standard of the roughness of the concrete. According to the drawings to determine the light or hacking technology. Before concrete casting, ensure that the division of labor teams is reasonable and the staff is adequate. It is generally required that at least two

vibrators, two workers, three people pave ground, two people unwinding concrete, should be configured for each pumping station. three people finish surface troweling and extraction pressure. In total, each pump needs to be configured for at least 10 people.

#### 4.2 Quality control during concrete casting

In the process of concrete casting, it is necessary to make sure the vibrating bar is vibrated in place, and also to ensure the depth of the vibrator into the concrete. In the process of concrete casting, in order to prevent formwork swelling and explosion, the strengthening of formwork should be strengthened. Concrete should be divided several times to fill the wall and the column, and choose the proper slump. Rather than in order to avoid swell formwork, burst formwork on the less vibrant, vibrate not in the end, or not vibrant. Although this can avoid the formwork swelling, bursting, but it will cause more serious quality problems.

It is necessary to strictly control the forming quality of concrete after casting. In the case of concrete with different grade in casting, during the concrete casting, we should make second confirmation to the grade of concrete. we need to prevent the low-grade concrete into the high-grade concrete, do stand-by supervision of the immersion depth and the immersion spacing of vibrator, and supervise the quality of follow-up light collection. After the concrete casting, maintenance work needs to be paid attention to. After stripping, the potential problems of honeycomb pitting surface and other quality problems need timely inspection and timely repair.

### 5. Conclusion

The site management of reinforced engineering, formwork engineering and concrete engineering is only a part of the whole construction management, only the complete management can complete the perfect architectural art.

### References

- [1] GB50164—2011. Standard for Quality Control of Concrete[S], 2011.
- [2] JGJ162—2008. Technical code for safety of forms in construction[S], 2008.
- [3] Chen Zhishan. Discussion on construction site management of reinforced concrete structure [J]. Scientific Technical Information of Gansu. 2013(09):78-80, 12.
- [4] Liu Wei. Analysis on construction management of reinforced concrete projects in residential buildings [J]. Manager' Journal. 2015(23):304.

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