TECHNICAL SPECIFICATIONS FOR PEB (CLOSED & SEMI CLOSED) STORE BUILDING FOR GIS

1.0 GENERAL

1.1 Architectural drawings pertaining to closed & Semi closed store are attached as a part of tender drawings. Based on the architectural drawings Complete Structural Design and Structural Drawings, Shop drawings, joinery, drainage, electrical works details etc. of complete structure shall be prepared by the contractor as per Technical Specifications and submitted for approval of employer before execution.

The building design consideration and execution shall be as per Technical Specification, Section: Civil Works Rev-12. However, if there is any conflict arises between Technical Specifications for Civil Works and Technical Specifications: Store for GIS, i.e. later shall prevail. In case any item is not covered under technical specification then the same shall be carried out as per CPWD specification /applicable BIS Standards and Codes.

1.2 The New store building for GIS shall be of pre-engineered steel structure. consisting of closed store along with T&P room inside & semi closed store.

1.3 The base plate of steel columns shall be mounted on the RCC foundation by means of hot dip galvanized foundation bolts (The zinc coating shall be minimum 610 gram per square meter. In case the substation is located in coastal area, the zinc coating shall be 900gm per square meter. The purity of zinc shall be 99.95% as per IS: 209). The RCC pedestal shall not protrude above floor level to avoid obstruction in the movement.

1.4 PVC electrical conduits of ISI marked or IS approved shall be provided as per the requirement of electrical installations, its accessories, junction boxes/surfaces boxes, fan boxes etc. Areas where false ceiling is provided and on puff panels, electrical conduit may be laid on exposed surfaces of walls or ceiling, above false ceiling area. In rest area conduit & junction boxes, fan boxes etc. shall be concealed wherever brick wall/RCC is provided.

2.0 MATERIAL SPECIFICATION FOR ALL PRE-ENGINEERED BUILDINGS

2.1 STRUCTURAL STEEL MEMBERS:

2.1.1 Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns and crane gantry girders and Frames at Door openings.

2.1.2 Primary members are fabricated from plates and sections with minimum yield strength of 340 Mpa to suit design by continuous double side welding.

2.1.3 All miscellaneous structural members, rod bracings, angle bracings, wind bracings, sag rods, etc. shall conform to the physical specification of IS: 2062 with a minimum 245Mpa Yield Strength.

All structural hollow pipe sections shall conform to the physical specification of IS: 1161 with YSt 240 as minimum grade.

2.1.4 All welded structural steel members shall be provided with suitable treatment of shot blasting before application of steel primer.

2.1.5 All structural steel members shall be painted with a steel priming coat followed by two coat of synthetic enamel paint. However, for coastal areas the members shall be finished with two or more coats of epoxy coating over steel primer.

2.2 PURLINS AND GIRTS MEMBERS:

2.2.1 Purlins, girts, necessary clips and other cold rolled structural members shall conform to the physical specification of ASTM A570 (Grade 50) or IS 277 Standards having a minimum yield strength of 340 MPa and shall be of Pre galvanized having a total coating thickness of 275 gm/sqm. inclusive of both sides.

2.2.2 The minimum thickness of secondary members shall be 2.5mm.

2.3 ROOF & WALL SHEETING:

2.3.1 Factory assembled 50mm thick puff (overall average density 40kg/cu.m. +/- 2 Kg/cu m as per IS: 11239 Part-2) sandwiched panels shall be provided. These panels shall be made of puff insulation sandwiched between two high tensile steel sheets each of 0.5 mm thickness. The material of sheets shall confirm to ASTM 792 M (or) it shall confirm to BIS standards (i.e. – Base material: IS 513 + Substrate: IS 15961 + color coating: IS 15965) with minimum yield strength of

340 Mpa. However, higher grades of steel sheet may be supplied without any further cost implication.

2.3.2 The steel sheets shall be provided with hot dip coating of Zinc aluminium alloy (approximately 55% Al, 43.5% Zn and 1.5 % silicon).Total mass of zinc aluminium alloy coating shall be minimum 150 gm/Sq. m inclusive of both sides. The tolerance of base metal thickness (BMT) of steel sheet shall be as per IS 16163. After hot dip coating of Zinc aluminium alloy, the sheet shall be provided with steel primer and silicon modified polyester (SMP) paint. The total thickness of primer and paint shall be 40 microns inclusive of both sides (TCT) comprising of 20 microns of SMP paint on top surface and 10 microns of backer coat (polyester coat) on back surface over 5 microns thick primer each on both surfaces with inorganic pigments coated free from heavy metals. Painting shall conform to IS: 15965. In case SMP paint is not available, Super Durable Polyester paint (SDP) can also be used by the bidder without cost implication to POWERGRID.

