1.0 SCOPE

This specification defines the requirements for the supply of earthing and lightning protection materials and installation of the earthing and lightning protection systems.

2.0 CODES AND STANDARDS

2.1 The work shall be carried out in the best workman like manner in conformity with this specification, EIL Installation Standards, layout drawings, the latest edition of relevant specifications, codes of practice of Bureau of Indian Standards and OISD Standards listed below :

SP:30 (BIS)	Special Publication-National Electrical Code
IS/IEC:62305	Protection against lightning.
IS:3043	Code of practice for earthing
IS:7689	Guide for control of undesirable static electricity.
OISD 110	Recommended practices on static electricity
OISD 147	Inspection and safe practice during electrical installation.
OISD GDN 180	Lightning protection.

2.2 In addition to the above, it shall be ensured that the installation conforms to the requirements of the following as applicable:

a. CEA Regulations

b. Regulations laid down by CEA/Electrical Inspectorate.

c. Regulations laid down by PESO/DGMS (as applicable).

d. The petroleum rules (Ministry of Industry, Government of India).

e. Any other regulations laid down by central/state/local authorities and Insurance agencies.

3.0 MATERIAL SPECIFICATIONS

3.1 All materials and hardware to be supplied by the contractor shall be new, unused and of best quality and shall conform to the specifications given here under and to latest specifications of Bureau of Indian Standards. Contractor shall bring material samples to site and get it approved by Engineer-in-charge before installation.

3.2 The main earth grid conductor shall be hot dip galvanised M.S. flat unless otherwise specified. Sizes for main conductors shall be as indicated on the earthing layout drawing .Amount of galvanizing shall be 610gm per sq.metre. Earth electrodes and Earth plate shall be as per EIL Installation Standards.

4.0 EARTHING NETWORK

4.1 This consists of main earth conductor (grid conductor) forming a closed ring network with required number of earth electrodes connected to it to provide a common earth for electrical devices and metallic structures. From each earth electrode two distinct connections shall be made to the main earth conductor. The earth plates shall be used for taking multiple earth connections to two or more equipments.

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4.2 The earth conductor shall be laid along cable trays/cable trench/pipe racks/ buried in pavement/ below finished grade level as indicated on the earthing layout drawing. Where lined cable trenches are available, the earth conductor shall be preferably laid in the trenches and shall be firmly cleated to the sidewall of concrete trenches using GI clamps at interval of 400 mm to 500 mm and near to the termination end. The earthing conductor shall run along one of the cable trays along the overhead cable route. The earthing conductor shall be suitably cleated and electrically bonded to all the other cable trays on the same cable route at a regular interval of 25 to 30 meter through copper flexible (insulated) . The earthing for equipment shall be tapped from the main earth conductor and not from cable tray support structure. Earth conductor when laid underground shall be at a depth of 500mm below finished grade level.

4.3 Joints and tapping's in the main earth loop shall be made in such a way that reliable and good electrical connections are permanently ensured. All joints below grade shall be welded and shall be suitably protected by giving two coats of bitumen and covering with Hessian tape. Earth strip laid above ground shall be welded across straight through joints and joints shall be suitably protected by giving two coats of bitumen to avoid oxidation and insulation film formation of the strip surface. When two earth strips are to be jointed by means of welding, lap welding with an overlapping of strip equivalent to double the width of the strip and all four sides(three on the Top and one bottom) shall be continuously welded. All joints at tappings above ground shall be by means of connector/lugs. A minimum of two bolts of adequate size shall be used for this purpose. Earthing strip joints at earth plate and equipment shall be through GI bolts, nut etc.

5.0 INSTALLATION OF EARTH ELECTRODE

5.1 Earth Electrode shall be installed as shown on installation standard and layout drawings. The location shown on the layout drawings are indicative.

The exact location of earth electrodes in the field shall be determined by contractor in consultation with the Engineer-in-charge, depending on the soil strata and resistivity. Earth electrodes shall be located avoiding interferences with road, building foundation, column, pipelines etc. The civil area drawings shall be referred for this. The distance between two electrodes shall not be less than twice the depth of electrode. However in the areas where there is physical limitation to meet the above separation distance between two electrode, the mutual spacing can be reduced to a value not less than the driven depth of each earth electrode.

5.2 Electrodes shall preferably be located in a moist soil which has a fine texture, grain size and distribution. Wherever practicable the soil shall be dug up, all lumps broken and stones removed from the immediate vicinity of the electrodes and soil packed by watering and ramming as tight as possible.

5.3 The electrodes shall have a clean surface, not covered by paint, enamel, grease or other materials of poor conductivity.

5.4 All earth electrodes shall be tested for earth resistance by means of standard earth test meter. The tests shall take place in dry months, preferably after a protracted dry spell.

5.5 The disconnect facility shall be provided for the individual earth electrode to check its earth resistance periodically.

5.6 Location of earth electrodes shall be marked by permanent markers for easy identification. All earth Electrodes shall be serial numbered and also marked on 'As Built' drawing for future reference.

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5.7 Individual earth electrodes shall be provided for each lightning arrestor, each dropper of building earthing protection system and flood light mast.

5.8 Earthing system provided for concrete paved area by other agency where applicable; shall be connected to the plant earthing system below ground by minimum two earth connections.

5.9 Top of earth pit shall be flushed with finished floor level in paved areas. In unpaved areas, top of earth pit shall be projected 100 mm above finished ground level.

6.0 CONNECTION

The earth system connections shall generally cover the following:

- Equipment earthing for personnel safety
- System neutral earthing
- Static and lightning protection

6.1 The following shall be earthed.

- System neutral
- Current and potential transformer secondary neutral
- Metallic non-current carrying parts of all electrical apparatus such as transformers, switchboards, bus ducts, motors, neutral earthing resistors, capacitors, UPS, battery charger panels, welding receptacles, power sockets, lighting/power panels, control stations, lighting fixtures etc.
- Steel structures/columns, rail loading platforms etc.
- Cable trays and racks, lighting mast and poles
- Storage tanks, spheres, vessels, columns and all other process equipment.
- Fence and Gate for electrical equipment (e.g. transformer yard etc.)
- Cable shields and armour
- Flexible earth provision for Wagon, Truck
- Shield wire
- Ladder, staircase as per layout drawing/job specification.

Conductor size for branch connection to various equipment shall be as per EIL Installation Standards unless otherwise stated on earthing layout drawings.

6.2 All process pipelines shall be bonded and earthed at the entry and exist points of unit battery limit of hazardous area.

6.3 Steel pipe racks in the process units and offsite area shall be earthed at every 24 meters.

6.4 Equipment/street light pole etc. located remote from main earth network may be earthed by means of individual earth electrode and earth conductor unless otherwise stated in job specifications/earthing layout drawing.

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6.5 Lightning protection shall be provided for the equipment, structures and buildings as shown on layout drawing. Self conducting structures shall not require separate aerial rod and down conductors. These shall however be connected to the earthing system at two or more points as shown on layout drawing. Each down conductor shall be provided with an earth electrode with test pit and all earth electrodes shall be interconnected through underground strip. Lightning protection system may be bonded to electrical safety earthing system, inside ground. Lightning down conductor shall be brought to earth electrode in shortest straight path as feasible to minimise surge impedance.

6.6 The main earthing network shall be used for earthing of equipment to protect against static electricity.

6.7 All medium and high voltage equipment (above 250V) shall be earthed by two separate and distinct connections with earth.

6.8 Plant instrument system clean earthing, UPS system clean/safety earth, Data concentrator panel, HMI etc shall be separate from the electrical earthing system, if mentioned in job specification/ layout drawings.

6.9 All paint, scale and enamel shall be removed from the contact surface before the earthing connections are made.

6.10 All earthing connections for equipment earthing shall be preferably from the earth plate mounted above ground wherever provided

Equipment foundation bolts shall not be used for earthing connection.

6.11 Earth connections shall be made through compression type cable lugs/by welded lugs.

6.12 All hardware used for earthing installation shall be hot dip galvanised or zinc passivated. Spring washers shall be used for all earthing connections and all connections adequately locked against loosening.

6.13 Lighting fixtures and receptacles shall be earthed through the extra core provided in the lighting circuit/cable for this purpose.

6.14 The reinforcements of sub-station building coulumns/beams and the sub-station floor slab shall be connected to main earth grid.

7.0 TESTING AND COMMISSIONING

7.1 Field inspection, testing and commissioning of electrical installation shall be done as per EIL standard specification.Earthing systems/connections shall be tested as follows:

7.2 Resistance of individual earth electrodes shall be measured after disconnecting it from the grid by using standard earth test meggar.

7.3 Earthing resistance of the grid shall be measured after connecting all the earth electrodes to the grid. The resistance value of an earth grid to the general mass of earth shall be as follows:

- For the electrical system and equipment, a value that ensures the operation of the protection device in the electrical circuit but not in excess of 4 ohm. However for generating stations and large sub-systems, the value shall not be more than 1 ohm.
- For lightning protection, the value of 5ohms as earth resistance shall be desirable, but in no case it shall be more than 10 ohms.

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7.4 The resistance to earth shall be measured typically at the following points:

a) At each electrical system earth or system neutral earth.

b) At each earth provided for structure lightning protections.

c) At one point on earthing system used to earth electrical equipment enclosures.

d) At one point on earthing system used to earth wiring system, enclosures, such as metal conduits and cable sheaths or armour.

e) At one point on fence enclosing electrical equipment.

7.5 All earthing layout drawings shall be marked by contractor for 'AS BUILT STATUS' and two sets of hard copies plus 1 set of soft copy, shall be submitted to EIL. For projects, where layout drawings have been prepared based on 3D modeling, contractor shall carryout necessary changes for 'AS BUILT STATUS' in the 3D model.

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STANDARD SPECIFICATION FOR TAPE COATING FOR UNDERGROUND STEEL PIPELINES

Rev. No	Date	Purpose	Prepared by	Checked by	Standards Committee Convener	Standards Bureau Chairman
					Approved by	
2	09.08.18	REVISED & ISSUED AS STANDARD SPECIFICATION	SM	SS	SG	RKT
1	16.08.12	REVISED & ISSUED AS STANDARD SPECIFICATION	SS	RC	PPL	DM
0	09.06.03	ISSUED AS STANDARD SPEC.	GVS	GS	KKS	SKG

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Abbreviations:

ASTM	:	American Society for Testing and Materials
AWWA	:	American Water Works Association
DFT	:	Dry Film Thickness
ISO	:	International Organization for Standardization
SSPC	:	Steel Structure Painting Council

For the purpose of this specification, the following definitions shall apply:

OWNER	:	Owner is the party that initiates the project and ultimately pays for its design & construction.
PMC	:	Owner's authorized agent/consultant to act for the owner. PMC is the party, which carries out management of the project.
MANUFACTURER	:	The party which manufactures and/or supplies the tape coating materials and services to perform the duties specified by owner/PMC.

Materials & Coating Standards Committee

Convener : Mr. S.Ghosal

Members : Mr. Deepak Gupta (Projects)
Mr. M. Ismaeel (Piping)
Mr. K.J Harinarayanan (SME)
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1.0 SCOPE

This specification covers the requirement for materials, surface preparation, application, inspection, repairs and handling for external corrosion protection of underground carbon steel pipelines, field joints and coating repair with service temperature upto 60°C using coal tar tape coating.

2.0 REFERENCE DOCUMENTS

The latest edition of the following standards and documents shall apply:

2.1 AWWA C-203: Coal tar protective coatings and linings for steel water pipelines

2.2 SIS 05-5900: Pictorial surface preparation standard for painting steel surface ISO 8501:1988

2.3 SSPC-SP: The Society for Protective Coatings surface preparation specifications :

SSPC-SP1: Solvent cleaning
SSPC-SP3: Power tool cleaning
SSPC-SP10: Near white metal blast cleaning

2.4 BS 4164: British Standard Specification for coal tar based hot applied coating materials for protecting iron and steel including a suitable primer

3.0 GENERAL REQUIREMENTS

3.1 Equipments and accessories required for tape coating shall be in good operating conditions. Adequacy of equipments and accessories shall be ensured by EPCC Contractor and Certified.

3.2 Necessary arrangements for power supply and other utilities shall be made for completion of the job.

3.3 Necessary testing and inspection facilities as required by this standard shall be developed at site and shall be approved by the PMC/OWNER.

3.4 Protective tapes and other materials brought to site shall be as per the specifications of this standard and should be approved by the PMC/OWNER.

Field and laboratory tests as given in this standard shall be carried out for each batch of primer and tape.

3.5 All work shall be carried out in accordance with this specification and shall be phase wise approved by PMC/OWNER. Any working procedure developed from this specification shall be approved in advance by the Engineer-In-Charge (EIC).

3.6 Manufacturers recommended/ Trained supervisor and skilled applicator shall be engaged by the contractor for application, inspection and quality assurance.

3.7 Applicator shall possess copy of reference documents and test procedure appearing in this standard, which are required for field application.

4.0 DOCUMENTATION

The following documentation is required:

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4.1 Before Starting-Up of the Work

A quality plan with procedures for qualification trials and for the actual work shall be made. The quality plan shall include a time table for the various activities, with a description of coating materials to be used, their application, qualification of personnel involved in the work, responsibilities and lines of communications, details of equipment and their calibration, proposed hold points for PMC/OWNER inspection and endorsement and the detailed procedures for the testing and inspection. Documented evidence that the requirements of this specification have been met during production shall be shown.

4.2 During Execution of Coating Job

- Daily progress reports on application of tape coating materials with details on weather conditions
- Results of comparison of surface cleanliness, surface profile on blast cleaned surface, tape coating thickness, holiday detection and adhesion tests
- Particulars of surface preparation, priming and tape application; no. of wraps
- Details of non-compliance, rejects and repairs
- Types of testing equipments and calibration
- Code and batch numbers of coating materials used
- Field tests on primers and tape coat
- Progress of work as per scheduled program.

5.0 MATERIALS

5.1 General Requirements

5.1.1 Manufacturer's test certificates shall be produced and examined by the PMC/OWNER for all materials, proposed to be used for tape coating as per this standard.

5.1.2 All materials brought to site for tape coating shall be suitably marked and identifiable with the following information:

- Manufacturer's name
- Type of material and code
- Batch number
- Date of manufacturing
- Technical datasheet for each type of material
- Shelf life
- Manufacturer's quality control test certificates with actual results of each batch.

5.1.3 Materials without manufacturer's test certificates and identification marks shall not be accepted and used.

5.1.4 Test certificate from competent/recognized Govt. laboratory/in the laboratory of internationally reputed certifying agencies like, Lloyds registrars, DNV (Det Norske Veritas), BV (Bureau Veritas) on the properties of materials quoted by the manufacturer in the technical data sheet shall also be submitted along with the technical data sheet of the products. Any recent past certificate can also be submitted

5.1.5 Each batch of primer and tape shall be tested in the field by the procedure as given in this standard. PMC/OWNER will review the field test data before use of the materials.

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5.2 Characteristics and Functional Requirements of Coating Materials

5.2.1 Coal tar tapes

Materials for coal tar tape coating shall conform to the following specifications. The following are the salient features of coal tar tape coating materials.

5.2.1.1 Primer

The primer shall be type B as specified in AWWA C-203. Following are the main characteristics:

Type	Fast drying, synthetic, chlorinated rubber-synthetic plasticizer-solvent based
Drying time (tack free)	15 minutes (approx.) (ASTM D1640)
Flash point	> 23^{0}C (ASTM D93/D3941)
Volatile matter (105-110^{0}C) percent by mass	75 (maximum) (ASTM D2369)
Viscosity, on FORD CUP NO. 4 (4mm nozzle) at 23^{0}C	35-60 seconds (ASTM D1200)
DFT	25 microns/coat (minimum)
Coverage (Theoretical)	10 M^2/Lit/Coat
Coverage (Practical) @ 25 microns DFT coat	6 M^2/Lit/Coat (minimum) (ASTM D344)
Application properties	By brush/ spray should produce an effective bond between metal and subsequent coaltar tape
Adhesion test (after 72 hours)	The primer shall be tested after applying tape coating as per AWWA C-203.

5.2.1.2 Coal tar tape

The tape shall be coal-tar component supported on fabric of inorganic fibres.

a) Raw coal tar pitch

The coal tar (hard pitch) which shall have the following salient properties:

Characterization	Values		Standard
Softening point ^{0}C	65	121	ASTM D36
Specific gravity	1.30±0.05		ASTM D71
Ash content, %	0.5 Max.		ASTM D2415
Physical state	Solid at ambient temperature		

b) Fabric

Type: The fabric shall be a thin, flexible, uniform mat or tissue composed of glass fibers in an open structure bonded with a suitable resinous inert material compatible with coal tar.

Weight (min) g/m^2 40
Thickness (min.) mm 0.3
Breaking load in the longitudinal direction: 2.28KN/m (min.)

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Porosity	When related to pressure difference across the sample, the glass fibre fabric shall have porosity of not less than 0.6mm and not more than 1.9mm of water at an average air velocity of 61m/minute (1m/sec.)
Temperature resistance	The fabric shall be unaffected under load in hot coal tar at 288°C for one minute. It shall not shrink length wise or width wise.
Pliability test	No cracking shall take place when bent over a mandrel of 3mm radius through 90° arc at a uniform speed of approximately 2 seconds after immersing in water for 10 to 15 minutes.

Note (1) : Manufacturer's test data in the laboratory are required for the above properties on the materials supplied.

c) Physical properties of coal tar tape

Property	Requirement		Test method
	Min.	Max.	
Service temperature (^{0}C)	-	60	
Tape thickness mm	2.0	2.5	AWWA C-203
Weight average (kg/sq.m/mm)	1.25	-	ASTM D146
Breaking strength in longitudinal direction kN/m	0.7		AWWA C-203
Adhesion	AWWA C-203.		
Insoluble content % by wt in petrol	93 minimum (procedure given in ANNEXURE-I)		

d) Physical properties of coal tar component in the finish tape

Property	Requirement		Test method
	Min.	Max.	
Softening point (^{0}C)	65	121	ASTM D36
Penetration at 25^{0}C/100g/ 10^{-1} mm/5 sec	1	9	ASTM D5/BS-4164
Filler %	20	35	ASTM D 2415 or AWWA C-203

e) Filler

Characteristics	Requirement	Test Method
Fineness: % w/w, minimum	Shall pass through mesh size of 75 microns	ASTM D1366
Loss on ignition at 800° C, w/w max.	10	ASTM D1208

f) Field Tests

Few test methods given in ANNEXURE-I are mainly applicable during field application.

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6.0 SURFACE PREPARATION

6.1 All oil, grease on the pipe metal surface shall be thoroughly removed by flushing with a suitable solvent (such as xylene or 1,1,1 trichloroethylene) and wiping with clean rags. The solvent cleaning shall be as per SSPC-SP-1. If required detergent cleaning shall be done before or after solvent cleaning.

6.2 The degreased pipe metal surface shall be blast cleaned to Sa2½ of SIS -05-5900 or SSPC-SP-10 with a surface profile of 30-50 microns trough to peak. Blasted surface that rusts before priming shall be cleaned by wire brushing or shall be re-blasted. Priming shall be done within 4 hours of completion of blast cleaning. Otherwise total re-blasting may be necessary.

7.0 APPLICATION OF PRIMER

One coat of primer shall be applied on blast cleaned surface by brush or spray to achieve complete wetting of the surface as recommended by the manufacturer. In case the surface is wet during application of primer, the surface should be made dry. The primer shall be allowed to become touch dry prior to tape application. Primer and tape shall be supplied by the same manufacturer.

8.0 TAPE COATING SYSTEM AND APPLICATION

8.1 Tape Coating System

(a) One coat of fast drying synthetic primer by brush or spray after surface preparation to provide complete wettability of the surface.
(b) One layer of coal tar tape coating with 2 mm thickness on the surface of primed pipe after touch dry.
(c) Second coat of fast drying synthetic primer by brush or spray on 1st layer of tape coating to provide complete wettability of the surface for application of 2nd layer of tape.
(d) 2nd layer of coal tar tape coating with 2 mm thickness on the surface of primed pipe after touch dry.

8.2 Application Method

Tape application should follow primer application as soon as the primed pipe surface is touch dry. The primer and tape application should not be done in case of dusty/windy weather or during rain. Primed surface should not be kept exposed to atmosphere for very long duration.

The tape shall be wrapped in accordance with the manufacturer's recommendations in a manner that shall meet the adhesion and holiday detection requirement of this standard. In any event, there shall be a minimum of 12.5 mm overlap per single wrap.

The applied coating system shall be as follows:

(a) In application, care shall be taken that there are no air pockets or bubbles beneath tape and the tape shall be in intimate contact with the primed steel.
(b) Manufacturer recommended/trained supervisor and skilled applicator shall be engaged for tape application.

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9.0 FIELD JOINT COATING AND REPAIR OF DAMAGED COATING

9.1 Field Joint Coating on Exterior Welds

The exterior joints shall be cleaned and surface preparation by blast cleaning to Sa2½ finish of SIS-05-5900/SSPC-SP-10 as given in clause 6.0. The coating materials shall be same as applied on as main pipeline. The tape coating material applied on field weld joints shall overlap at least 75 mm the main pipe coating on each side of the field joint to form a continuous external coating free of defects. The coating inspection for quality assurance shall be as given in clause 10.0.

9.2 Repair of Damaged Tape Coating

9.2.1 Damages, flawed areas and holidays: Areas that are damaged, flawed or contain holidays shall be repaired using the tape coating materials applied on main pipeline and made by the same manufacturer. In no case, shall damaged areas be repaired by applying additional tape over loose damaged tape where the damage goes down to the metal or where the bond of the tape has been destroyed.

9.2.2 Repair of tape: Repair shall be made by removing the applied tape coating from the area around the holiday. The surface preparation shall be done as per clause 6.0 of this specification and then repair the area by using the same system of primer and hot applied tape as was used for the original wrapping as given in clause 8.0. When completed, the area shall be re-tested following the method of electrical inspection described in clause 10.8.

10.0 INSPECTION AND TESTING FOR QUALITY ASSURANCE

The following stage wise inspection and testing shall be carried out at manufacturers end/at site by the OWNER or by OWNER's representative third party inspection agency. Petrol test as per Clause No. 5.2.1.2 c) and Section 2.3 of ANNEXURE-I shall be conducted at site under the supervision of EIC.

10.1 Fast Drying Synthetic Primer Materials

The physical properties of primer are given in clause 5.2.1.1.The test procedure given is in Annexure-1

10.2 Tape Coating

As per 5.2.1.2 (b), (c), & (d), the procedure is given in ANNEXURE-I.

10.3 Measurement of Pipe thickness (in case of coating refurbishment)

10.4 Surface Preparation

- Blast cleaning equipment for nozzle type, size, safety gauges, working condition, and pressure at the tip of the gun.
- Abrasive type, hardness to provide required profile size and cleanliness.
- Measurement of surface profile and comparing cleanliness with visual standards of ISO 8501.

10.5 Measurement of pitting depth area of pitted portion, inspection of weld filling and grinding and patch plate welding, welding of replaced pipe if any.

10.6 Checking of condition of concrete saddles, rubber padding and end seals wherever required.

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10.7 Inspection of Primer after Application

- Checking for drying time to be touch dry, tack free drying and hard drying of primer.
- Dry film thickness (DFT) shall be checked on metal panel separately.

10.8 Inspection of Tape Coating after Application

- Visual inspection for uniformity without any wrinkles and irregularities and overlapping width as per specifications
- Adhesion test as per AWWA C-203
- High voltage holiday detection test for pinholes as per AWWA C-203.

10.8.1 **Visual**

The coated pipes including field joint coating shall be visually inspected for cracks, trapped air, uniformity, damage etc. Any repair arising out of visual inspection will be decided by PMC/OWNER.

10.8.2 **Thickness**

Thickness has to be measured with a caliper with caliper surfaces of at least 20mm diameter, on 5 tape pieces with an edge length of at least 50mm taken from 5 different coils. The measuring pressure should be 0.5 N/m^2. The measuring accuracy should be within 0.1 mm.

10.8.3 **Adhesion Test**

a) Adhesion tests shall be made to determine the proper bond between the tape and the primed pipe. One test per section (of upto 10 meter length) shall be carried out initially afterwards adhesion test is to be done as per the advice of PMC/OWNER. Repair required due to adhesion testing shall be decided by the PMC/OWNER.

b) Temperature of the tape and pipe to be tested shall be between 10^0C and 27^0C. If required cold water shall be poured over the test area to bring down the temperature to with in the above range. The coating shall be allowed to set at ambient temperature for 72 hrs.

- A test area shall be selected where the tape is smooth for 150 mm in the longitudinal direction of the tape.
- Two knife cuts of 150 mm long and 50 mm apart shall be made through the tape.
- A flat blade shall be used to pry up 50 mm of the fabric.
- The 50 mm flap of fabric shall be grasped firmly in one hand and shall be pulled with a quick motion in the direction of the remaining 100 mm of the 150 mm knife cut.
- The adhesion is satisfactory if (i) the tape tears at the point of stripping or (ii) the fabric strips from the underlying tape component, leaving no more than 10% or less of the primer or bare metal exposed.

c) Adhesion between tape to tape can be tested following similar procedure as in (b). This should preferably be done on a test panel.

10.8.4 **High voltage holiday detection test**

- All tape coated pipes and joints shall be tested with an approved high voltage holiday detector preferably equipped with an audio visual signaling device to indicate any faults, holes, breaks or conductive particles in the protective coating.

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- The applied output voltage of the holiday detector shall have a spark discharge of thickness equal to at least twice the thickness of the coating to assure adequate inspection voltage and compensate for any variation in coating thickness. The electrode shall be passed over the coated surface at approximately half the spark discharge distance from the coated surface only one time at the rate of approximately 10 to 20 meters per minutes. The edge effects shall be ignored. Excessive voltage shall be avoided as it tends to induce holidays in the coated surface thereby giving erroneous readings.
- While selecting test voltages, consideration shall be given to the tolerance on coating thickness and the voltage should be selected on the basis of maximum coating thickness likely to be encountered during testing of a particular pipe.

Thickness of Coating (mm)	Test Voltage (Max.) (kV)
2	10
3	12
4	15

- The electrical equipment used to test tape coating shall be a portable, low amperage, adjustable-voltage, pulse type holiday detector. It shall be furnished with a coil spring electrode or a suitable brush type electrode. The primary input wattage shall not be higher than 20 W, and the minimum pulse at crest voltage shall be 20 per second.

11.0 PROTECTION OF COATED PIPES AGAINST UV DEGRADATION

When the coated pipes are required to be left out exposed to sun light for more than a week before back filling the trench, the coated pipe shall be protected with white coloured water emulsion latex paint. The water emulsion latex paint to be used must be stabilized, pigmented dispersion of water-insoluble film forming, high molecular wt. Synthetic polymeric materials in water. After application and drying the paint must be able to produce a film that adheres to the coal tar tape coating is white in colour, water resistant and able to withstand exterior exposure without degradation for a minimum of 90 days.

12.0 COAL TAR TAPE WIDTH

The width of coal tar tape coating for various pipe sizes shall be as follows:

Pipe Size (Nominal Bore)	Tape Width (mm)
80	100/125
100	100/125/166
150	125/166/200
200	125/166/200/250
250	166/200/250/333
300	166/200/250/333
>300	333

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ANNEXURE-I

TEST METHODS

1.0 PRIMER (fast drying chlorinated rubber based synthetic primer)

1.1 Test method for volatile content (refer ASTM D2369 for full details)

Procedure:

A specimen sample of primer 0.50± 0.10 gms is weighed into a tared aluminum foil dish into which add 3 ml of solvent toluene technical grade and disperse completely. Heat the above sample in the forced draft oven for 60 mins. at $110^0C \pm 5^0C$. Remove the dishes from the oven place immediately in desicator, cool to room temperature and weigh. Calculate % volatile matter (V) by using the following formula:

$$V = \frac{(W_2-W_1)}{S} \times 100$$

Where, W_2 - Weight of dish + Specimen
W_1 - Weight of dish + Specimen after heating
S - Specimen wt.

