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How to Design and Construct the Underground Waterproofing Project in Combination

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Abstract: With the improvement of our country 's comprehensive national strength, the economic strength has been greatly improved. The various areas have been a lot in the progress of development. In each project, in order to achieve a deeper level of development, then we must strive for the existing observation and thinking, and in the past case for improvement and innovation, then we will be in highly competitive society to achieve survival and the road of development. This article is mainly on the design and construction of underground waterproofing project on how to combine the implementation of awareness and new thinking to elaborate and analysis.

Keywords; underground waterproofing; design and construction; implementation

Introduction

With the development of the building, people are increasingly the demanding for the betterment in building. As there are some large public buildings increasingly built, and now the groundwater works have become more and more important. Underground waterproofing project has a good development prospects which attracts the industry's attention. Groundwater through the infiltration and corrosion, resulting in a certain damage to the building, so that the basement engineering waterproof life for the life of the building has a certain relationship. So that we should vigorously develop the design and construction of underground waterproofing works. This article through several methods to illustrate the Suzhou City Vanke project for underground waterproofing project design and construction.

1. Some specific circumstances of the project

1.1 Geography

The case is located in Suzhou City, Jiangsu Province, Xiangcheng District, at north of An Yuan Road, west of Jucheng

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Road and east of the kiln road. Xiangcheng District is located in the center of Suzhou, at east of Yangcheng Lake and Kunshan, at west of Taihu Lake, at north of Wuxi and Changshu, at south of Suzhou ancient city, industrial park and high-tech zones. Xiangcheng District is one of the most developed areas in Suzhou and even the Yangtze River Delta. It is with 14 high-speed entrances and exits in the Beijing-Shanghai high-speed rail and the Shanghai-Nanjing railway which are all in the city[1]. The project land east of Jade Road, south to An Yuan Road, at west to the kiln road, at north to the status quo channel.

1.2 The environment of the building

According to the planning requirements of the local block, the total land use is 138601.25 ㎡, the nature of the planned land is residential land, the building height is less than 100m, the floor area ratio is not more than 3.0, the building density is not more than 25%, the green space is ≥37%, the sunshine spacing coefficient: 1.30 control; the main entrances and exits in the west side of the kiln road, the main entrance is located in the east side of Yucheng Road. General high-rise residential basement waterproof grade for the two, power distribution and weak parts of the local waterproof level for the first level. From the construction cost considerations to meet the use of the principle of the basement side wall and floor using two waterproof, the basement roof with a waterproof. Waterproof design are waterproof concrete and flexible waterproof layer, waterproof concrete impermeability rating of not less than P6[2].

2. Underground waterproofing design points

According to the "underground engineering waterproof technical specifications" underground waterproof design, should be based on the surface water, groundwater, capillary water and other functions, as well as due to human factors caused by the impact of the nearby hydrogeological changes to determine. The height of the waterproofing fortification of the all-underground project with the design of the project should be higher than the outdoor floor elevation of more than 500mm.

2.1 Underground waterproofing project options

2.1.1 Underground waterproof engineering design principles

Underground engineering waterproof design and construction should follow the "anti, row, cut, plug the combination of hardness and softness, according to local conditions, comprehensive management" principle. In the actual design and construction process, for the underground garage construction, "sparse, pass" the principle of more prominent waterproof. "Sparse" is to ease, in the water where the water in accordance with the artificial design direction to ease the principle of the project applied to the planting of the surface of the ground to penetrate the water grooming. "Pass" is smooth, in all waterproof measures should ensure that the flow direction is smooth, which cannot appear water accumulation, plugging and so on. For the different parts of underground engineering, the use of the corresponding design principles for waterproof design, choose different structural measures of great significance.

2.1.2 Underground waterproof engineering materials selection

According to the "underground engineering waterproof technical specifications" fortification requirements, the choice of waterproof material of not less than two waterproof. The first for the waterproof concrete, the second for the other waterproof material. Selection for the two waterproof material, one is to use the relevant departments of the country after passing the inspection of qualified products; the second is to use to meet the actual needs of the material; Third, as much as possible the use of new materials, such as new waterproof materials and waterproof coating. According to the actual case analysis, waterproof membrane "polyethylene polypropylene composite waterproof material" has the advantages of high tensile strength, good corrosion resistance, bending resistance, good flexibility and other waterproof

materials do not have the advantages.