2.3.3 ROOF TURBO VENTILATORS

Advanced type Turbo ventilators to the roofing system (minimum size 2'x14') along with minimum 24" turbo ventilators module to roofing systems to be provided (not less than 6 units) to attain required ventilation performance standards (Air Changes per Hour (ACH). The sheet fixing shall be done to suit the profile of roof sheet. Polycarbonate sheet shall have foam tap or rubber gasket under and over it and fixed by 1 to 2mm thick aluminium angle 25x25mm with self-tapping screw to panels. Ventilator should be fixed on minimum 1 to 2mm thick G.I ring which be fixed on 2mm thick polycarbonate sheet. All joints shall be sealed by silicon, including all material, labour, fittings.

2.4 SHEETING FASTENERS:

Standard fasteners shall be self tapping zinc plated metal screws with EPDM bonded zinc plated washers. All screws shall be colour coated to match roof and wall sheeting.

2.5 SEALER:

This is to be applied at all side laps and end laps of roof panels and around self flashing windows. Sealer shall be pressure sensitive elastomeric Butyl tapes. The sealer shall be non-asphaltic, non-shrinking and non toxic and

shall be superior adhesive metals, plastics and painted at temperatures from 51°C to +104°C.

2.6 CLOSURES:

Solid or closed cell closures matching the profiles of the panel shall be installed along the eaves, rake and other locations. It should be specifically specified on drawings. The steel sheets shall be provided with hot dip coating of Zinc aluminium alloy (approximately 55% Al, 43.5% Zn and 1.5 % silicon).Total mass of zinc aluminium alloy coating shall be minimum 150 gm/Sq. m inclusive of both sides. The tolerance of base metal thickness (BMT) of steel sheet shall be as per IS 16163. After hot dip coating of Zinc aluminium alloy, the sheet shall be provided with steel primer and silicon modified polyester (SMP) paint. The total thickness of primer and paint shall be 40 microns inclusive of both sides (TCT) comprising of 20 microns of SMP paint on top surface and 10 microns of backer coat (polyester coat) on back surface over 5 microns thick primer each on both surfaces with inorganic pigments coated free from heavy metals. Painting shall conform to IS: 15965. In case SMP paint is not available, Super Durable Polyester paint (SDP) can also be used by the bidder without cost implication to POWERGRID.

2.7 FLASHING AND TRIM:

Flashing and / or trim shall be furnished at the rake, corners, eaves, and framed openings and wherever necessary to provide weather tightness and finished appearance. Colour shall be matching with the colour of wall. The steel sheets shall be provided with hot dip coating of Zinc aluminium alloy (approximately 55% Al, 43.5% Zn and 1.5 % silicon).Total mass of zinc aluminium alloy coating shall be minimum 150 gm/Sq. m inclusive of both sides. The tolerance of base metal thickness (BMT) of steel sheet shall be as per IS 16163. After hot dip coating of Zinc aluminium alloy, the sheet shall be provided with steel primer and silicon modified polyester (SMP) paint. The total thickness of primer and paint shall be 40 microns inclusive of both sides (TCT) comprising of 20 microns of SMP paint on top surface and 10 microns of backer coat (polyester coat) on back surface over 5 microns thick primer each on both surfaces with inorganic pigments coated free from heavy metals. Painting shall conform to IS: 15965. In case SMP paint is not available, Super Durable Polyester paint (SDP) can also be used by the bidder without cost implication to POWERGRID.

2.8 WALL LIGHTS:

For day lighting purpose of GIS hall, minimum 2 mm thick approved translucent polycarbonate sheet shall be provided for wall lighting in addition to windows for at least 10% of wall area on upper portion of both long walls. The polycarbonate sheet shall be fixed with necessary EPDM/rubber gasket, Silicon Sealant, cold forged fastener, aluminum profile etc. including MS supporting structural steel (conforming to IS:1161/4923) frame to ensure watertight arrangement.

2.9 CONNECTIONS:

2.9.1 SITE CONNECTIONS

i) All primary bolted connections shall be provided with galvanized high strength bolts, washers, nuts conforming to specifications of grade 8.8 of IS 1367/IS:3357

ii) All secondary bolted connections shall be furnished with bolts, nuts, washers conforming to the specifications of grade 4.6 of IS 1367 or ASTM-A307.

