

Anganwadi Centre is 400 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

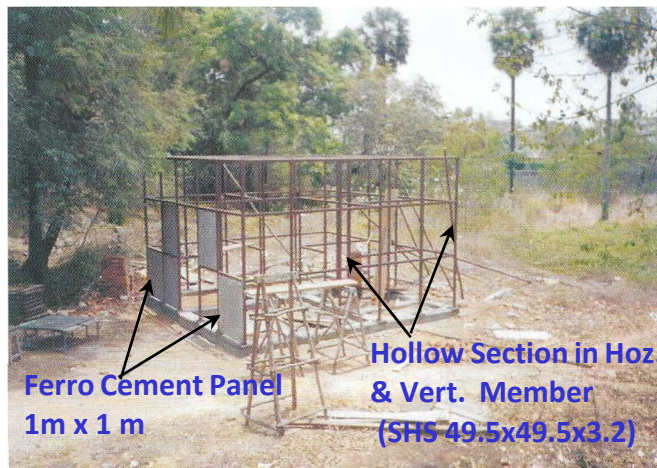
The foundation type and pattern for all of the housing modules has been conceived as a frame work of RCC peripheral beam at plinth level supported over RCC pedestals and RCC isolated footings. For partition walls, intermediate supports have been considered supported over tie beams.

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.

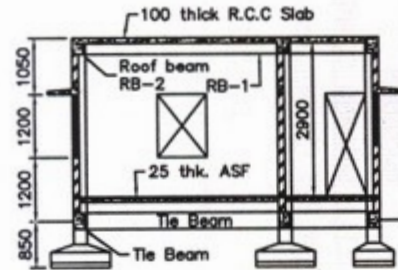
B. Cost Aspects

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.

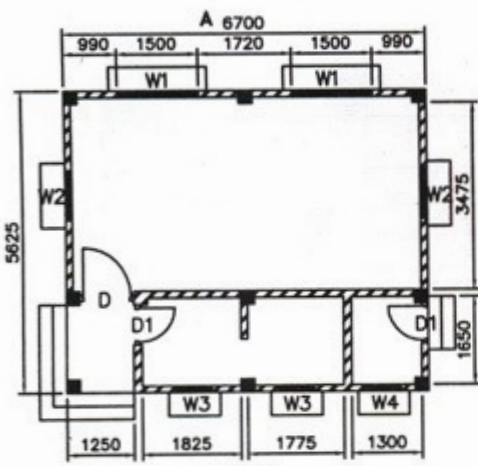
Cost & Steel Usage – 4 Building Modules

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)

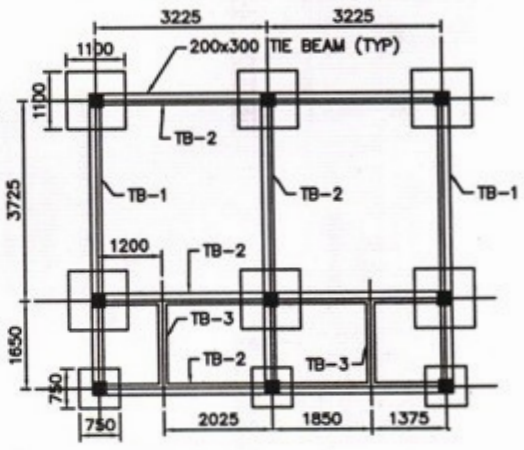
Architectural Plan of 400 sq. ft Floor Area of Anganwadi Centre (AWC)



