

INTRODUCTION

Construction Industry in India is witnessing a phenomenal growth in all sectors of utility, be it the infrastructure, industrial, or commercial sector for the last few years. All these are evident from the visible growth that is taking place all around mostly in the urban environment. The urban society is witnessing this phenomenon through a wide spectrum of development mostly in the field of construction of urban amenities, like roads, bridges flyovers, commercial centers like shopping malls and multiplexes and last but not the least various state-of-the-art signature structures and buildings like world class Auditoriums, Art Galleries, Exhibition Halls etc. These places mainly act as the cultural nerve centers of the city.

APPOINTMENT AS CONSULTANT

One of the reputed structural consultants in India has been short listed to design a Trade Fair Centre having an exhibition hall of 23,750 sq. ft. and 2 storied Banquet and Display area. [REDACTED] has been able to convince the client that steel intensive design will not only complete the project in a much lesser time because of faster construction but also it will be cost competitive and more aesthetic and will have longer life than any of the other alternative methods of construction.

In view of the challenge taken up by [REDACTED] to implement the aforesaid benefits of steel intensive construction to the client, [REDACTED] seeks your expertise in providing Analysis, Design, Detail Engineering and Estimation of a “**Steel-Intensive Trade Fair Centre**”

1. Development of an Economical and Aesthetic structural scheme within the specified requirement.
2. Structural design engineering and Detail drawings for the developed structural scheme.
3. Bill of materials.

FACILITIES

The client has specified the following requirements for the proposed project:

1	Site Location	:	Kolkata
2	Building Dimension (Length x Width)	:	70.55 m x 40 m
3	Building Height		As per design
4	Minimum span of roof structure along width of the building in Exhibition Hall area	:	40 m
5	Minimum spacing of column along length of the building	:	As per design
6	Minimum column spacing along 40 m width of the building in Banquet Hall area	:	10 m
7	Minimum spacing of column along length of the building in Banquet Hall area	:	As per design
8	Minimum Clear Height at Exhibition Hall area	:	10 m

9	Clear Height in Banquet area	:	4 m (or as standard practice)
10	Height of plinth/Floor Level from existing GL	:	0.6 m
11	Material of Façade/ Roof	:	Colour Coated Steel Sheet/ As applicable
12	Floor in Banquet/ Conference Hall area	:	Steel- Concrete Composite
13	Roof Shape	:	Innovative
14	Minimum Clear Height at Entry/ Exit Gate	:	3 m
15	Provision of Roof Top Solar Panel	:	Consider Solar Panel Load
16	Minimum columns no with more open space is required	:	Showing advantage of Steel

MATERIALS FOR CONSTRUCTION

- | | | |
|--|---|--|
| 1. Foundation system | : | R.C.C. of minimum grade M25 |
| 2. Structural members like columns, beams, members and bracing systems | : | Structural steel of mild steel (grade E250BR or higher grade as required and applicable) |
| 4. Roof & Cladding | : | Standard Colour Coated Steel Sheet (Galvalume) |

STANDARD SHAPE OF THE STRUCTURE

While considering the shape and arrangement of the Structure, aesthetics, economy as well as structural integrity of the entire system has to be considered.

DESIGN LOADS

1. Dead Load:

Dead load will be the weight of the structure itself along with all permanent weight carried by it.

2. Live Load:

- | | |
|----------------------|--|
| a. Live load on Roof | - as per IS: 875 Part 2 latest version |
| b. Live Load on Deck | - as per IS: 875 Part 2 latest version |
| c. | |

3. Wind Load:

- a. Basic wind speed to be considered for the specified location as per IS: 875 Part 3 latest version

4. Seismic Load:

- a. Seismic Zone for the mentioned location as per IS: 1893 latest version

5. Other Loads:

Temperature variation of 15°C has to be considered. Please consult relevant specification for other specific loads and action points.

