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FUTURE-PROOF FOUNDATIONS: ADVANCED WATERPROOF TECHNIQUES FOR ANTI-SEEPAGE PROTECTION

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Abstract: The quality of buildings plays a pivotal role in the daily lives and safety of residents, while also significantly impacting urban development and the reputation of construction enterprises. Effective waterproofing and anti-seepage construction are crucial measures to ensure construction quality. Persistent issues of building leakage have been a long-standing concern, potentially resulting in substantial losses if not addressed adequately. Additionally, substantial resources are invested in post-construction maintenance. Hence, ensuring a meticulous construction process to preempt leakage issues is of paramount importance.

Keywords: Building construction quality, Waterproof and anti-seepage construction, Building leakage, urban development, Construction enterprise reputation

1. Introduction

The quality of buildings is closely related to the daily life and work of residents, and is also related to the life safety of residents. If the quality of buildings is poor, it will not only affect the reputation and image of engineering construction enterprises, but also have a huge impact on urban development. In building construction, waterproof and anti-seepage construction is an important measure to ensure construction quality. Building leakage is a problem that has troubled everyone for a long time. It may cause significant losses if not handled well, and it will also cause significant investment of manpower and material resources in the later maintenance process. Therefore, it is of great significance to do a good job in the construction process to avoid leakage problems as far as possible in the later stage.

2. Waterproof and anti-seepage problems in building construction

During the use of construction projects, leakage is a major construction quality problem. At present, the common leakage parts are wall leakage (as shown in Figure 1), roof leakage (as shown in Figure 2), kitchen and toilet leakage (as shown in Figure 3), and basement underground garage leakage (as shown in Figure 4). There are many reasons for leakage problems: material quality, unreasonable design, nonstandard construction technology, etc., which may lead to leakage problems. Before the construction of the project, it is necessary to survey the foundation, geology, etc., and obtain certain parameters and data through the survey. Then the designer should go to the site in person, determine the architectural design scheme according to the actual survey results, and grasp the important design points in combination with the actual characteristics of the project, so as to improve

the design quality, ensure the preciseness of the design, and reduce the probability of leakage problems. From the aspect of materials, if the construction party is trying to gain benefits from it, it often passes the shoddy for the good and steals the beam for the column, which leads to poor material quality and unscientific material selection. Some low-quality waterproof materials have poor waterproof effect and cannot achieve the purpose of seepage prevention, thus causing the leakage problem of the construction project. In terms of construction technology operation, if the construction technical parameters are not standardized and the technology is not up to standard, which results in the construction of some materials being not standardized, and the sealing of the interface or junction is not strong, it will pose a threat to the construction quality, thus causing serious leakage.

3. Significance of building leakage prevention in construction engineering

If the key points of drainage and anti-seepage cannot be grasped in the construction project, the construction of anti-seepage project should be well done. After the building is put into use in the later period, it is easy to have engineering problems such as water leakage, which seriously affects the comfort of users, and even causes potential safety hazards. Therefore, in the construction project, doing a good job in waterproofing and seepage prevention can greatly reduce the risk of water seepage and seepage. It has important practical significance.

3.1. Building leakage prevention can reduce the maintenance cost of later buildings

After the completion of the building, the building materials will be affected to varying degrees in the face of different use environments, which will change the chemical and physical properties of the building materials, leading to wall peeling, wall cracking, foundation settlement, building leakage and other phenomena. Therefore, the construction unit must maintain regularly during use to avoid damage. If we do a good job in seepage prevention of buildings, we can effectively reduce the possibility of building seepage, thus improving the service life of buildings and reducing the maintenance and repair costs of buildings in the later period.

3.2. Building leakage prevention can improve the comprehensive quality of buildings

The quality of construction projects is an important standard of construction projects. After the completion of the project, the quality acceptance shall be carried out, and the corresponding parts in the later period shall have a warranty period. Building leakage is a common engineering quality problem and an important factor to measure engineering quality. Waterproof and anti-seepage work in construction projects can effectively improve the overall quality of buildings, reduce customer complaints about project quality, lay a good foundation for building a harmonious society, and improve the economic and social benefits of construction enterprises.