1.2 Test method for viscosity by ford cup no. 4 (refer ASTM D1200 for full details)

The efflux time of primer is determined by ford cup no.4. The cup is cleaned thoroughly by solvent toluene and a soft brush. Fill the cup with the primer to full level by holding the orifice with a rubber stopper or finger pull the stopper away and simultaneously start the timer and measure the time until the first break of primer in the orifice. Measure the temperature of the fluid in the efflux stream. It shall be reported the efflux time in seconds at a measured temperature.

1.3 Test method for drying time (refer ASTM D1640 for full details)

Apply the primer by brush on clean glass/clean mild steel panels of suitable sizes and measure the drying time at a normal room temperature and 50% relative humidity with the coated panels on horizontal position:

a) **Set-to-touch time:** Lightly touch the test film with the tip of clean finger and immediately place the finger tip against a piece of clean clear glass. Observe if any coating is transferred to the glass. The film is set- to- touch where it still shows a tacky condition, but none of it adheres to the finger.

b) **Dust free time:** The coating film is considered to have dried dust free when the cotton fibres can be removed by blowing lightly over the surface of film.

c) **Tack free time:** The film is considered free from after tack when the test paper drops of the test film within 10 seconds.

2.0 COAL TAR TAPE

2.1 Test Method for Relative Density of Tape (refer ASTM D71for full details)

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The test sample is suspended from a thin wire and weighed first in air, then in water at 25^{0}C in a glass beaker. The relative density is calculated from these weights.

Relative density of tape sample at 25°C $= \frac{A}{(A-B)}$

Where, A = Weight of specimen in air in mg.
B = Weight of specimen in water at 25^{0}C in mg.

2.2 Test Method for Adhesion of Tape Coating in Laboratory (AWWA C-203)

Clean a section of 2 inch dia steel pipe of 2 ft length or a flat steel panel of 2 inch x 6 inch prime the cleaned metal and apply a 2 inch width of tape as per manufacturer's recommendations. The coating shall be allowed to set at room temperature for 72 hrs. after the test sample has completely set, grasp one end of the tape and pull it off by hand. The coating is considered to have satisfactory adhesion if [1] the fabric tears at the point of stripping or (2) the fabric strips from the under lying coating material leaving no more than approximately 10% or less of the primer or bare metal exposed.

2.3 Test Method for % Wt Loss in 24 hrs Immersion of Tape in Petrol

Samples as described below for this test shall be drawn at random in presence of EIC at site from the lot delivered to site.

Test Method: Cut 2 tape samples from the same batch weighing accurately 100gms each with same dimensions (wt. A) and put this sample in a clean and dry 600 ml capacity glass beaker. Pour 550 ml of standard quality petrol (gasoline) into the glass beaker in v-shape form so that the tape sample gets totally immersed in petrol. The level of petrol shall be about 5 cm above the tape sample.

Cover the mouth of the beaker with two layers of thick polyethene sheets and tie these polyethene sheets with a rubber band around the mouth of the glass beaker. Allow the beaker to stand at room temperature for 24 hrs without any disturbance. No stirring is to be done. Take the tape sample out of the beaker after 24 hrs and spread it on blotting papers on a table. Allow it to dry in the air for 4 hrs weigh the tape accurately again (wt. B)

% Loss in wt. $= \frac{(A-B) \times 100}{A}$

% Insoluble = 100 - % Loss in wt.

The above test shall simultaneously be carried out with 3 more tape samples selected at random and the average result shall be taken.

The indicative loss for coal tar tape in petrol shall be 7% maximum.

2.4 Standard Test Method for Relative Density of Solid Hard Pitch of Coal (refer ASTM D71for full details).

This test is applicable for testing at manufacturer's end.

2.4.1 **Summary of Test Method**

The sample is suspended from a thin wire and weighed, first in air, then submerged in water at 25^{0}C. The relative density is calculated from these weights.

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Relative density of sample at 25^0C = $\frac{A}{A - B}$

Where A = Weight of specimens in air in mg.

B = Weight of the specimen in water at 25^0C in mg.

2.4.2 **Procedure**

Tare the balance with a piece of 0.127, (5 ml) nichrome wire or mono-filament nylon line sufficiently long to reach from the hook on the pan. Support to the saddle when the latter is in position across the pan. Attach the test specimen to the wire or line so that it is suspended 20 to 30 mm above the straddle when the other end of the wire is attached to the hook.

Weigh the suspended specimen to the nearest 1 mg and record this weight as "A". Fill a 400 or 600ml beaker two thirds full with freshly boiled distilled water containing a small amount of detergent. About 100 mgs of Alconox detergent to 200 ml of water has been found satisfactory. Adjust the temperature of water to 25 ± 2^0C and maintain this temperature during the remainder of the test. Place the beaker with water on the saddle with the specimen, still suspended, and fully submerged. Weight the immersed specimen to the nearest 1 mg and record this weight as "B".

Repeat the determination with the second test specimen.

2.4.3 **Report**

Report the average of two determinations to the third place, unless the individual values differ by more than 0.005. In this case, repeat the determinations.

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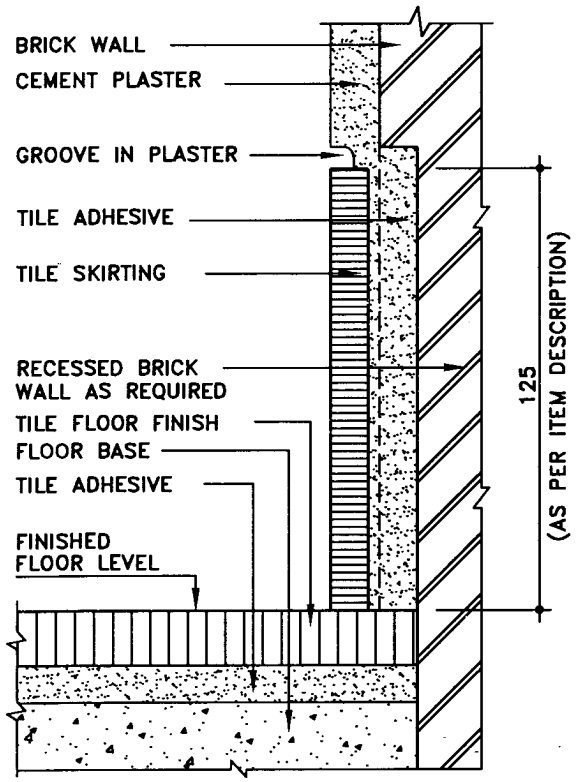
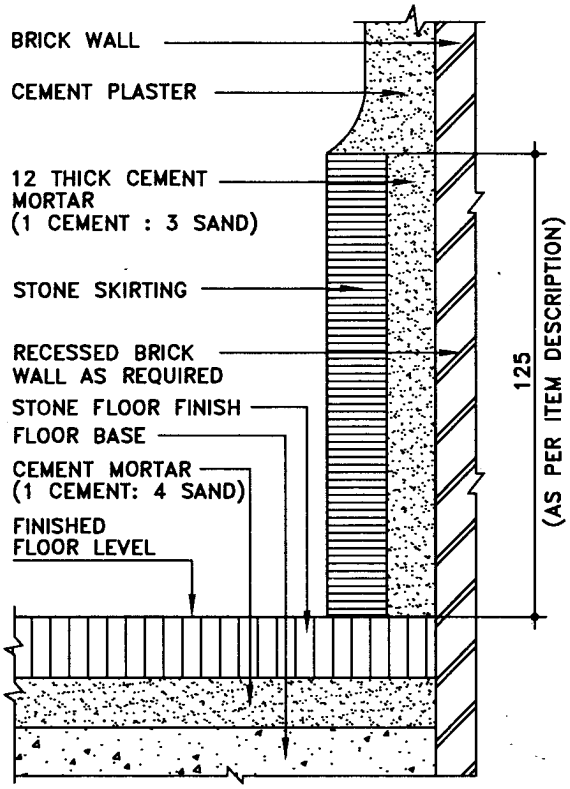
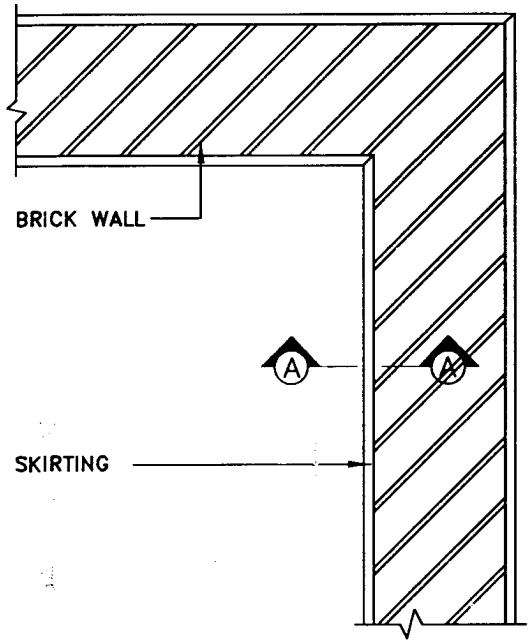


SECTION A–A
(TILE FLOORING–FLUSH SKIRTING)

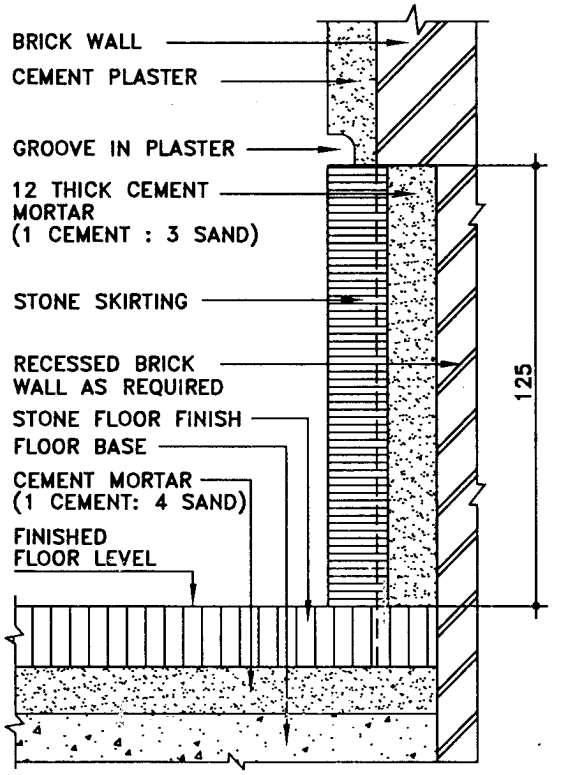


SECTION A–A
(STONE FLOORING–RAISED SKIRTING)



PLAN

NOTE: ALL DIMENSIONS ARE IN MM



SECTION A–A
(STONE FLOORING–FLUSH SKIRTING)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	11.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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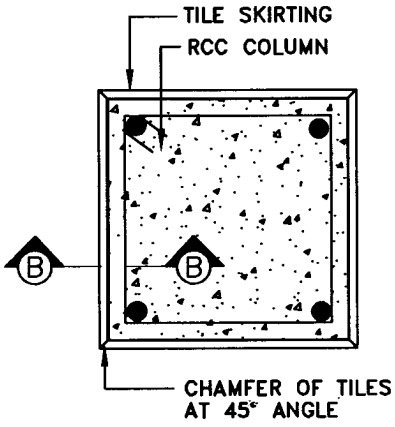
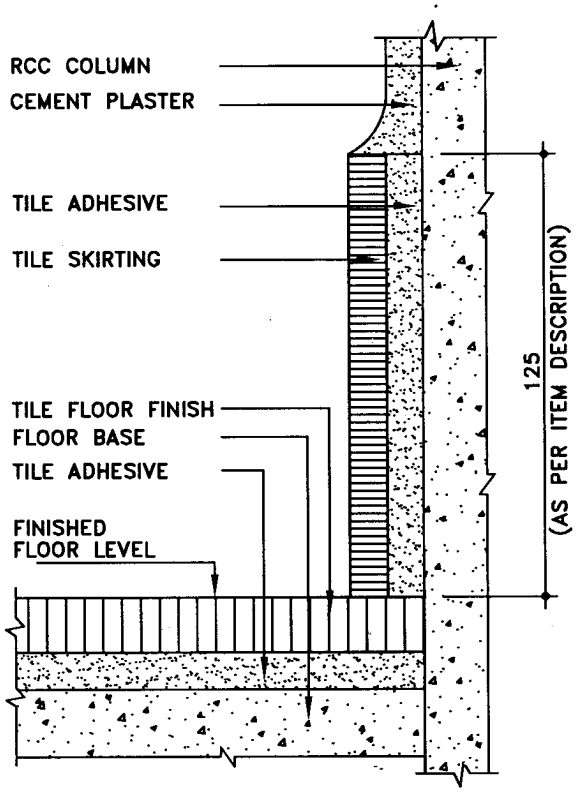
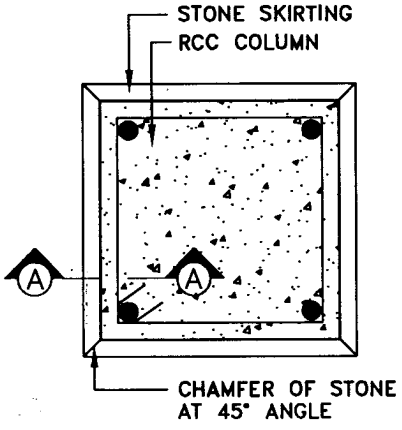


PLAN
(TILE SKIRTING)



SECTION B–B



PLAN
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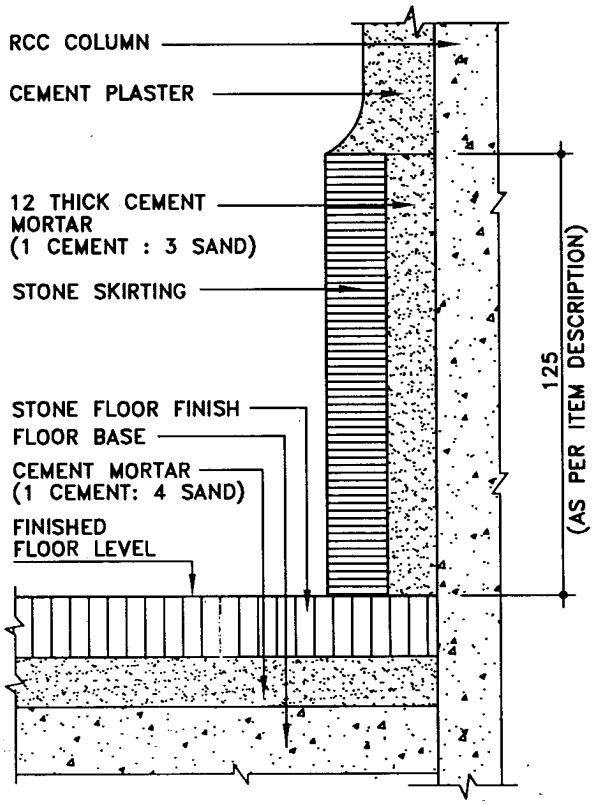

SECTION A–A

NOTE: ALL DIMENSIONS ARE IN MM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	11.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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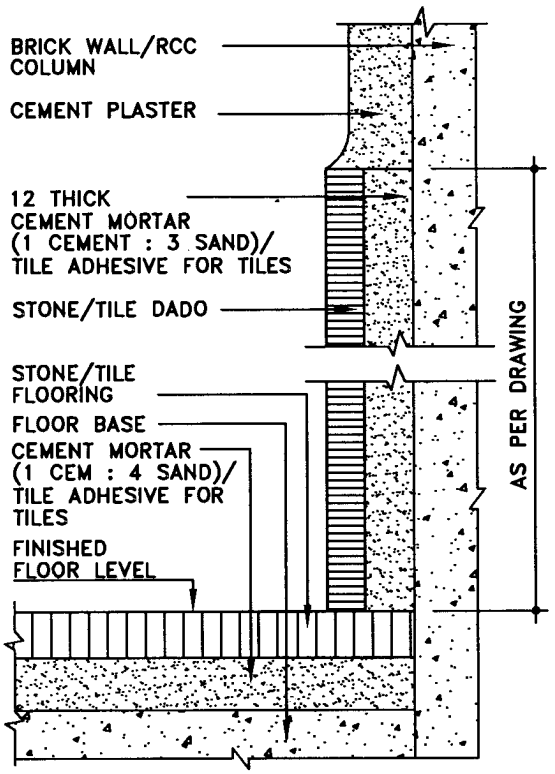
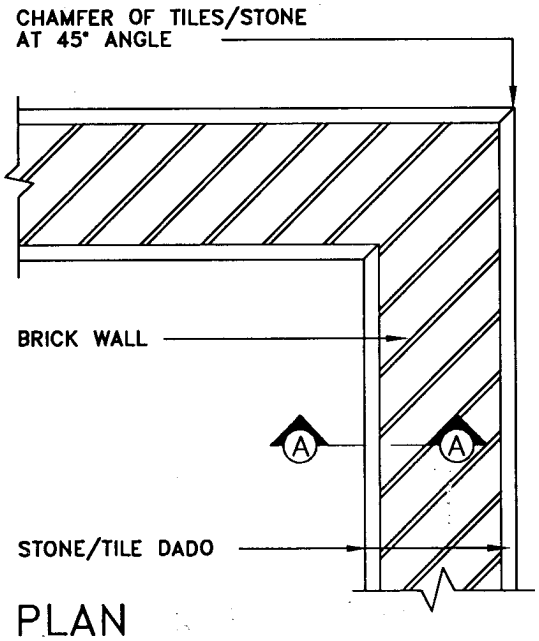
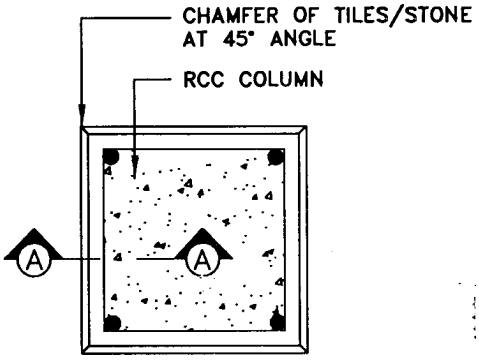


SECTION A–A



PLAN
(DADO ON BRICK WALL)



PLAN
(DADO ON RCC COLUMN)

NOTE: ALL DIMENSIONS ARE IN MM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	11.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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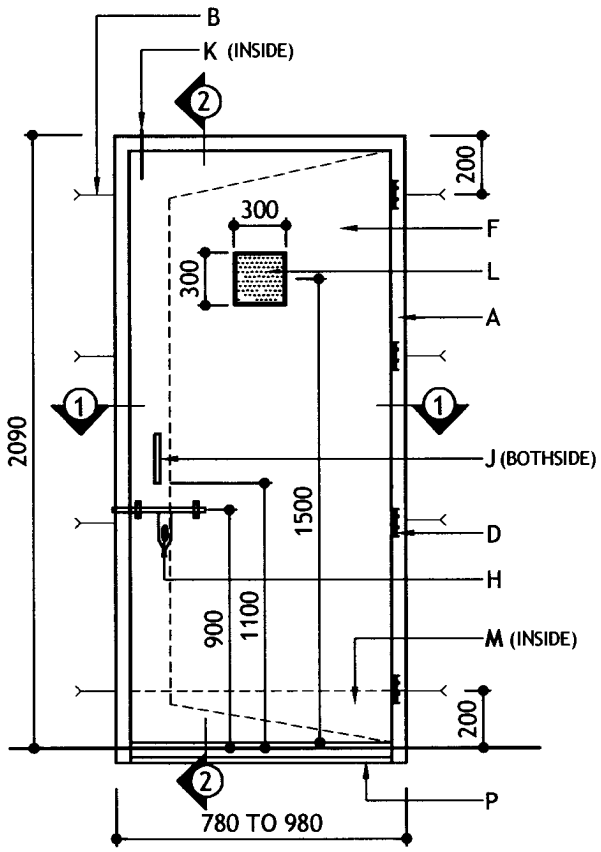
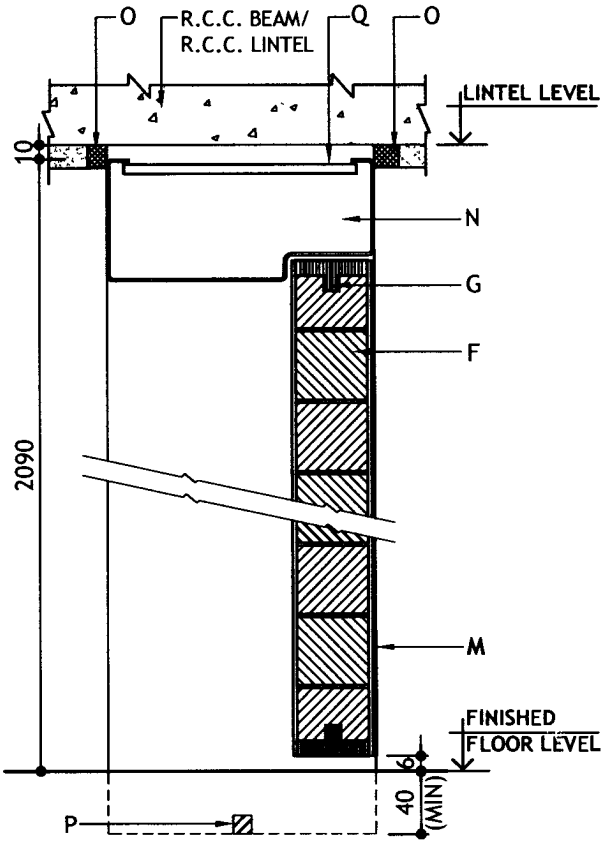
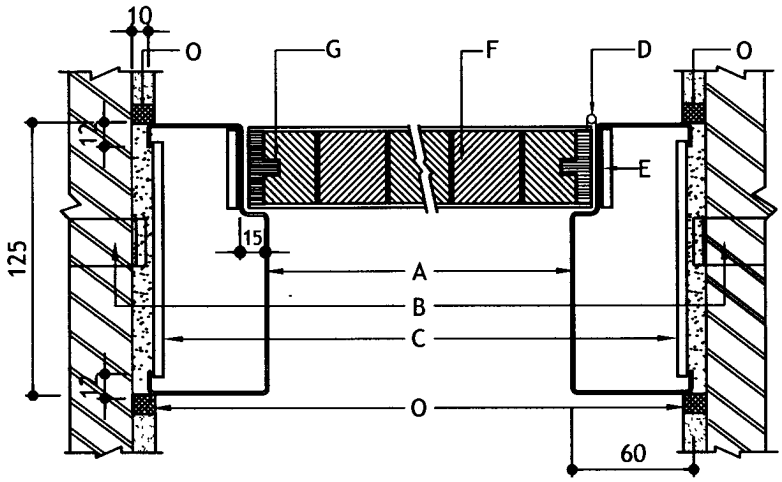
WOODEN FLUSH DOOR
(WITH PRESSED STEEL FRAME)



ELEVATION



SECTION 2-2



SECTION 1-1

LEGEND :

A : 16 SWG PRESSED STEEL FRAME FINISHED AS PER TENDER ITEMS.
B : 25x6-300 LONG M.S. HOLDFAST/FASTENER @ MAXIMUM 600 C/C WELDED TO FRAME SPACER.
C : 50x6 THICK M.S. FLAT SPACER WELDED TO FRAME AT HOLD FAST LOCATIONS.
D : 150 LONG M.S. BUTT HINGE @ MAXIMUM 600 C/C SCREWED TO FRAME AND SHUTTER.
E : 40x3-150 LONG M.S PAD WELDED TO FRAME AT ALL HINGE & LOCK LOCATIONS.
F : 35 THICK FLUSH DOOR SHUTTER (AS PER ITEM / SPECIFICATION).
G : TEAK WOOD LIPPING
H : ALDROP/MORTICE LOCK (AS PER REQUIREMENT)
J : HANDLE BOTHSIDE (AS PER REQUIREMENT).
K : 10 DIA x 250 LONG ALUMINIUM TOWER BOLT INSIDE.
L : VISION PANEL WITH 4mm THK GLASS WITH 15x15 TEAK WOOD BEADING (AS PER REQUIREMENT).
M : 200x3 PLASTIC KICK PLATES FIXED WITH STEEL SCREWS (AS REQUIRED).
N : CAVITY FILLED WITH CONCRETE OR PHENOLIC FOAM.
O : 12X10 GROOVE IN PLASTER FILLED WITH POLYSULPHIDE SEALANT.
P : 12mm M.S. SQUARE BAR (TIE) WELDED TO BOTH ENDS OF VERTICAL MEMBER OF FRAME.
Q : 25x3 THICK M.S. FLAT SPACER @500 C/C MAXIMUM.

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FOR SHUTTER FINISH REFER TO DRAWINGS AS/TENDER ITEM.
3. DOOR CLOSER & DOOR STOPPER SHALL BE PROVIDED AS PER TENDER ITEM.

