

Channel Design and Construction in the Design of Agricultural Water Conservancy Project

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Abstract: Agricultural water conservancy project is the key part of agricultural economic development and agricultural green ecology. In the design of agricultural water conservancy projects, attention should be paid to the scientific nature and rationalization of the design. Whether the effectiveness of water conservancy engineering channel design is closely related to the actual operation effect of water conservancy engineering system software. Scientific channel design and construction management are beneficial to improve the field flood control level.

Keywords: Agricultural water conservancy; Engineering design; Channel design; Construction

Foreword

For agricultural water conservancy projects, in order to ensure the success and rationality of agricultural irrigation and reasonably promote the good development trend of agriculture, we must reasonably ensure the operation effect and quality of the channel system software. Therefore, in the agricultural water conservancy project basic construction process, relevant departments must be in accordance with the detailed requirements of local agricultural development trend, scientific design channel, strengthen channel construction project quality management, guarantee the channel basic construction quality design regulations and relevant standards, and ensure the dominant channel in agricultural manufacturing can really appear, can better serve the agricultural development trend.

1. Basic principles of channel design in agricultural and water conservancy projects

The fundamental task of channel design of agricultural water conservancy project is to meet the requirements of watering water resources in the whole process of modern agricultural development. In general, the design of farmland irrigation channels must be based on the landform to ensure the high efficiency of farmland water use in the overall target area and minimize the project budget. Therefore, in the whole process of specific water conservancy and hydropower project design, the staff of the design enterprise must carry out on-site investigation of the overall target construction area of the water conservancy project before the operation, explore the key landform of the construction area of the overall target project, and show the data information according to the pattern and the electronic computer entity model. At the same time, the channel design of agricultural water conservancy project should consider the area of farmland layout and residential relative density, implement the “people-based” the design of the core concept, effective overall planning channel line reasonable layout, ensure that farmland can get efficient watering water, prevent engineering construction and daily operation noise near the harm of farmers daily life.

2. Key points of channel design

2.1 Overall channel planning

According to the function and application field, the channels of irrigation projects can be divided into four types, namely dry channel, branch channel, bucket channel and agricultural channel. Therefore, in the design, the function of channels and regional characteristics should be integrated, and different channels should be distributed effectively. The fixed channels should be set in irrigation projects, which are generally set according to the order of dry channels, branch channels, bucket channels and agricultural channels. For the agricultural land under 20,000 square kilometers, the safety channel chain can be reduced, otherwise it must be divided according to the above grade.

2.2 Layout adjustment

All the design must be based on the basic theory and social experience, and must take into account the operation of the construction site. Design should be as scientific as possible. Considering the drought characteristics of the project area, increase the channel design flow to ensure the channel water supply; consider the wetland park standard to reduce the channel design flow and reduce the water consumption.

2.3 Design of channel gradient direction

Channel inclination is a key component of channel design. In the design process, it is necessary to further scientifically study the main parameters of the original channel slope protection, summarize the existing deficiencies, and carry out scientific design according to the irrigation regulations and regional regulations, so as to achieve the economic benefits of the irrigation project.

2.4 Reasonable selection of channel materials

At present, there are many kinds of channel capital construction materials on the market, and the characteristics and quality of materials are not the same. It is difficult to fully consider the materials of the channel to avoid corrosion from water and surrounding environment, so it is necessary to choose the materials whose quality complies with the regulations of the channel. At the same time, the materials of the channel should be taken into account to ensure that the materials used can meet the operation requirements.

3. Specific content of U-shaped channel design in agricultural water conservancy projects

3.1 Vertical section design of the U-shaped groove

The design of the longitudinal section of U-shaped channel is based on the construction drawings and engineering drawings, reduce the total area of the channel as far as possible, effectively improve the performance index, produce field channels, and ensure that the channel has high planness. When designing the longitudinal section of the channel, the irrigation area should be clear according to the actual landform, and the longitudinal slope should reach the specific high line and watering regulations. The design elevation and water level of each pile point shall be based on vertical section. The key to design is to define the length, inclination, and water loss. After the water level is clear, the total net flow of bucket canal, branch canal and other channels should be calculated according to the total area and the specific situation, and the main parameters of information such as longitudinal slope of U-shaped channel should be calculated.^[1]

3.2 Profile section design

The longitudinal section design of the farmland water conservancy channel is related to the reasonable capacity of the water resources in the irrigation canal. In the specific operation process, but also according to the overall target project construction area terrain characteristics to carry out a detailed display and design of the construction area. In order to better reduce the cost of farmland irrigation, the longitudinal section design of the vast majority of irrigation and water conservancy channels strictly follows the contour line in the overall target project construction area, and chooses the parallel surface plan scheme to carry out the design and layout. It can be said that in China irrigation and water conservancy construction project is a basic construction natural environment leading project design. In addition to the harm of the landform, the real requirements of the soil composition and the indoor space of the field in the overall target capital construction area are also the main reference index values in the planning process of the longitudinal section design of the irrigation and water conservancy channel. These three elements play a crucial role in the deep design of the vertical section of the irrigation and water conservancy channel. Deep design refers to the straight line distance generated by the connection between the longitudinal section point and the pile point and the relative height of the top of the channel. Fully considering the cost management in the whole process of the construction project, the longitudinal profile specification design of the irrigation and water conservancy channel should be scientifically and reasonably considering the elements of volatilization and infiltration, and should not exceed the requirements of regional agriculture. In order to ensure the accuracy of the numerical calculation method, the longitudinal slope rate of U-shaped groove can be used in the whole design process.

4. Construction of irrigation and water conservancy channel technology

4.1 Channel construction

The function of water conservancy project channel is to establish the irrigation of water and soil resources. Therefore, in the whole process of the actual design, the design staff must strictly control the water flow, accurately calculate the agricultural irrigation damage and channel water loss, so as to ensure the accuracy of the flow design. Considering the detailed requirements of regional agriculture of agricultural water conservancy and hydropower projects, in-depth analysis and accurate calculation of the flow are carried out to obtain the flow design. Then, the detailed situation of water conservancy and hydropower projects should be fully considered to

ensure that the flow is consistent with the project, so as to ensure the application of the channel. According to the main parameters of agricultural operation scale changes and other flow estimation and design, as far as possible, and add the use period of channels, so that it has to solve the transformation of agricultural production and manufacturing working ability.^[2]

4.2 Channel seepage prevention technology

In order to ensure that the farmland can obtain sufficient water, the enterprise water should be used for irrigation as far as possible to achieve the best practical irrigation results. At this stage, China has already established a large number of new river sections with contemporary characteristics. For the vast majority of farmland in small and remote areas, irrigation rates are still low, and some ditches still have significant leaks. In order to prevent the above problems, the subgrade soil should be compacted or laid on the surface of the canal bed as a seepage layer. The supporting process can endanger the construction quality of water conservancy and hydropower project at the same time; after the slope completion project acceptance, the reverse shovel excavator strengthens the repaired slope; adopt u-type concrete construction method with low cost maintenance and good seepage prevention effect, which can save soil resources reasonably.

4.3 U-type groove prefabrication

In the development of small and medium-sized irrigation and water conservancy engineering projects, the first U-shaped groove must be prefabricated. The application of prefabricated machinery and equipment is simple process, cheap cost, significant advantages. Two molds with the same or difference in specifications and pressure head are installed on the server of the U-shaped groove prefabricated parts, and the molds can be manufactured in different types. Be sure to check the planness of the steel formwork before applying the prefabricated U-shaped bad steel die. To reach the standard, the new projects should be updated or renovated as soon as possible. When making the U-shaped groove, try to avoid the process setting, to prevent the cause in the transportation Much damage.

4.4 Installation of the 4.4 U-type slot

The u-type tank has satisfactory hydraulic characteristics and strong ability to resist external frost distension. According to the moisture content of cement mortar, the water-cement ratio of concrete is strictly controlled to make it comply with the clear specifications. The whole process of excavation and filling can be divided into three parts: during excavation, a few U-shaped ditch can be used as a template, every 12 meters, the horizontal and vertical directions can be checked. When the level is backfilled, the U-type foundation groove is accurately excavated to avoid the collapse of some canal sections. Before the construction of the project, the canal bed soil layer shall be compacted. After filling, place the appropriate bedding at the bottom of the canal to prevent the flow back. Mechanical and equipment excavation. When coarse soil excavation, the thickness of the soil must be ensured at a certain level, and the concrete must be poured on the finalized foundation groove bed course.^[3]

5. Conclusion

Agricultural water conservancy project is an important part of agricultural development and is closely related to people's life. The channel design and construction management of irrigation and water conservancy projects is the key to the smooth construction of irrigation and water conservancy projects. We should strictly control the channel design details and construction quality, and constantly improve and innovate to promote the healthy development of agricultural economy.

References:

- [1] Liu Lei. Discuss the channel design and construction management in the design of irrigation and water conservancy projects [J]. Hubei Province Agricultural mechanization 2018 (05): 60.
- [2] Meng Xiangyu, Yang Qinghua. Channel design and construction in the design of agricultural water conservancy projects [J]. China High-tech, 2021,000 (015): P.118-119.
- [3] Wang Baoji. Analysis of the key points of channel design and construction management in the design of irrigation and water conservancy projects [J]. Sense of Science and Technology, 2019 (35): 117.

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