SECTION : A-A



PLAN



COLUMN & BEAM LAYOUT PLAN

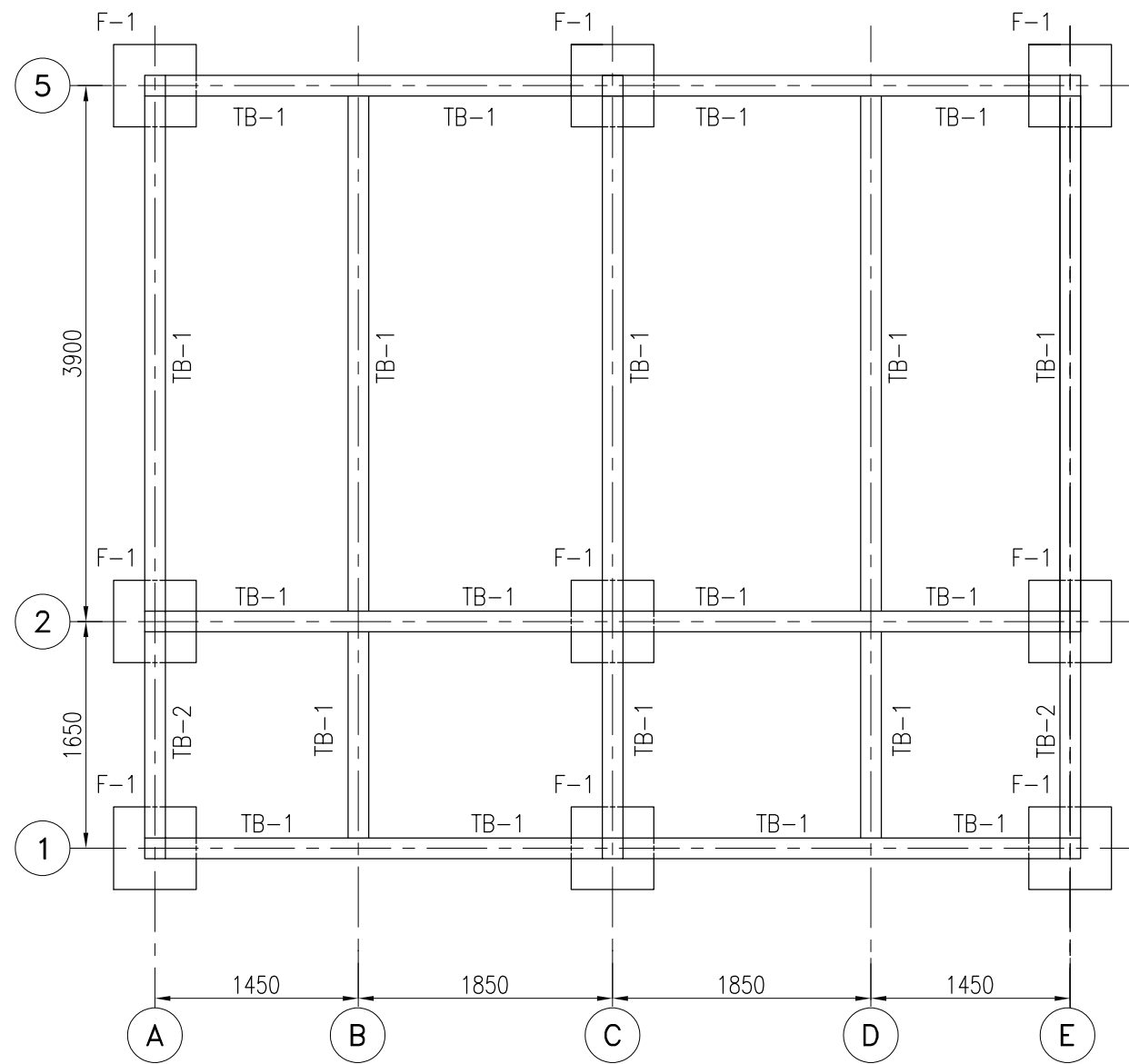
PLAN AND ELEVATION SHOWING AWC CENTRE
400 SQ. FT. FLOOR AREA

NOTES :

