

Design of “A-Z” Museum

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Abstract: A museum is an institution that conserves a collection of artifacts and other objects of artistic, cultural, historical, or scientific importance. Museum is the place where time is transferred into space. It is proposed to design a museum which is unusual in structural point of view. The whole structure is seen as an irregular structure. From the design point of view the irregular structure is made into several regular components. The direction of view is made in such a way that only one path is made to avoid unnecessary clash of visitors and to provide easy guidance for them. The water tank, slab, columns, and footing are designed. Staircase is also provided. All the analysis are made manually by considering only maximum loads.

INTRODUCTION

A museum is an institution that conserves a collection of artifacts and other objects of artistic, cultural, historical, or scientific importance. Many public museums make these items available for public viewing through exhibits that may be permanent or temporary. There are different types of museums. The purpose of modern museums is to collect, preserve, interpret, and display items of artistic, cultural, or scientific significance for the education of the public. From a visitor or community perspective, the purpose can also depend on one's point of view. A trip to a local history museum or large city art museum can be an entertaining and enlightening way to spend the day. To city leaders, a healthy museum community can be seen as a gauge of the economic health of a city, and a way to increase the sophistication of its inhabitants. Museums are, above all, storehouses of knowledge.

ANALYSIS:

A Museum is a complicated statically indeterminate structure. The exact analysis by the moment distribution method is very lengthy and difficult. It is proposed to discuss some of the method adopted in analysis of multi-storeyed frames.

DESIGN:

Design of a reinforced concrete structure is carried in many stages, from instance, the empirical apportionment of economical size to the various element, the detailed calculation of the strength and stability of the structure as a whole, and each of the elements under the various forces it is subjected to, the estimation of economical amount of reinforcements to be provided for the safety, as also the detailing of the steel in the various parts for integrated action. In addition, serviceability aspect and durability aspects should also be given due consideration in the design.

LIMIT STATE METHOD OF DESIGN:

In the limit state method a structure is designed to withstand all loads likely to act on it in the duration of its life span and also to satisfy the serviceability requirements like deflection limitations and limitation of requirements before failure can occur. The design provides a condition that the structure will not become unfit for use which it is meant or in other words, the structure will not reach a limit state. Primary elements of Reinforced Concrete Structures are Slabs, Beams, Columns and Foundations. All these are designed based on the limit state method only.

LOADS ON STRUCTURE:

The correct estimation of loads on a structure or a part of a structure leads the designer to the safe and economical design. It is very important that no load which is to be borne by the structure is overlooked. The procedure of correct estimation of load consists of estimation of different types of loads expected to be borne by the structure throughout its design life. It is estimated by using respective INDIAN STANDARD CODES OF PRACTICE. There are two types of loads acting on the structure. One is live load and the other is dead load. Determination of worst combination of loads that may occur at one time throughout the life of structure. The standard codes of practice gives guidelines for this. All the loads are not expected at the same time [as per annex B-2.3, IS-456]. Wind and Seismic loads need not to be considered. Since earthquake are rare phenomena. Therefore for design purpose these are assumed not to occur simultaneously.

EXISTING STRUCTURE IDEALOGY:

It was designed by Daniel Libeskind who offered a zigzag design. It consists of two buildings – a baroque old building, the Kollegienhaus and a new, deconstructivist-style. The two

buildings have no visible connection above ground. Average visitors per day is 2112 people as per recent record. C.Kugelmann and J.Bitter published "Jewish Museum Berlin" in 2011. The design principles for each elements are clearly pointed out. Further numerous reference are also available for clarification. H.Binet and R.Bunschoten published "A passage through silence and light" in 1997 by Black Dog Pub., The history of Berlin museum, Data required for calculating capacity and Allotment of Dimensions are provided here with sample pictures.

SPECIFICATIONS:

Type of structure-Framed structure, Number of storey-G+1, Average visitors-2000/day, Land area-4200 sq.m, Building area-2376 sq.m, Height between floors-3m, Concrete grade-M20, Steel grade-Fe415, Wall thickness-300mm. This museum is in the form of 2 alphabets (A & Z). These two blocks are not connected to each other directly. This museum is of one entry and one exit type. There are totally 18 galleries in this museum which comprises of 7 different museums. It also has washrooms located at both "A block" and "Z block". There is a presentation hall at the end of 18th gallery. The parking area has been provided at the museum.

Sub-Structure: The earthwork of excavation for foundation shall be carried out upto hard dense soil. The size of footing is designed as per the specifications. The basement of ground floor will be filled with sand, crushed dust and it is consolidated with watering and pumping. Anti termite treatment to the foundation bed, floor wall, etc. has to be carried out through best method of control during pre construction.

Super-Structure: Super structures elements like column, beam shall be designed as RC elements of M20 grade concrete and Fe415 steel. The walls are of brickwork using 1st class bricks and cement mortar. The top of the roof is finished with the best quality of hydraulic pressed Mangalore clay tiles over the weathering course. Entire brick walls are to be plastered. The external plastering is done by mixing with an approved water proofing compound for 12mm thick. The internal plastering is done for 10mm thick. The flooring is rendered with colored mosaic tiles. It is laid over the PCC and with the help of Cement mortar. The flooring should be thin as much as possible. All wood works are painted with 3coats of best quality of synthetic enamel paint. All internal and external surfaces are painted with 3coats of best quality of cement paints of approved colors. Supply from water tank is properly connected to the sanitary arrangements like closets, urinals, wash basins and these are connected to the septic tank through proper lines.

STRUCTURAL DESIGNING AND REINFORCEMENT DETAILING:

The design and analysis of this structure includes Design of R.C.C Water tank, Design of Flat Slab, Design of Columns (Uniaxial, Biaxial and Axial), Design of Footing, Design of Staircase. Reinforcement detailing of each and every component is drawn manually. It is then drawn using AutoCadd software to avoid manual errors.

CONCLUSION:

We have designed an irregular shaped museum as a framed structure. Irregular shaped building is designed by splitting it into regular structural shapes. It is purely design oriented rather than surveys and research purpose. It is covered entirely with all the necessary detailing, report and drawings are applied and checked for safety. This project will also focus on detailed site analysis and brief. This design is calculated with average number of visitors as 2000 people/day. In case of more visitors, future expansion is also possible here by increasing the number of storeys and adding amenities to it.

REFERENCES:

- [1]"Reinforced concrete design" written by N.Krishna Raju and R.N.Pranesh
- [2]C. KUGELMANN and J. BITTER published "Jewish Museum Berlin" in 2011.
- [3] KIDDELL-KING and JANE published "A place to muse" in February, 13, 1999.