2.2 Underground waterproof engineering site design

The waterproof layer is a continuous and closed design and in construction process, cannot have hollowing, cracks and other water leakage which caused by defects. In the underground engineering waterproof design, mainly reflected in the basic parts of the project waterproof, waterproof parts of the project wall parts, engineering roof waterproofing and engineering construction node waterproof.

Waterproofing of the basic parts of the project is an important part of the whole project, the lowest part of the project and concealed works. Due to the pressure of external water, to be "anti" mainly, the specific application should be used in combination with waterproof concrete and waterproof board in the form of fortification. At the same time, the construction of underground garage is often a large excavation form, the base area is larger. In the construction process requires waterproof material cushion smoothness and cleanliness, which require a good waterproof material laying, lap and protection. Embedded parts, through the wall, after pouring, which must be taken to strengthen the reinforcement measures; to do deformation joints, construction joints construction of the details of the node. Deformation of the leakage problem has been one of the common problems of underground engineering, which requires engineering designers to fully understand the structural structure, in dealing with deformation joints waterproofing more attention, from a single waterproof design to composite waterproof design.

2.3 Underground waterproofing project drainage design

Underground waterproofing works is at the end of the project , but it is the most important. Especially in the high groundwater level of the environment, underground engineering long-term erosion in the water, while preventing the infiltration of groundwater secondary to the potential of the second increase, the drainage program more scientific layout. The project uses the principle of combining the anti-row, one is through the permanent automatic drainage system will penetrate the indoor water discharged to the sump, and then through the automatic sensor water pump facilities to the outdoor pipeline; the second is based on underground engineering pump room, pool and to other places where water operations restrictions and on the face of the scientific set of ground anti-flood water, drains, orderly into the catchment pits and efflux.

2.4 Flexible outsourcing waterproof system

2.4.1 Coil waterproofing system

Coil waterproofing system common SBS modified asphalt membrane waterproof system, synthetic polymer membrane waterproof system, self-adhesive polymer modified asphalt membrane waterproof system and polymer self-adhesive film membrane waterproof system four categories.

A. SBS modified asphalt waterproofing membrane widely used for all types of underground waterproofing works in the design can be used when the single layer can also be used in layers.

B. Synthetic polymer waterproofing membrane usually has good tensile strength and elongation at break, with better weatherability, and therefore more for roof engineering waterproofing, when used in underground engineering is not conducive to play its excellent weather resistance characteristics, and also because of the basic structure of the grass-roots ups and downs and difficulty to effectively paste, which is not conducive to construction and to closed waterproof, so the underground works are generally not in used.

C. Self-adhesive polymer modified asphalt waterproofing membrane has been introduced into China after years of development, has become a modified asphalt waterproofing membrane market, the mainstream products, widely used. As the construction is simple, convenient, waterproof and reliable, especially the tireless self-adhesive polymer

modified asphalt waterproofing membrane is very light and easy to construction, so in underground engineering is also widely used.

2.4.2 Waterproof coating system

Coating waterproof coating is consider the second most important to the waterproofing of waterproof material, from the composition which is divided into inorganic and organic two categories. In terms of organic waterproof coating, which mainly includes polyurethane waterproof coating and polymer emulsion modified asphalt waterproof coating, in which polyurethane waterproof coating in the underground engineering flexible coating waterproof coating system occupies an important position. The reason why it can be widely used in waterproof engineering, because there are many reasons, but the root cause lies in its performance itself, such as: rich source of raw materials, stable prices, adjustable performance range, excellent physical and mechanical properties, good compatibility, easy to construction and many other advantages.

3. The basic requirements of the construction

(1) Before the underground waterproof construction, the corresponding technical staff should review the drawings, a better understanding of the entire construction requirements on every link, so as to be able to better construction, improve the quality of construction.

(2) Underground waterproof construction before the whole process, you should have to find a professional company and professional staff to carry out construction. Construction of the relevant personnel must have the relevant business license and certificate[2].

(3) In the underground waterproofing works, we must pay attention to the pit and the pit of the shaft, hole and so on. The groundwater level must be kept below 0.5 m below the basement and it should take some precipitation measures.