Rev. No	Date	Purpose	Prepared by	Checked by	Stds Committee Convenor	Stds. Bureau Chairman
6	12.04.21	REVISED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	19.10.15	REVISED & ISSUED AS STANDARD	BABITA/GJK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

Approved by

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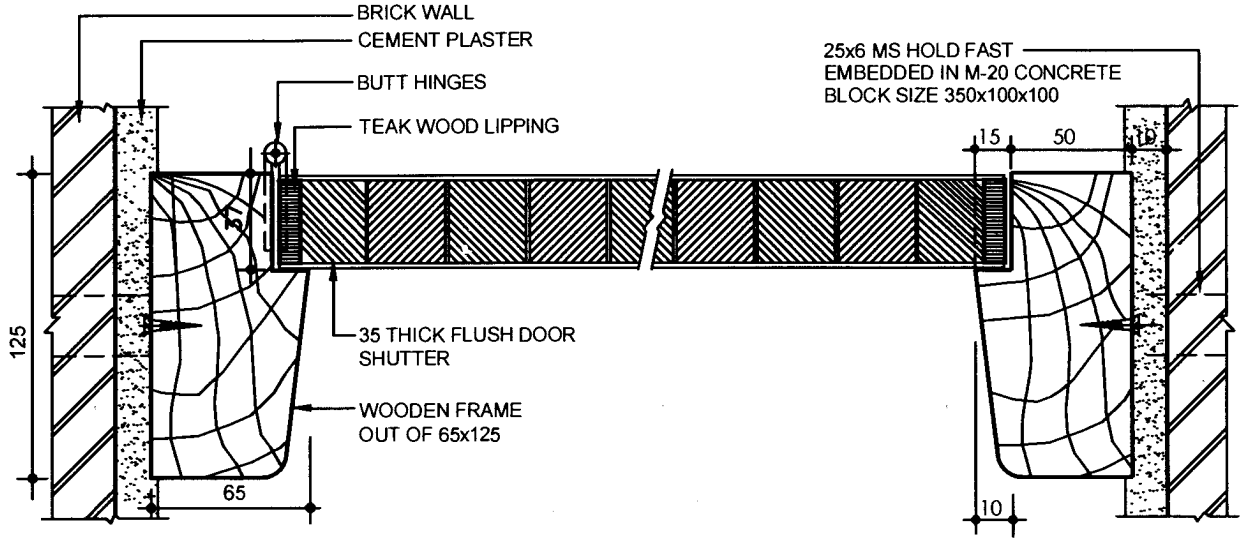
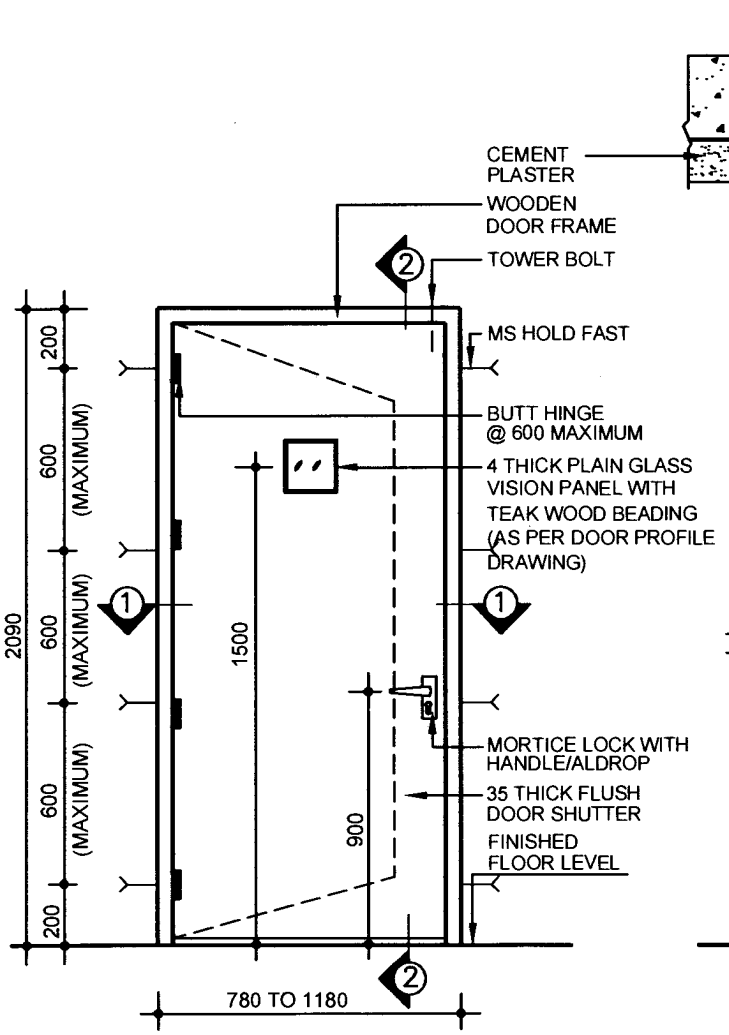
WOODEN FLUSH DOOR
(WITH WOODEN FRAME)



SECTIONAL PLAN 1-1



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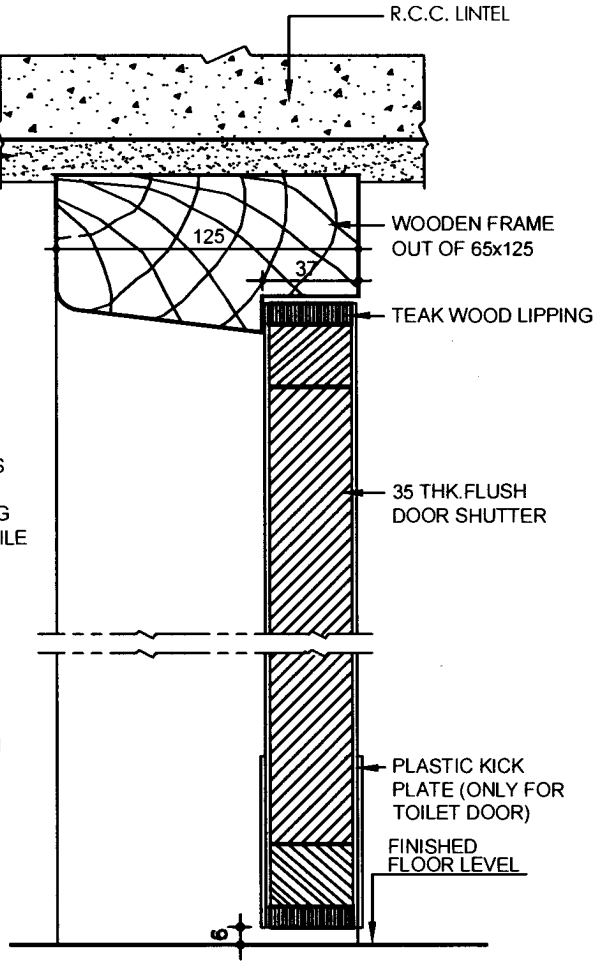

SECTION 2-2

NOTE:
1. ALL DIMENSIONS ARE IN MM.
2. DOOR HARDWARE SHALL BE AS/ SPECIFICATION

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SUMEDHA	SAMIR DAS	SANJAY MAZUMDAR
5	14.09.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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ENGINEERS INDIA LIMITED
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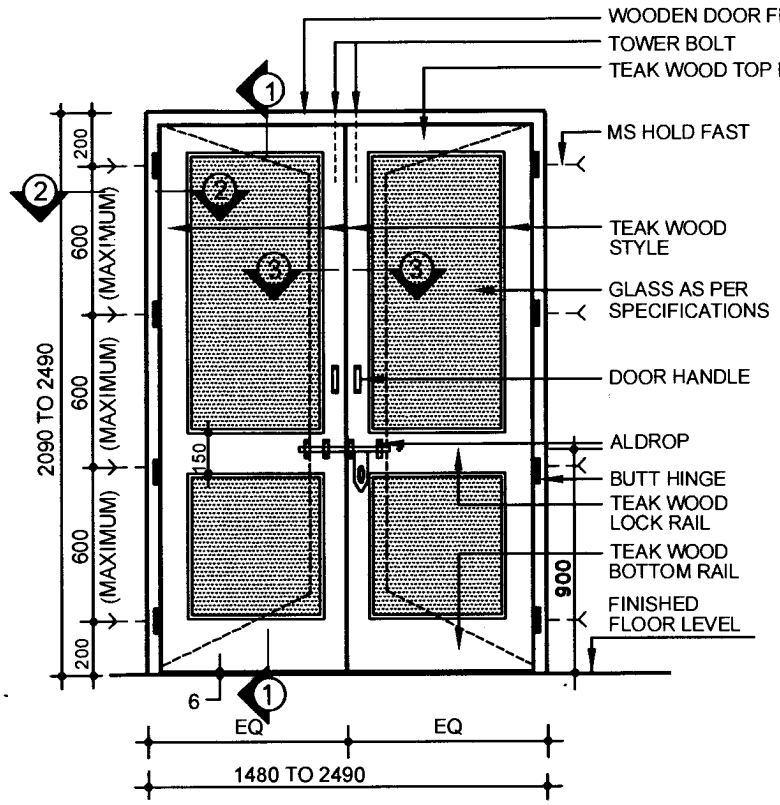
WOODEN GLAZED DOOR DOUBLE SHUTTER

STANDARD No.
7-75-0013 Rev. 6



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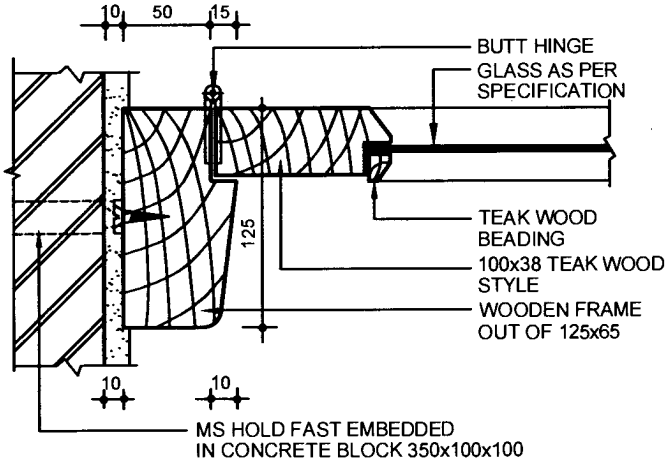

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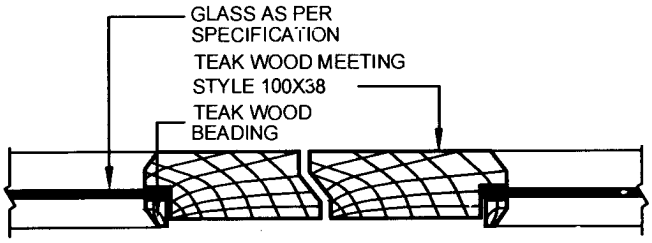

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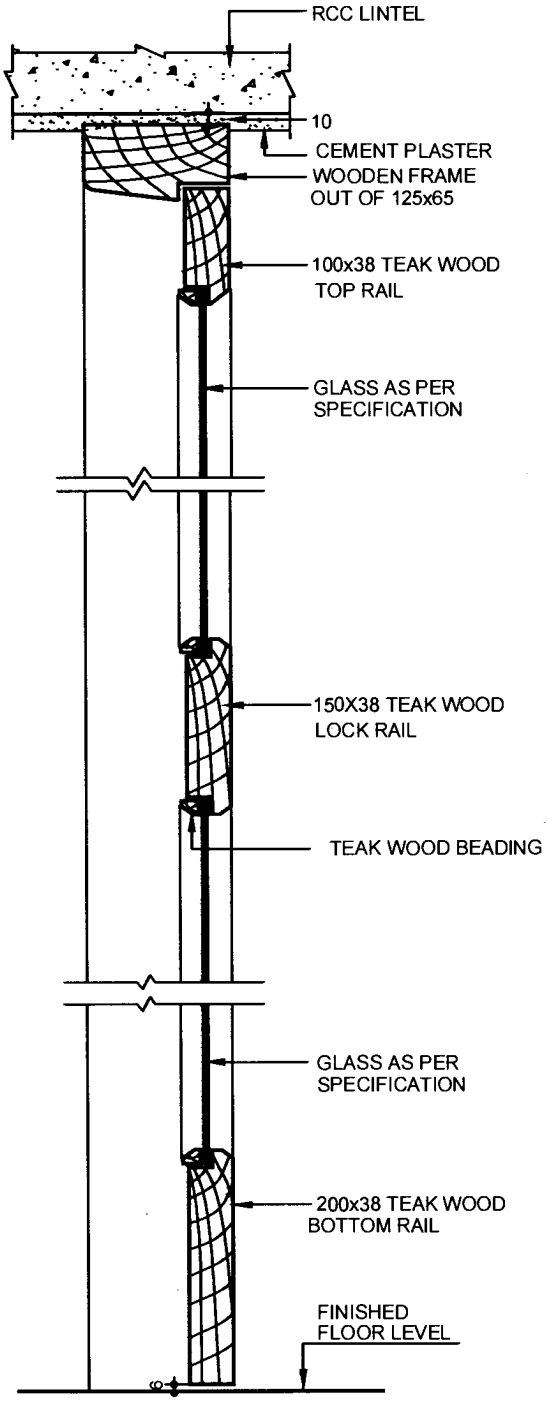

SECTION 1-1

NOTE:
ALL DIMENSIONS ARE IN MM.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SUMEDHA	SAMIR DAS	SANJAY MAZUMDAR
5	21.11.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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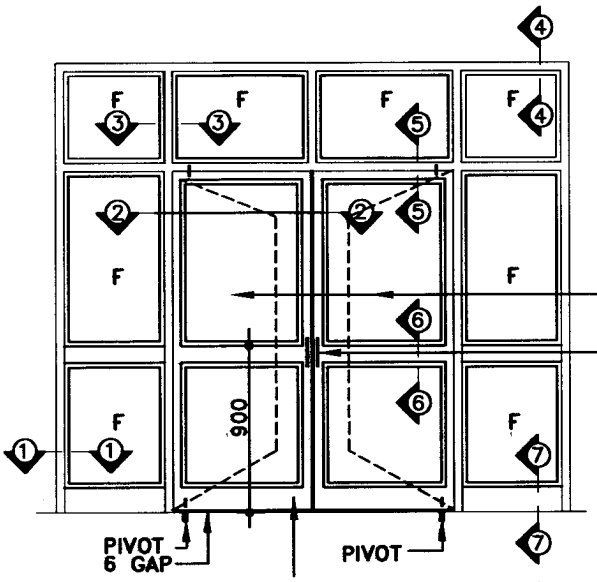
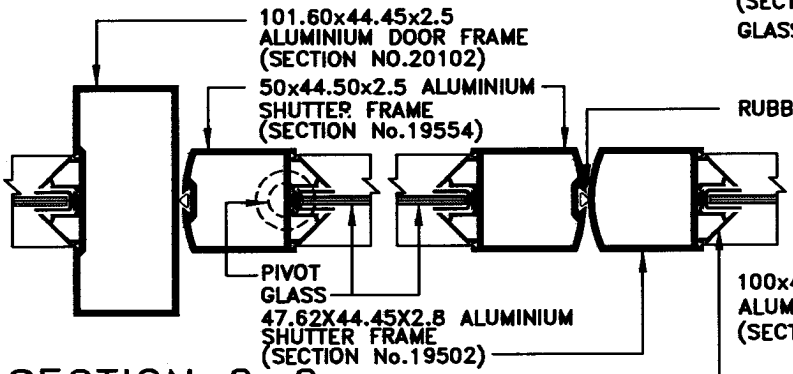
GLAZED ALUMINIUM DOOR



ELEVATION
(F-FIXED GLAZING)



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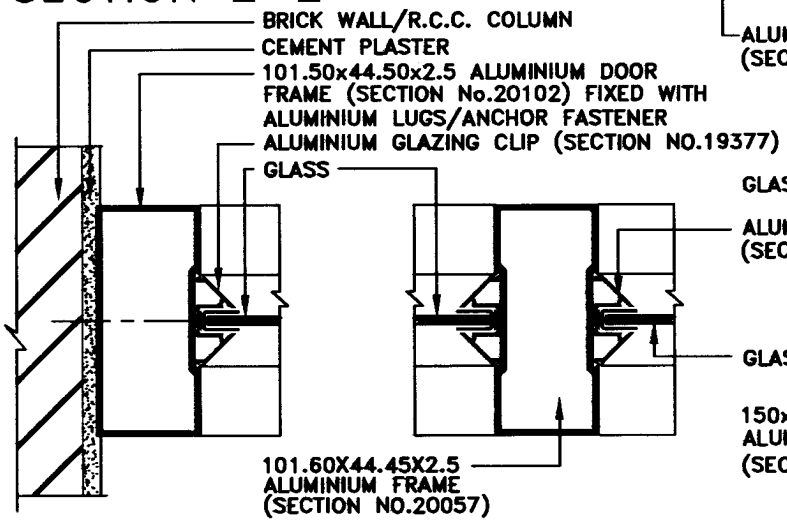
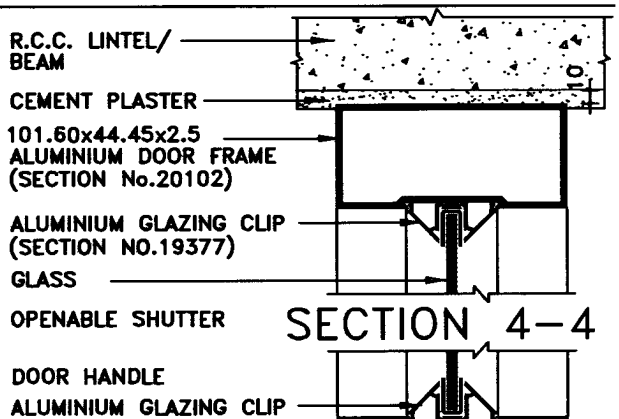


SECTION 1–1 SECTION 3–3



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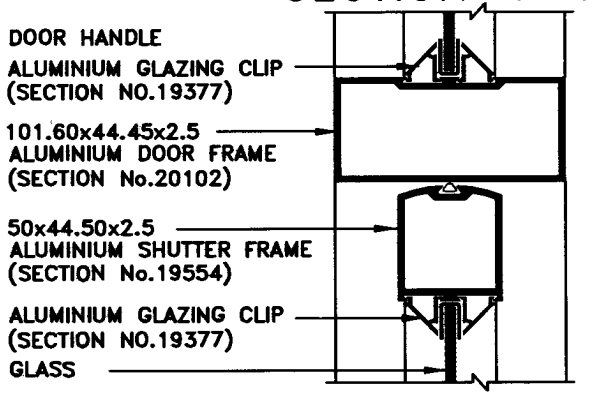
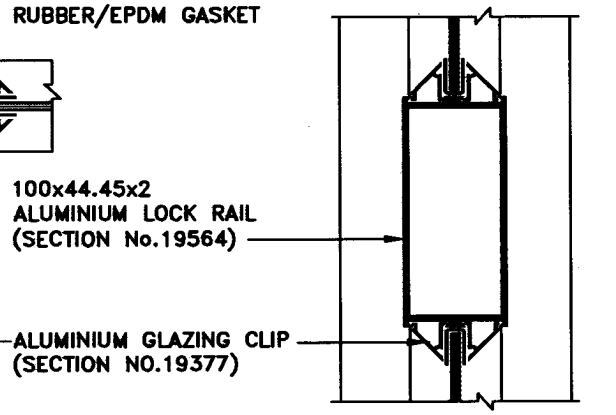
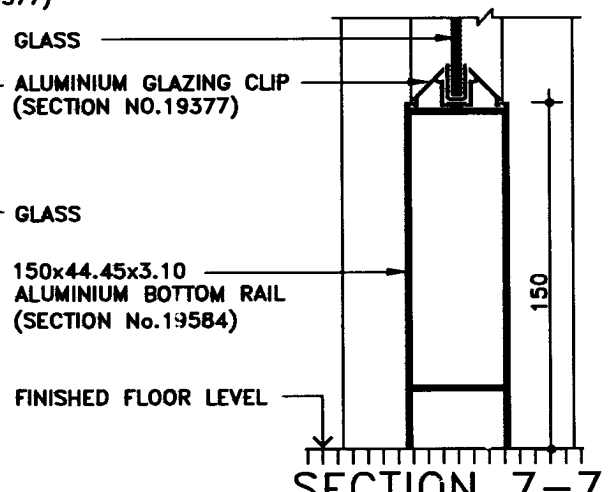


SECTION 5–5



SECTION 6–6



SECTION 7–7

NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. THE SECTION DESIGNATION NOS. PERTAIN TO EXTRUDED ALUMINIUM SECTIONS OF "JINDAL ALUMINIUM LTD." AND ARE INDICATED FOR REFERENCE. EQUIVALANT SECTIONS OF OTHER APPROVED MANUFACTURERS CAN ALSO BE USED.
3. FOR FINISHING OF ALUMINIUM SECTION (ANODISED/POWDER COATING) REFER BID/TENDER.
4. RUBBER/EPDM GASKET SHALL BE USED FOR FIXING OF GLASS.
5. HARDWARE SHALL BE AS PER BID/TENDER.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	21.03.17	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RANJANI SRIVASTAVA	R. NANDA

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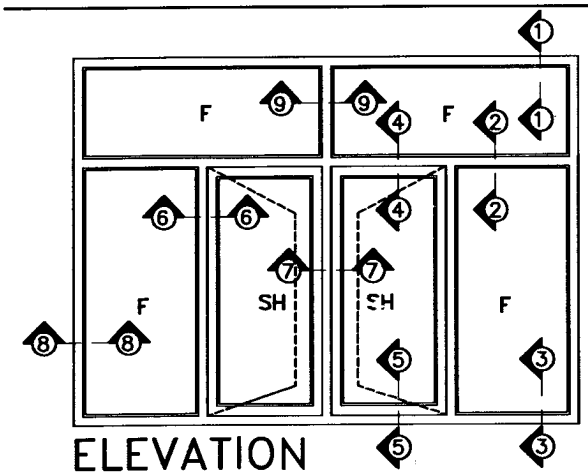
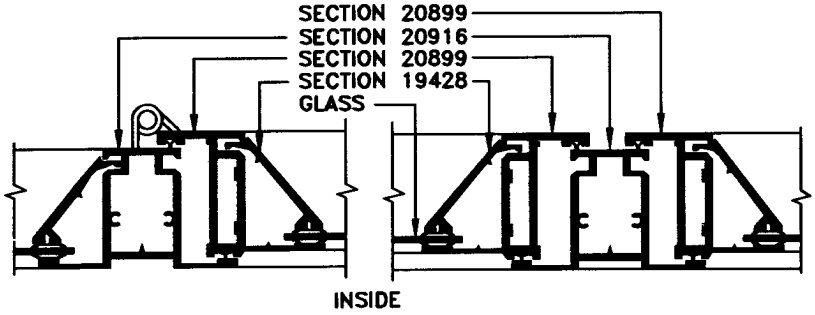
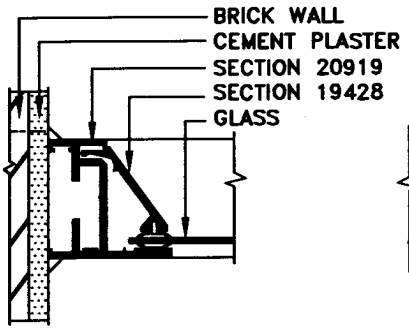


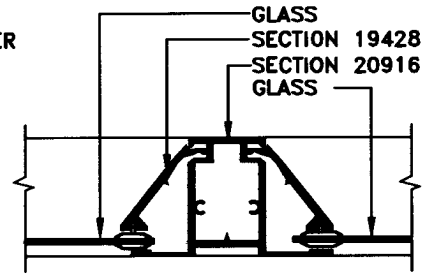
ELEVATION
(F–FIXED GLAZING)
(SH–SIDE HUNG SHUTTER)



SECTION 6–6

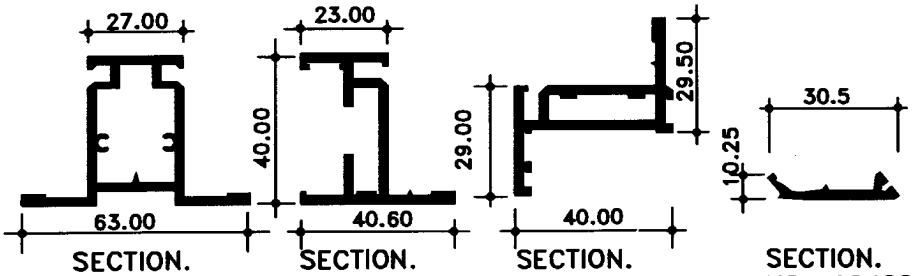
SECTION 7–7





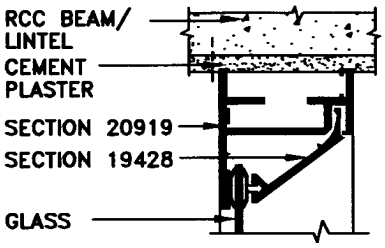
SECTION 8–8

SECTION 9–9

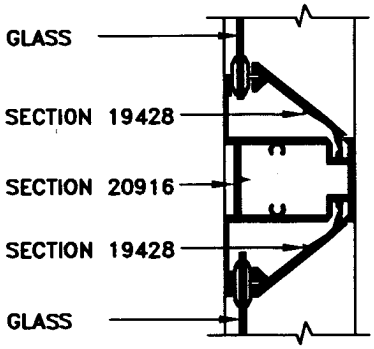


SECTION. NO.–20916 | SECTION. NO–20919 | SECTION. NO.–20899 | SECTION. NO.–19428

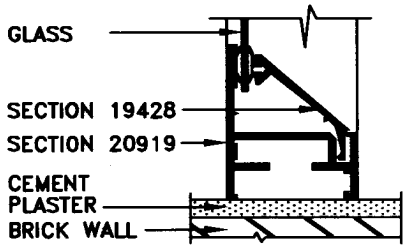
NOTE:
1. ALL DIMENSIONS ARE IN MM.
2. THE SECTION DESIGNATION NOS. PERTAIN TO EXTRUDED ALUMINIUM SECTIONS OF "JINDAL ALUMINIUM LTD." AND ARE INDICATED FOR REFERENCE. EQUIVALANT SECTIONS OF OTHER APPROVED MANUFACTURERS CAN ALSO BE USED.
3. FOR FINISHING OF ALUMINIUM SECTION (ANODISED/POWDER COATING REFER BID/TENDER.
4. RUBBER/EPDM GASKET SHALL BE USED FOR FIXING OF GLASS.
5. HARDWARE AND GLASS SHALL BE AS PER BID/TENDER.