2.9.2 SHOP CONNECTIONS

All shop connections shall be welded with appropriate arc welding process and welding shall be in accordance with relevant IS codes such as IS: 816, IS -818 ,IS1024, IS:1261, IS1323, IS-9595, etc. as appropriate. The Webs should be welded on to the flanges at both the faces at top and bottom for columns, beams and crane girders. Weld material should have more strength than the parent metal.

2.10 GUTTERS AND DOWN SPOUTS:

Gutters and downspouts shall be adequately designed to ensure proper roof drainage system. The steel sheets shall be provided with hot dip coating of Zinc aluminium alloy (approximately 55% Al, 43.5% Zn and 1.5 % silicon).Total mass of zinc aluminium alloy coating shall be minimum 150 gm/Sq. m inclusive of both sides. The tolerance of base metal thickness (BMT) of steel sheet shall be as per IS 16163. After hot dip coating of Zinc aluminium alloy, the sheet shall be provided with steel primer and silicon modified polyester (SMP) paint. The total thickness of primer and paint shall be 40 microns inclusive of both sides (TCT)

comprising of 20 microns of SMP paint on top surface and 10 microns of backer coat (polyester coat) on back surface over 5 microns thick primer each on both surfaces with inorganic pigments coated free from heavy metals. Painting shall conform to IS: 15965. In case SMP paint is not available, Super Durable Polyester paint (SDP) can also be used by the bidder without cost implication to POWERGRID.

3.0 VENDORS & MQP FOR PEB BUILDINGS

3.1.1 All the material required for Pre-engineered (steel) building shall be procured from approved vendors as per list of compendium of vendors available on POWERGRID web site or any other reputed manufacturer for which prior approval shall be obtained from POWERGRID.

3.1.2 Manufacturing of various parts of the building shall start only after approval of "Manufacturing Quality Plan". Design and structural drawings shall be approved by POWERGRID.

3.1.3 Shop/fabrication showing each and every detail along with bill of material for all members of structures, joints, nuts & Bolts, welding shall be prepared and approved by venders as per standard practice of fabrication based on POWERGRID approved design and structural drawings.

3.1.4 Complete material shall be offered for inspection by CC (Corporate Centre) QA&I department before dispatch. Inspection of Material by POWERGRID CC QA &I deptt. shall be carried out based on Shop/fabrication drawing and BOM as approved by Vendors. Approval of BOM and shop/fabrication drawings from Employer is not required.

4.0 BUILDING REQUIREMENTS & FINISH SCHEDULE

4.1.1 Colour Scheme matching with local aesthetic and best industry practices shall be submitted by vendors for approval of POWERGRID. Three alternatives of coloured isometric views with colour codes shall be submitted for approval. The monotony of external colour of sheet shall be avoided by providing vertical bands of different coloured sheet. The colour of roof sheet shall be light coloured to minimize heat absorption. External and internal masonry walls shall be painted with suitable approved colour in consultation with Employer.

4.1.2 WALLS

i) All walls shall be of non-load bearing walls. External and Internal walls of all buildings shall either be with solid concrete block masonry (minimum 200 mm

thick) or with brick masonry (minimum 230 mm thick) in cement sand mortar 1:6 (1 Cement: 6 Coarse Sand) or equivalent.

ii) All half brick masonry walls shall be provided with cement mortar 1:4 (1 cement: 4 coarse sand) and reinforcement consisting of 2 nos. of 6 mm diameter bars every third course.

iii) FPS or Modular clay/fly ash-based Bricks having minimum 75 kg/cm2 compressive strength can only be used for masonry work. Contractor shall ascertain himself at site regarding the availability of bricks of minimum 75 kg/cm2 compressive strength before submitting his offer. However, Contractor can propose to use aerated concrete block or solid concrete blocks of compressive strength not less than 75kg/cm2 without any cost implication to POWERGRID.

iv) The walls of closed store building along with attached T&P room shall be full brickwork up to a height not less than 150mm above false ceiling level of T&P room. Rest portion shall be provided with puff sandwiched panels as mentioned elsewhere in TS/ attached architectural drwaings. The outer walls of semi-closed store building shall be full brickwork up to a height not less than 900mm above FFL.

