

Meeting Hall of 1500 sq. ft.
Floor Area

Steel Intensive Rural Structures - INSDAG Initiative

To achieve the goal of ensuing sustainable construction and for its mission of steel promotion INSDAG has developed few design models of rural buildings using structural steel.

4 building plans collected from municipalities of West Bengal have been used for building design.

1. One Unit house if Area 350 Sq Ft
2. One Anganwadi –cum- Health Centre of area 400 Sq ft
3. A meeting / Panchayat hall of area 1500sq.ft
4. A school building of area 2600sq.ft

A. Salient Features / Building Components of in Building Models with Steel Framing

i) Roofing

Roof sheeting is done with 0.5 mm thick Corrugated Galvanized/ Galvalume/ colour coated Steel Sheets spanning over purlins supported on steel portals or trusses made from Square Hollow Section/ Rectangular Hollow Section. Lighter weight Galvalume sheet and FC panel can also be used.

ii) Structural Framework

Structural steel Column and Trusses / Portal Frames using SHS/RHS

The entire framework for the building has been conceptualized using Square Hollow Section with idealized panels approximately 1.0mx1.0 m. The members are connected with the SHS or RHS sections by insert plates.

iii) Ferro-Cement Wall panels/Cladding

A typical panel size of 1m x 1m for the cladding materials has been chosen. Each panel is made of a 15 mm thick Cement-Sand mortar (1:1) skin with 1 layer of 0.265 mm diameter galvanized chicken mesh under a layer of 2.65 mm diameter reinforcement @ 25 mm c/c both ways as welded mesh placed centrally. The typical details of the connection of these panels are in the corresponding drawing sheets of each building . The gaps (approx. 2 mm) between the panels and SHS sections will be sealed with waterproof grouting using SIKA / Accoproof or equivalent, to make the connections leak proof.

iv) RCC Foundation System

The foundation type and pattern for all of the housing modules has been conceived as a frame work of RCC peripheral beam at plinth level supported over RCC pedestals and RCC isolated footings. For partition walls, intermediate supports have been considered supported over tie beams.

v) **Flooring**

Brick on-edge flooring placed over rammed earth at locations of rooms. For water-tightness flooring is placed over 50 mm thick 1:2:4 Plain Cement Concrete.

vi) **Doors and Windows**

Steel framed doors and windows are assumed to be used. Depending on the local site condition other material can be used also to make it cost-effective.



Structural Frame & Ferro cement panels while Installation



Connection of SHS with Ferro cement panel

Prototype Buildings Installed by INSDAG



Picture 1



Picture 2

**Model Rural House Installed at Rural Technology Park
at the Campus of National Institute of Rural Development & Panchayat Raj, Hyderabad,
(Installed in 2017, still in good condition in 2023)**

Many more prototypes have been installed by INSDAG in many places like in Burdwan in West Bengal (2013), Tripura, Talegaon in Maharashtra (2017) with FC Panels.