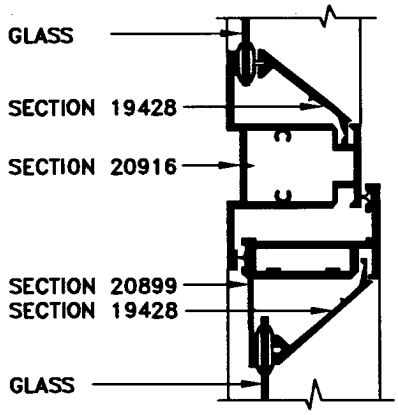
SECTION 1–1



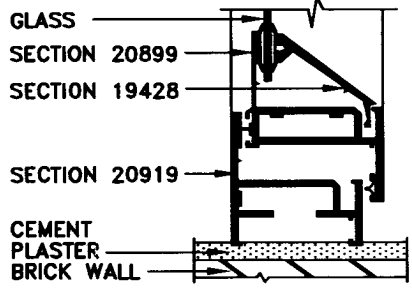
SECTION 2–2



SECTION 3–3



SECTION 4–4



SECTION 5–5

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	21.03.17	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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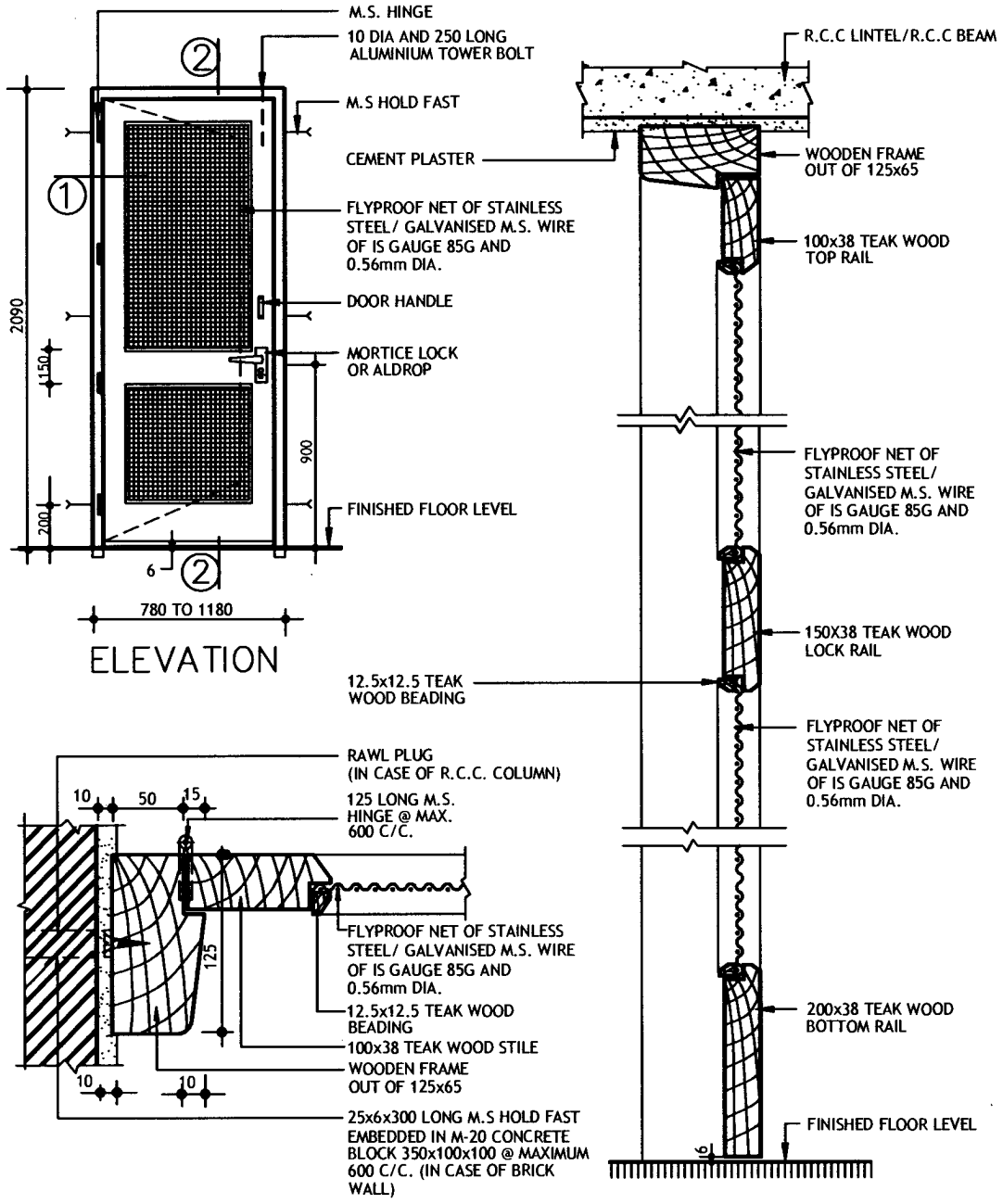
WOODEN WIRE-MESH DOOR (SINGLE SHUTTER)



SECTIONAL PLAN AT 1

SECTION 2 -2

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FOR SHUTTER FINISH REFER TO DRAWINGS/TENDER ITEM
3. DOOR CLOSER & DOOR STOPPER SHALL BE PROVIDED AS/TENDER ITEM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
4	01.02.16	REAFFIRMED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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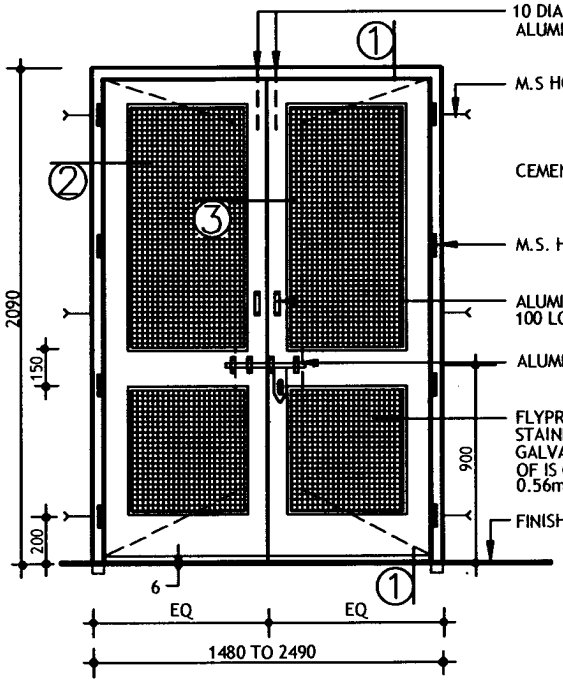
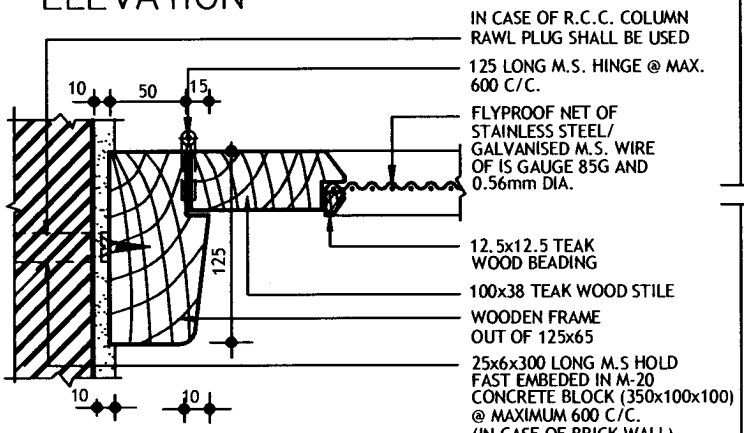
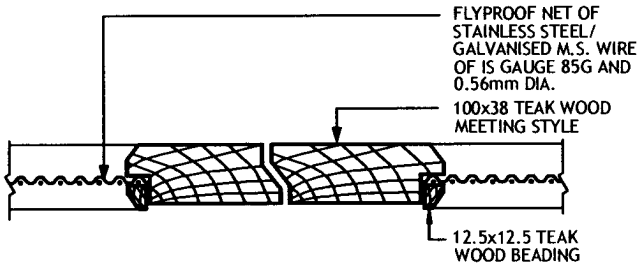
WOODEN WIRE-MESH DOOR (DOUBLE SHUTTER)



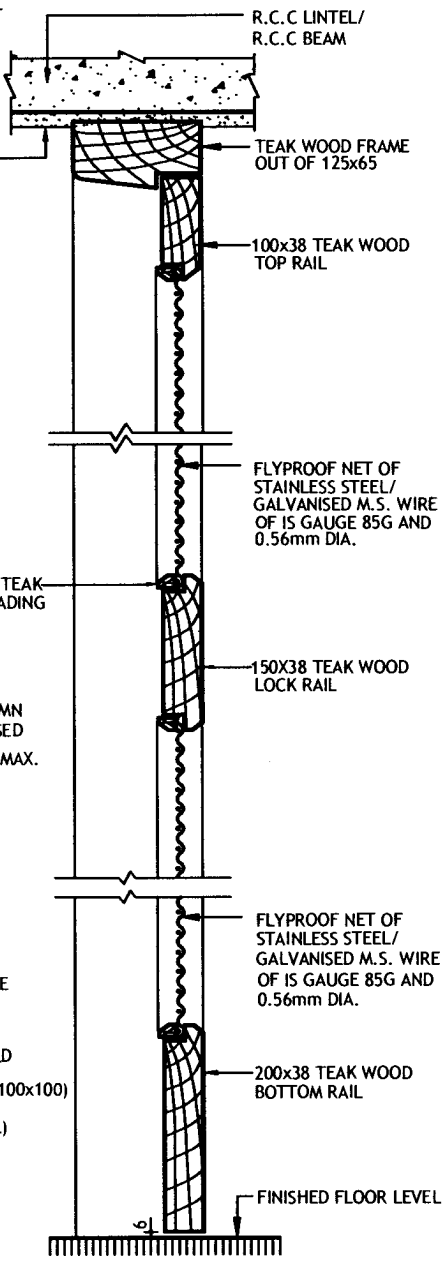
ELEVATION



SECTIONAL PLAN AT 2



SECTIONAL PLAN AT 3



SECTION 1 -1

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. FOR SHUTTER FINISH REFER TO DRAWINGS/TENDER ITEM.
3. DOOR CLOSER & DOOR STOPPER SHALL BE PROVIDED AS/TENDER ITEM.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
5	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
4	01.02.16	REAFFIRMED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

Approved by

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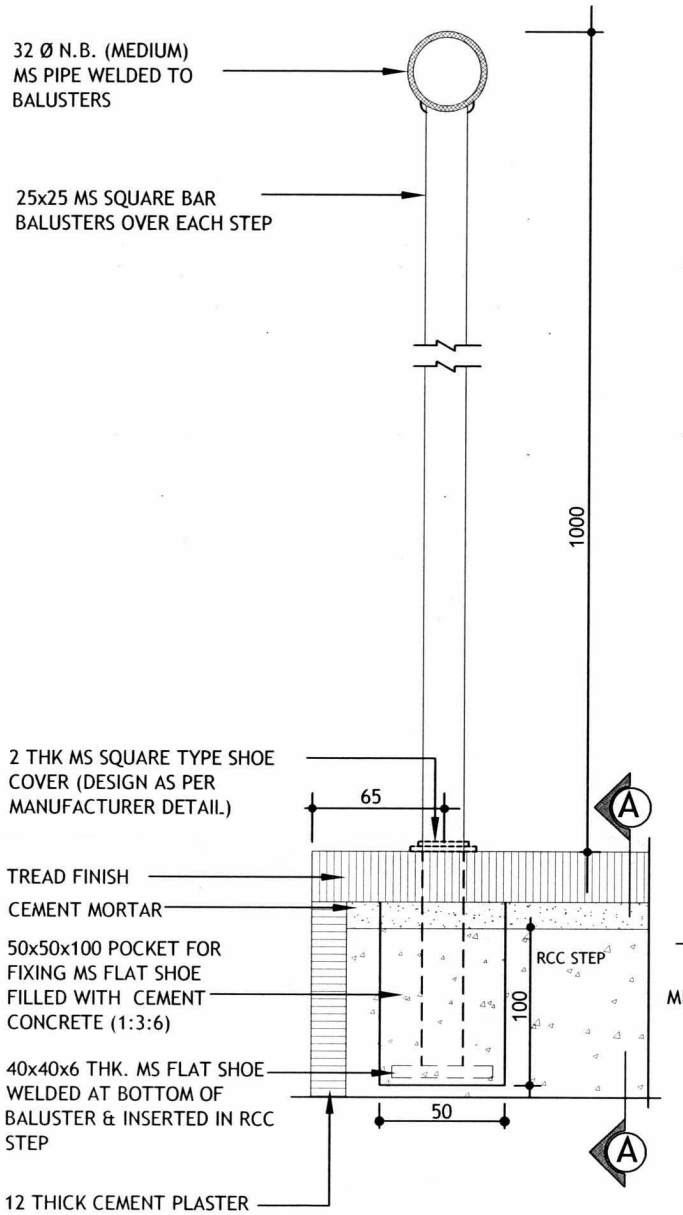
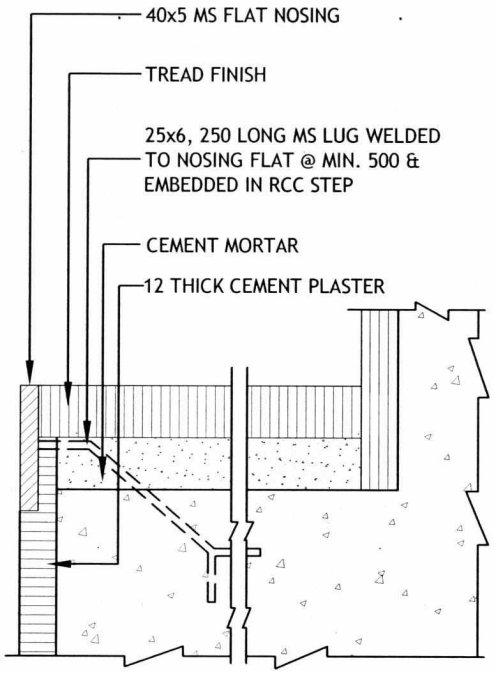
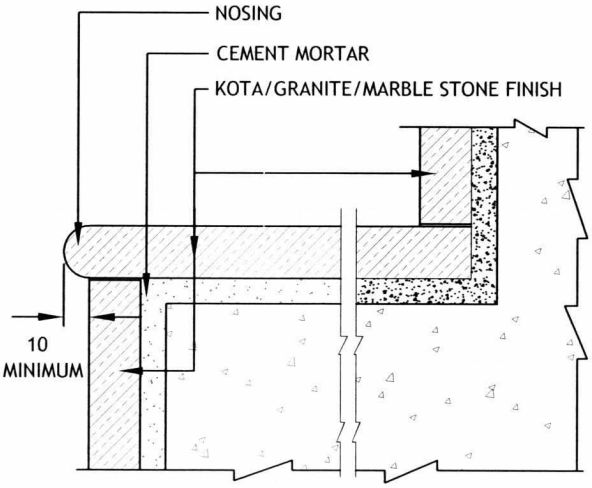




SECTION A-A
(FOR CAST IN-SITU CONCRETE TREAD)



SECTION A-A
(FOR STONE FINISHED TREAD)

DETAIL OF HANDRAIL

NOTE: 1. ALL DIMENSIONS ARE IN MM.
2. RISER, TREAD AND SKIRTING SHALL BE OF SAME FINISH

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
7	16.10.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
6	02.01.19	ISSUED AS STANDARD	SG	SD	RS	R K TRIVEDI

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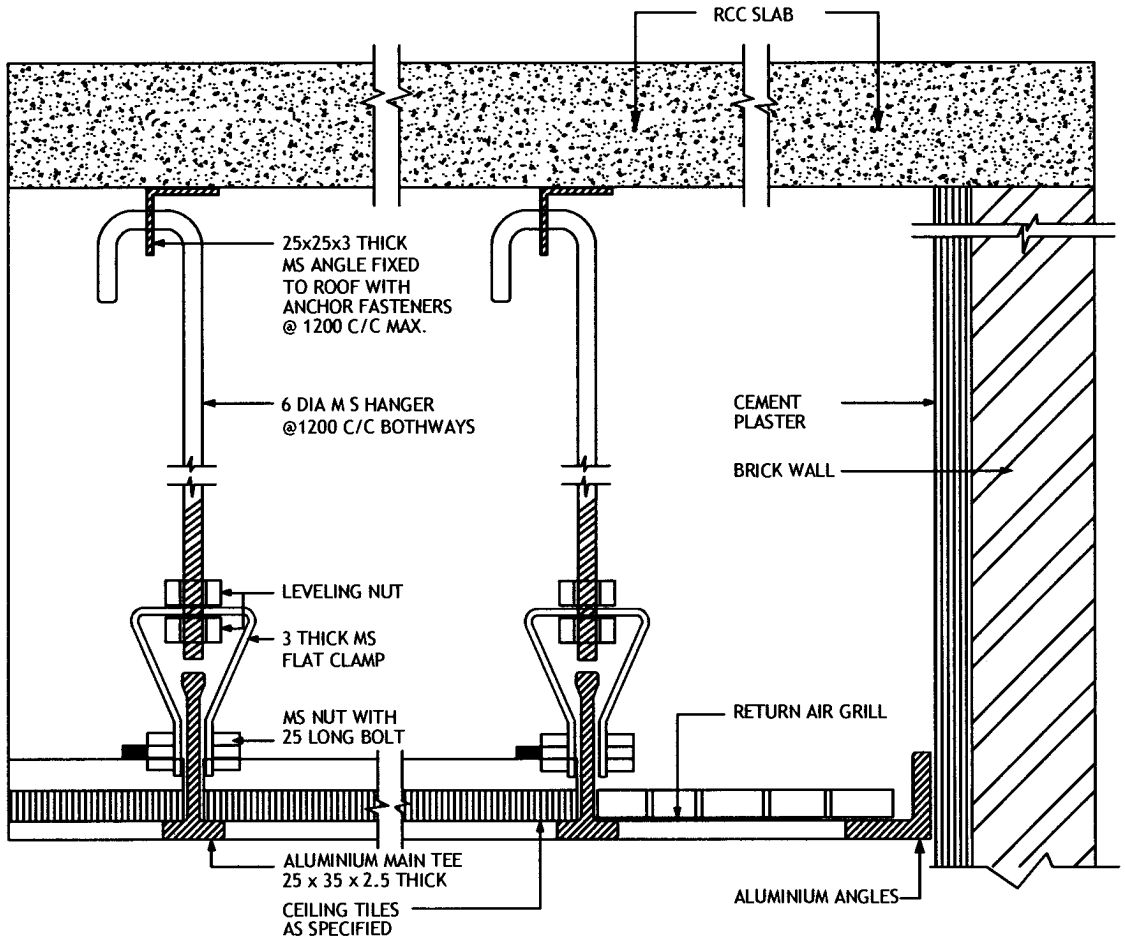
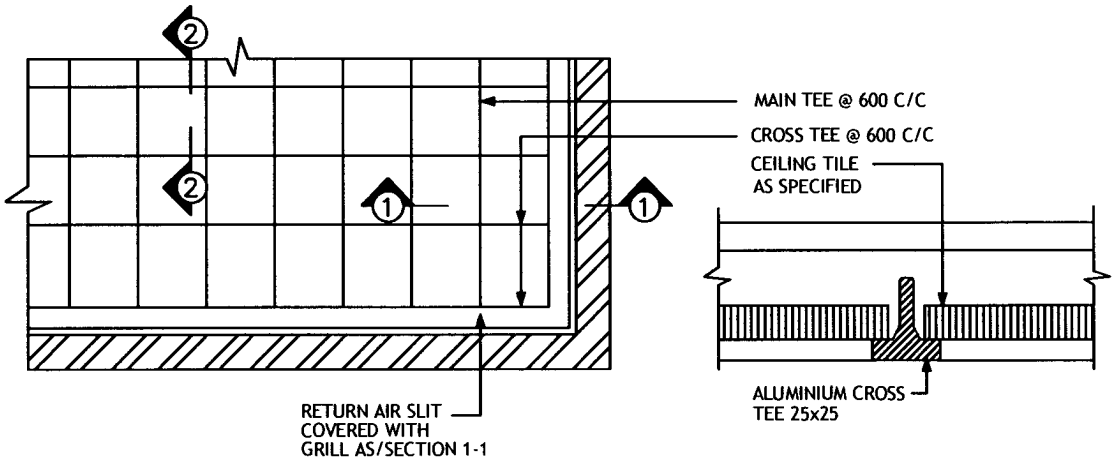


SECTION AT 1-1



PLAN (PART)

SECTION AT 2-2

(ELECTRICAL, A/C FIXTURE LOCATIONS SHALL BE AS PER DETAIL DRAWING)

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	02.03.16	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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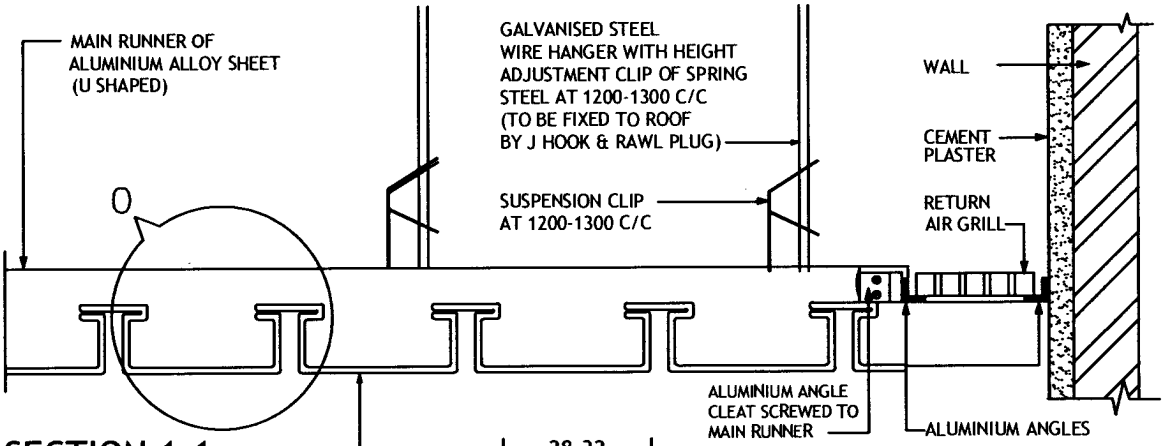
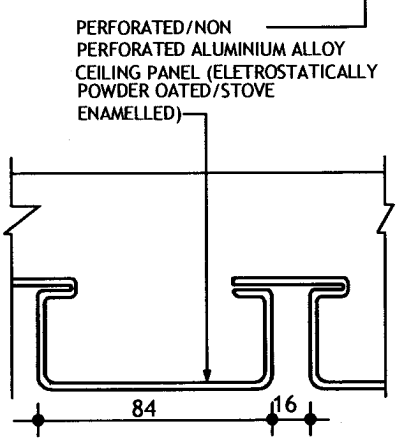
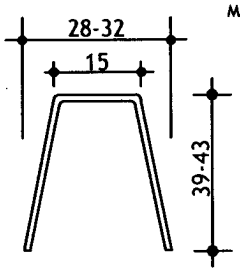
ALUMINIUM PANEL FALSE CEILING (84C SYSTEM)



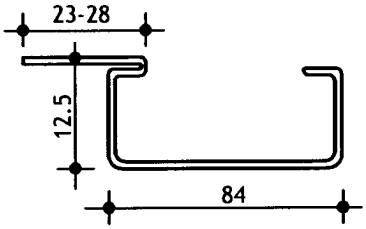
SECTION 1-1



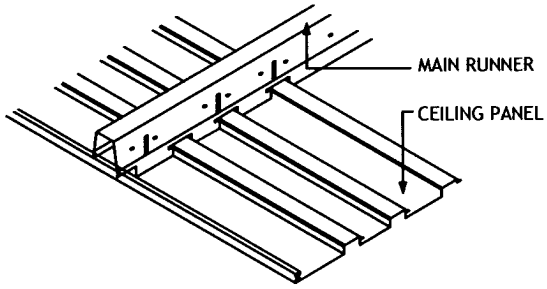
DETAIL AT 'O'



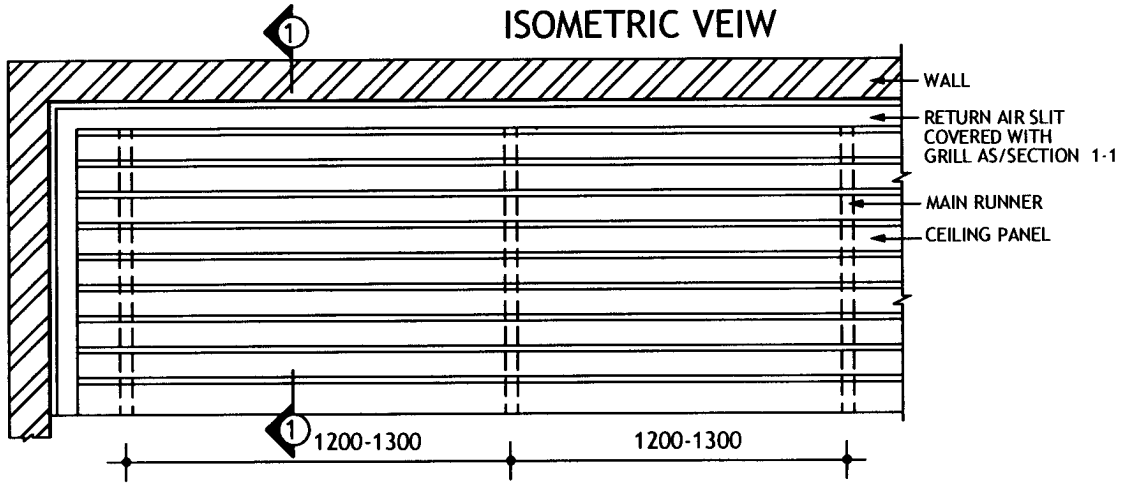
SECTION
(MAIN RUNNER)



SECTION
(PANEL)



ISOMETRIC VEIW



REFLECTED CEILING PLAN (PART)

(ELECTRICAL, A/C FIXTURE LOCATIONS SHALL BE AS PER DETAIL DRAWING)

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	02.03.16	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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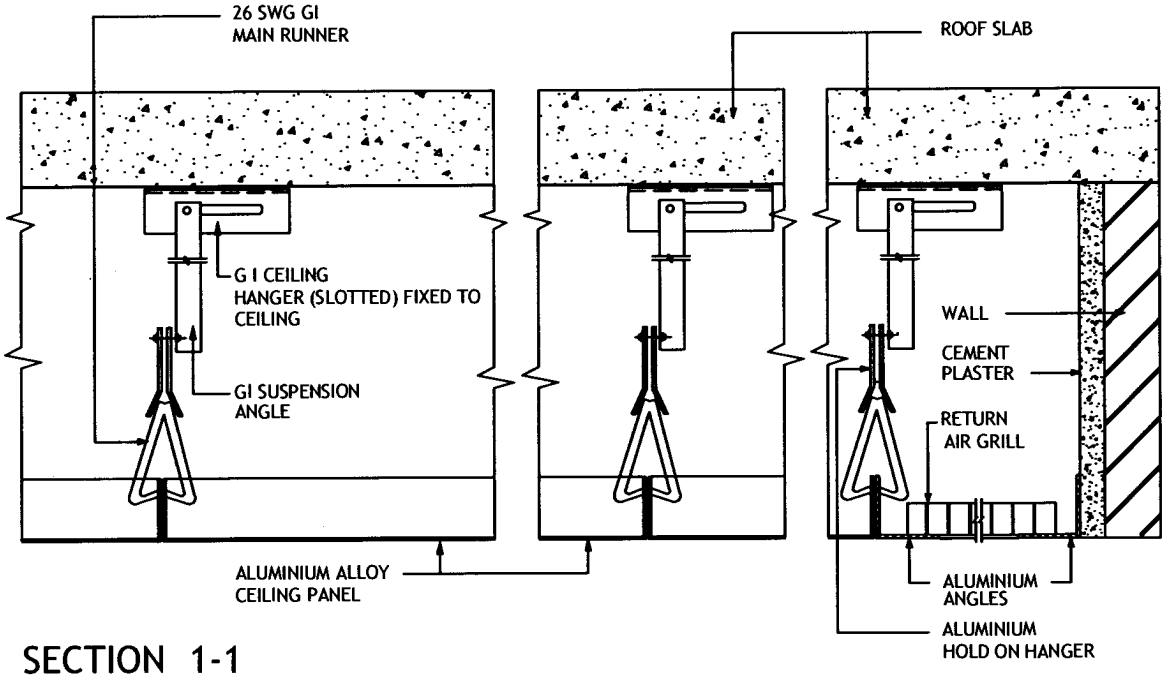
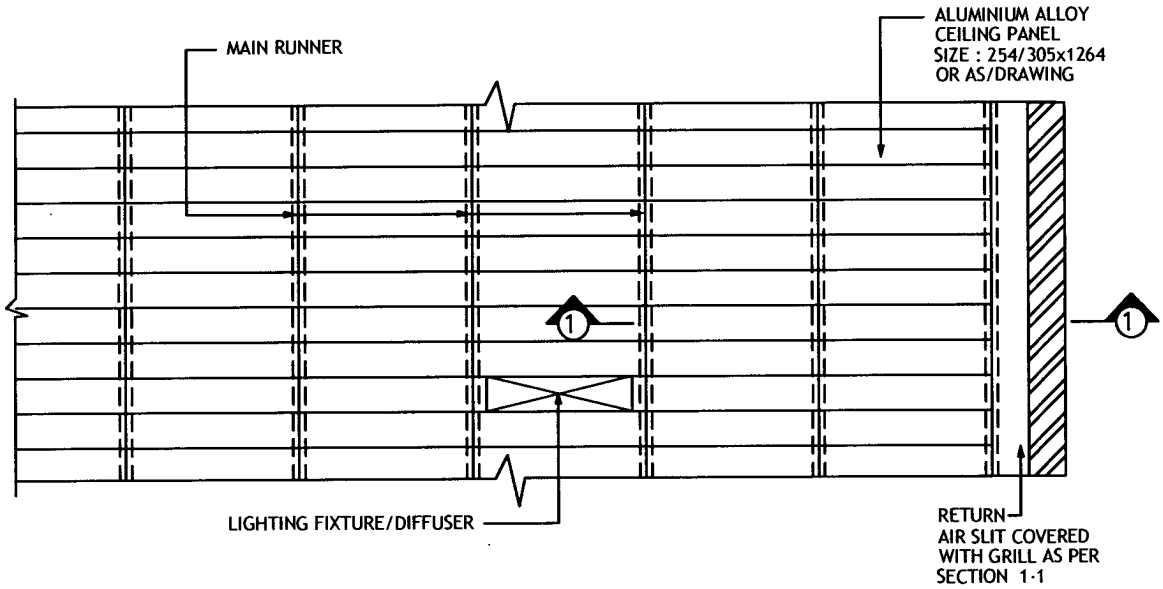


