

Skeleton Consultant Pvt. Ltd.



FACT FILE

Client: Shiromani Gurudwara Parbhandhak Committee (SGPC)

Architecture, MEP & Interior Design Consultant: Ar. Robin Matharu, Renu Robin Design Studio

Structural consultant: Skeleton Consultant Pvt. Ltd.

Steel Fabricator & Erector: Mid Thermo Façade Solutions P.Ltd.

Concrete Cutting & Anchoring Contractor: Mr. JK Khani, Jay kay Engineering

Area: 10,100 sq. ft.

Height: Basement + Ground + First

Cost: 14 crore (approx.)

Tonnage: Steel Domes 40MT

Construction: Ongoing

PROJECT BRIEF:

The Gurdwara Rakabganj Sahib is a historic Gurdwara near Parliament House, New Delhi. The ICSS Complex shall have a new auditorium constructed inside Gurudwara premises. The architect has deployed an innovative concept of shell type of dome construction to give sense of floating light space within core of the building. Since project had time constraints & required construction in existing building, Structural Steel was chosen. The lower dome is having 16.6m diameter & 7.5m height. The structure had 225mm thick slab earlier and an opening of 22m diameter is cut at roof and covered with dome. Hollow tubular sections were used for dome being light weight. The dome has been designed in such a way that curvature in both, radial & tangential, directions is maintained. The main challenge was to customize connections considering existing structure. The construction sequence was meticulously designed so as not to adversely affect strength and stability of existing building.

SIGNIFICANCE OF STRUCTURE:

The Gurdwara Rakabganj Sahib is a historic Gurdwara near Parliament House in New Delhi. Built in 1783, the structure is one of the religious shrines constructed during the brief stay of Sikh military leader Baghel Singh in Delhi. Inception of this project leads to construct an auditorium in the

premises of Gurudwara glorifying the sacred principles of the community with the indigenous blend of today's time.

CONCEPT DESIGN:

An innovative auditorium was created giving the sense of floating light space within the core of the building itself. This illusion was created with the help of the hanging columns. It led to create an open space for gathering on the ground floor leading up to the auditorium structure with ramps, making the building barrier free. The innovative dome on top again gives a new outlook to the existing dome of the main Gurudwara building. The project consists of auditorium, gallery, and VIP lounges along with amenities.

STRUCTURAL GEOMETRICS:

Requirements of erection friendly structure in the existing building and time constraints, steel was unanimous choice by the team. This building shall be mainly used for exhibition purpose; hence architect's deployed an innovative concept of shell type of dome construction along with other amenities/services to meet the civic project requirement. The lower frame of dome is erected as hemispherical dome having 16.6m diameter & 7.5m height. Area inside the dome shall be utilized as auditorium. A Pentagon RCC slab inside the whole dome has been constructed for sitting purpose. The entire auditorium has been housed inside a big hall which had 225mm thick concrete slab earlier and a large opening of 22m diameter is cut at roof level and covered with steel dome



structure. The benefits considered for the design of dome is the ability to cover the large distance with minimum thickness. Structural steel hollow tube sections have been used for the construction of dome.

Accommodating a domical auditorium inside an existing RCC building by cutting 4 main RCC columns and replacing existing 9" thick slab to cover again with a light weight large column free span element, STEEL is the perfect solution. We used closed hollow structural sections and designed an elegant & sleek looking design, matching with architectural aesthetics n functional requirements.

CHALLENGES:

- The challenge of this project is to develop a concept design for the construction of dome in an existing building. The entire construction sequence was meticulously designed.
- The whole construction must be performed in such a way that it does not adversely affect the strength and stability of existing building.
- Being designers, the toughest part was to customize the connection considering the structural members of existing building.
- The dome has been erected in such a way that it maintained the curvature in both directions, i.e. radially & tangentially.
- First the RCC roof approx. 22m diameter has been cut and heavy slab pieces were carefully removed outside the building without any impact on lower slabs with the help of expert concrete cutting agency.
- Then the roof level steel dome curved pieces were fabricated and erected. These were supported over steel brackets specially designed and fixed at the periphery columns. Then the lower hemispherical dome radials were erected and finally the horizontal curved members.
- Finishing work at roof and in the auditorium are in progress.

Excellent architectural concept from Renu Robin Design & SGPC have been made possible by structural engineering from Skeleton & Construction by MTFS.

Er. Anisha Annee, Mr. Joby Joseph & Er. Nitesh Agrawal have provided complete engineering under the guidance of Er.(Dr) Abhay Gupta in creating another marvelous iconic structural engineering marvel in the historic city of DELHI.

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