GUIDELINES

The following guidelines should be taken into consideration:

1. Items designed in accordance with design scope, should be checked for axial, bending, shear, bearing stresses etc. as applicable. Equivalent stresses and any other stresses necessitated by the relevant codes should also be calculated.
2. Deflection calculated should be within stipulations given in relevant IS code.
3. For designing of Base Plates and Anchor Bolts, grade of concrete to be considered as mentioned above.
4. For foundation design consider Safe Bearing Capacity as 200.0 kN/m² at 3.0m from GL. No tension in bearing pressure due to uplift for DL+WL condition is allowable.
5. While selecting the steel sections for use, please refer [REDACTED] website or any manufacturer's website for availability.

DESIGN SCOPE

For designing the building, the following scope of work needs to be undertaken:

1. Layout Plan, Elevation and Sectional views should show the arrangement facilities provided.
 - d. Beams & Columns: Sections, such as MB/MC [refer IS 808, built-up sections or parallel flange sections], Tubular Sections [refer IS 1161 and IS 4923 will be preferred.- latest versions to be used
 - e. Truss members: IS 808, IS 1161 and IS 4923 - latest versions to be used
2. Connections: All connections shall be either welded connection or bolted connection using mild steel or high tensile black bolts, turned bolts or HSFG bolts.
3. The design and detailing of the following items shall be done:
 - a. Analysis of the structure in 2D or 3D as applicable.
 - b. Foundation System
 - c. All Columns / Girders / Beams
 - d. All Truss members / Arch members, Posts, Purlins and Girts
 - e. All Bracings, Struts and cables / steel ropes.
 - f. Connection designs for Critical joints
 - g. Any other members conceived in the scheme.
4. Bill of Materials: A bill of materials (in A4 sheet) should be prepared for all items under design scope to determine the quantity of materials required.

EXCLUSIONS

Structural bearings for supports and all allied services like electrical fittings.

DESIGN STANDARDS

1. Design

- Steel design - As per IS: 800 -2007 & NBC 2016 (for latest revision)
- Concrete design - As per IS: 456 -2000
- Live load - As per IS: 875 Part 2 -1987
- Wind load - As per IS: 875 Part 3-2015
- Seismic load - As per IS: 1893 -2016

2. Material

- Rolled sections and plates - As per IS: 2062 – 2011
- SHS/RHS - As per IS: 4923 – 2017
- CHS - As per IS: 1161 – 2014

3. Welding

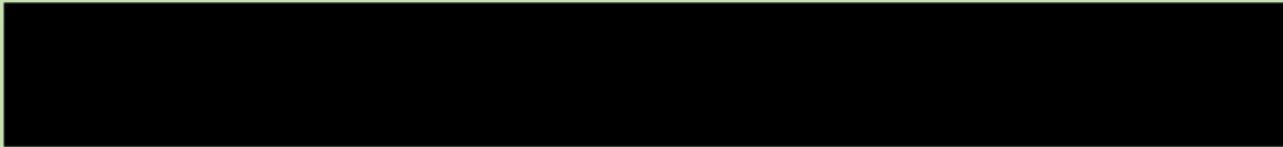
- Symbols for welding - As per IS: 813(Part 1) – 2018
- Weld joint details - As per IS: 9595 – 1996