4. Key points of waterproof and anti-seepage technology at various positions of buildings

4.1. Key points of waterproof and anti-seepage in external wall construction

First, the quality of exterior wall materials should be strictly controlled, check the building materials used for external walls in strict accordance with relevant standards. When selecting construction materials, materials with good waterproof and high compression resistance should be selected as far as possible. When selecting sand and cement, it is necessary to reasonably control the proportion of their mixture to make their performance meet the building standards and prevent abnormal conditions such as building wall cracking and wall falling off. Second, the plastering procedure should be strictly controlled. Before plastering, the flatness of the wall surface shall be determined first, and then the workers shall clean the surface to prepare for the next plastering. Third, we should pay attention to the mortar construction process on the wall surface. Generally, the wall surface area of a building is large. If effective protection is not provided, it will inevitably lead to wall leakage [1]. Plastering mortar on the wall surface can effectively prevent external wall leakage. When selecting mortar, attention shall be paid to the adhesive index of mortar, and the mortar with the index meeting the building standard shall be selected. In the process of mortar coating, a reasonable coating thickness shall be ensured. If the coating thickness is too large, it

may cause the mortar to fall off. If the coating thickness is too small, it may fail to meet the requirements of waterproof and anti-seepage. The external wall construction shall be carried out according to the construction requirements and each work shall be accepted. After the waterproof of the exterior wall is completed, it can be accepted by spraying to check whether the wall will leak.

4.2. Waterproof and anti-seepage points for roof construction

4.2.1. Strictly select high-quality materials

The roof waterproof construction should be carried out in sunny days, and the construction temperature should not be too high or too low, because some waterproof materials have requirements on the construction temperature, and the effect of waterproof construction will be greatly reduced if it is too high or too low. During the construction of the building roof, if the selected waterproof and anti-seepage materials fail to meet the corresponding standards, the roof will leak. It can be seen that the project of building roof waterproof and anti-seepage must pay attention to the link of material selection, select highquality products from regular manufacturers in strict accordance with the standards of the construction industry, and do a good job of inspection before construction [2].

4.2.2. Check the waterproof construction technology

Before construction, the foundation surface shall be cleaned first, and the uneven and cracked parts shall be repaired and leveled, and a certain amount of detergent shall be smeared on the brushing tools. During the brushing process, attention shall be paid to the fine and uniform brushing. After the painting is completed and the roof is completely dry, the position of waterproof and anti-seepage materials shall be determined in time, the baseline shall be drawn, and then the pipe openings on the roof shall be cleaned one by one. In case of some special areas, they shall be covered and paved. In the construction process, attention should be paid to the laying of waterproof and anti-seepage materials. In case of adverse drainage slope, the waterproof and anti-seepage materials shall be laid in the order of low to high, so that the long side of the waterproof materials can be at the same level with the watershed. After the cleaning work and the waterproof and anti-seepage materials are laid, the waterproof and anti-seepage materials need to be heated in the next step. Relevant personnel shall control the heating process and check the heating effect according to the actual requirements of the construction project, so as to ensure that the bonding strength meets the building standard and provide guarantee for subsequent construction.

4.3. Key points of waterproof and anti-seepage in kitchen and toilet construction

The kitchen and toilet are the rooms that people often use in daily life. If water leaks in these two areas, it will hinder people's normal life. During the civil construction of kitchen and toilet, the construction shall be scientifically and reasonably arranged according to the location of embedded pipes. During the specific operation, the work shall be carried out in strict accordance with the design drawings of the kitchen and toilet. Attention shall be paid not only to the design of the drainage slope, but also to the maintenance of a certain distance between the embedded pipe and the floor to prevent the pipe from blocking and cracking. The waterproof layer of kitchen and bathroom shall be firmly stuck without skid edge, blistering, sliding and folding. Floor drains, squatting pits, drainage outlets, etc. shall be kept smooth, and protective measures shall be taken during construction. When designing the pipeline, pay attention to the design of the drainage pipe, including the form, state, etc., to prevent the occurrence of casing. However, in the design of heat supply pipelines, the casing scheme can be adopted according to the actual situation. When using this scheme, attention should be paid to the tightness between pipes. The places where pipes connect should be sealed with waterproof and impermeable materials to check whether there are gaps and prevent water seepage.