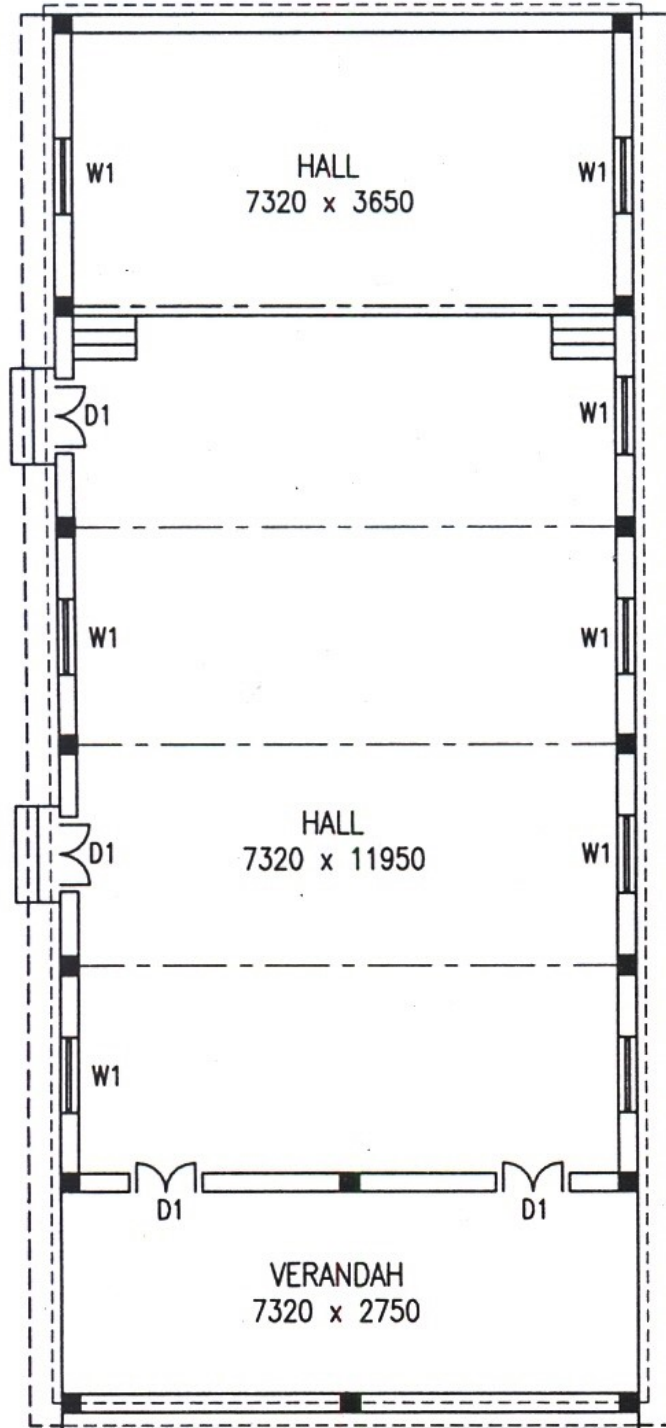
B. Cost Aspects

Steel framed building module by INSDAG would cost around Rs. 1100 to 1300/- per sq. ft of area (as estimated with DSR 2023) with steel usage of 4.0 to 5.3 kg steel per sq. ft. of construction area (structural steel & TMT bars) which is competitive and sometimes lower if constructed in mass scale.

Cost & Steel Usage – 4 Building Modules

Building Type	Area Sq. Ft.	Cost per sq. ft.	Steel usage (Structural Steel & TMT)
Unit House	350	Rs. 1295 /-	5.3 kg / sq. ft. (only structural steel- 4.54)
Health / Aanganwadi Centre	400	Rs. 1125 /-	4.9 kg / sq. ft. (only structural steel- 4.00)
Meeting Hall	1500	Rs. 1276/-	4.7 kg / sq. ft. (only structural steel- 4.0)
School Building	2600	Rs. 1050 /-	4.0 kg / sq. ft. (only structural steel- 2.7)

Architectural Plan of 1500 sq. ft Floor Area of Meeting Hall



PLAN AT F.F.L SHOWING MEETING HALL
1500 SQ. FT. FLOOR AREA

NOTES :

1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
2. DRAWING COLLECTED FROM S.A.E. WBSRDA, PURULIA, WEST BENGAL DIVISION



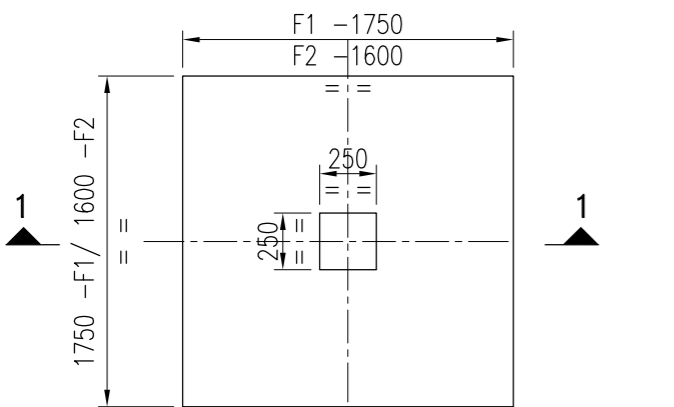
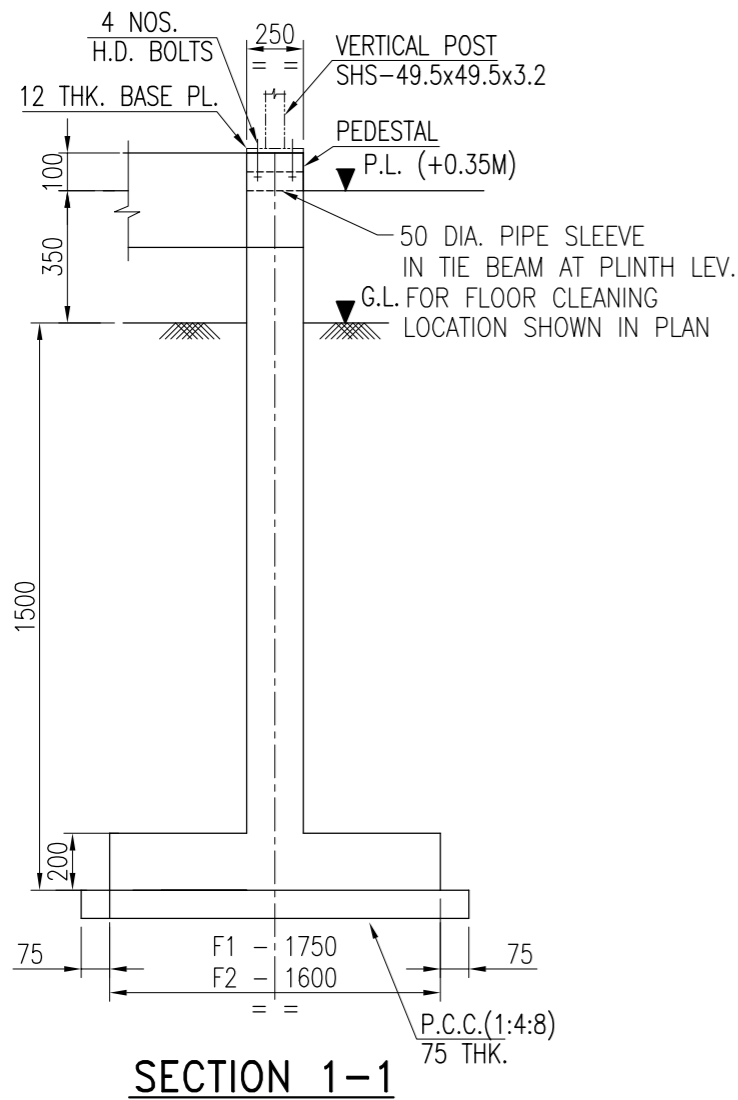
INSTITUTE FOR STEEL DEVELOPMENT & GROWTH
(JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
52/1A, BALLYGUNGE CIRCULAR ROAD, KOLKATA-700 019

TITLE : ARCHITECTURAL PLAN
OF MEETING HALL

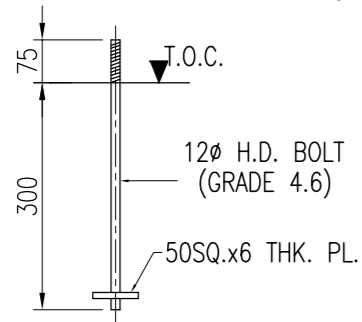
DRG. NO.: NS/CON/12-13/01/MH/ARCH/01

DRAWN	SM	CHKD	ND/SC	SCALE	1:50, 1:20, 1:10	DATE	18/12/13	REV.	0
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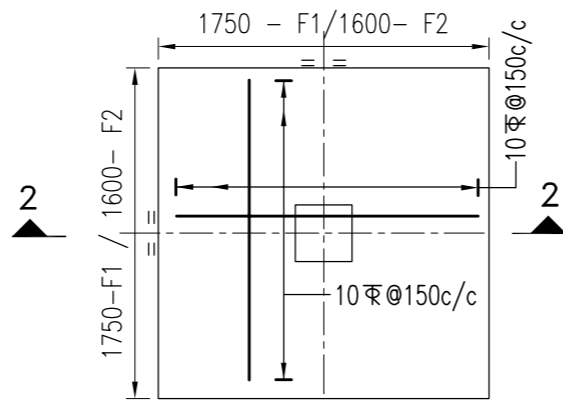
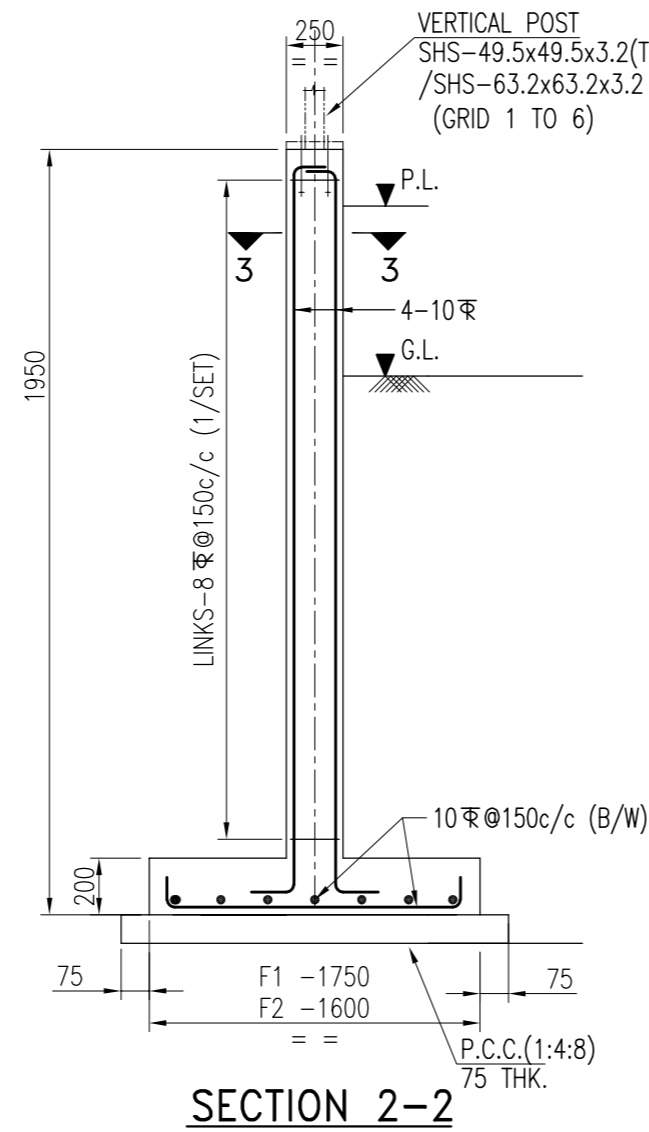
G.A & Detail of Meeting Hall - Foundation Details



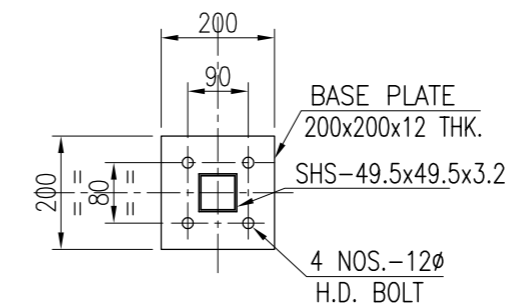
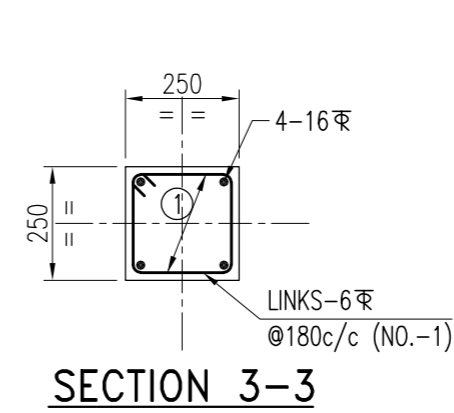
DETAIL OF FOUNDATION (F1/F2)



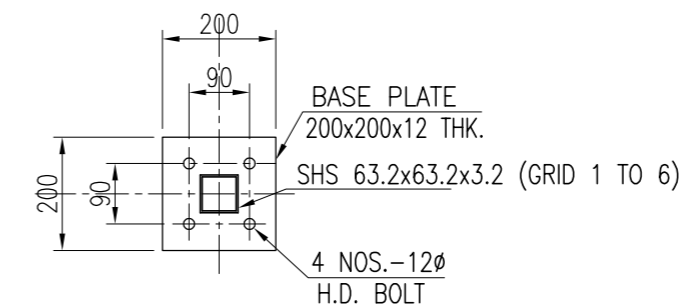
DETAIL OF ANCHOR BOLT



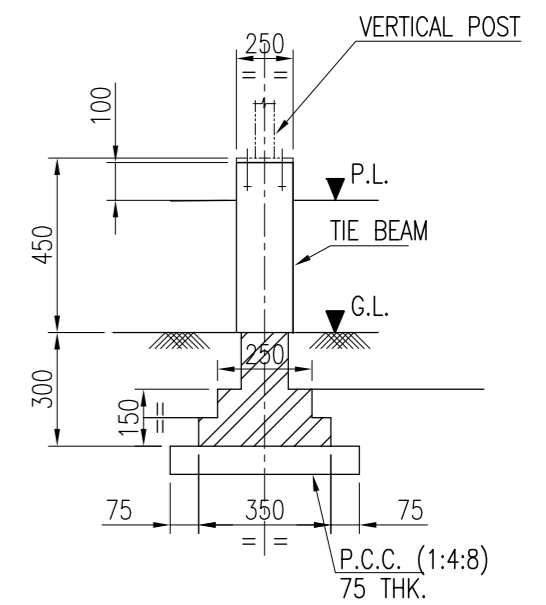
REINF. DETAIL FOUNDATION (F1/F2)



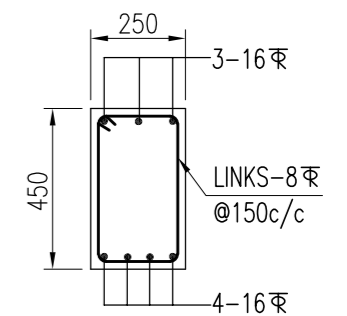
BASE PLATE DETAIL (TYPE 1)



BASE PLATE DETAIL (TYPE 2)




