

Analysis of the influence of building structure engineering design on project cost

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Abstract: In the modern architectural engineering design and construction, the factors that affect the project cost are more extensive, and the engineering design is one of the key factors. The design of building structure engineering is not only closely related to the amount of project investment and daily capital consumption, but also has a direct impact on the quality of construction projects. Therefore, in the process of construction cost control and management, the staff should deeply analyze the impact of building structure design. This paper analyzes the problem of building structure engineering design on project cost control, summarizes the impact of building structure engineering design on project cost, and puts forward the strategic approach of optimizing project cost based on building structure engineering design.

Key words: Building structure; Engineering design; Engineering cost; Impact; strategy

From the perspective of cost control, the design of building structure engineering is the key factor affecting the level of engineering cost control, but also an important means to improve the efficiency of cost control and adjust the allocation of resources. Therefore, in the structural design stage, the relevant staff should take the project cost control as the basic goal, through the analysis of the impact of building structure engineering design on the project cost, put forward the optimization of the project cost plan and strategy, in order to achieve the purpose of controlling the construction project cost, improve the construction efficiency and quality.

I. The problem of building structure engineering design on project cost control

1. The target of project cost control is unclear

In the process of building structure design, some construction enterprises fail to carry out a comprehensive investigation of the construction site, and lack of understanding of the building needs and use functions, resulting in a low level of cost control. The reason is that the project cost control objectives of the enterprise are not clear, on the one hand, most of the target design is based on experience, on the other hand, the cost target is not broken down and detailed, in addition, it is also faced with poor communication, improper department cooperation and other problems, making the project cost control objectives can not be effectively implemented.

2. Lack of design cost control ability

In the process of building structure design, some designers only pay attention to the effectiveness and advantages of the design scheme, but fail to take cost control as one of the important standards of design. The specific problems can be analyzed from three aspects. First, designers pay attention to the functionality and aesthetics of the building, and fail to consider the cost input from the aspects of materials, construction difficulty and later maintenance. Second, when designers choose different design schemes, they pay more attention to functionality and design effect, and fail to compare the cost. Thirdly, in the process of architectural design, designers set the cost input of each link improperly, which leads to more capital problems in the later stage, and even causes the change of design scheme.

3. The construction of cost control system is incomplete

Some construction engineering enterprises lack of perfect cost control management system, neither clear norms and standards of cost control, nor binding force, making the cost control lack of execution, and even make the cost control and construction design staff of the two sides resulting in contradictions and conflicts, unable to achieve the construction goal through a good cooperation mechanism.

II. The impact of building structure engineering design on project cost

1. Influence of structural design quality

For construction projects, the use of human resources, input of material resources and control of construction progress are the key factors to improve the profit level of construction projects, so they are also direct factors affecting the project cost. Structural design, as the most critical part of building structure engineering, not only affects the construction cycle and resource input, but also is closely related to the functional use and construction of the building. Therefore, the quality of structural design has become one of the factors that directly affect the project cost, and its quality problems are related to the construction progress, whether the design plan needs to be amended, whether the rework needs to stop and so on, which has become one of the important links of cost expenditure control.

2. The impact of structural design scheme

The structural design scheme is also one of the important factors affecting the project cost. In the process of building structure design, the choice of the designer in materials, structural system design, difficulty of design scheme, etc., will directly affect the economic benefits of the construction project, and thus have an impact on the cost. For example, in the design process, the type of steel bar selection, structural size design, connection mode selection, etc., will affect the cost input in the process of material procurement and building construction; The lighting system design and heating system facilities of the building project will also affect the cost of use and maintenance in the later period

of the building.

3. The effect of foundation design

In the construction engineering design, the foundation design is one of the key links, but also one of the basic factors affecting the project cost. The quality of foundation design is directly related to the stability and safety of the building, and it is also a link with higher cost input in the construction, so it has a greater impact on the project cost. Generally speaking, the more complex the geological conditions, the higher the difficulty of foundation design, the more engineering required for the construction link, and the cost will increase. The deeper the foundation design, the more building materials will be consumed, which will also increase the cost. For example, under weak geology, the foundation needs to be treated with deep foundation through pile foundation, foundation reinforcement and other technologies. Under good geological conditions, shallow foundation schemes such as strip foundation and independent foundation can be chosen for foundation design. Compared with the two, there is an obvious gap in cost input.

4. the scale impact of building components

In the design of building structure, the scale selection of building components is also one of the factors affecting the project cost. For example, in the design of building walls and columns, different size specifications follow different specifications and requirements, and the use of steel bars is also different. For example, when the axial pressure of the column is small, it is necessary to design a larger section size, which leads to a decrease in the utilization rate of building space, and the required building materials such as steel and cement will also increase, thus improving the project cost. For example, in the design of cast-in-place concrete slab, the thickness and length of the slab will directly affect the amount of building materials used. Generally speaking, the thickness of the board is 9-11 centimeters, and the length is 3 to 4 meters. When the design is unreasonable, its scale exceeds the standard, which will naturally cause the use of steel and the increase of processing costs. Therefore, the designer must control the size of the component, under the premise of ensuring safety, as far as possible to reduce the project cost, and improve the quality and efficiency of construction.