4.4. Waterproof and anti-seepage points for basement construction

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Basement is a very important part of a building. Before construction, special construction organization design shall be made for people, machines and materials, and construction plans shall be prepared. During the waterproof and anti-seepage construction of the basement, the materials with high waterproof and high compression resistance should be selected first, and then the appropriate coating should be considered in combination with the actual situation. After the waterproof layer of the basement is completed, relevant personnel shall strictly inspect the waterproof layer to ensure that the quality of the waterproof layer meets the building standard, and then carry out the construction of the protective layer [4]. During the basement construction, if the casing needs to be embedded in advance and the number of casings is large, the scheme of embedded angle can be directly used instead. When pouring concrete, the construction personnel shall pay special attention to the joint area between two pieces of concrete. In order to improve the overall waterproof and anti-seepage performance, the joint area can be wetted first and then sealed during construction. After the concrete pouring is completed, the construction unit shall assign relevant professionals to join the concrete management team to monitor the temperature and humidity of the environment, and maintain the concrete in time according to the change of concrete temperature to prevent cracks in the concrete.

5. Optimization measures for waterproof and anti-seepage construction process

5.1. Select high-quality, cost-effective and environment-friendly materials

The use of appropriate waterproof materials during construction can improve the waterproof and antiseepage effects of buildings. First of all, understand the actual construction requirements, cooperate with the design drawings, and select the waterproof materials that meet the requirements. In addition, when facing many brands and specifications of waterproof and anti-seepage materials in the market, material purchasers should have a comprehensive understanding of these materials, including their quality, performance, price, warranty period, etc. They should choose products with lower price under the condition of ensuring the waterproof quality [5]. The purchasers should also have the concept of green and environmental protection. When the gap between quality and price is small, they should choose green and pollution-free waterproof materials, In order to select high-quality, cost-effective, environmentally friendly waterproof and seepage proofing materials, and promote the quality of construction projects.

5.2. Continuously improve the construction standardization

In addition to selecting high-quality, cost-effective and environment-friendly waterproof and antiseepage materials, attention should also be paid to the standardization in the construction process. First of all, we should first understand the characteristics of the parts that are easy to seep, and choose the waterproof materials that match them. Secondly, before using the materials, personnel shall be arranged to inspect the waterproof materials to ensure that they meet the building standards. Relevant personnel shall sort out all steps of waterproof and anti-seepage construction, standardize and optimize them, and ensure orderly waterproof construction [6]. For example, when painting waterproof and anti-seepage coatings, the thickness of the coating should be specified to prevent the coating from falling off in the later stage due to the coating being too thick; The service time limit of the grout shall be specified, and the construction personnel shall be urged to use the grout in time to prevent the performance of the grout from being affected due to too long storage time.

5.3. Scientific design of drainage system and proper treatment of separation gap

The design of the drainage system and the treatment of the separation joints are also important links for the overall waterproof and anti-seepage of the building. If the treatment is improper, it is easy to cause water leakage in the house. Therefore, the designer should first understand the owner's demand for drainage, and then investigate the overall characteristics of the house on the spot, including the sunshine duration, intensity, room humidity, wind direction, wind speed, etc., and carry out customized design of the drainage system in combination with the

owner's needs, investigation results, and building requirements. When dealing with the separation joint, the designer can use the structural drawing of the house to design the joints and nodes at the turning position as much as possible, which can not only show the overall structure intuitively, but also help the construction personnel to carry out construction work. In addition, the waterproof layer shall be poured with asphalt, oil and other materials to increase the width and depth of the gap and ensure the waterproof effect of the house in combination with the exhaust function [7].

5.4. Strengthen the acceptance of waterproof and anti-seepage work

After the completion of waterproof and anti-seepage works, strict quality inspection and acceptance shall be carried out to ensure that the construction quality can meet the waterproof requirements of the building, so as to improve the overall waterproof and anti-seepage effect of the house. In the acceptance stage, the inspectors shall carry out a comprehensive, standardized and systematic inspection on the quality of the project in strict accordance with the design requirements and building requirements, and timely collect the documents and data of the waterproof project for proper preservation. The acceptance and quality inspection of waterproof works can effectively prevent water leakage, seepage and collapse of buildings, and enhance the overall quality of the house. In addition, when water leakage and seepage are unavoidable in the future, problems can also be found in time through the documents saved in the acceptance stage to quickly solve the problem of water leakage.

6. Conclusion

To sum up, the problem of water leakage and seepage of buildings poses a great threat to people's lives and the overall quality and safety of buildings. Water leakage is a manifestation of poor construction quality of construction projects and affects the life of buildings. Therefore, in the engineering practice, the construction team should reasonably design the waterproof scheme. The construction unit should pay attention to the key points of waterproof and anti-seepage construction, select economic, safe and green building materials, standardize the waterproof construction process, and try to avoid water leakage from the walls, roofs, kitchens and toilets of buildings, so as to improve the building waterproof ability and the overall quality of the building project.

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