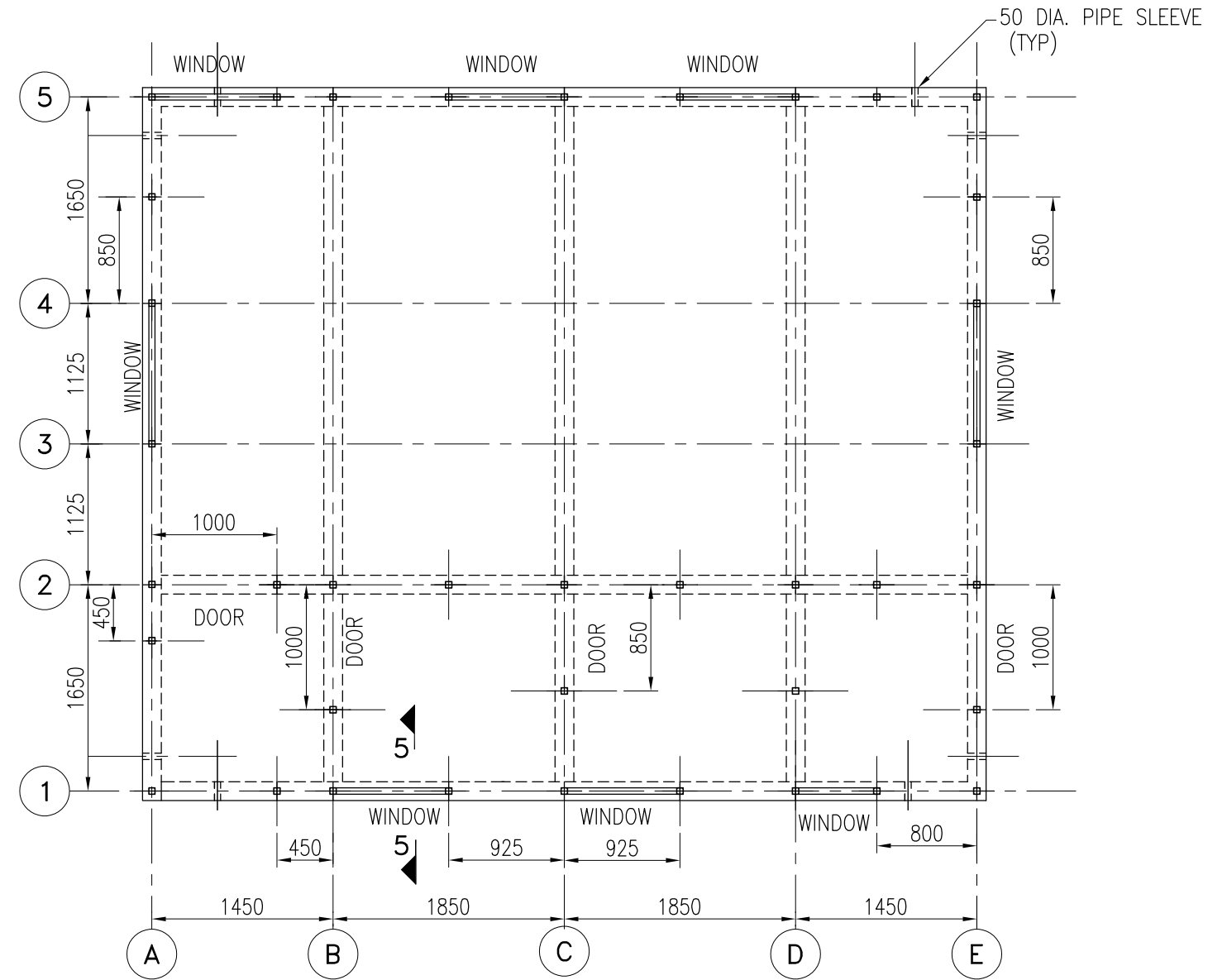
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
2. DRAWING COLLECTED FROM S.A.E. OFFICE RANAGHAT BLOCK, WEST BENGAL.

	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 HEALTH/ANGANWADI CENTRE	DRG. NO.- INS/CON/12-13/01/AWC/ARCH/01			
DRAWN SM	CHKD	ND/SC	SCALE 1:50, 1:20, 1:10	DATE 15/12/13	REV. 0

G.A & Detail of Unit Housing – Foundation Plan




PLAN AT TIE-BEAM LVL. (+0.45 M)



