INDOOR CYCLING VELODROME AT INDIRA GANDHI STADIUM COMPLEX FOR COMMONWEALTH GAMES -2010

Location: New Delhi
Client: Central Public Works Department, (CPWD) New Delhi
Architect: STUP Consultants Pvt. Ltd.
Structural Consultant: STUP Consultants Pvt. Ltd.
Software used: STAAD Pro V8i
Steel Section Used: TATA STEEL for RHS & SHS sections / SAIL
Execution Agency: JMC Projects (India) Ltd
RCC Contractor: JMC Projects (India) Ltd
Steel Fabricator: PHILIPS Electronics (India) Ltd./ Elgin Electronics
Electrical Contractor: JMC Projects (India) Ltd
Plumbings & Sanitary Contractor: Fire Remedy
Fire Fighting: VOLTAS (India) LTD./ Comfort Net India & Dale Hughes JV
HVAC: Date of Commencement: November 2008
Date of Commission: June 2010
Structural Steel Requirement: 1786 MT
Construction Cost: Rs.150 Crores
Architectural Features & Concepts

Stadia structures incorporate the viewing stands for the spectators and together with various sports facilities, Medical facilities, Dope test, Players’ lounge & concourse, Warm-up Hall, Gymnasium, Change Room, Judges/ Referee/ Officials meeting room, VIP Lounge, Toilets, Utilities and offices for the many Sports Associations housed in the space underneath the galleries.

Following criteria has been kept in mind while planning for the roof structure for any stadia.

1) Obstruction-less viewing for all spectators. Care is taken to see that all members of the audience get a clear view of the event.
2) All Stadia need to be designed to Olympic/International standards so that competition of various levels can be held in them
3) From an aesthetic aspect, each stadium is planned and designed to suit the topography and surrounds of that stadium
4) Fast track construction often becomes essential due to time constraints. Design criteria decisions are taken from this aspect wherever possible

As per requirement of Commonwealth Games a stadium is to construct for housing a 250m long timber track of 7m width having capacity of 3800. The layout of the stadium is dependent on the track geometry number of spectators to be accommodated and the various other sports facilities to be provided underneath the gallery. Total area of playing arena is 5000 sq.m and the total covered area is 17500 sqm.
including the area marked for utility. The cycling track is of Siberian Pine wood constructed.

The total width and length of the stadium as per architectural planning works out to be 124.3m and 145.8m without having any internal column except at periphery. Roof is having a double curvature.

Barrier free access has been provided introducing two ramps and four lifts for physically challenged persons.

**Structural Features & Concept (Write up, min. 250 words)**

The total roof structure having shape of felt hat has been designed with RCC columns and steel roof. The RCC columns are provided on the peripherals only to achieve the unobstructed view. Two main spine steel arches curved in horizontal profile having span of 146 m and height of 38.7m are the main supporting structure of the roof. The steel latticed girder made up of rectangular tube in the cross direction having span varying from 78m to 130m is supported on the RCC column at ends and at two intermediate points from the main arch through suspenders, thus reducing the span of the latticed girder. The radius, span and height of these trusses in cross direction is varying due to the shape of the roof. The two main spine arches are connected in plan through ties to form a vierendeel girder for stability against horizontal forces. The purlins over the cross trusses are laid to hold the double skin roof sheeting with insulation. Adequate bracing arrangement has been provided to hold the total structures against lateral instability. The two main arches are anchored on a concrete block resting on 1.5m diameter bored cast-in-situ pile. Seismic Zone - IV and wind velocity 47 m/ sec. All the element of the roof structure is of either RHS or SHS section. Temperature loading due to increment & decrement has been considered in design of roof. All structural steel has been painted two coats of Zinc Anode epoxy primer and two finish coat of Epilux 89 high build after cleaning the surface to SA 2.5.
Special Features:

- 3X 350TR Screw Chillers having VFD & VSD for chillers and AHU provided for energy efficiency. Ozonizers provided in the system.
- Sports lighting for 2200 lux provided with HDTV transmission and controlled by PLC.
- Automatic Sprinkler system / wet riser with intelligent addressible fire detection and fire alarm system provided.
- Roof in the shape of felt hat covering the entire velodrome constructed of double skin Galvalume sheet with Rock Wool Insulation.
- Energy efficient system adopted for HVAC & Lighting system, Building Management system introduced.
- While Homologating the stadium for use Mr Ray Godkin said "The Delhi Velodrome is absolutely marvelous facility of highest standard and probably would only be surpassed by the Beijing Olympic Velodrome built at cost of US$ 215 million" - Delhi Velodrome cost - US $ 34 million.