4.1.3 A 50 mm thick DPC shall be provided as per DSR Item. No. 4.10, at plinth level before starting the masonry work.

4.1.4 PLASTERING

i) External surface of buildings shall be 18mm Cement plaster in two coats under layer 12mm thick cement plaster 1:5 (1 cement: 5coarse sand) finished with a top layer 6mm thick cement plaster (1cement: 6 fine sand). External plastered surface shall be finished with white cement-based putty of average thickness 1 mm of approved brand and manufacturer to prepare the surface even and smooth.

ii) 12mm cement plaster of mix 1:6 (1cement: 6 fine sand) shall be provided on the smooth side of internal walls. However rough side of walls shall be provided with 15mm cement plaster of mix 1:6 (1cement: 6 fine sand).

iii) Internal walls shall be finished with Plaster of Paris putty of average thickness 2 mm of approved brand and manufacture, over the plaster surface to prepare the surface even and smooth complete. except for areas where wall paneling is provided.

iv) All RCC ceilings shall be provided with 6 mm thick cement sand plaster (1:3).

4.1.5 PAINTING

i) Outside surface of the store building shall be finished with Premium Acrylic Smooth exterior paint of approved brand and manufacturer with Silicone additives of required shade (Two or more coats applied @ 1.43 ltr/ 10 sqm. over and including priming coat of exterior primer applied @ 2.20 kg/ 10 sqm) after putty on the external walls

ii) Interior painting: Internal walls shall be painted with minimum two coats of premium acrylic emulsion paint having VOC (volatile organic compound) content less than 50gm per litre of approved brand and manufacture including applying additional coats wherever required, to achieve even shade and colour over priming coat as per manufacturer specification/ recommendation.

iii) Non - VOC premium acrylic emulsion paint having volatile organic compound content less than 50gm per litre of approved brand and manufacture shall be used wherever specified.

iv) Painting with synthetic enamel paint of approved brand and manufacture of required color to give an even shade shall be provided on the steel doors and rolling shutters in building or as specified in the drawings. Two or more coats over an under coat of suitable shade with primer paint of approved brand and manufacture.

4.1.6 FLOORING

100mm thick VDF flooring shall be done with nominal reinforcement over 75mm thick PCC (1:4:8) above well compacted 500mm thick 90-63mm tones mixed with sand. The mixed concrete shall be laid and finished by floating etc. complete as per specification and as directed by Engineer-In-Charge. Two coats of PU shall be provided above the finished floor. Total thickness of PU coat shall be minimum 300 microns. Finished Floor Level of store building shall be minimum FGL+600MM.

4.1.7 GUTERS & DOWN SPROUTS

Guters & down sprouts shall be adequately designed to ensure proper roof drainage system. Post installation trapezoidal voids between the gutter beam and panels are covered with flashing or brick masonry/ concrete etc. All accessories and fixtures for lighting and others required are included as part of the installation.

i. Unplasticized rigid PVC rainwater pipes of required dia shall be provided and fixed on the wall face conforming to IS: 13592 type A as per requirement including jointing with seal ring conforming to IS: 5382 leaving 10mm gap for thermal expansion single socketed pipes including all fittings like bends, bat clamps gratings etc.

ii. Unplasticized PVC Moulded fittings/accessories including suitable dia. bend & shoes shall be provided and fixed for unplasticized rigid PVC

rainwater pipes conforming to IS:13592 type A including jointing with seal ring conforming to IS: 5382 leaving 10mm gap for thermal expansion.

iii. Clips of approved design shall be provided and fixed to unplasticized PVC rainwater pipes by means of 50x50x50mm hard wood plugs, screwed with MS screws of required length including cutting brick work and fixing in cement mortar1:4 (1 cement: 4 coarse sand) and making good the wall etc

4.1.8 FALSE CEILING:

15mm thick densified tegular edged ecofriendly light weight calcium silicate false ceiling tiles of approved texture spin tone/cosmos/ Hexa or equivalent of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanising @ 120 grams per sqm. Including both side).

Consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38 mm made from 0.33 mm thick (minimum) sheet, spaced 1200 mm centre to centre, and cross 'T' of size 24x28 mm made out of 0,33 mm (minimum) sheet, 1200 mm long spaced between main 'T' at 600 mm centre to centre to form a grid of 1200x600 mm and secondary cross 'T' of length 600 mm and size of 24x28 mm made of 0.33 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grid of size 600x600 mm, resting on periphery walls/partitions on a perimeter wall angle precoated steel of size (24x24x300 mm made of 0.40 mm thick (minimum) sheet with the help of rawl plugs at 450 mm centre to centre with 25 mm long drywall screws @230 mm interval and laying 15 mm thick densified edges calcium silicate ceiling tiles of approved texture (Spintone/ Cosmos/ hexa) in the grid, including, cutting/making openings for services like diffusers, grills, light fittings, fixtures, smoke detectors etc., Wherever required.