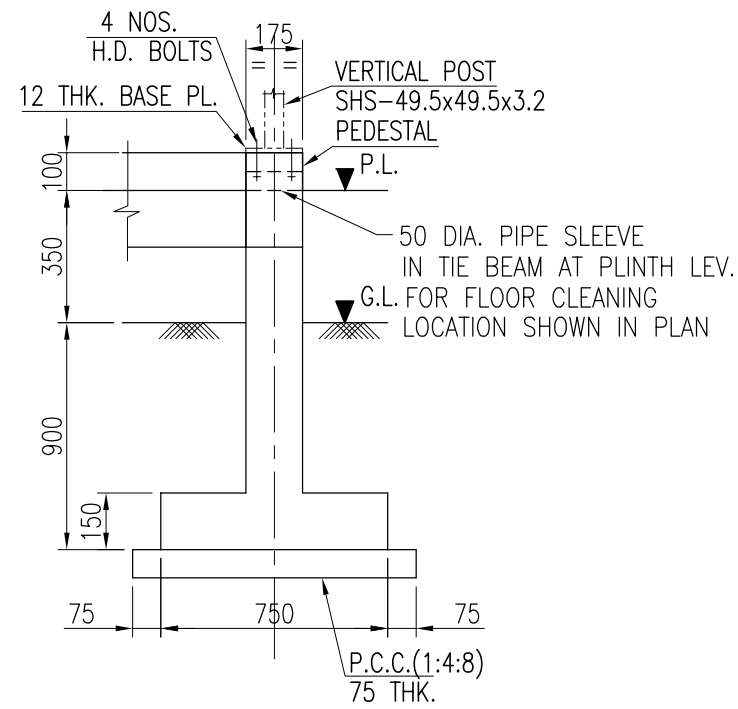
PLAN AT PLINTH LVL. (+0.35 M)

NOTES :

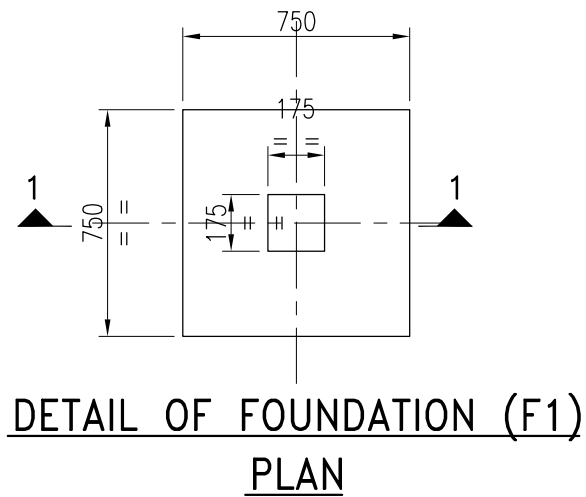
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
2. CONCRETE GRADE IS M25 CONFORMING TO IS:456-2000
3. REINFORCEMENT BAR SHALL BE Fe 500 TMT CONFORMING TO IS:1786-2008
4. ALL STRUCTURAL STEEL SHALL CONFORM TO IS : 2062 : 2011
5. WELDING SHALL CONFORM TO IS: 816 & IS: 9595 (LATEST REV.)
6. SHS/RHS SHALL CONFORM TO IS:4923-2017.
7. ASSUMED SOIL BEARING CAPACITY = 10.0 MT/M SQ.

					DRAWN	S.M.	APPROVED	 INSTITUTE FOR STEEL DEVELOPMENT AND GROWTH ISPAT PRAGATI BHAWAN, 793 ANANDAPUR , KOLKATA-700107 (JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
							D.D.	
					DESIGNED	N.D./S.C.	SCALE	TITLE : G.A. & DETAIL OF AWC FOUNDATION PLAN
1	GENERALLY UPDATED	04.04.2024	ND	AG			1 : 50, 1:20, 1:10.	
NO.	DESCRIPTION	DATE	BY	CHECKED	CHECKED	S.C./A.G.	DATE	DRG. NO.- INS/CON/12-13/01/AWC/01
							01-12-2010	

