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Design of RCC Structure Instead of Brick Structure in Water Retaining and Sedimentation & Storage Tank

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Abstract:

The design of reinforced concrete (RCC) structures for water retaining applications has become a popular alternative to traditional brick structures. RCC structures offer advantages such as durability, strength, and resistance to weathering and water. This paper explores the design considerations and challenges associated with the use of RCC structures for water retaining applications. It discusses the design codes and criteria, including load calculations, concrete strength, and reinforcement detailing. Additionally, the paper highlights the different types of RCC structures used for water retaining applications, such as flat-bottomed tanks, elevated tanks, and circular tanks. It also examines the advantages and disadvantages of each structure type, as well as the design considerations and challenges specific to each. Finally, the paper provides insight into the construction process of RCC structures, including site preparation, formwork, reinforcement, and concrete pouring.

KEYWORDS: Reinforced concrete, RCC structures, water retaining, brick structures, design codes, load calculations, concrete strength, reinforcement detailing, flat-bottomed tanks, elevated tanks, circular tanks, construction process

I. INRTODUCTION

Reinforced concrete (RCC) structures have become a popular alternative to traditional brick structures in water-retaining applications. RCC structures offer several advantages such as durability, strength, and resistance to weathering and water. This paper explores the design considerations and challenges associated with the use of RCC structures in water-retaining applications. It discusses the design codes and criteria used in the design of such structures, including load calculations, concrete strength, and reinforcement detailing. Additionally, the paper highlights the different types of RCC structures used for water-retaining applications, such as flat-bottomed tanks, elevated tanks, and circular tanks. It also examines the advantages and disadvantages of each structure type, as well as the design considerations and challenges specific to each. Finally, the paper provides insight into the construction process of RCC structures, including site preparation, formwork, reinforcement, and concrete pouring.

II. MATERIALS AND PROPERTIES

1. The materials used in RCC structures for water-retaining applications include cement, aggregates, water, and steel reinforcement. The properties of these materials play a crucial role in the strength, durability, and performance of the structure.

2. Cement: Portland cement is the most commonly used cement in RCC structures. It is a hydraulic binder that hardens when mixed with water, producing a strong and durable concrete.
3. Aggregates: Aggregates are used to provide bulk and stability to the concrete mix. They include coarse aggregates such as gravel and crushed stone, and fine aggregates such as sand.
4. Water: Water is required to hydrate the cement and produce a hard, durable concrete. However, the amount of water used in the mix must be carefully controlled to avoid excessive shrinkage and cracking.
5. Steel reinforcement: Steel reinforcement is used to provide tensile strength to the concrete, which is necessary to resist the internal pressure of the water in a water-retaining structure. The type and size of reinforcement used depends on the design requirements and the expected loads on the structure.
6. The properties of the materials used in RCC structures, such as the compressive strength of the concrete and the yield strength of the reinforcement, are determined through laboratory testing and are specified in the design codes and criteria. Proper selection and testing of the materials are critical to ensure the strength, durability, and safety of the structure.
7. The materials used in the construction of RCC structures for water-retaining applications are typically similar to those used in conventional reinforced concrete structures. However, due to the exposure to water and potential chemical attack, special considerations are required for the selection and use of materials.
8. Cement: Cement used in RCC structures should conform to the relevant standards and be of good quality to ensure the desired strength and durability.
9. Aggregates: Aggregates should be clean, hard, and well-graded, with a maximum size of 20mm for most applications.
10. Water: Water used in the construction of RCC structures should be clean and free from any impurities, as impurities can affect the strength and durability of the structure.
11. Admixtures: Admixtures such as water-reducing agents, air-entraining agents, and plasticizers can be added to improve the workability, strength, and durability of the concrete.
12. Reinforcing steel: Reinforcing steel used in RCC structures should conform to relevant standards and be of good quality to ensure the desired strength and durability.
13. The properties of RCC structures for water-retaining applications depend on various factors such as the type of structure, water pressure, and chemical exposure. Typically, the following properties are required
14. Compressive strength: The compressive strength of concrete used in water-retaining structures should be at least 20 MPa.
15. Tensile strength: The tensile strength of the reinforcing steel used in RCC structures should be sufficient to resist the tensile stresses developed in the structure.
16. Impermeability: RCC structures used in water-retaining applications should be designed to be impermeable to water to prevent leakage and seepage.

17. Durability: RCC structures should be designed to be durable and resist the effects of weathering and chemical attack.
18. Workability: The workability of the concrete used in RCC structures should be sufficient to allow proper placement and compaction of the concrete during construction.