SECTION 1-1

(HANGING/SUSPENSION ARRANGEMENT CAN VARY FROM VENDOR TO VENDOR)



REFLECTED CEILING PLAN (PART) (LINEAR PANEL)

(ELECTRICAL, A/C FIXTURE LOCATIONS SHALL BE AS PER DETAIL DRAWING)
NOTE: ALL DIMENSIONS ARE IN MILLIMETRES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	02.03.16	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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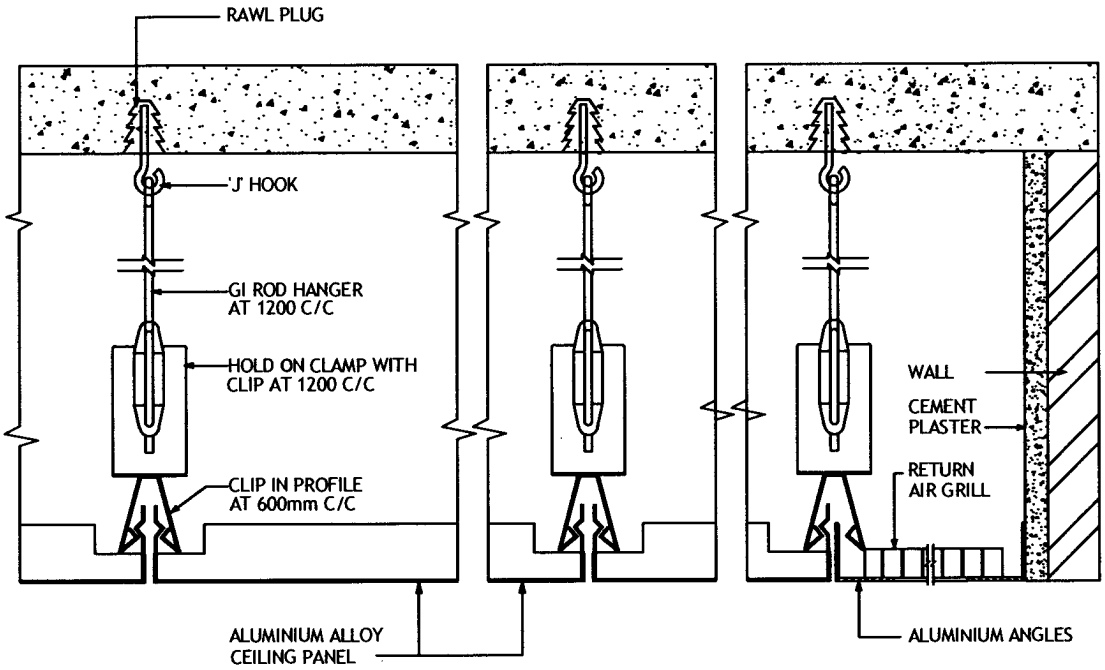
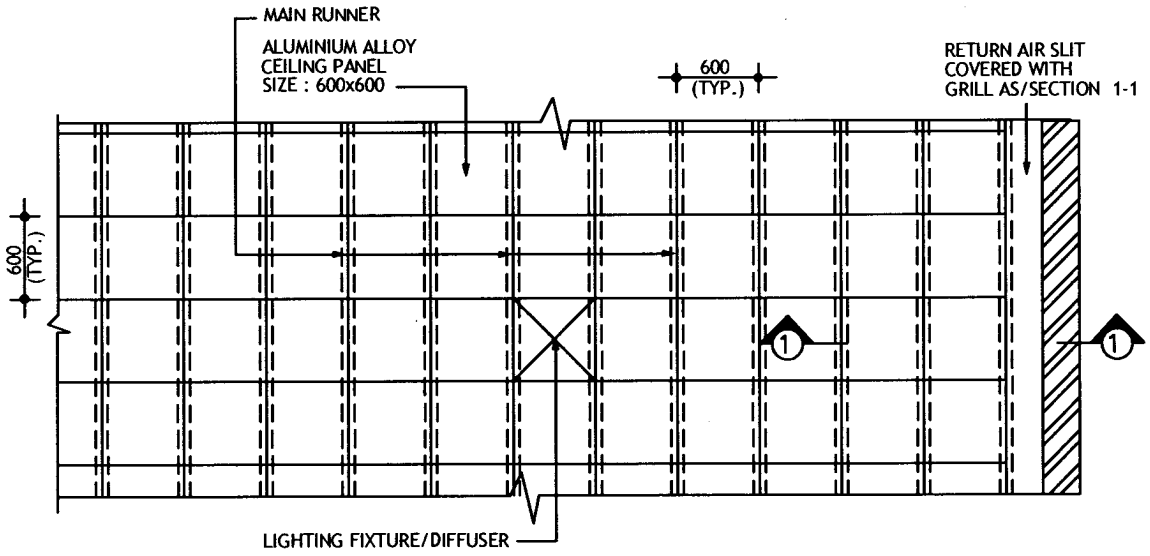


SECTION 1-1

(HANGING/SUSPENSION ARRANGEMENT CAN VARY FROM VENDOR TO VENDOR)



REFLECTED CEILING PLAN (PART) (600mm X 600mm PANELS)

(ELECTRICAL, A/C FIXTURE LOCATIONS SHALL BE AS PER DETAIL DRAWING)

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	02.03.16	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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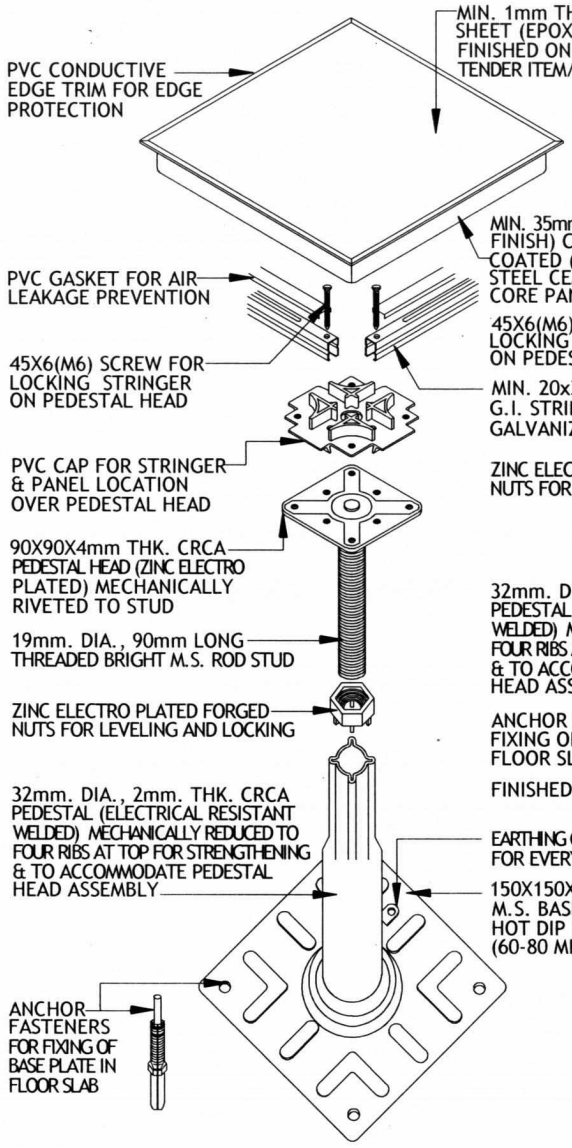
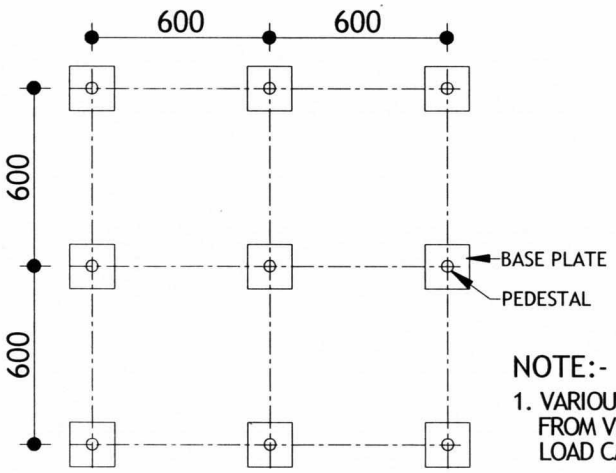
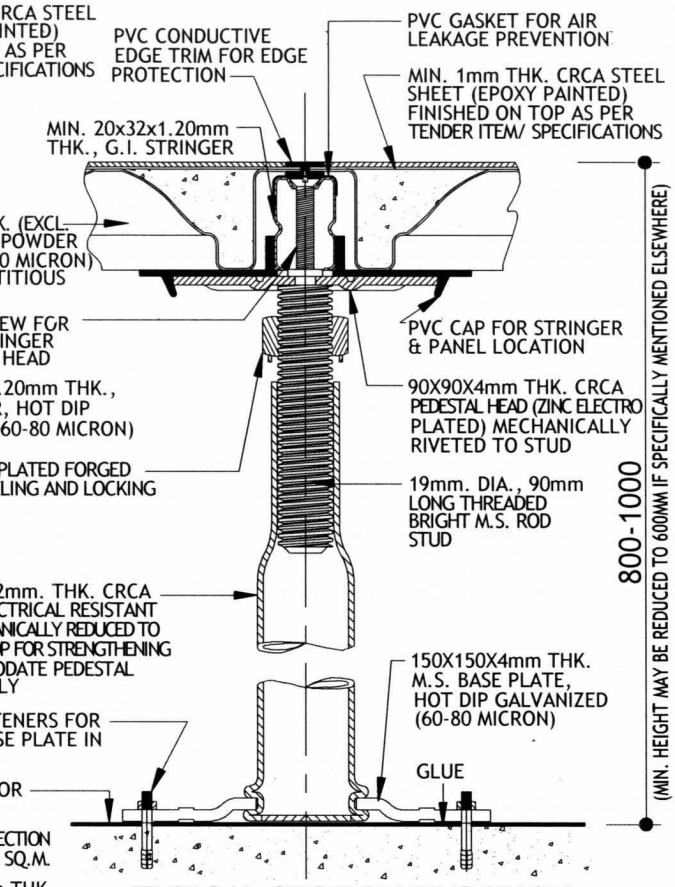


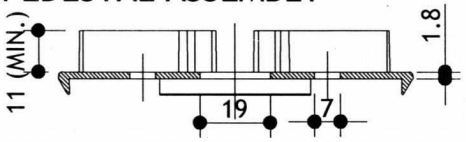
ISOMETRIC VIEW OF PEDESTAL ASSEMBLY



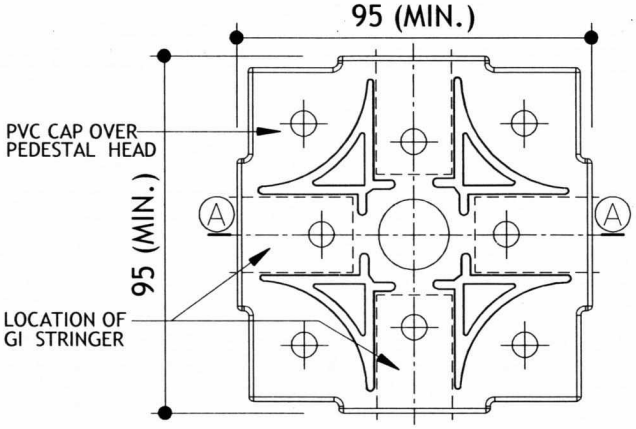
PART GRID PLAN (PEDESTALS)



TYPICAL SECTION THROUGH PEDESTAL ASSEMBLY



SECTION A-A



TOP VIEW OF CAP FOR PEDESTAL HEAD

NOTE:-

1. VARIOUS COMPONENTS' DIMENSIONS, SHAPES ETC. MAY VARY SLIGHTLY FROM VENDOR TO VENDOR. HOWEVER THE SYSTEM SHALL HAVE THE LOAD CARRYING CAPACITY AS PER ITEM DESCRIPTION & SPECIFICATIONS.
2. THE BASE FLOOR AND WALL PORTION UNDERNEATH THE FALSE FLOOR SHALL BE PROVIDED ONE COMPONENT POLYURETHANE COATING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
3	22.09.22	REVISED & ISSUED AS STANDARD	BABITA SHARMA	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
2	11.02.22	REAFFIRMED & ISSUED AS STANDARD	ATUL GUPTA	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR

Approved by

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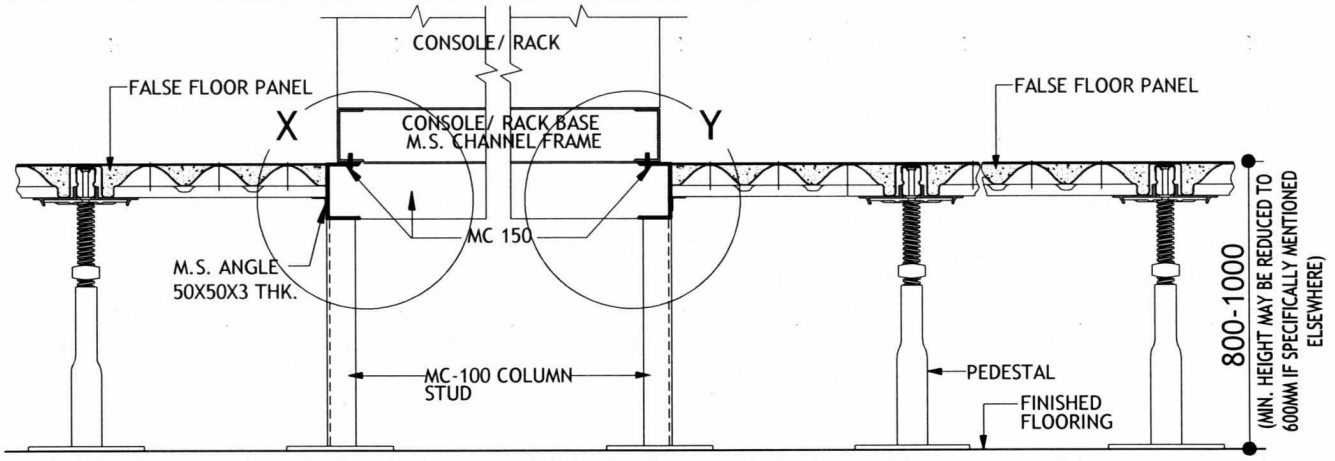
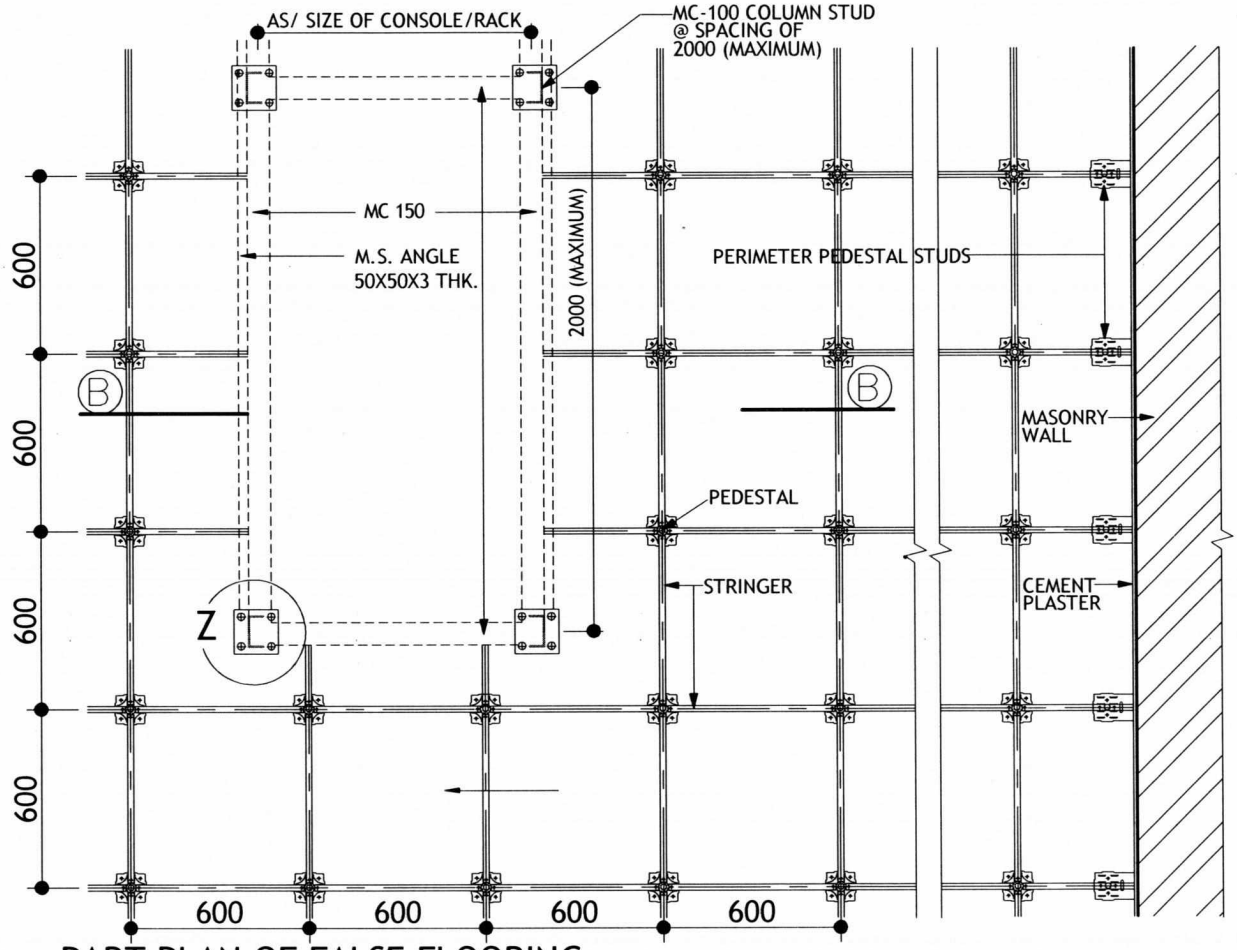
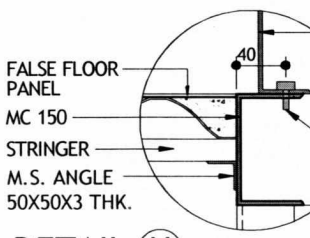


SECTION B-B

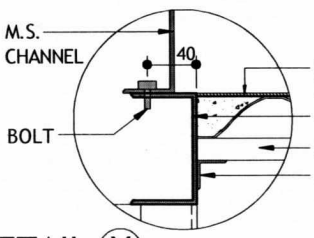
AS/ SIZE OF CONSOLE/ RACK



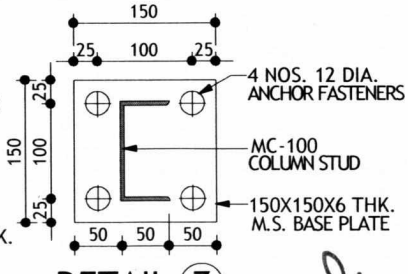
PART PLAN OF FALSE FLOORING



DETAIL (X)



DETAIL (Y)



DETAIL (Z)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
3	22.09.22	REVISED & ISSUED AS STANDARD	BABITA SHARMA	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
2	11.02.22	REAFFIRMED & ISSUED AS STANDARD	BABITA SHARMA	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR

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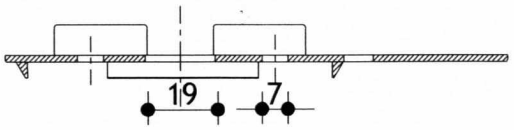
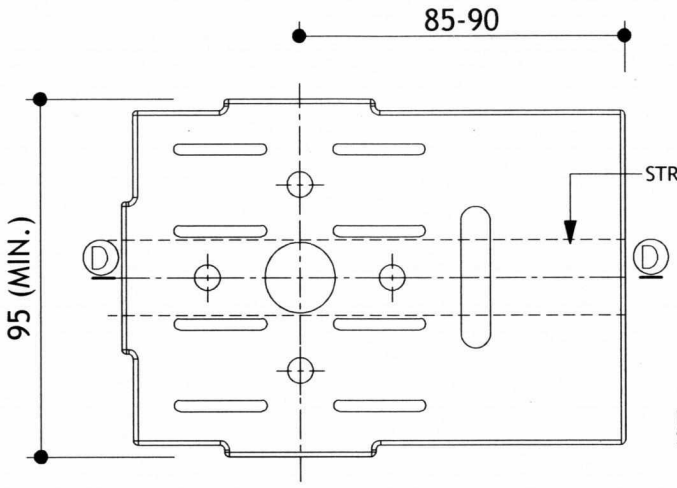
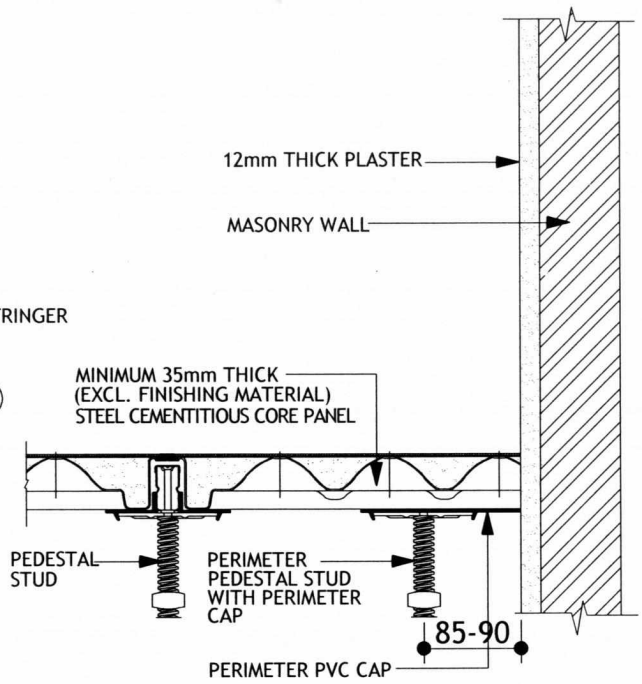


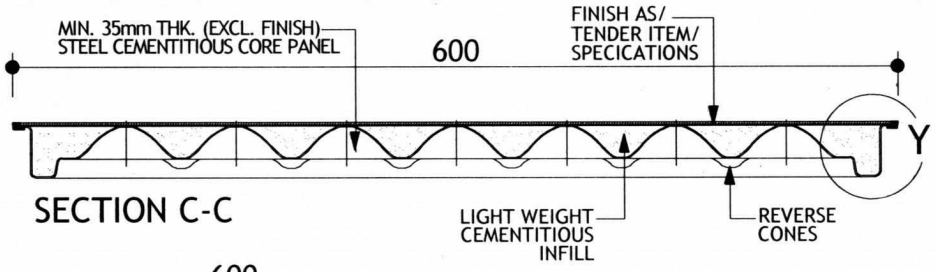
SECTION D-D



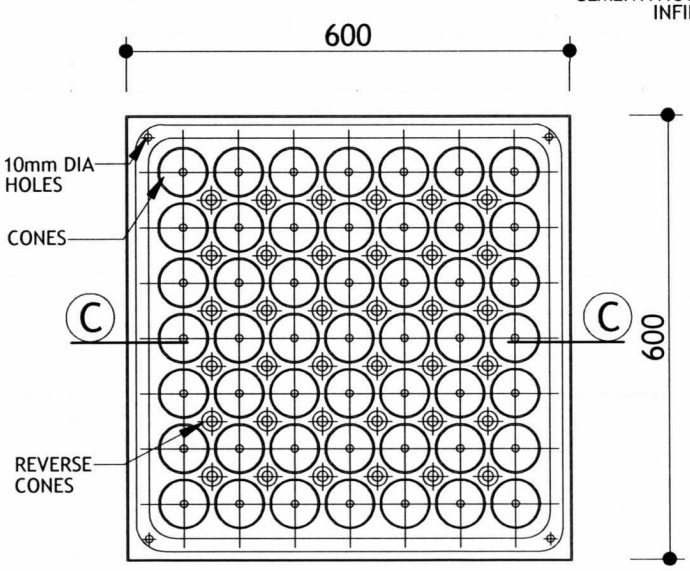
TOP VIEW OF PERIMETER PVC CAP



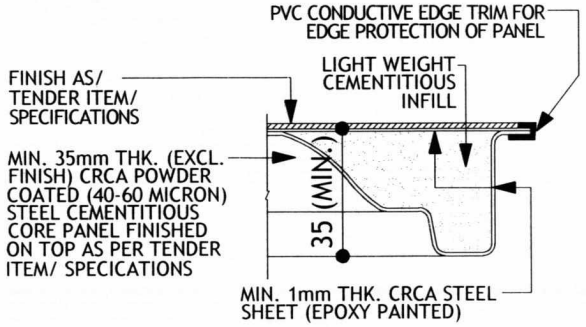
DETAIL OF JUNCTION WITH WALL



SECTION C-C



PLAN OF FALSE FLOOR PANEL
(UPSIDE DOWN)



DETAIL (Y)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
3	22.09.22	REVISED & ISSUED AS STANDARD	BABITA SHARMA	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
2	11.02.22	REAFFIRMED & ISSUED AS STANDARD	ATUL GUPTA	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR

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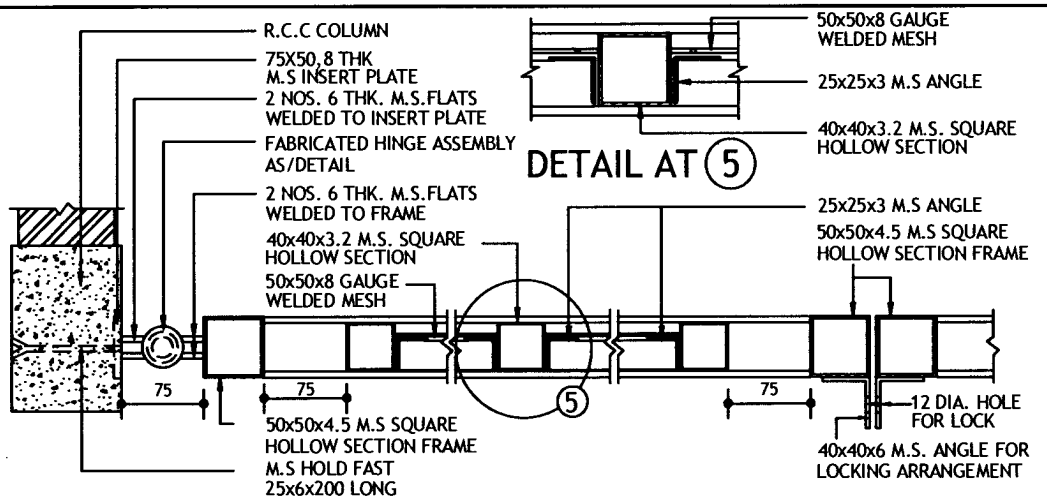
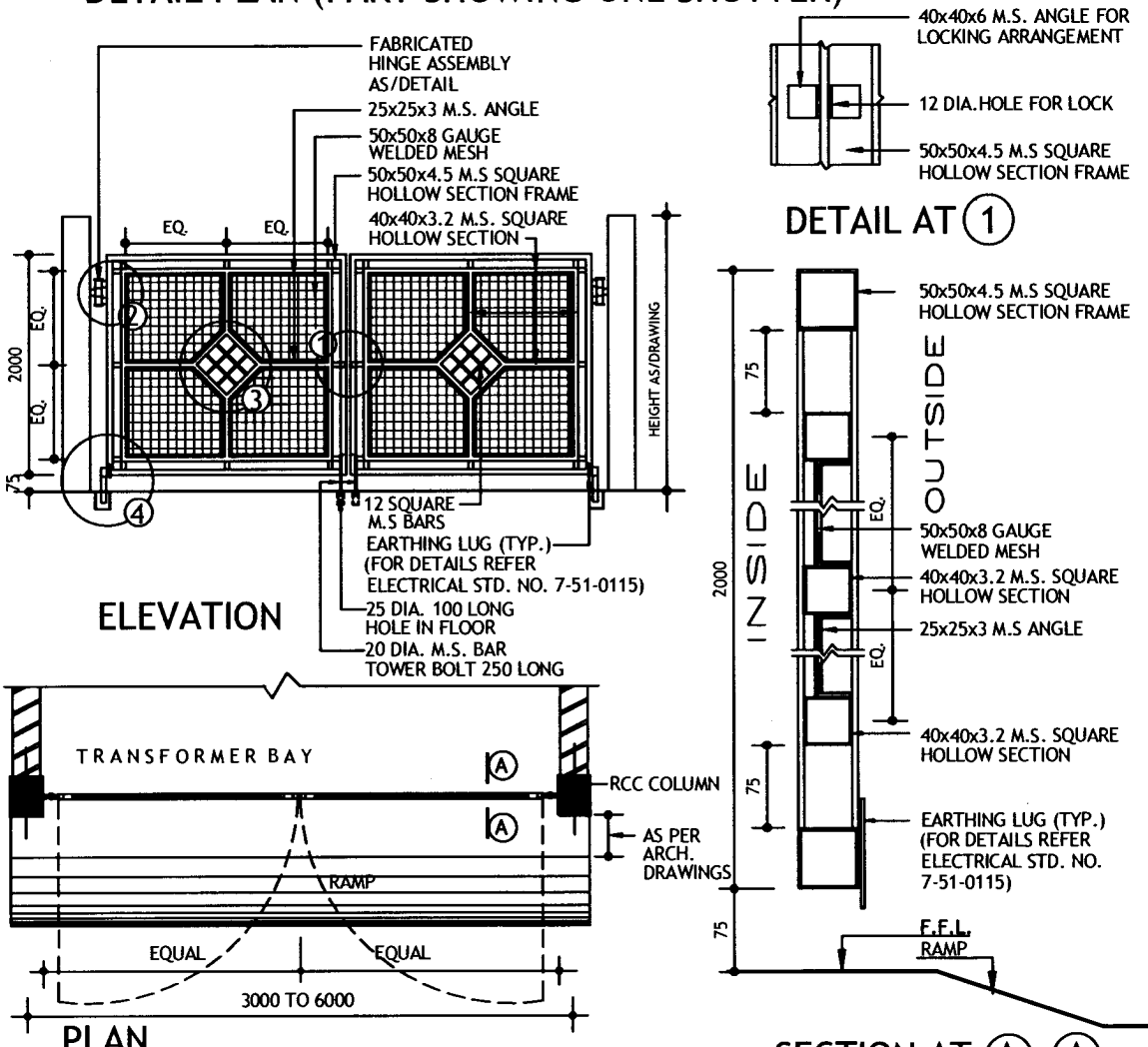


DETAIL PLAN (PART SHOWING ONE SHUTTER)



NOTE:
ALL STEEL MEMBERS SHALL CONFORM TO RELEVANT B.I.S. CODES AS APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	14.12.15	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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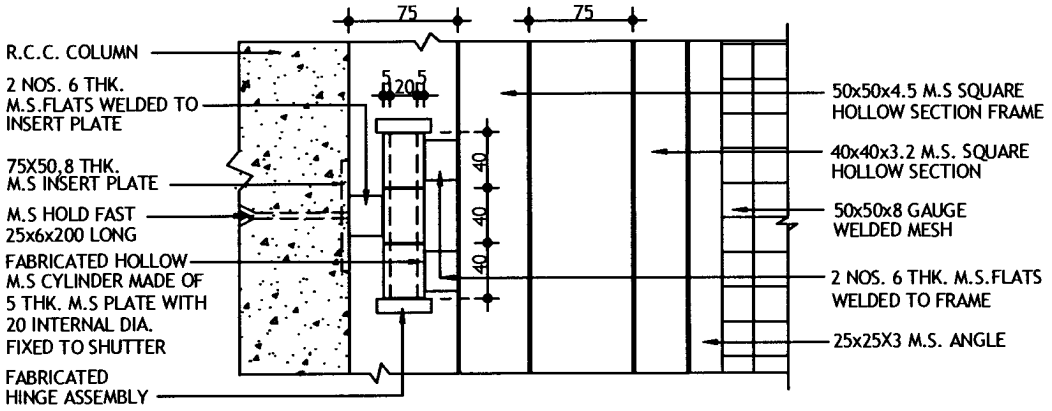
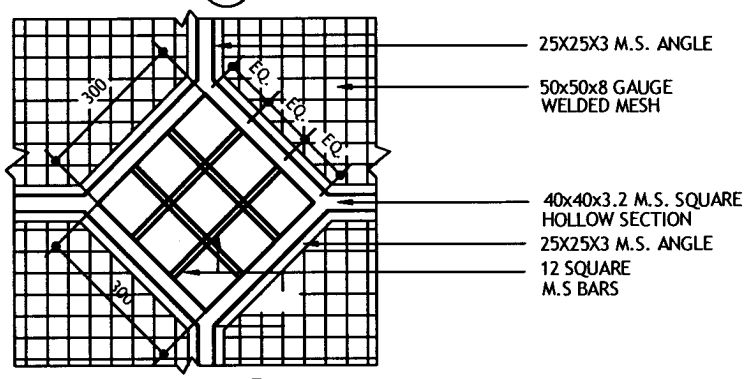
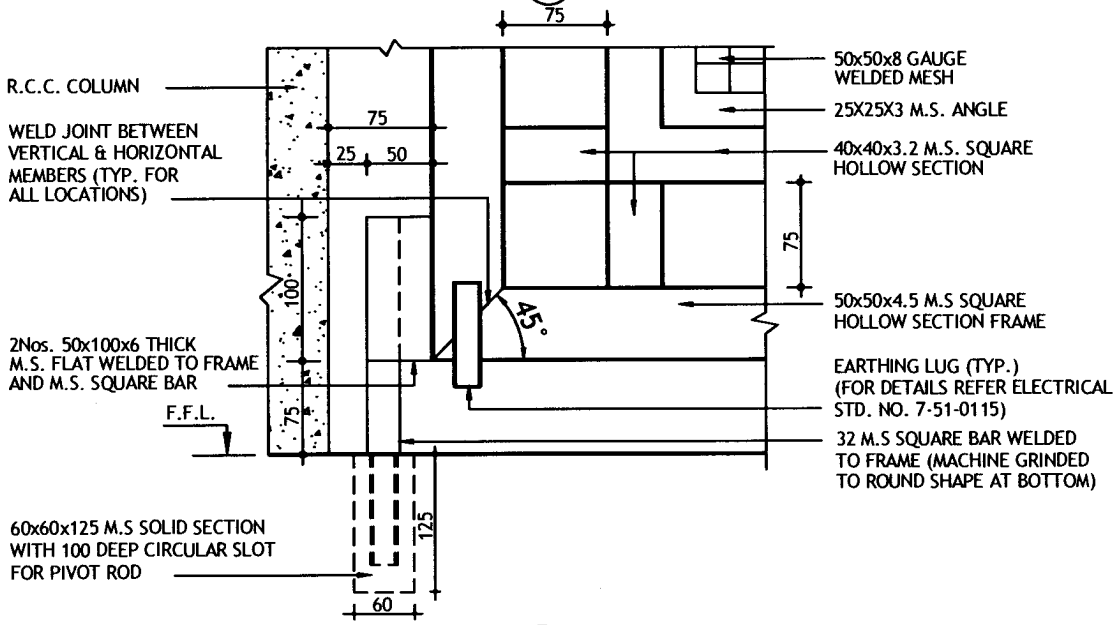


DETAIL AT (2)



DETAIL AT (3)



DETAIL AT (4)

NOTE:
ALL STEEL MEMBERS SHALL CONFORM TO RELEVANT B.I.S. CODES AS APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
5	14.12.15	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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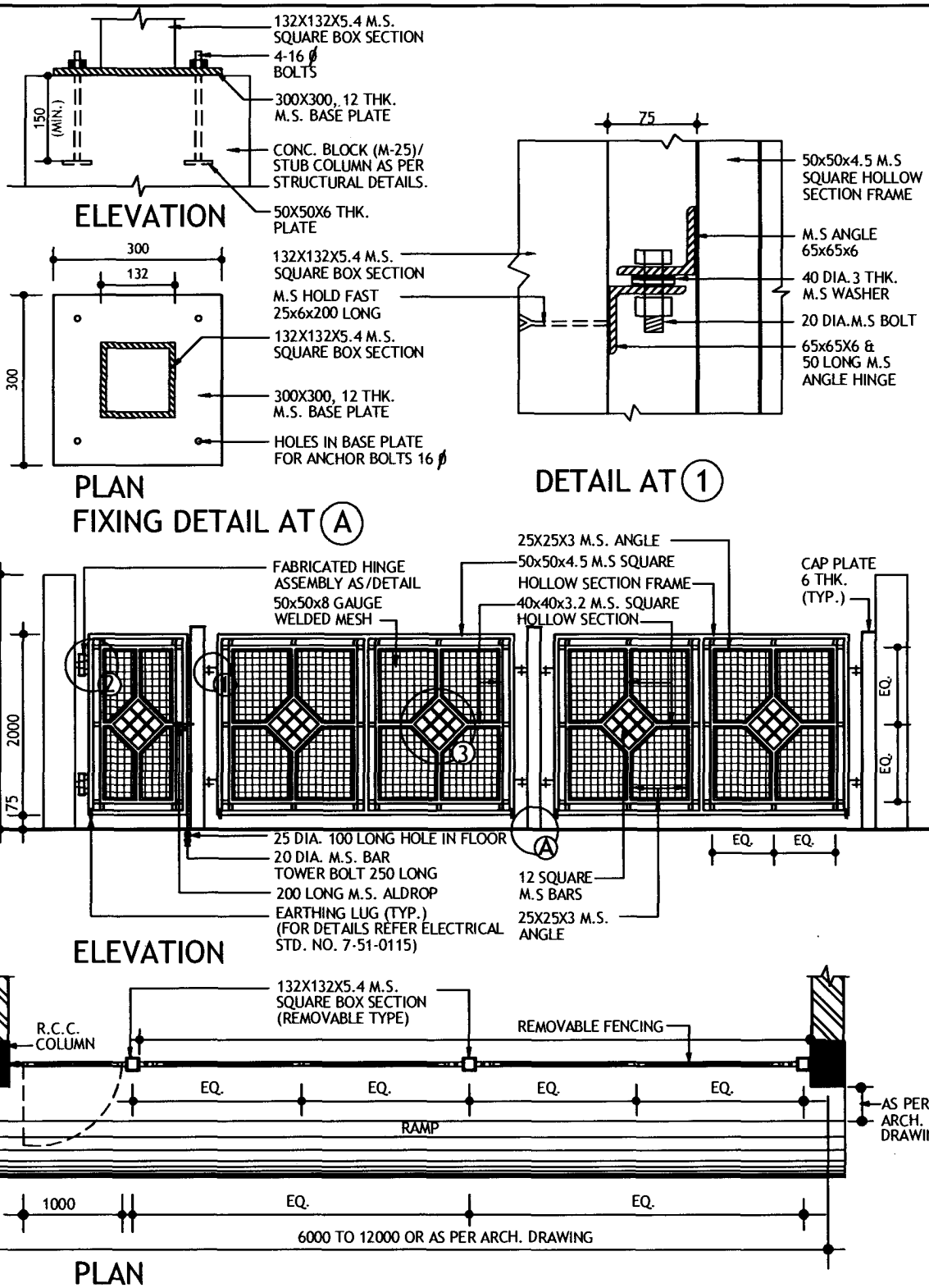

NOTES:

1. FOR DETAILS (2) & (3) REFER STANDARD NO. 7-75-0051
2. ALL STEEL MEMBERS SHALL CONFORM TO RELEVANT B.I.S. CODES AS APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
5	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR
4	14.12.15	REVISED & ISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	S. CHANDA

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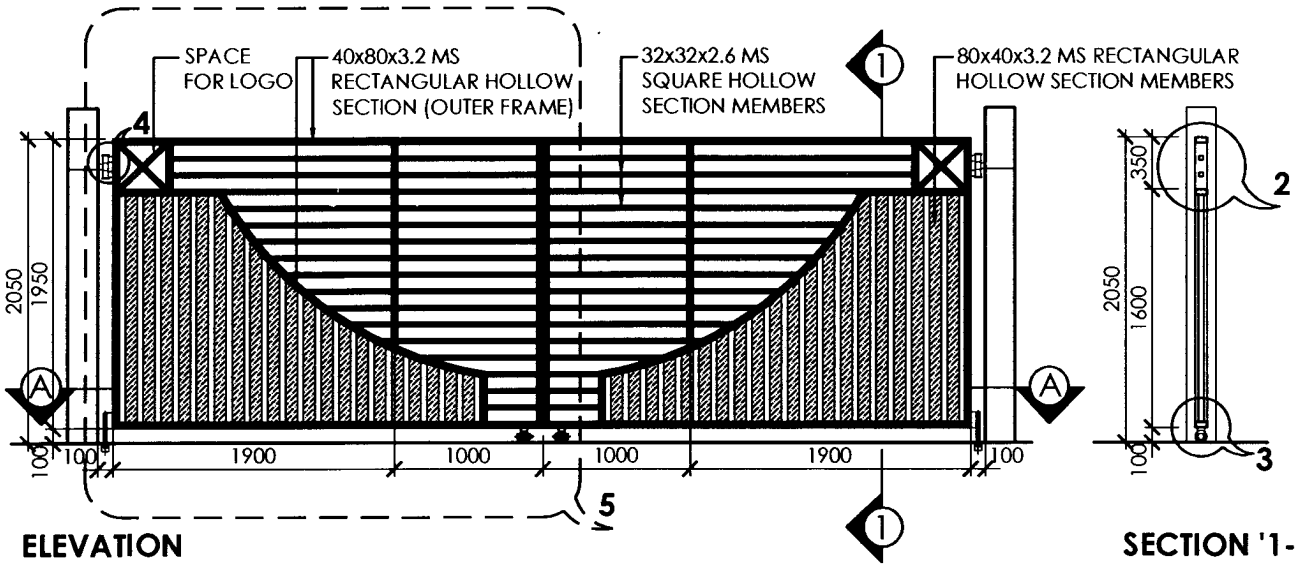
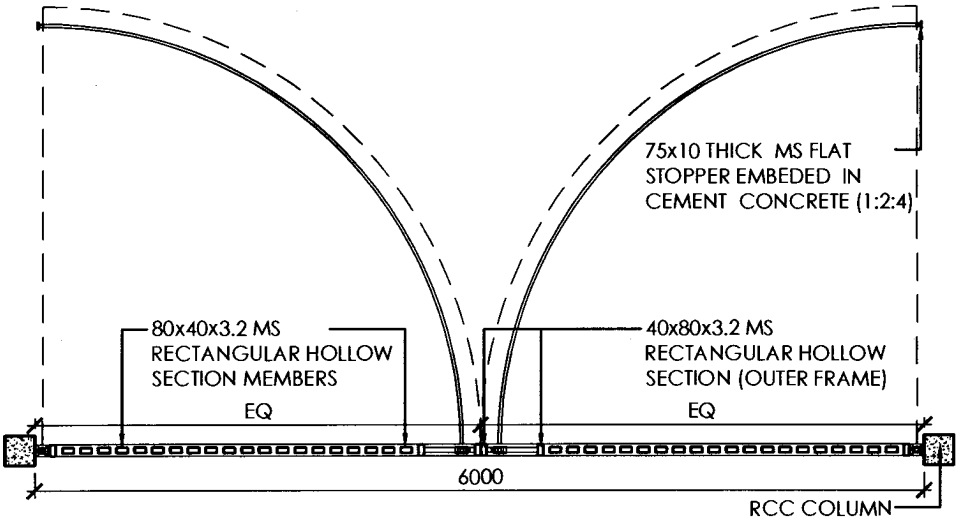
STEEL GATE
(FOR ENTRANCES UPTO 6.0M WIDTH)

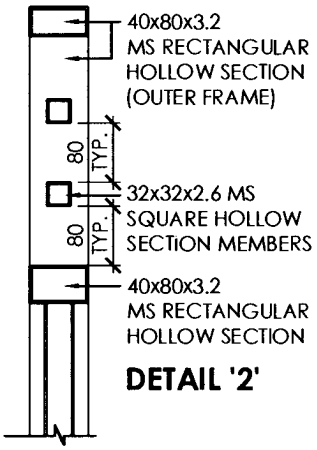


ELEVATION

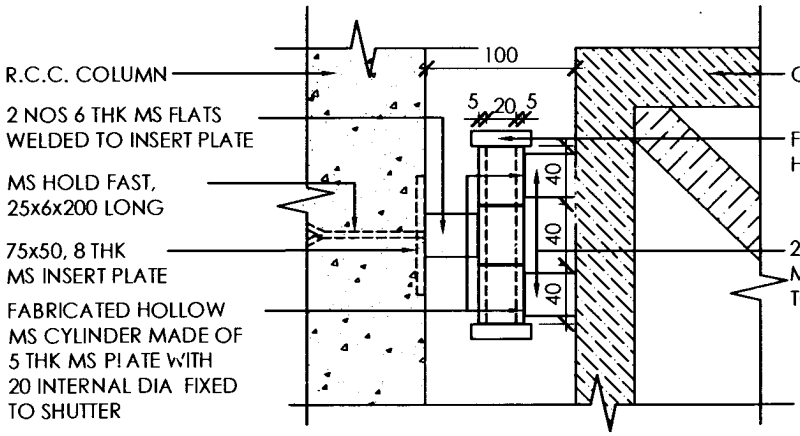
SECTION '1-1'



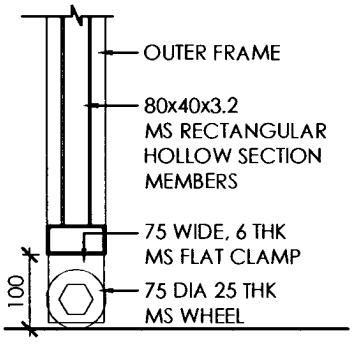
PLAN AT 'A'



DETAIL '2'



DETAIL AT '4'



DETAIL '3'

NOTE:
1. ALL DIMENSIONS ARE IN MM.
2. ALL STEEL MEMBERS SHALL CONFORM TO RELEVANT B.I.S. CODES AS APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SUMEDHA	SAMIR DAS	SANJAY MAZUMDAR
5	20.02.17	UPDATED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

Approved by

Format No. 8-00-0001-F4 Rev 0
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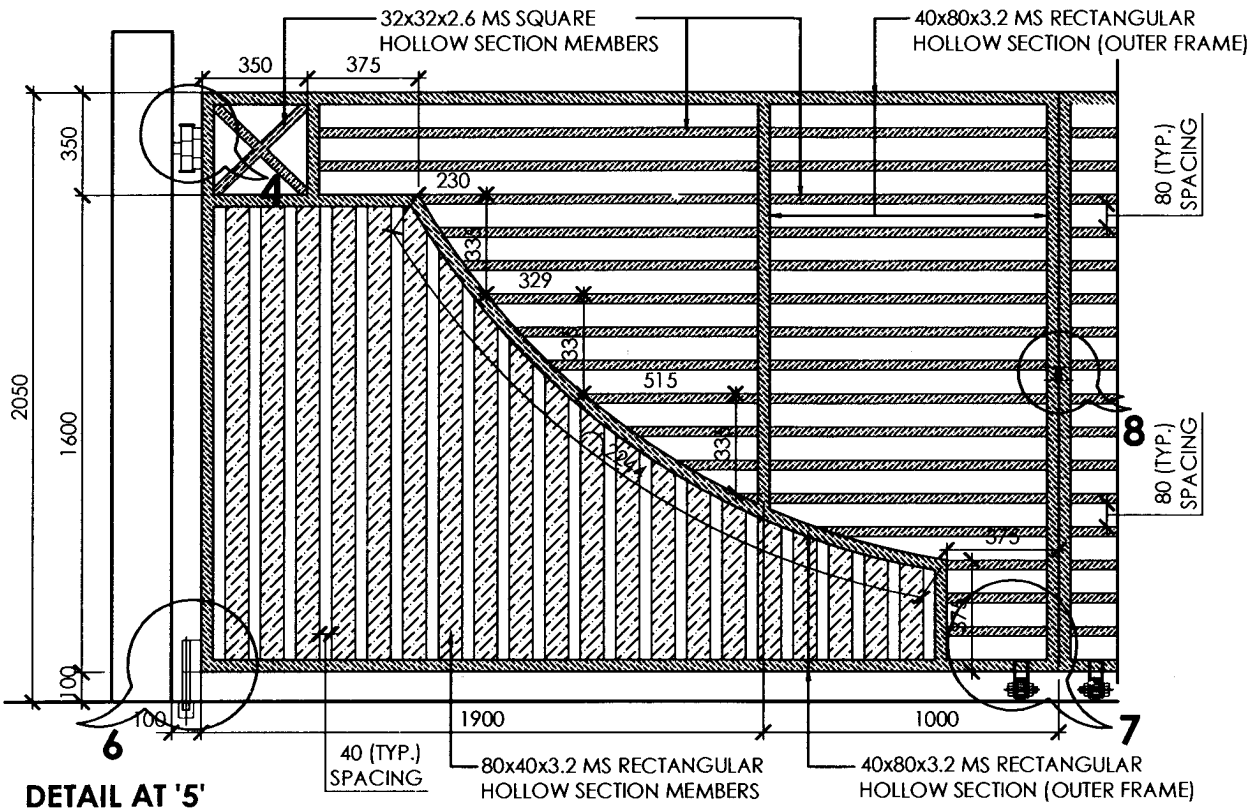
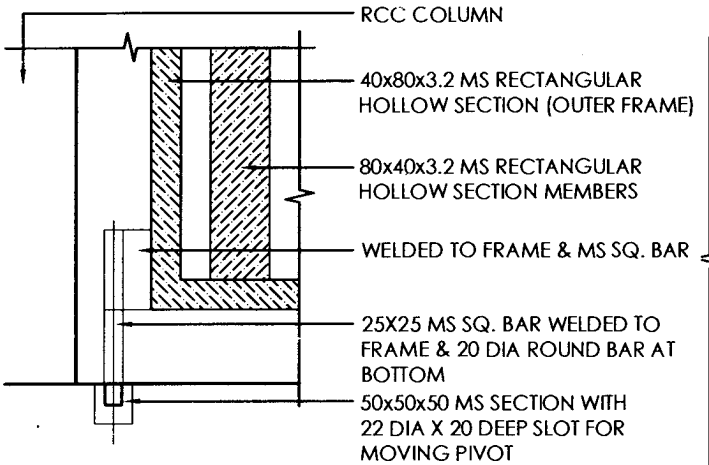
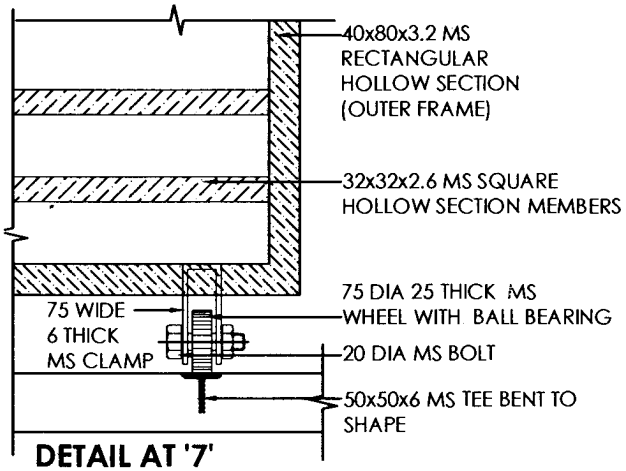


DETAIL AT '5'



DETAIL AT '6'



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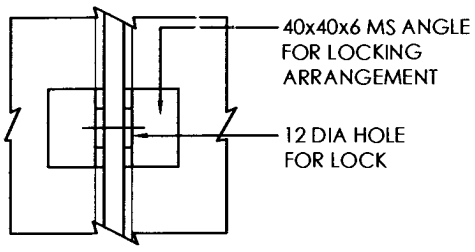

DETAIL AT '8'

NOTE:
1. ALL DIMENSIONS ARE IN MM.
2. ALL STEEL MEMBERS SHALL CONFORM TO RELEVANT B.I.S. CODES AS APPLICABLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SUMEDHA	SAMIR DAS	SANJAY MAZUMDAR
5	20.02.17	UPDATED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

Approved by

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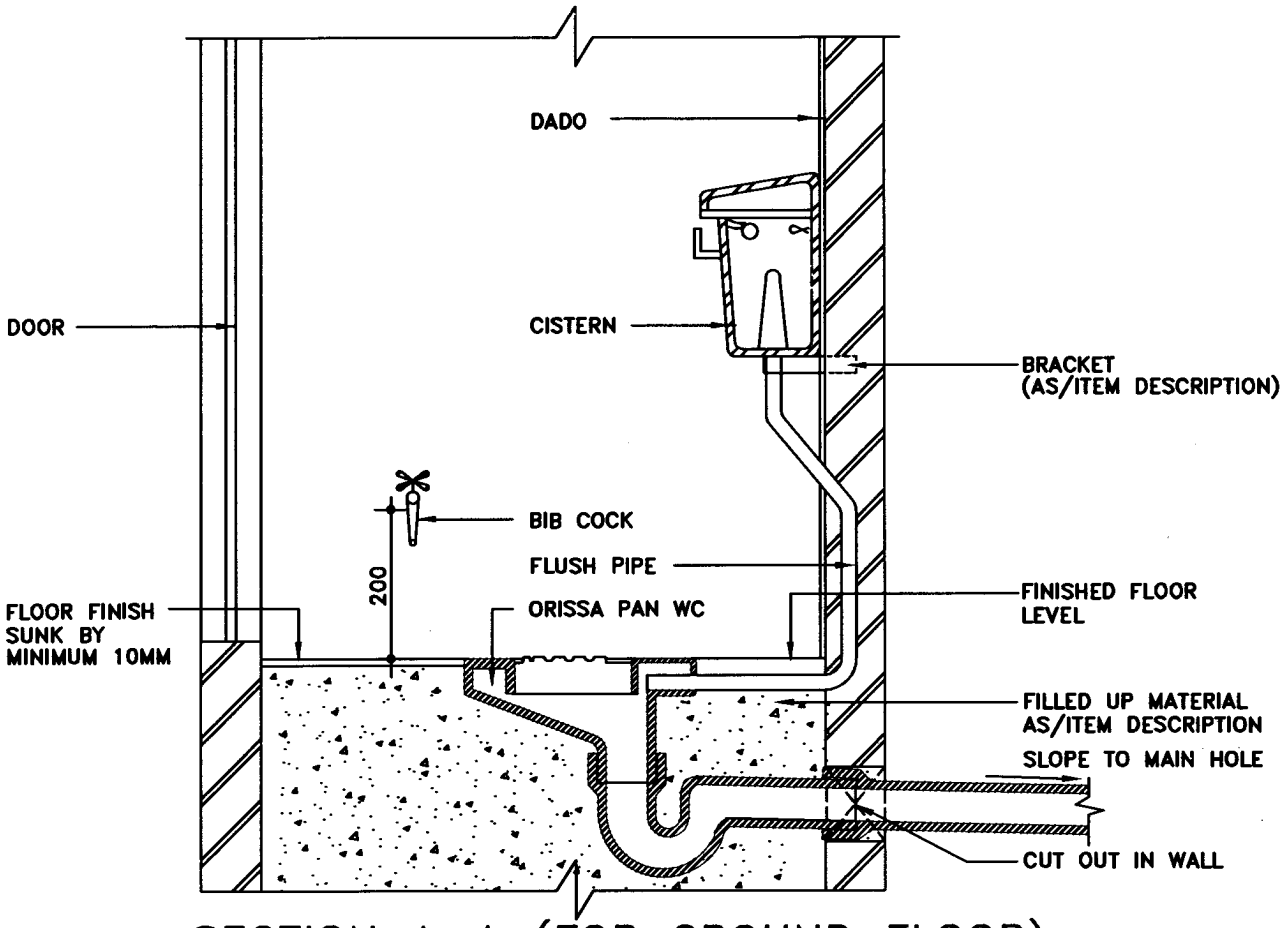
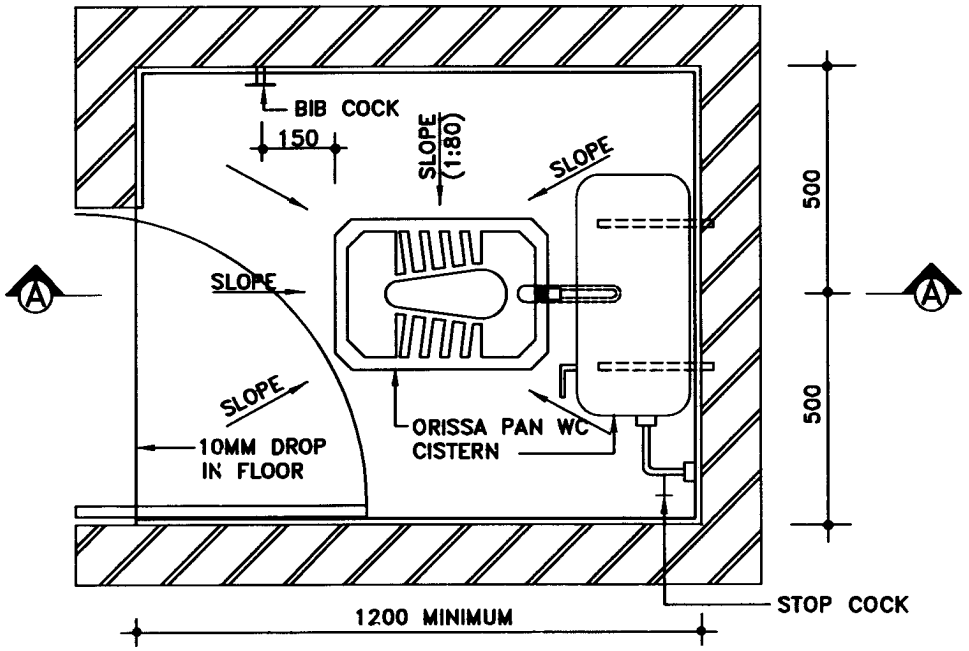


SECTION A–A (FOR GROUND FLOOR)

(REFER SHEET 2 OF 2 FOR SECTION A–A APPLICABLE TO UPPER FLOORS WITH SUNK SLAB)



PLAN

NOTE: REFER SHEET 2 OF 2.

Rev. No.	Date	Description	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REVISED & REISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

Approved by

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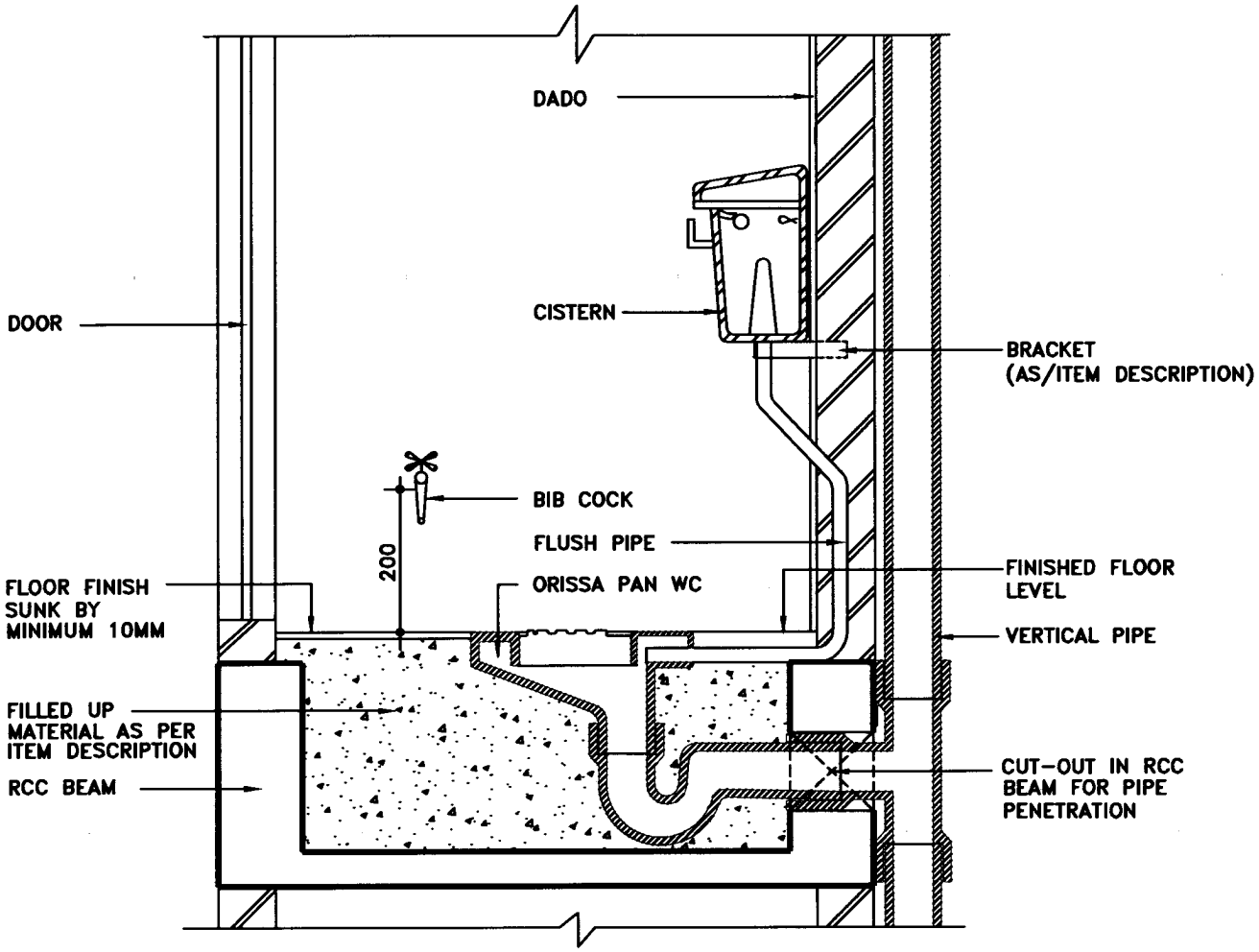

SECTION A–A
(FOR UPPER FLOOR WITH SUNK SLAB)

(REFER SHEET 1 OF 2 FOR SECTION A–A APPLICABLE TO GROUND FLOOR)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL FLOOR FINISH LEVEL INSIDE THE W.C. CUBICLE SHALL BE 10 TO 15MM LOWER THAN OUTSIDE.
3. PROVISION FOR NECCESSARY CUT–OUT IN THE R.C.C. STRUCTURAL BEAM SHALL BE KEPT (FOR DISPOSAL PIPE PENETRATION). THE LOCATION ANGLE, GRADIENT ETC. OF THE CUT–OUT SHALL BE AS PER SITE REQUIREMENTS.
4. REFER RELEVANT ARCHITECTURAL DRAWINGS FOR ACTUAL SIZE OF THE CUBICLE.

Rev. No.			Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	02.02.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REVISED & REISSUED AS STANDARD	DK	SD/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

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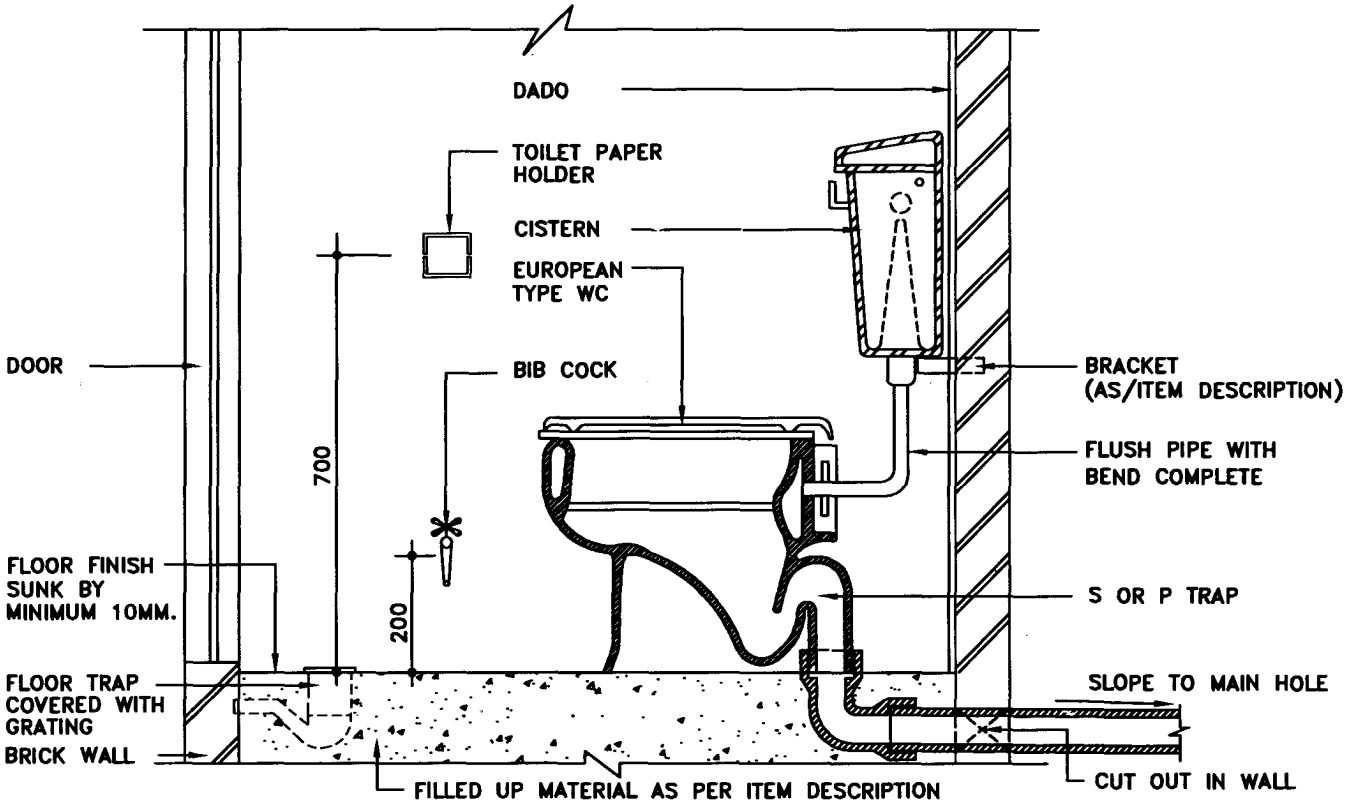
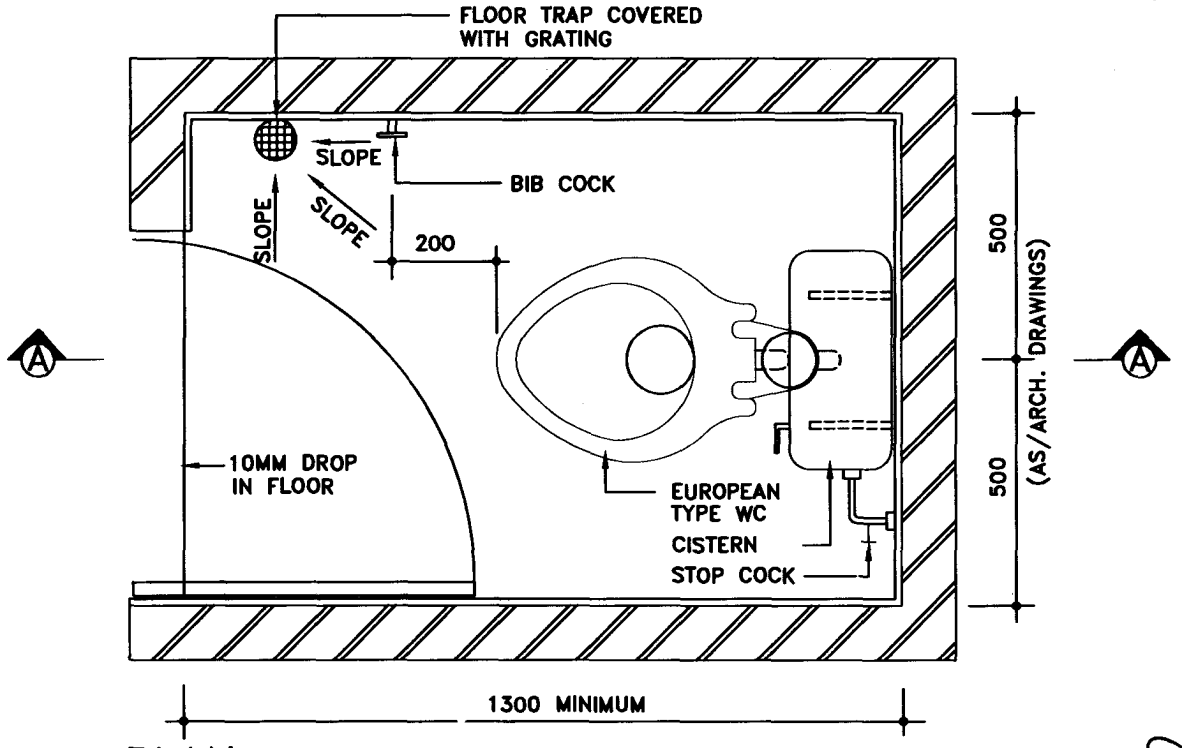


SECTION A–A (FOR GROUND FLOOR)

(REFER SHEET 2 OF 2 FOR SECTION A–A APPLICABLE TO UPPER FLOORS WITH SUNK SLAB)



PLAN

NOTE: REFER SHEET 2 OF 2.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REVISED & REISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

Approved by

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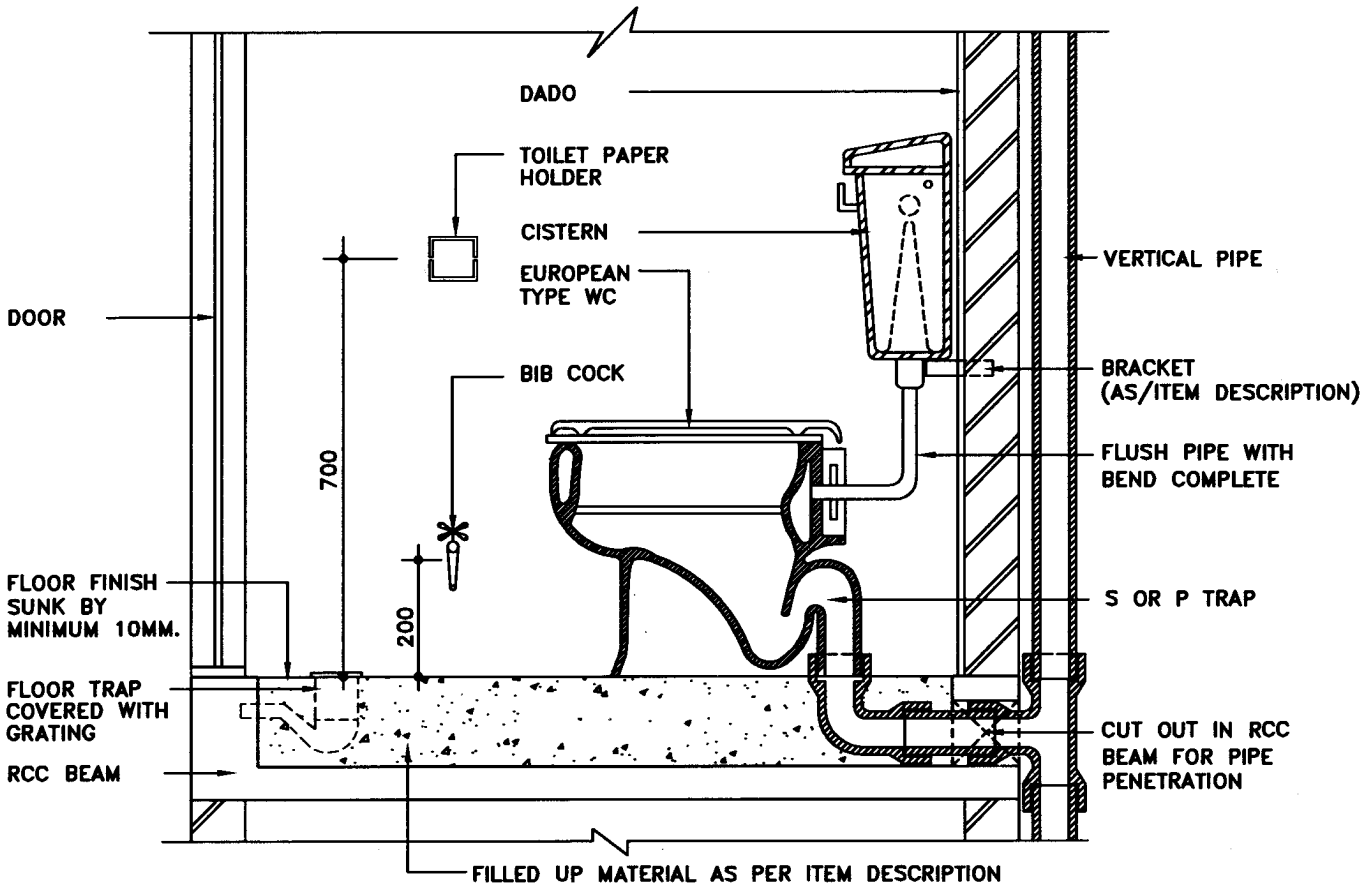

SECTION A–A
(FOR UPPER FLOOR WITH SUNK SLAB)

(REFER SHEET 1 OF 2 FOR SECTION A–A APPLICABLE TO GROUND FLOOR)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL FLOOR FINISH LEVEL INSIDE THE W.C. CUBICLE SHALL BE 10 TO 15MM LOWER THAN OUTSIDE.
3. PROVISION FOR NECCESSARY CUT–OUT IN THE R.C.C. STRUCTURAL BEAM SHALL BE KEPT (FOR DISPOSAL PIPE PENETRATION). THE LOCATION ANGLE, GRADIENT ETC. OF THE CUT–OUT SHALL BE AS PER SITE REQUIREMENTS.
4. REFER RELEVANT ARCHITECTURAL DRAWINGS FOR ACTUAL SIZE OF THE CUBICLE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	18.01.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	07.11.16	REVISED & REISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

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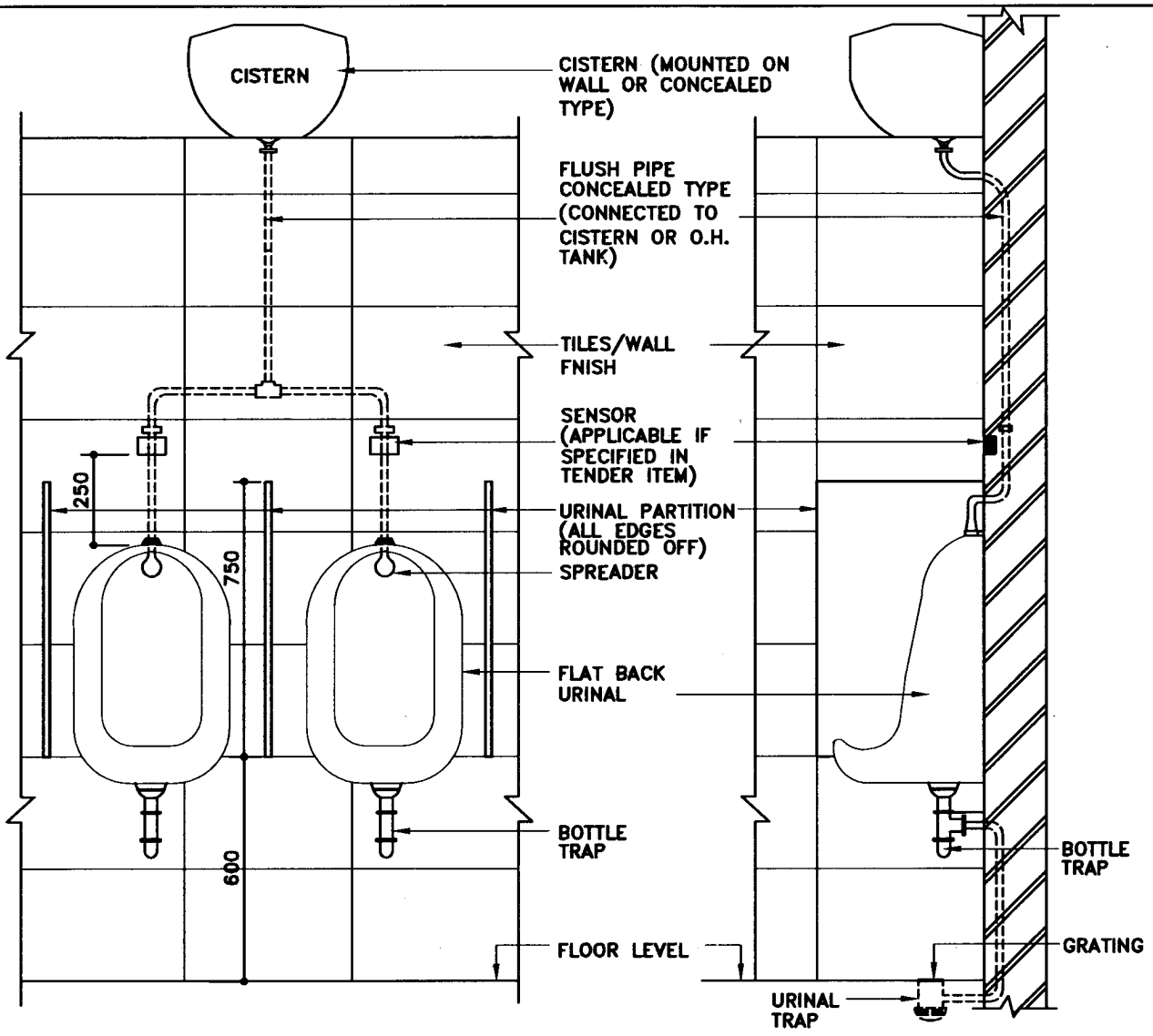
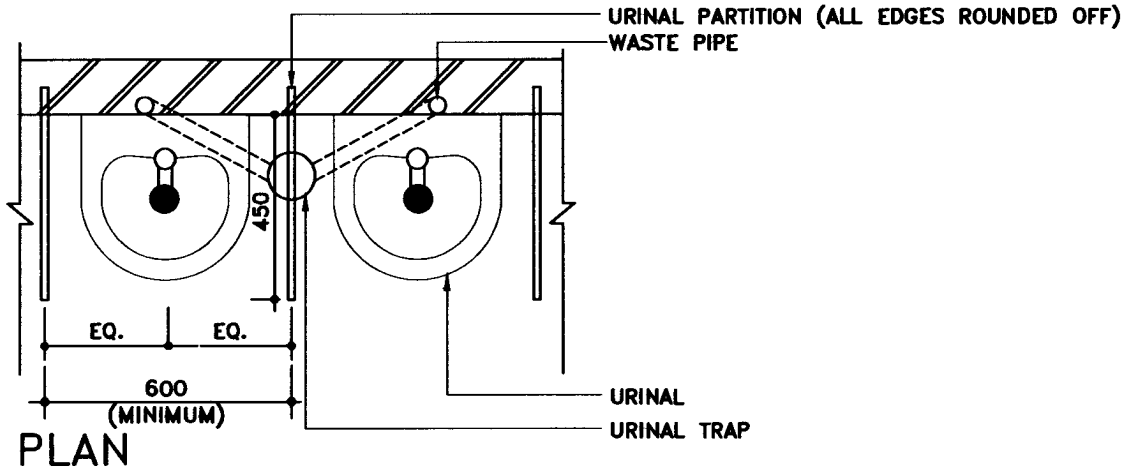
URINALS FIXING DETAIL



ELEVATION

SIDE ELEVATION



PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THIS STANDARD IS INDICATIVE. TYPE AND NO. OF URINAL FIXTURES, FLUSHING ARRANGENT ETC. SHALL BE AS PER ARCHITECTURAL DRAWINGS & TENDER ITEM.
3. SENSORS SHOWN SHALL BE PROVIDED ONLY IN CASE THE SAME ARE SPECIFIED IN TENDER ITEM.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	02.02.22	REVISED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	01.12.16	REVISED & REISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