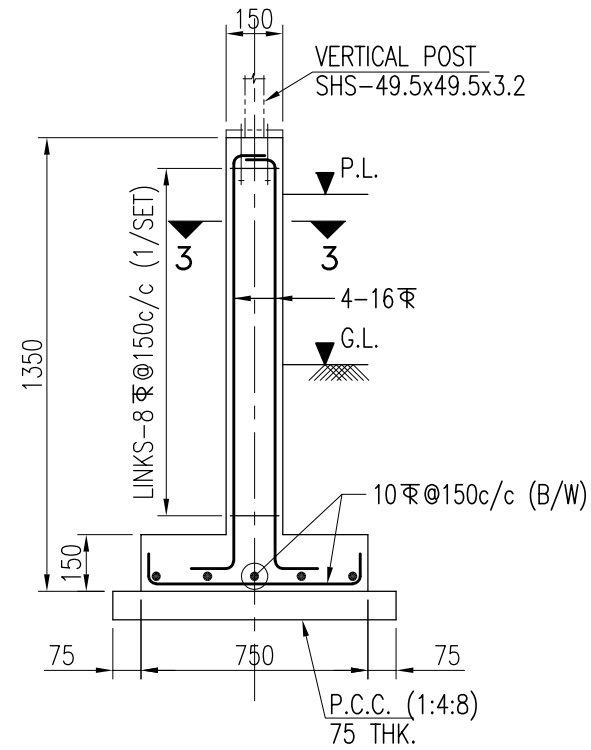
G.A & Detail of AWC – Foundation Details



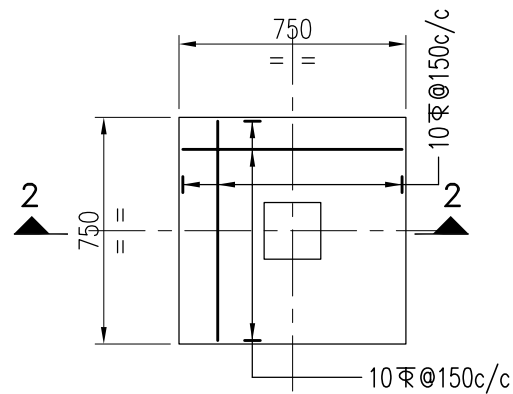
SECTION 1-1



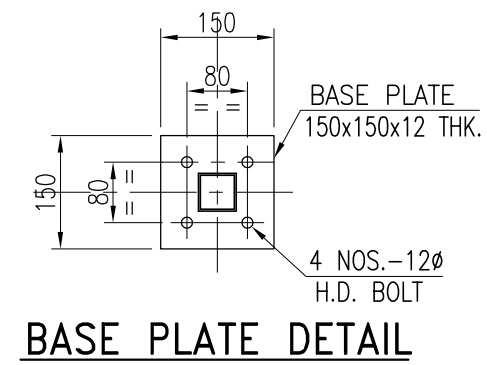
PLAN



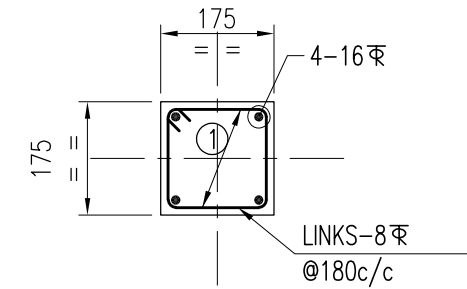
SECTION 2-2



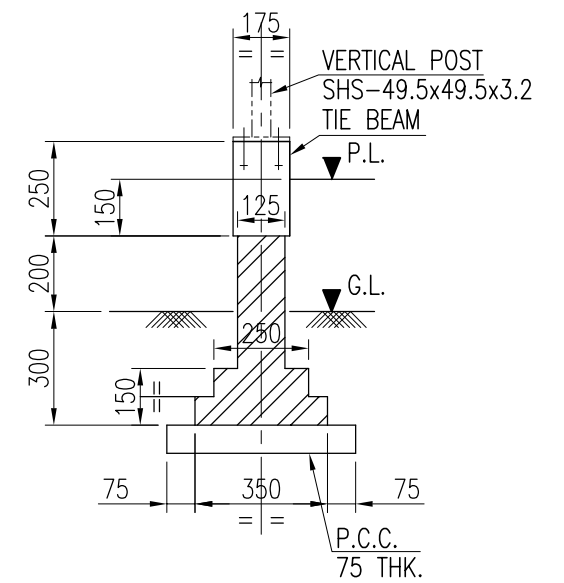
PLAN



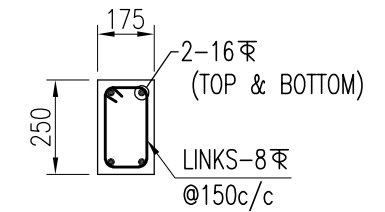
BASE PLATE DETAIL



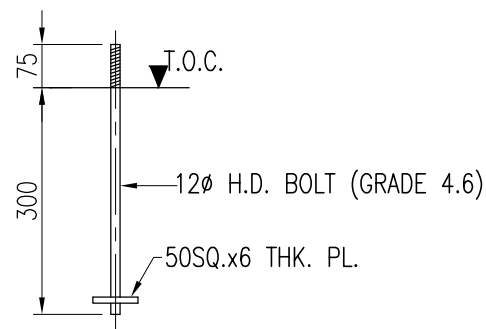
SECTION 3-3



**SECTION 5-5
(REF DWG. NO -03)**




**REINF. DET.
OF TIE-BEAM (TB 1)**



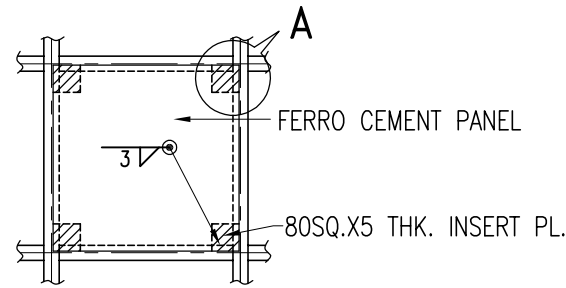
DETAIL OF ANCHOR BOLT

NOTES :

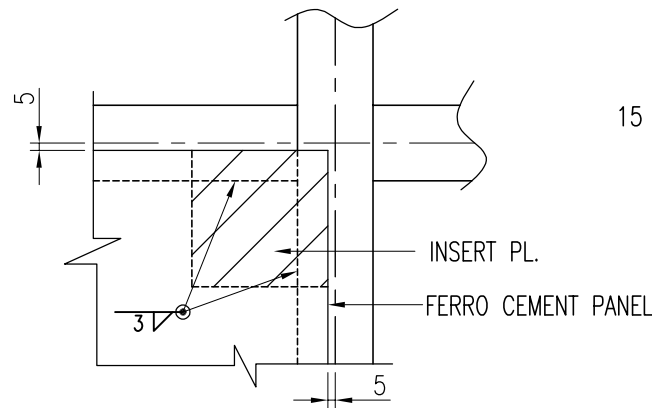
1. ALL DIMENSIONS ARE IN MM. & LEVELS ARE IN M.
2. CONCRETE GRADE IS M25 CONFORMING TO IS:456-2000
3. REINFORCEMENT BAR SHALL BE Fe 500 TMT CONFORMING TO IS:1786-2008
4. ALL STRUCTURAL STEEL SHALL CONFORM TO IS : 2062 : 2011
5. WELDING SHALL CONFORM TO IS: 816 & IS: 9595 (LATEST REV.)
6. SHS/RHS SHALL CONFORM TO IS:4923-2017.
7. ASSUMED SOIL BEARING CAPACITY = 10.0 MT/M SQ.

					DRAWN	S.M.	APPROVED	 INSTITUTE FOR STEEL DEVELOPMENT AND GROWTH ISPAT PRAGATI BHAWAN, 793 ANANDAPUR , KOLKATA-700107 (JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
							D.D.	
					DESIGNED	N.D./S.C.	SCALE	TITLE : GA & DETAIL OF AWC FOUNDATION DETAILS
1	GENERALLY UPDATED	04.04.2024	ND	AG			1 : 50, 1:20, 1:10.	
	NO.	DESCRIPTION	DATE	BY	CHECKED		DATE	DRG. NO.-INS/CON/12-13/01/AWC/02
							01-12-2010	
REVISION					CHECKED	S.C./A.G.		REV.
								1

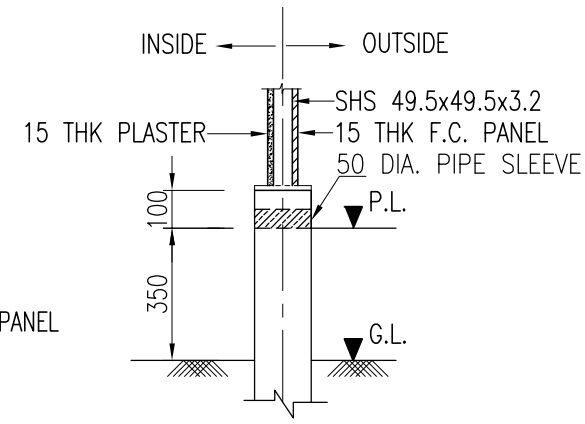
G.A & Detail of AWC – Miscellaneous Details



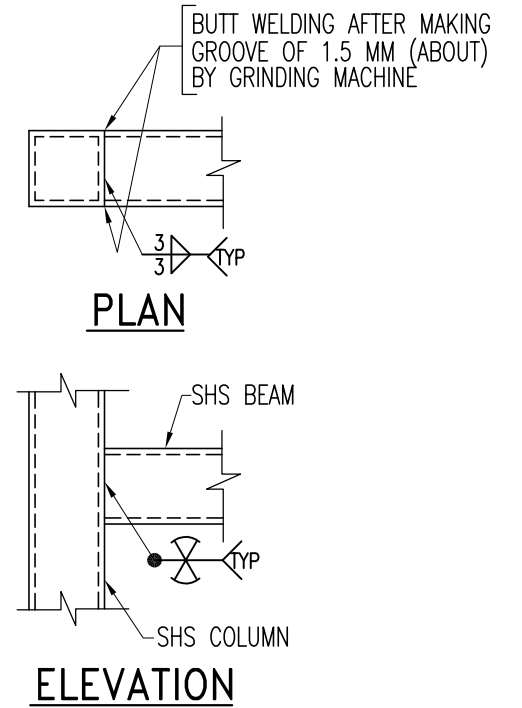
TYP. DETAIL OF PANEL



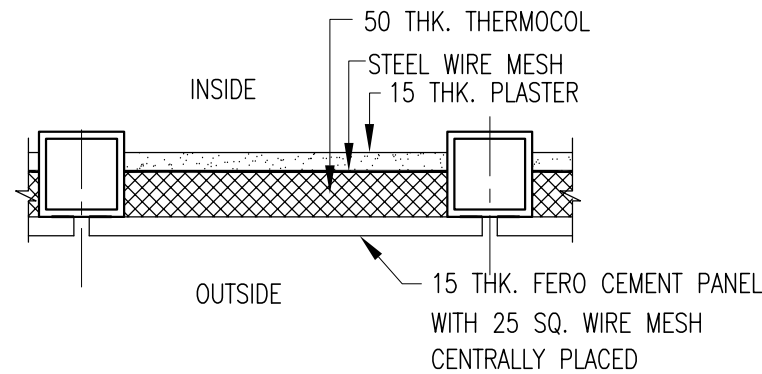
DETAIL - A



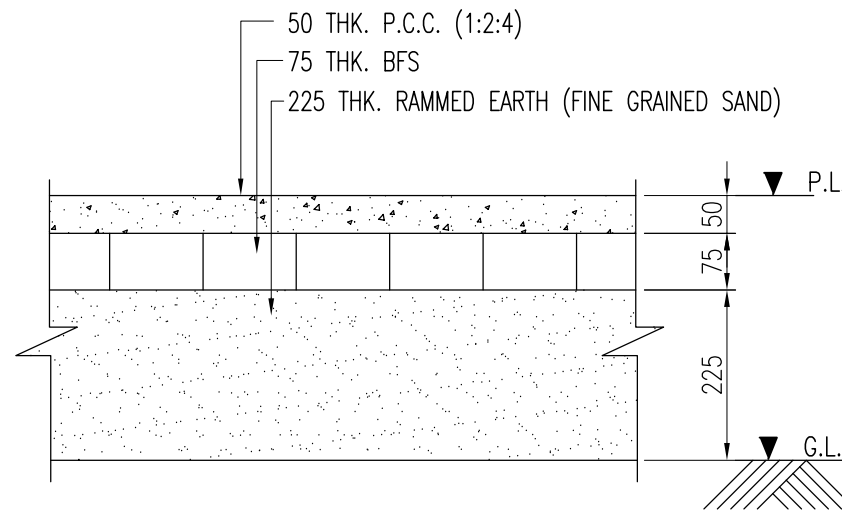
**SECTION 4-4
REF. DWG NO. 3**



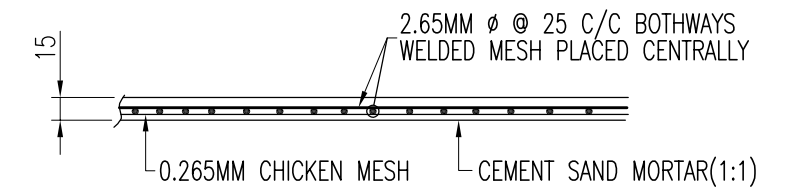
**TYP. DETAIL SHOWING CONNECTION
BETWEEN SHS COLUMN AND BEAM**



TYPICAL SECTION OF PANEL




TYP. DETAIL OF FLOOR



**TYP. CROSS SECTION OF
15 mm THICK FERRO-CEMENT PANEL
(WALL PANEL)**

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.
7. ASSUMED SOIL BEARING CAPACITY = 10.0 MT/M SQ.

					DRAWN	S.M.	APPROVED	 INSTITUTE FOR STEEL DEVELOPMENT AND GROWTH ISPAT PRAGATI BHAWAN, 793 ANANDAPUR , KOLKATA-700107 (JOINTLY PROMOTED BY MINISTRY OF STEEL & STEEL PRODUCERS)
							D.D.	
					DESIGNED	N.D./S.C.	SCALE	TITLE : GA & DETAIL OF AWC MISCELLANEOUS DETAILS
1	GENERALLY UPDATED	04.04.2024	ND	AG			1 : 50, 1:20, 1:10.	
	NO.	DESCRIPTION	DATE	BY	CHECKED		DATE	DRG. NO.-INS/CON/12-13/01/AWC/05
					REVISION	CHECKED	01-12-2010	

Bill of Materials & Estimated Cost of Anganwadi Centre (AWC)

Summary for the construction materials required for **Cost Rs. 1125** per Sq ft