4. Fasteners

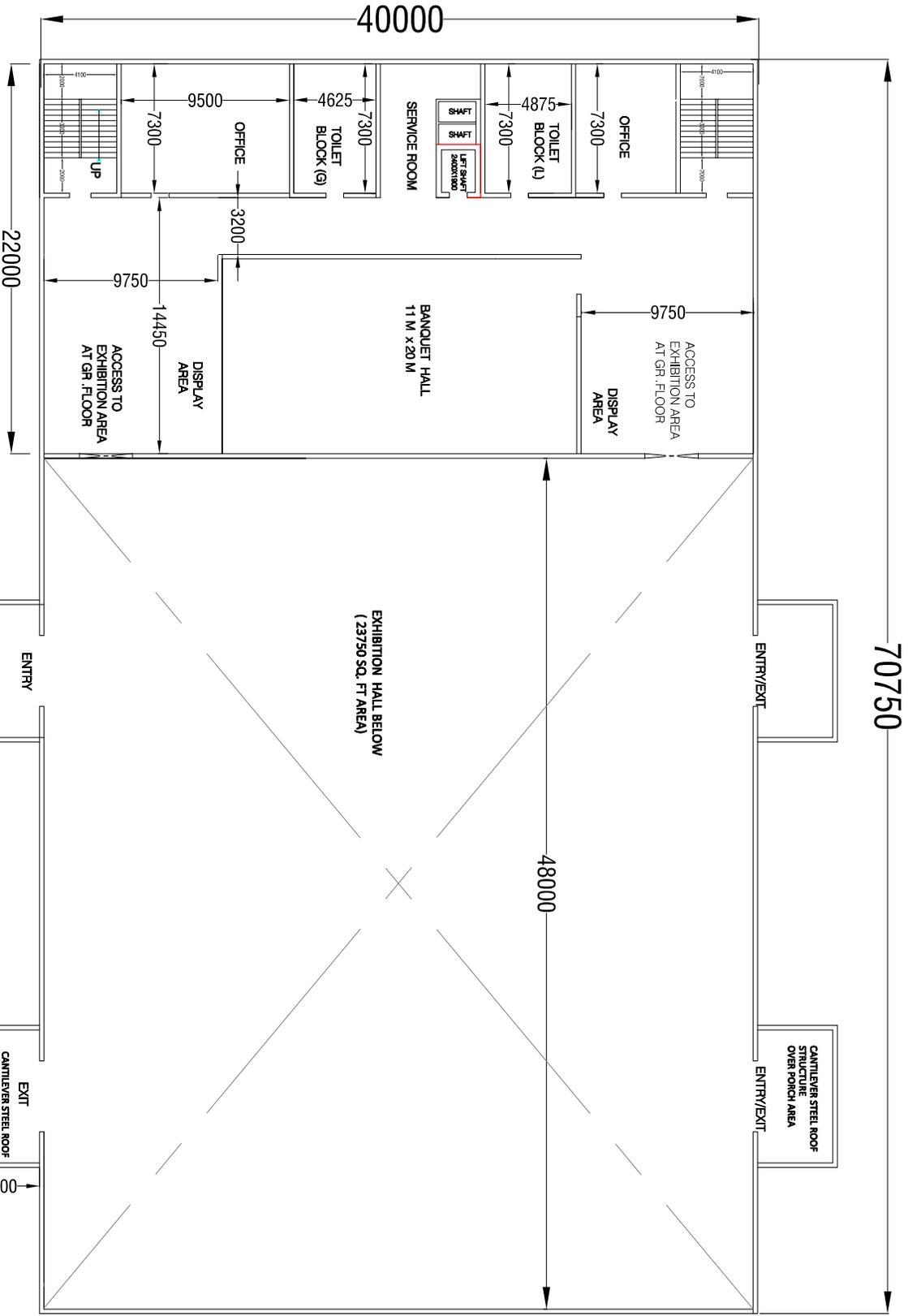
- High strength structural bolts - As per IS: 3757 – 1985 (Reaffirmed 2019) & IS: 4000 – 1992 (Reaffirmed 2017)
- Hexagon Head Bolt -As per IS: 1363 (Part 1)– 2019
- Foundation bolts - As per IS: 5624 – 1993

Checklist for Submission

Sl No	Description
1	Content page for report and all submissions
2	All pages and drawings are to be numbered
3	All soft copies are submitted on a CD (i.e., drawings, input and output files of analysis, excel spreadsheets for design checks etc.)
4	Hard copy report along with all required drawings.
5	Bonafide certificate in hard copy
6	Student details along with photos in soft copy.



Schematic Plan For Steel Intensive Trade Fair Centre



GROUND & FIRST FLOOR PLAN