Main 'T' runners to be suspended from, ceiling / MS structural framework as per requirement using G.I. slotted cleats of size 25x35x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm G.I. adjustable rods with galvanised steel level clips of size 85x30x0.8 mm, spaced at 1200 mm centre to centre along main 'T', bottom exposed with 24 mm of all T-section shall be pre-painted with polyester baked paint, for all heights, as per specifications, drawings and as directed by engineer- in-charge.

4.1.9 DOOR: 32 mm thick uPVC flush door with SS Hinges and locking arrangements with exterior grade weather-resistant laminates.

4.1.10 WINDOW: All windows shall be of uPVC with minimum 5.5.mm thk. Glazing along with MS grills of approved pattern & design.

4.1.11 All external openings for windows, doors shall be provided with all round sunshade/chajjas to ensure that no rainwater shall directly splashes inside the building.

4.1.12 Rolling shutters shall be seamless galvalume motorized rolling shutters, with inclusion of features as under:

Slat material (Shutter curtain):	min. 1.0 mm steel slate (Galvalume)
Slat profiles	min. 100mm wide
Side guide	GI side guides min. 75mm Especially design guides with wind locks for high wind velocity exposed shutters. Nylofelt seals fitted on the shutter skin for frictionless movement within the guides.
Bottom profile	Aluminium bottom rail is provided with additional rubber seal for tight closing for prevention of dust entry.
Roller shaft	Roller shaft shall be heavy duty mild steel strong suspension tubular shaft without springs.
Side brackets	M.S. plate 3 mm to 10 mm as per the opening dimension.
Surface Finish & Painting	Primer and Duco paint (Matt finish)
Operations	Electrically operated with motor of suitable capacity along with manual operation by hand chain or hand crank for emergency

4.1.13 Plinth protection 50 mm thick of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone) aggregate 20 mm nominal size) shall be laid over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and

shall be grouted with fine sand including finishing the top smooth. Minimum width of plinth protection shall be 1000 mm.

4.1.14 The scope also includes supply, erection, civil works, electrical works etc. with all materials, labour required to complete the building in all respect. The above requirements are minimum; the contractor can give superior / better products without any additional financial implication to POWERGRID. Internal electrical wiring & fixtures (Fan, Tube lights, LED luminaries, switch and sockets etc.) should be of reputed make.

5.0 INTERFACING:

The proper coordination & execution of all interfacing civil works activities like fixing of conduits in roofs/walls/floors, fixing of foundation bolts, fixing of lighting fixtures, fixing of supports/embedment, provision of cut outs etc. shall be the sole responsibility of the Contractor. He shall plan all such activities in advance and execute in such a manner that interfacing activities do not become bottlenecks and dismantling, breakage etc. is reduced to minimum.

1	**LED LUMINAIRES**							
	Type	**Description**	**Phillips**	**Insta Power**	**CGL**	**HPL**	**Havells**	**Bajaj**

	IHB	Indoor High Bay LED luminaire, aesthetically designed pressure die cast housing and ingress protection class of IP65. Use of High power LED to offer high system lumen maintenance of 50,000 Br. Hrs. With 70% lumen maintenance at -5°C to +45°C and surge protection up to 5kV. The luminaire shall have system output of ≥14000 lumens with system power in power in the range of ≤150W having system efficacy of >100 lumens/watt. CRI equal to greater than 70 and CCT equal to greater than 5700 k +/- 300 k	BY400V LED72S or equivalent	NEBULA or equivalent	LHBBX-90-CDL or equivalent	90w led High Bay or equivalent	Highbrite 90w or equivalent	BGHB 100W LED GIV or equivalent

Sl.No.	**Technical Specification**	**Type IHB (LED Indoor High Bay)**
1	System Wattage	≤150W
2	System Lumen Output	≥14000
3	System efficacy (Lumens/Watt)	>100
4	Housing	Aluminum Extruded Housing with reflector AL sand blasted
5	Ingress Protection	IP-65

6	Surge Protector	5kV
7	Mounting	Hanging Type under Shed
8	THD	<15%
9	CRI	>70
10	CCT	>5700k±300k
11	Power Factor	>0.95
12	Ik Protection	IK-05
13	Operating Humidity	90% RH

Note: In addition to vendors above Equivalent Approved LED luminaries from approved POWERGRID Sub-Vendors shall be accepted.

MODE OF MEASUREMENT:

The quantity of earth work (excavation, backfilling, disposal etc.), concrete (all type), reinforcement steel only shall be measured & paid separately. However, payment for all remaining items for completion of scope of work is inclusive in the quoted plinth area rate. Plinth area shall be calculated based on IS 3861-2002.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx