

# Skeleton Consultants Pvt. Ltd

## PROJECT BRIEF

Sri Sathya Sai Sanjeevani Hospital is the proposed super speciality heart centre for children located at Ballabgarh, Delhi-Mathura Road. The proposed building is G+2 structure with the provision of one future floor. The proposed built up area is approximately 147300 sqft.

This multispecialty hospital will offer high quality healthcare services with numerous OTs, ICUs, with modern technology & advancement in heart care. It is a complex heart shaped building having unsymmetrical plan. The structure is envisaged as a steel-concrete hybrid structure with substructure upto the plinth level in concrete and superstructure in structural steel.

## GETTING STARTED

Since it is a fast track project with time bound completion and due to the low soil bearing capacity reported at site, structural steel was the unanimous choice. Being a light and high strength material structural steel offers a greater degree of flexibility and sturdy behaviour.

## STRUCTURAL GEOMETRICS

The primary frame of the building comprises of special moment resisting steel Beam-Columns frame with Cross bracings in vertical plane at suitable locations to resist the lateral force due to earthquake & wind. The floor system comprises of steel beam & joist with concrete slab over profiled metal deck sheet. The composite action of steel & concrete is utilised to optimise beam & joist design. Composite design helps in reducing the size of section, controlling deflection and achieving economy. Shear studs are placed at top of steel sections to transfer the shear force from slab to achieve composite behaviour.

The total design lateral forces is resisted by the columns-beam frames and bracings in proportion to their lateral stiffness at all the floor levels. Hollow tubular sections are preferred for cross bracing due to slenderness benefits resulting from higher radius of gyration.



Moment resisting connections are considered for column-beam junction for rigid & stable behaviour and being lighter. Steel columns are analysed as pinned at top of RC pedestal and support reaction at that location were considered for substructure design in order to make the substructure lighter.

Through rigorous analysis and design iterations, the structural stability was ensured while satisfying the budgetary constraints as well as time constraints.



Fire rating for the steel structure was ensured by the means of vermiculite coating used.

All Wall panels (external & internal) are Schnell wall panels, 170mm thk.

## STEEL SECTIONS/GRADES

The Steel column-beam frame are having plate fabricated I section as well as all connection plates are made of high strength steel having yield strength of 345 MPa conforming to IS 2062. Hollow tubular sections are considered for cross bracings having yield strength of 310 Mpa.

## CHALLENGES /COMPLEXITIES FACED

There were quite a few complexities involved while designing this project. The shape of the building is heart shaped owing to which stress gets concentrated at the corner bend which results in rotational dynamic mode shape. Cross bracings at several locations were provided in line with architectural features to control the rotational mode and deflections.

Due to low soil bearing capacity, site located in seismic zone IV and being a hospital building with importance factor 1.5, primary concern was to keep the weight of superstructure light. The connection of steel columns and pedestals are designed as hinged and composite action of steel beam & concrete slab is utilised to make the foundations lighter.

## SALIENT FEATURES

- Heart shaped plan: Unsymmetrical in mass & stiffness
- Curved periphery
- Building located in earthquake zone-IV with IF= 1.5.
- Composite design of beams and RC slab with proper shear studs anchorage.
- Use of Light weight Schnell walls

## FAST FACTS

- Client: Sri Sathya Sai Charitable Trust Bangalore
- Architect: Ravi Associates, Bengaluru
- Structural Consultant: Skeleton Consultants Pvt. Ltd., Noida
- Turnkey Contractor: Synergy Thrislington, Mohali
- Proof Consultant: Sterling Engineering, Bengaluru
- Steel Tonnage: 1000MT (approx.)
- Current status: Under construction
- “ the building design has been led by Er. Nitesh Agrawal along with Anisha Annee & Joby Joseph, under the guidance of Er.(Dr) Abhay Gupta”



### Contact:

**Skeleton Consultants Pvt. Ltd.**  
A-75, Second Floor, Sector-5, Noida –201301  
Tel: 0120-4222642  
Email: [skeletondelhi@skeleton.in](mailto:skeletondelhi@skeleton.in)