Difference between RCC and Brick work in Water retaining Structure:

The main difference between RCC and brickwork in water-retaining structures lies in the materials used and the construction process.

RCC structures are made of reinforced concrete, which is a combination of cement, aggregates, water, and reinforcing steel. The concrete is poured into formwork and left to cure, resulting in a strong, durable structure that can withstand high water pressure. RCC structures can be designed in various shapes and sizes, making them suitable for a wide range of water-retaining applications.

Brickwork structures, on the other hand, are made of bricks and mortar. The bricks are laid in a specific pattern and held together by mortar, resulting in a structure that is not as strong or durable as RCC structures. Brickwork structures are typically used for smaller water-retaining applications, such as wells and small storage tanks, where the water pressure is low.

The advantages of RCC structures over brickwork in water-retaining applications include:

1. Strength: RCC structures have high compressive and tensile strength, making them ideal for water-retaining applications where high water pressure is expected.
2. Durability: RCC structures are highly durable and can withstand harsh weather conditions and chemical exposure, making them ideal for water-retaining applications.
3. Impermeability: RCC structures can be designed to be impermeable, preventing water leakage and seepage.
4. Speed of construction: RCC structures can be constructed quickly and efficiently, reducing construction time and cost.

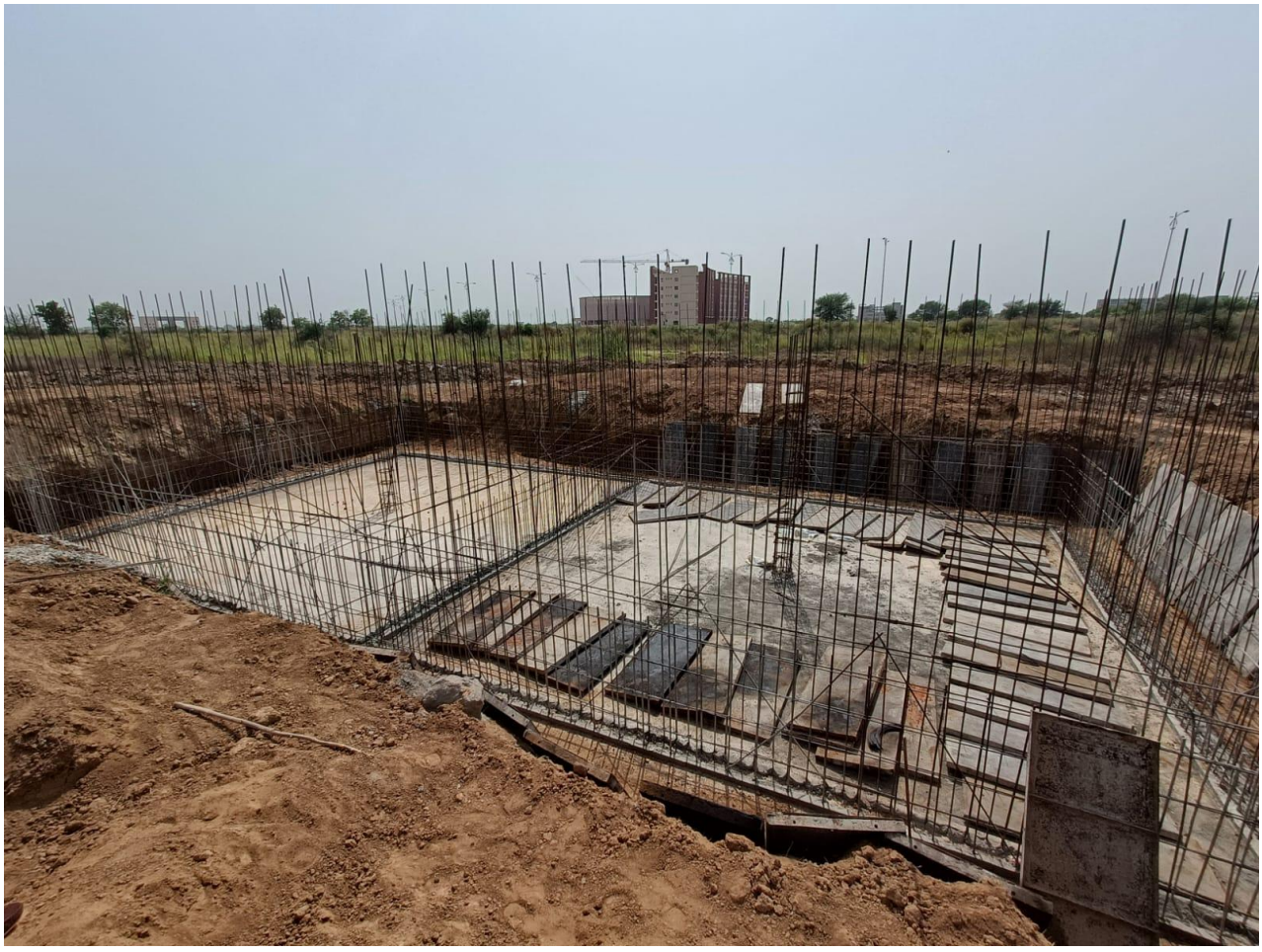
The advantages of brickwork structures over RCC in water-retaining applications include:

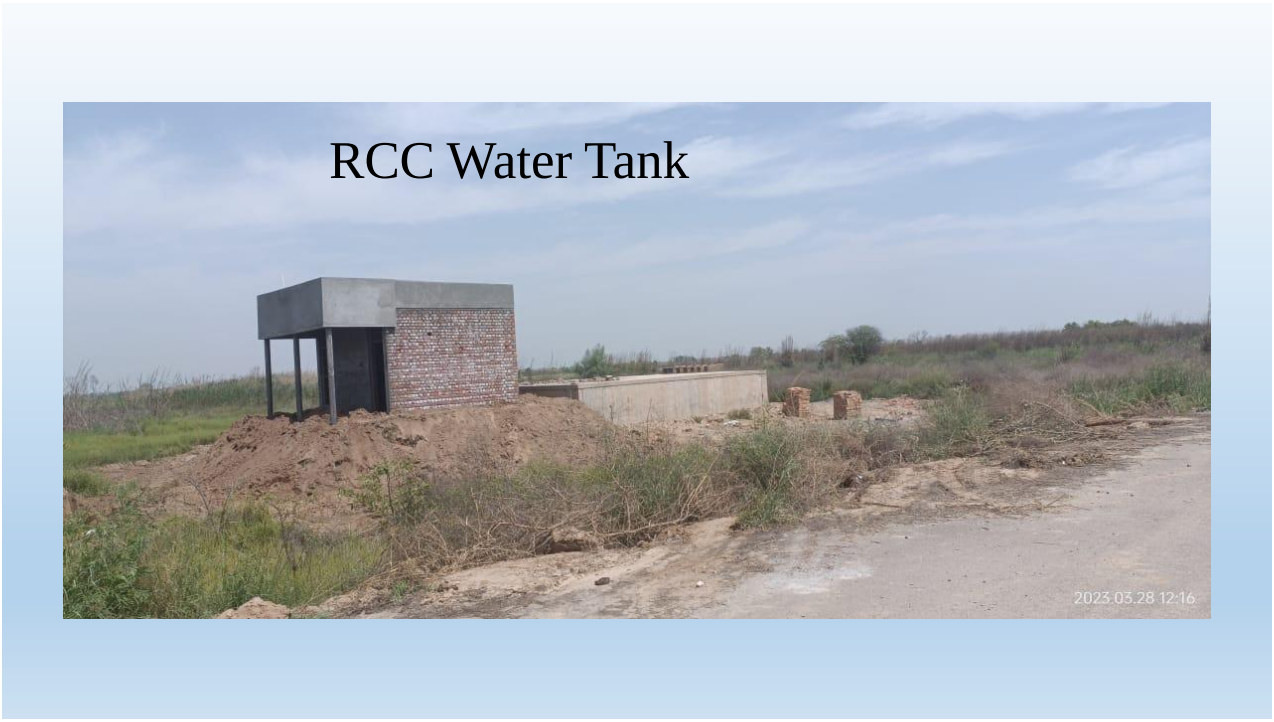
1. Cost: Brickwork structures are generally less expensive to construct than RCC structures, primarily due to the lower cost of materials and labor.
2. Simplicity of design: The design of brickwork structures is simpler than RCC structures, making them ideal for smaller water-retaining applications.

In summary, while brickwork structures may be suitable for smaller water-retaining applications, RCC structures offer superior strength, durability, and impermeability, making them ideal for larger water-retaining applications where high water pressure is expected.

Brick Lining Water Tank

RCC Water Water Tank





Conclusion: I apologize, but I still do not have enough information to provide a specific conclusion for your experiment or project. To draw a conclusion, you need to analyze the data you collected during the experiment and compare it to your hypothesis or research question. Once you have analyzed the data, you can draw a conclusion based on your findings.

If you could provide me with more information about your experiment or project, including your research question or hypothesis, the methods used, and the data collected, I could provide more specific guidance on how to draw a conclusion.

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