5. The influence of building material selection

In the field of construction engineering, the cost of building materials can usually reach more than 60% of the project cost, so the choice of building materials is also a key factor affecting the project cost. The brand, type, specifications and other standards of building materials are different, and their quality, performance and price are also widely different, which requires designers and construction personnel to choose the right building materials according to the needs of architectural design. For example, in the selection of concrete, the price difference between the highest strength and the lowest strength is several times, and the impact on cost expenditure is extremely important. In the specific selection, the designer and construction personnel should specifically analyze the overall load, span, height and other information of the building, and choose the appropriate concrete according to the strength needs of different building parts. For example, in the selection of exterior wall decoration materials, stone, glass curtain wall, paint and other materials should also be selected according to the building needs, functional characteristics, etc., which can control the cost from the material purchase cost, and reduce the investment from the later maintenance cost.

6. The impact of building extension

Building extension refers to the ratio of the projected area of the building plane to the total construction area, which can directly feedback the space utilization rate of the building and show the effect of its layout. Specifically, the greater the extension of the building, the more scattered the building plane, the lack of regularity, which requires the building envelope to cover more area, while the need for walls, doors and Windows and other building components more, resulting in the use of materials will increase, thus increasing the cost of construction. At the same time, the extension of too high also means that the building function is complex, and the construction difficulty will be significantly increased, and even cause the stairwell, elevator room and other public transportation area to become larger, which will also increase the construction cost.

7. The impact of building layout

The rationality and scientificity of building layout is also an important means to assist cost control. Architectural layout not only directly affects the utilization rate of space, but also is related to the use of building functions. On the one hand, the compact layout design can reduce the building external wall area and reduce the wall structure, so as to achieve the purpose of saving material costs. For example, the regular rectangular or circular building layout, compared with the irregular shape, the external wall area can be reduced by 10%-20%, and the cost required for the envelope structure can also be reduced by 5%-10%. On the other hand, a reasonable layout can also reduce the use of walls, thereby reducing the cost of construction. For example, the center symmetry or axisymmetric layout design can effectively reduce the number of structural components such as floors, beams and columns, thus achieving the purpose of saving costs.

III. Based on the building structure engineering design to optimize the strategic approach of engineering cost

1. Optimize the design scheme to improve the economy

First of all, in the structural design of architectural engineering, multiple schemes should be designed according to the needs, and the optimal scheme should be selected after comparison in many aspects such as functionality, practicality and economy. In the comparison link, it is necessary to consider the material consumption, construction difficulty, schedule and other factors, but also to analyze the practicality and functionality of the design scheme, and choose the most economical design scheme under the premise of ensuring that its function

meets the use standards. Secondly, the scheme optimization mechanism should also be established. Under the premise of ensuring that the architectural design is functional, safe and stable, beautiful and beautiful, the designer can further simplify the design structure and design a reasonable layout, so as to reduce the cost of construction and materials. For example, the column mesh size can be reduced according to the design specification, and the functional demand can be lowered and the material cost can be reduced.

2. Improve the design method and promote standardization

First of all, under the background of the new era, the building structure design should adopt the prefabricated building model, and the stairs, balconies, bay Windows and other structures should be made into standardized parts, which can not only speed up the construction progress, but also reduce the difficulty of construction, but also save construction costs. Secondly, the module should be selected reasonably, not only to ensure the unity of the building plane, facade and profile size, but also to reduce the use of non-standard components, which can also reduce the cost expenditure. For example, in the wall design, its thickness can be designed to 300 mm, which not only ensures that it achieves the bearing capacity required by the building, but also avoids dimensional adjustment, so as to reduce the amount of material used. For example, in the design of door and window openings, you can choose a standardized and unified production size to avoid the cost consumption caused by differentiation.

3. Reduce project costs and choose new materials

First of all, in the process of selection of building materials, designers and construction personnel should consider cost control issues, and on this basis choose new materials and new processes, not only to meet the building performance, but also to reduce project costs. For example, in the selection of concrete, through the selection of high-strength concrete, self-compacting concrete, etc., can effectively improve its structural bearing capacity, and reduce the amount of concrete. For example, in the selection of steel structure, concrete filled steel tube columns or composite beams can also be selected according to demand, and the strength of steel structure can be improved through the technological level, and the purpose of reducing the amount of use can also be achieved. In addition, in the design of masonry structure, materials such as ceramsite concrete small hollow blocks and aerated concrete blocks can also be selected, which can not only ensure the strength of the wall, but also reduce the material cost.

4. Strengthen process management and improve professionalism

First of all, in the design of building structure, we should strengthen the process management, so as to improve the design quality. Specifically, managers should establish clear organization and management plans, put forward reasonable design input and output standards, and form perfect design documents and preparation norms, so as to improve the integrity and professionalism of design results. Secondly, a technical training mechanism for designers should be established to improve their overall professionalism and sense of responsibility. It is necessary to update their design concepts and methods as well as improve their professional quality. In addition, a comprehensive inspection and verification mechanism should be established to avoid problems and defects in the construction plan through review, cross-audit, third-party audit and other ways, so as to avoid the problem of rework stoppage, ensure the stable construction of the construction project and ensure that the project cost is not unexpected.

IV. Conclusion

To sum up, the structural design of architectural engineering is one of the important factors affecting the project cost. Designers and construction personnel should clearly grasp the impact of structural design quality, structural design scheme, foundation design effect, building component scale, building extension, building layout and other factors on the project cost. And through optimizing the design scheme, improving the design method, reducing the project cost, strengthening the process management and other strategic means to optimize the project cost, in order to improve the scientific and practical design of building structure.

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