**SECTION 5-5
REF. DWG NO. 1**

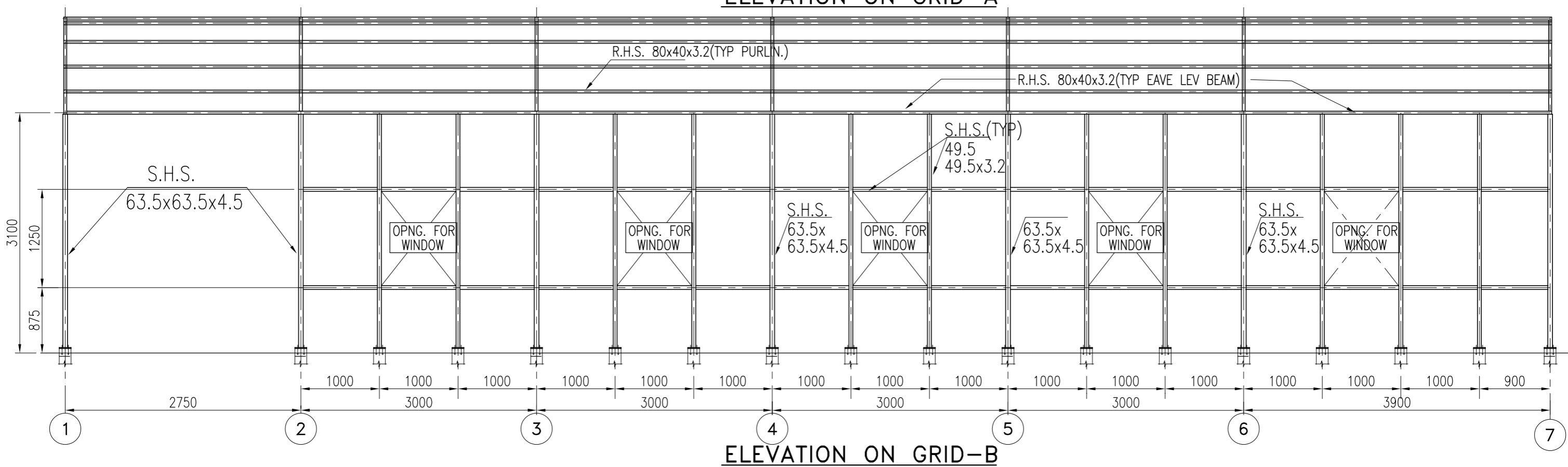
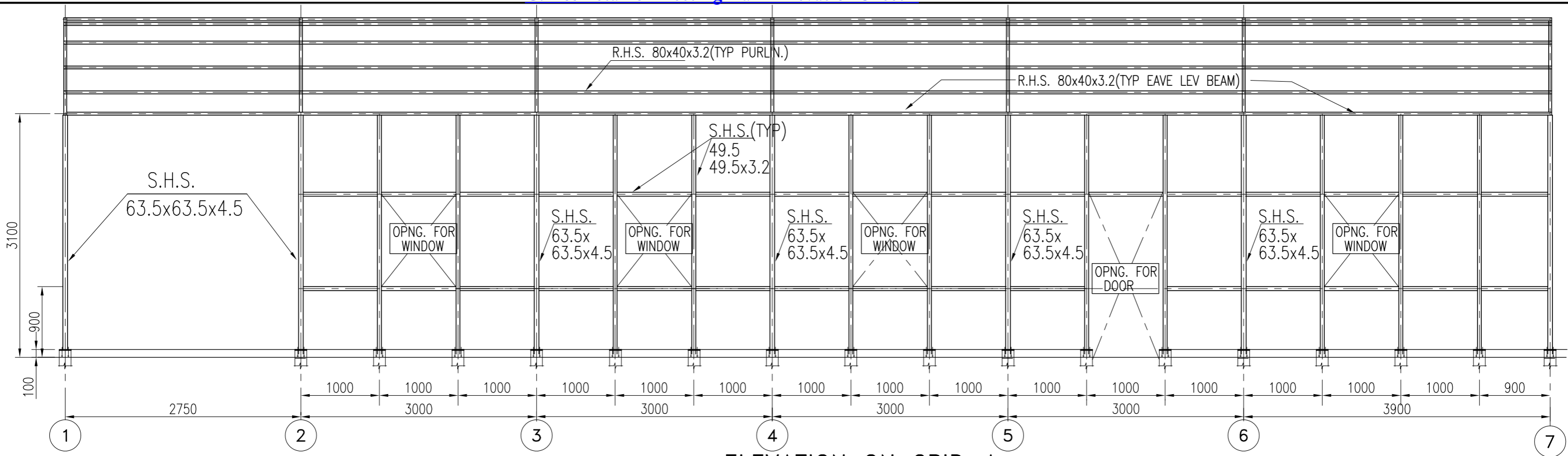


REINF. DET. OF TIE-BEAM TB-1


NOTES :

1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
2. CONCRETE GRADE IS M25 CONFORMING TO IS:456-2000
3. REINFORCEMENT BAR SHALL BE Fe 500 TMT CONFORMING TO IS:1786-2008
4. ASSUMED SOIL BEARING CAPACITY = 10.0 MT/M SQ.