(4) Impermeable concrete

The structure of the concrete is mainly for the purpose of waterproofing, it is the use of its own structure for a certain waterproof function. The project buried depth of less than 10 meters, the choice of P6 this type of waterproof concrete, and the use of PNC expansion agent. This expansion agent is calcium sulphoaluminate concrete expansion agent, it not only has the function of expansion, as well as concrete to enhance low temperature hardening, anti-freeze damage, anti-sulfuric acid and so on[4]. The addition of PNC reagents to cement concrete will result in the expansion of crystalline water compounds, called hydrated calcium sulphoaluminate. This agent can produce expansion, so that the structure becomes more closely. When the expansion is constrained, the resulting expansion will become pressure, which can withstand the pressure generated by shrinkage, creep, temperature, and so on. And the optimum amount of PNC should be determined according to the specific requirements. In most cases, the configured shrinkage of the compensation is greater than 10%, less than 15%. In the PNC content should be used when the production of special tools, and should be sent to a certain number of professionals responsible for the error to be controlled within a certain range[5].

4. For the construction of waterproof concrete construction methods

(1) Waterproof concrete should be the first in continuous pouring, it is best not to leave the construction of the gap, the concrete floor, should be the overall and continuous pouring on the wall, there should not be some vertical construction gap, and The construction gap should be stuck in the gap combined with the level of construction slit. Should not appear at the maximum of the shear and bending moments and cannot appear at the junction of the floor and side walls, which should be on the wall of the floor 300 mm. The arch of the horizontal combination of the horizontal construction joints

should be left in the arch wall. Seam phenomenon side of a certain range within the wall when there is reserved hole. The distance between the construction gap and the hole should be less than a certain value. There are a variety of options for the construction of a watertight level, but each program must be rigorously designed to be finalized[6]. Most of the construction joints in the construction of the middle of the wall to be buried in a certain plate to stop the water or to stop with a rubber seal. The purpose of the steel stop is generally to make each paragraph more convenient, in the construction process must pay attention to the problem of lap, see the seam should be welded, and the corner should be carefully repeated check to ensure that can be welded Is a good lap. The steel plate and the steel plate are better fixed. Steel plate must not be distorted. Most of the rubber-type water-retaining belts are soft, solid solids that should be swollen in water when used, and then expand and expand between 100% and 500%. Before the construction of its surface clean, and tear off the above water separation paper, the use of some of the characteristics of the water stop itself stick to the concrete surface, but the use of this material is also affected by the season.

(2) When setting the protective layer of waterproof concrete, it should be noted that the thickness of the protective layer should be greater than 50 mm at the surface of the water, and allow a certain deviation, the deviation of the range of plus or minus 10 mm. In the structure of a variety of steel and other materials are not able to contact the template, forced the surface cannot be exposed to the outside. For the mold we can use the method of embedded bolts, and in the wall can be added some water ring, Most of the water ring will be some four millimeters thick steel plate, about 80 mm in diameter.

(3) In the pipeline through the waterproof structure of the process, you should buy some of the required casing. In the process of embedding the casing, the upper part of the wall should be added with some welding water ring, requiring it to be tightly welded plate, where the number of water rings should be in accordance with certain provisions and standards To install, you should first pass the pipe through the embedded pipe, and must pay attention to its location to find accurate.

Conclusion

China is now in a period of rapid development, all areas of business are in an orderly development. In this fierce competition in the market, in order to get the living space, then we must continue to carry out technological development and innovation. Although now China's underground waterproofing project design and construction process have made some development and achievements, but we still need to humbly learn from foreign high-tech technology at the same time to self-improvement, and slowly to the extent of self-satisfaction.

References

1. Luo Cheng, Shi Ji Sian. Fuzhou Strait International Convention and Exhibition Center Underground Waterproof Design and Construction [J]. China Building Waterproof, 2009 (2): 30-32.
2. Gao Shu Peng. Fuzhou Strait International Convention and Exhibition Center outside the Exhibition Decoration Design and Construction [J]. Fujian Architecture, 2013 (3): 66-68.
3. Zhang Xing Shan, Liu Han Jie. Harbin Wanhua Hotel Underground Waterproof Design and Construction [J]. Heilongjiang Science and Technology Information, 2000 (4): 61-62.
4. Wang Yun Liang, Zheng Zi Long, Gu Shou Guo. Guo Feng Wei King International Hotel Underground Waterproofing Engineering Design and Construction [J]. China Building Waterproof, 2017 (2): 40-44.
5. Zhang Wu Ting. Qingdao Seaside Hotel Basement Waterproof Design and Construction [J]. China Building Waterproof, 2008 (2): 28-30.
6. Gao Shu Feng. Waterproof Design and Construction of Underground Garage in Beijing Hotel [J]. Journal of

Underground Space and Engineering, 2001, 21 (1): 48-54.