AWC **400 Sq Ft.** **Steel 4.9 KG/ Sq ft**

SI No	Description	Quantity	Unit	Rate (Rs)	Total
1	Excavation in Foundations and trenches	12.10	m ³	260	3144.8625
2	75 mm thk PCC below Foundation (1:4:8)	2.64	m ³	5205	13716.802
3	Volume of RCC (M25 Grade)	3.41	m ³	9045	30837.797
4	Brickwork	3.88	m ³	7132	27660.571
5	Earthwork in filling.	7.95	m ³	308	2450.0654
6	Reinforcement bar TMT Fe 500	377	kg	89.65	33798.05
7	Structural steel SHS, Plates etc	1.59	MT	100000	159034.45
8	50 thk PCC (1:2:4) for Floor	1.83	m ³	9257	16954.196
9	75 thk BFS for Floor	36.6	m ²	450	16483.5
10	225 thk Rammed Earth (Fine Grained Soil)	8.24	m ³	186	1532.9655
11	15mm thick Ferrocement panels	97.82	m ²	350	34236.143
12	50 mm thk Thermocol	97.82	m ²	10	978.1755
13	Steel Wire Mesh (2.65 ϕ @ 25 mm c/c)	97.82	m ²	250	24454.388
14	15mm thk Plaster (1:5)	97.82	m ²	175	17118.071
15	Roof Sheeting	0.16	MT	100000	15543
16	PVC Pipe Sleeves 150 mm long x 50 mm dia	12.0	Nos	50	600
17	Centering and Shuttering	39.3	m ²	307.95	12102.435
18	Doors and windows		LS	5000*D+200	35000
19	White washing and paint	223.35	m ²	20	4466.902

Total Rs. **450112.37**

Note: RATE as per DSR 2023