					DRAWN	S.M.	APPROVED	 INSTITUTE FOR STEEL DEVELOPMENT AND GROWTH ISPAT PRAGATI BHWAN 793 ANANDAPUR KOLKATA-700 107 (JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
							D.D.	
					DESIGNED	N.D./S.C.	SCALE	TITLE :
1	GENERALLY UPDATED	01.04.2024	ND	AG			1 : 50, 1:20, 1:10.	G.A. & DETAIL MEETING HALL FOUNDATION DETAIL
NO.	DESCRIPTION	DATE	BY	CHECKED	CHECKED	S.C./A.G.	DATE	DRG. NO. - INS/CON/12-13/01/MH/02
REVISION							01-12-2010	REV.
								1



- NOTES :**
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
 2. CONCRETE GRADE IS M25 CONFORMING TO IS:456:2000
 3. REINFORCEMENT BAR SHALL BE Fe 500 TMT CONFORMING TO IS:1786-2008
 4. ALL STRUCTURAL STEEL SHALL CONFORM TO IS : 2062 : 2011
 5. WELDING SHALL CONFORM TO IS: 816 & IS: 9595 (LATEST REV.)
 6. SHS/RHS SHALL CONFORM TO IS:4923-2017.

					DRAWN	S.M.	APPROVED	 INSTITUTE FOR STEEL DEVELOPMENT AND GROWTH ISPAT PRAGATI BHWAN 793 ANANDAPUR KOLKATA-700107 (JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
					DESIGNED	N.D./S.C.	D.D.	
1	GENERALLY UPDATED	01.04.2024	ND		CHECKED	S.C./A.G.	SCALE 1 : 50, 1:20, 1:10.	TITLE : G.A. & DETAIL MEETING HALL ELEVATION (SHEET 2 OF 2)
NO.	DESCRIPTION	DATE	BY	CHECKED			DATE 01-12-2010	DRG. NO.-INS/CON/12-13/01/MH/04
REVISION								REV. 1

Bill of Materials & Estimated Cost

Summary for the construction materials required for **Cost Rs. 1276** per Sq ft

MEETING HALL **1500 Sq Ft.** **Steel** **4.7** **KG/ Sq ft**

SI No	Description	Quantity	Unit	Rate (Rs)	Total
1	Excavation in Foundations and trenches	104.93	m ³	260	27281.329
2	75 mm thk PCC below Foundation (1:4:8)	99.19	m ³	5205	516296.96
3	Volume of RCC (M25 Grade)	21.01	m ³	9045	190073.89
4	Brickwork	6.04	m ³	7132	43104.917
5	Earthwork in filling.	82.26	m ³	308	25335.503
6	Reinforcement bar TMT Fe 500	2100	kg	89.65	188265
7	Structural steel SHS, Plates etc	4.95	MT	100000	495031.21
8	50 thk PCC (1:2:4) for Floor	7.21	m ³	9257	66705.942
9	75 thk BFS for Floor	143.6	m ²	450	64638
10	225 thk Rammed Earth (Fine Grained Soil)	32.32	m ³	186	6011.334
11	15mm thick Ferrocement panels	179.77	m ²	350	62919.85
12	50 mm thk Thermocol	179.77	m ²	10	1797.71
13	Steel Wire Mesh (2.65Ø @ 25 mm c/c)	179.77	m ²	250	44942.75
14	15mm thk Plaster (1:5)	179.77	m ²	175	31459.925
15	Roof Sheeting	0.59	MT	100000	59420.183
16	PVC Pipe Sleeves 150 mm long x 50 mm dia	30.0	Nos	50	1500
17	Centering and Shuttering	120.6	m ²	307.95	37124.912
18	Doors and windows		LS	5000*D+200	45000
19	White washing and paint	320.24	m ²	20	6404.84

Total Rs. **1913314.3**

Note: RATE as per DSR 2023