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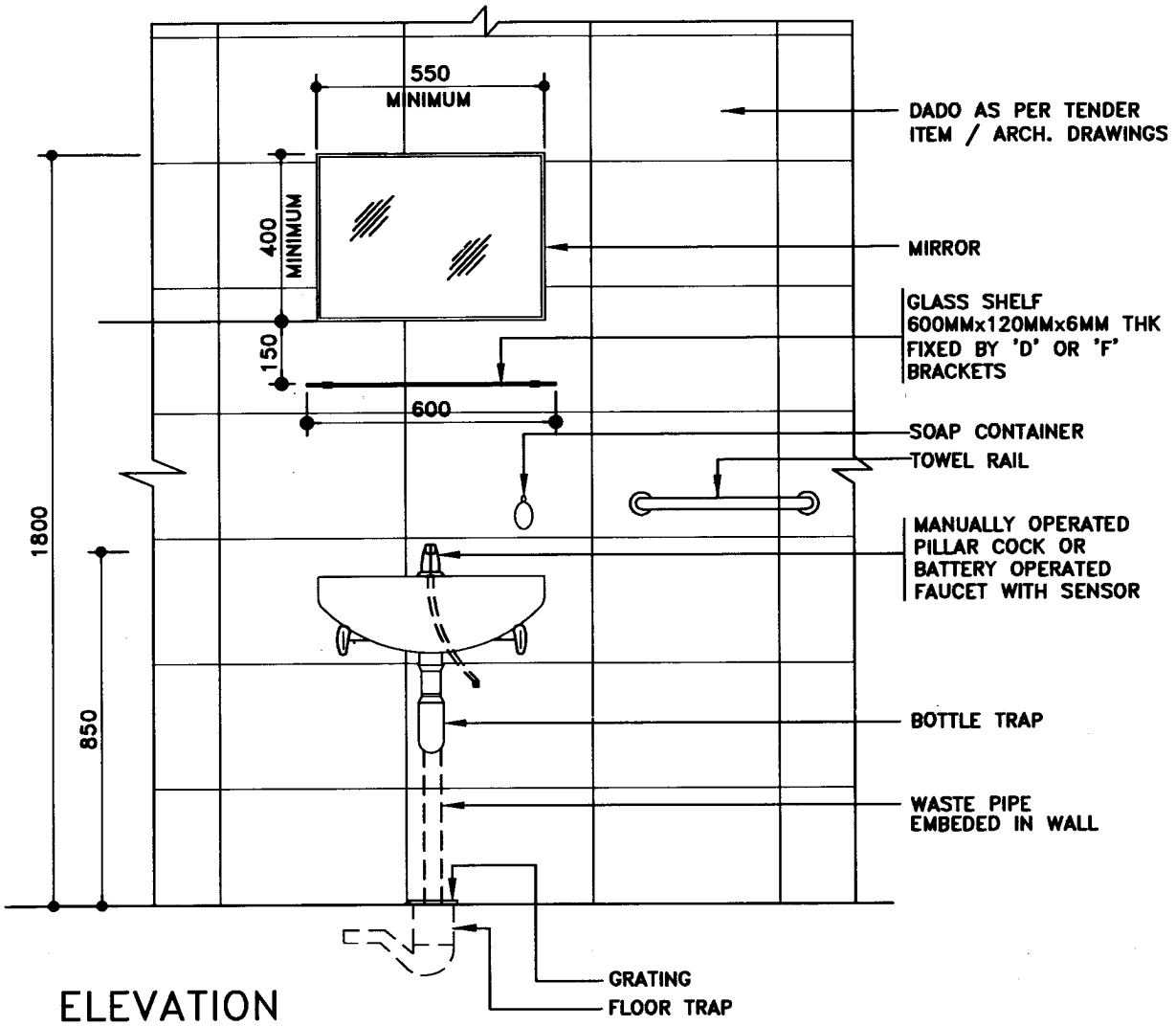
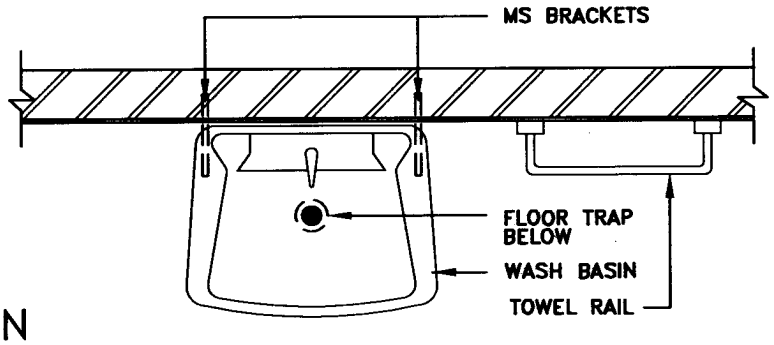
WASH BASIN FIXING DETAIL



ELEVATION



PLAN
(FOR WALL HUNG TYPE WASH BASIN)

NOTES:-

1. ALL DIMENSIONS IN MILLIMETRES.
2. THE SIZE OF MIRROR SHOWN IS INDICATIVE. ACTUAL SIZE SHALL BE AS PER ARCHITECTURAL DRAWINGS/ ITEMS DESCRIPTION.
3. THE ARRANGEMENT AND DETAIL OF WASH BASIN SHOWN (HERE AND IN SHEET-2) IS TYPICAL. FOR 2 OR MORE WASH BASIN, REFER RELEVANT ARCHITECTURAL DRAWING (FOR LOCATION & CONFIGURATION) WHICH SHALL BE READ IN CONJUNCTION WITH THIS STANDARD.
4. LOCATION & TOWEL RAIL IS INDICATIVE. REFER RELEVANT ARCHITECTURAL DRAWING FOR EXACT LOCATION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	21.11.16	REVISED & REISSUED AS STANDARD	MLT	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

Approved by

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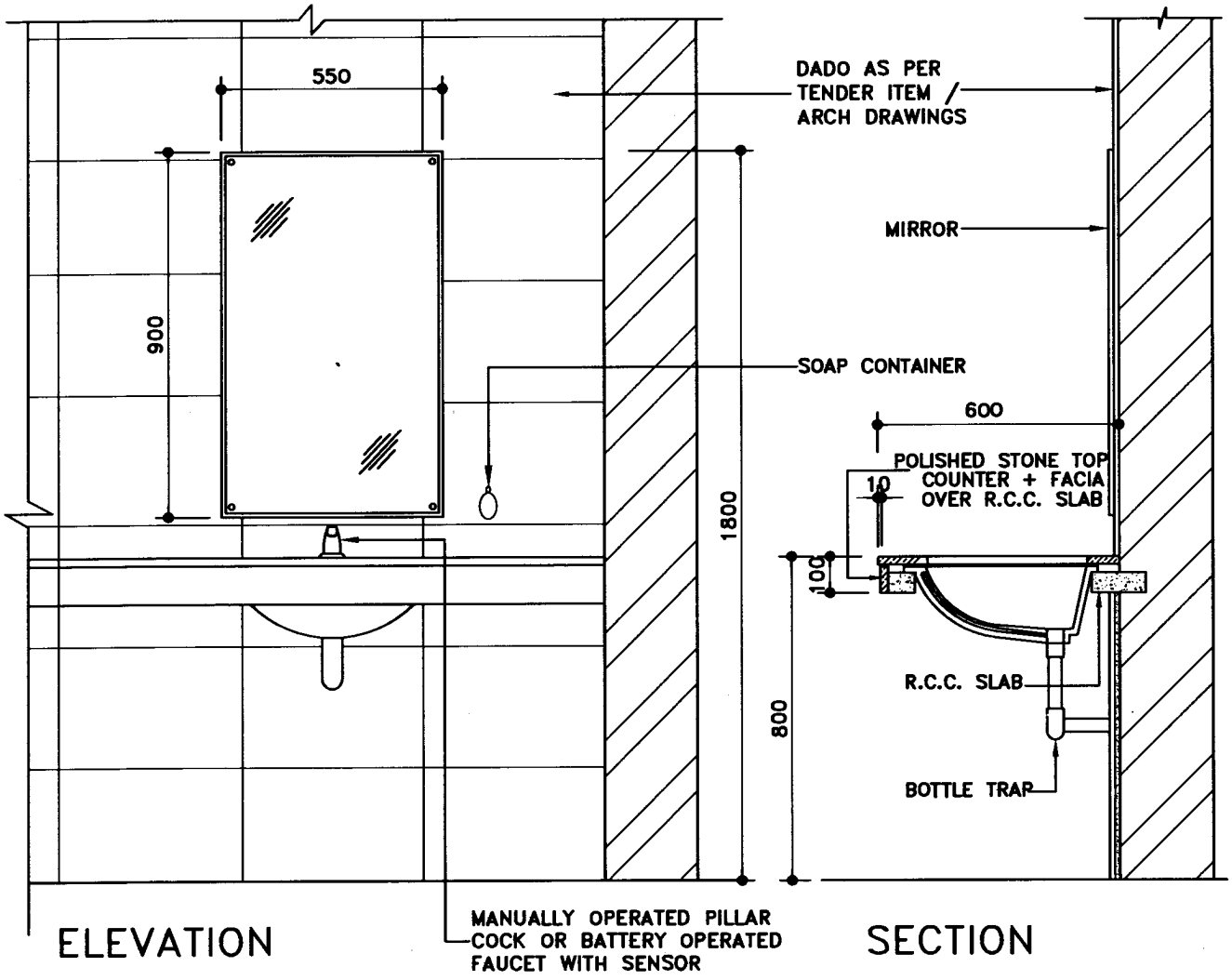
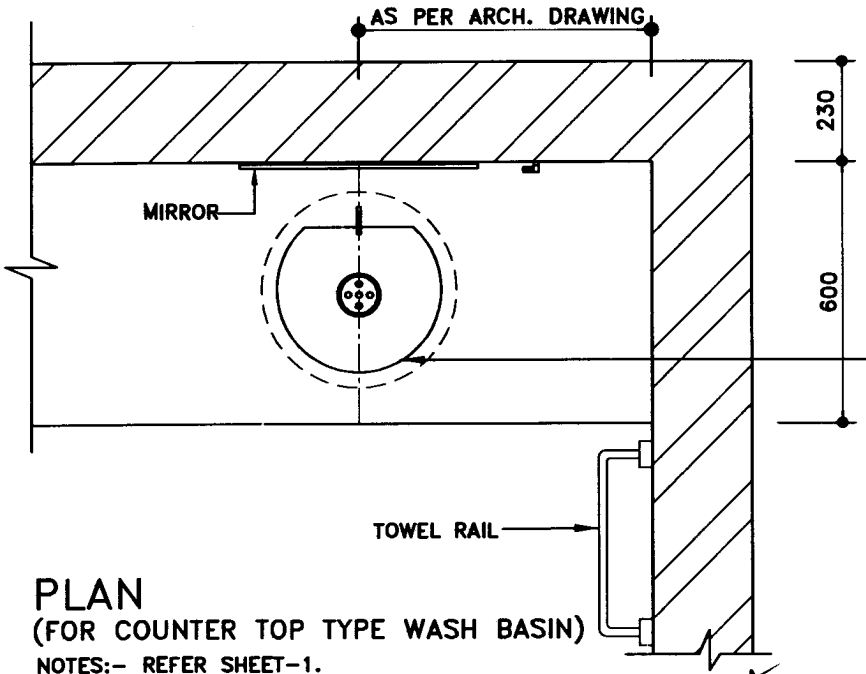
WASH BASIN FIXING DETAIL



ELEVATION

SECTION



ROUND TYPE COUNTER TOP WASH BASIN FITTED NEATLY IN STONE COUNTER TOP AND RCC SLAB UNDERNEATH.
(CUT NEATLY FOR EXACT SIZE AND SHAPE OF WASIN BASIN).

PLAN
(FOR COUNTER TOP TYPE WASH BASIN)

NOTES:- REFER SHEET-1.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & REISSUED AS STANDARD	NAVEEN	AKHILESH	SAMIR DAS	SANJAY MAZUMDAR
5	21.11.16	REVISED & REISSUED AS STANDARD	MLT	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA
4	09.11.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

Approved by

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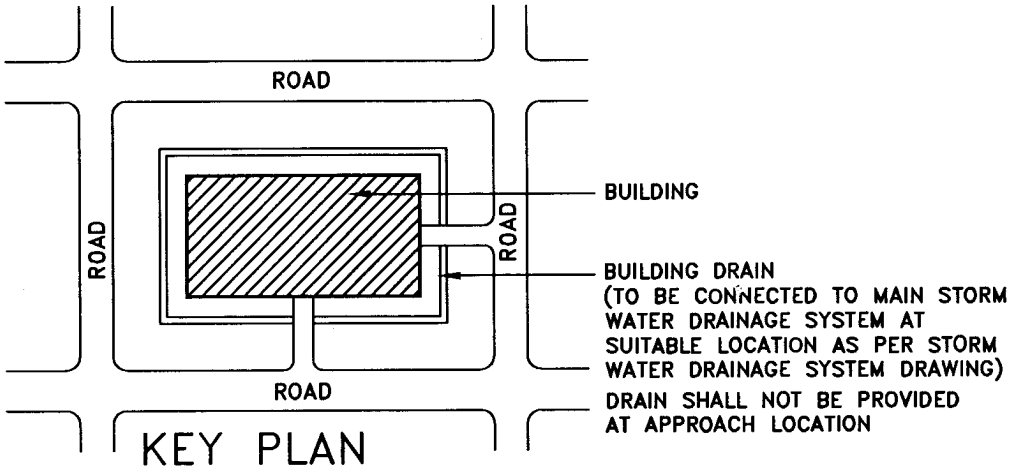
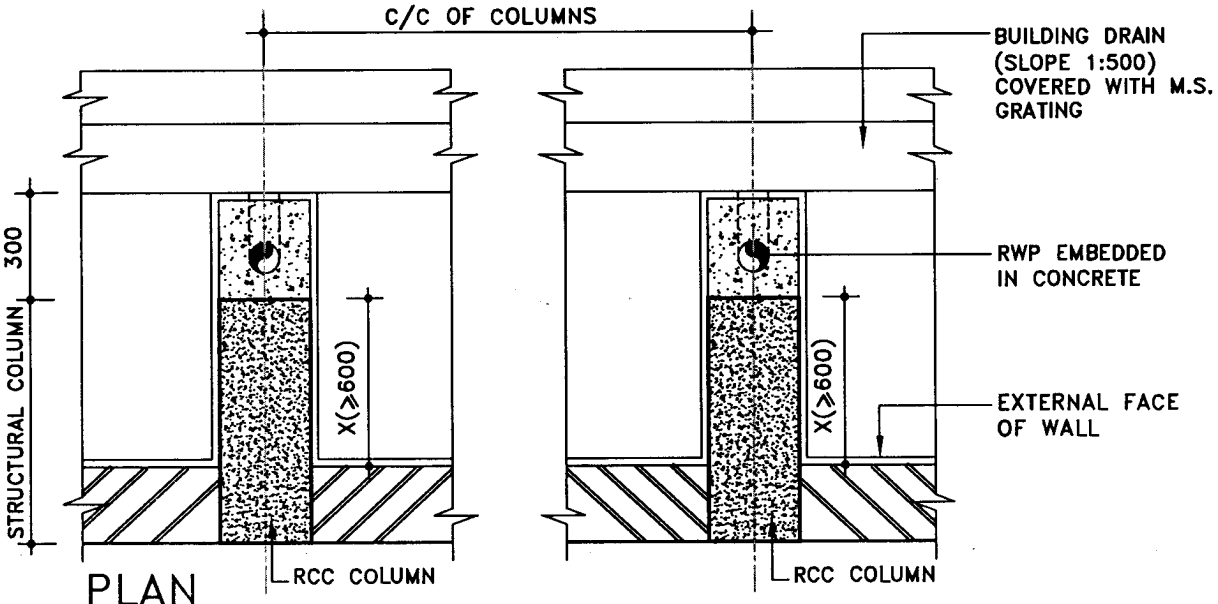
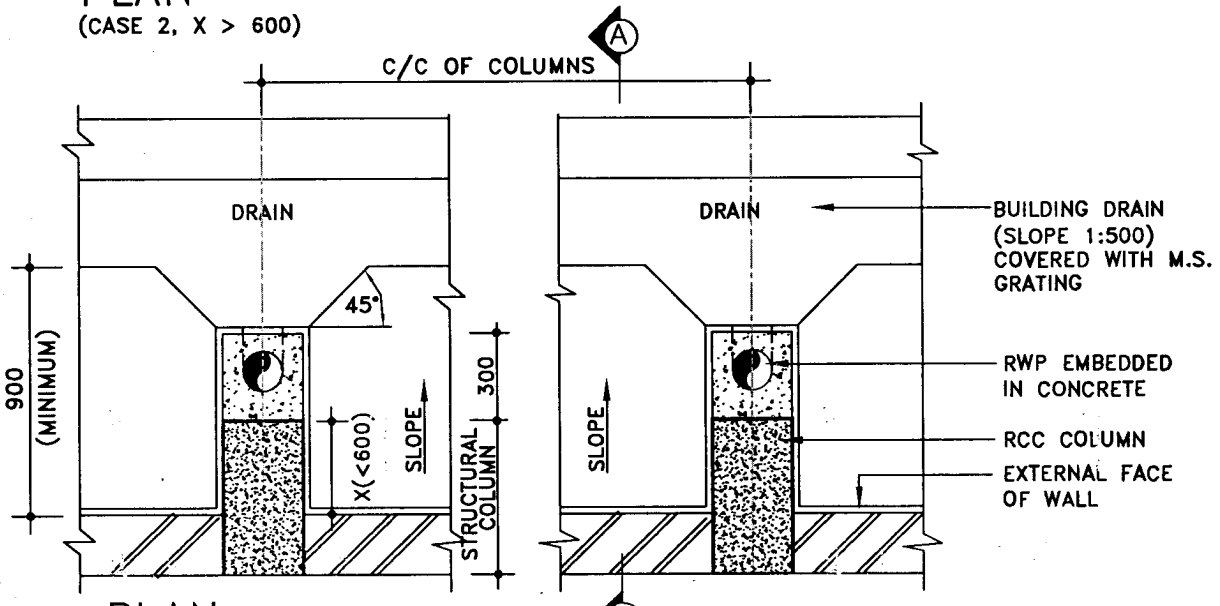
PLINTH PROTECTION
(WITH BUILDING DRAIN)



KEY PLAN



PLAN
(CASE 2, X > 600)



PLAN (CASE 1, X<600)

NOTE: REFER SHEET 2 OF 2 FOR NOTES & DETAILS

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	11.02.22	REVISED AND REISSUED AS STANDARD	NG	JS	SAMIR DAS	SANJAY MAZUMDAR
5	09.11.16	REVISED AND REISSUED AS STANDARD	BR	JS/JKB	RAJANJI SRIVASTAVA	R.NANDA
4	25.10.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

Approved by

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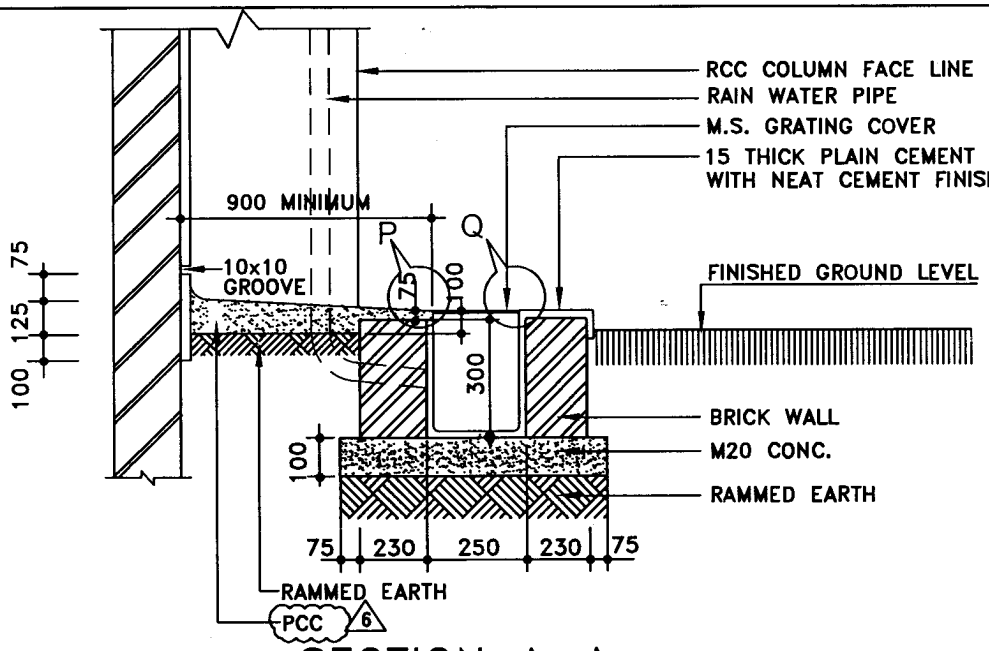
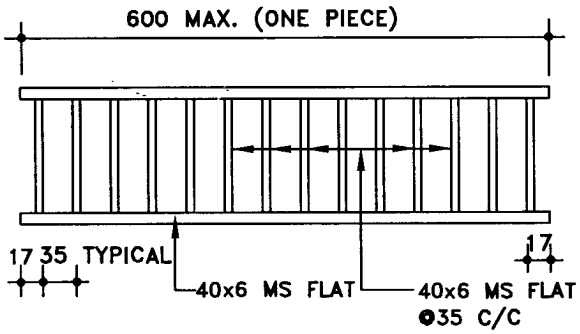
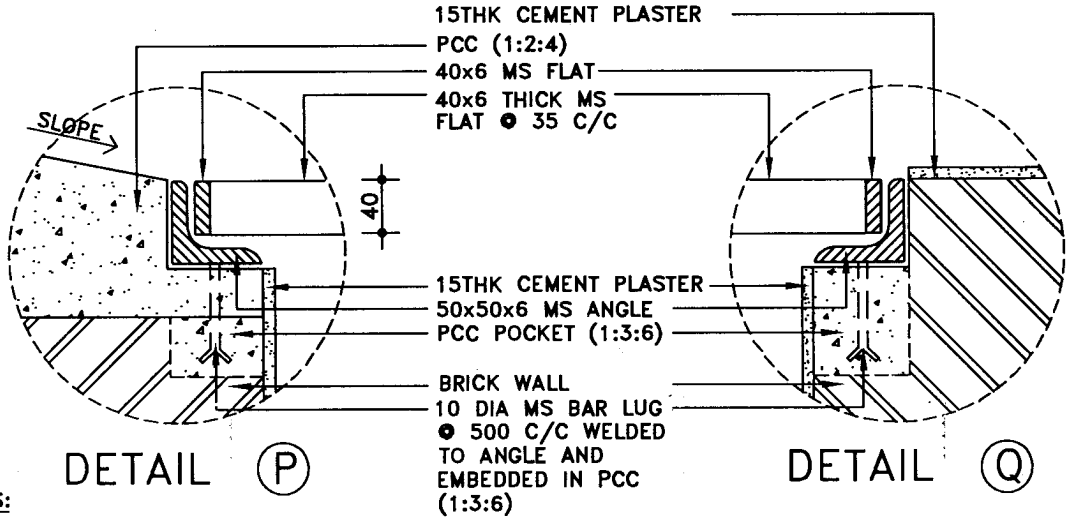
PLINTH PROTECTION
(WITH BUILDING DRAIN)



SECTION A–A



M.S. GRATING DETAIL



DETAIL (P) DETAIL (Q)

NOTES:

1. ALL DIMENSIONS ARE IN MM.
2. WIDTH OF THE PLINTH PROTECTION SHALL BE MINIMUM 900mm AND X+300 MAXIMUM UNLESS OTHERWISE MENTIONED IN BUILDING DRAWING.
3. PLINTH PROTECTION ALONG ANY PARTICULAR SIDE OF THE BUILDING SHALL BE OF CONSTANT WIDTH FOLLOWING THE EXTERNAL WALL ALIGNEMENT IF NOT SPECIFICALLY MENTIONED/INDICATED IN BUILDING DRAWING.
4. M.S. DRAIN COVER GRATING SHALL BE PROVIDED OVER BUILDING DRAIN UNLESS OTHERWISE MENTIONED/ INDICATED IN BUILDING DRAWING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	11.02.22	REVISED AND REISSUED AS STANDARD	NG	KS	SAMIR DAS	SANJAY MAZUMDAR
5	09.11.16	REVISED AND REISSUED AS STANDARD	BR	JS/JKB	RAJANJI SRIVASTAVA	R.NANDA
4	25.10.11	REVISED & REISSUED	DK	SD	JKB	D.MALHOTRA

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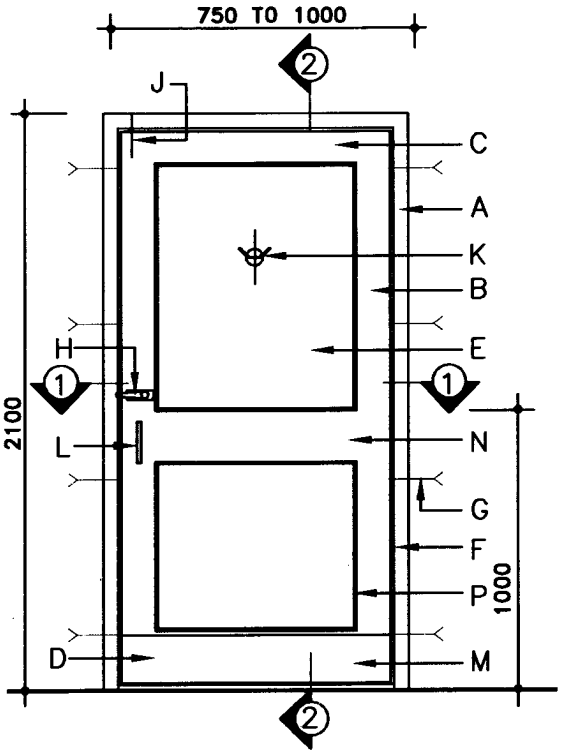
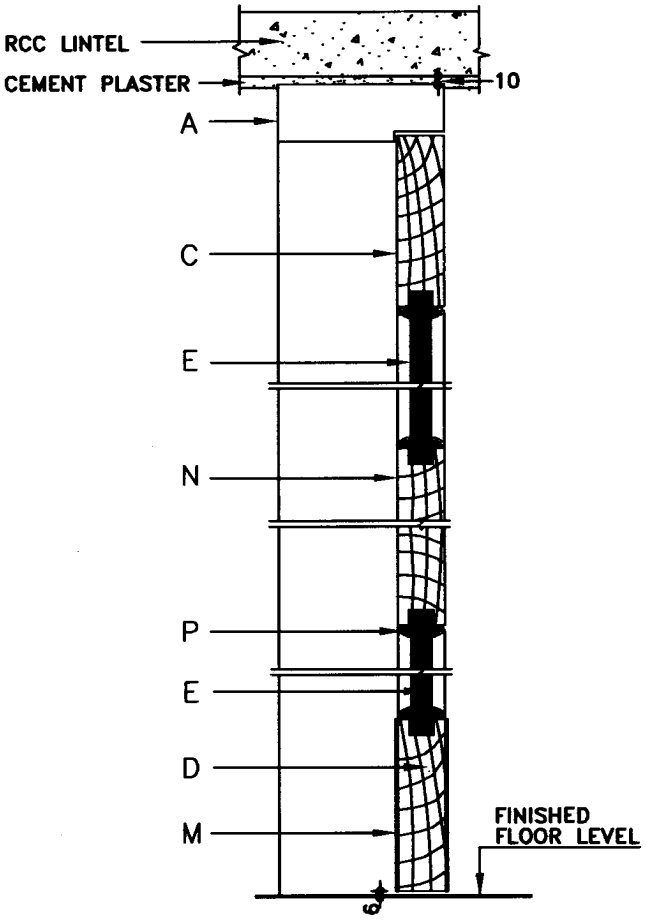
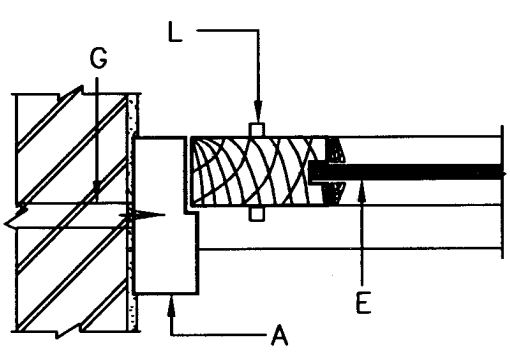
WOODEN PANEL DOOR (TOILET DOOR)



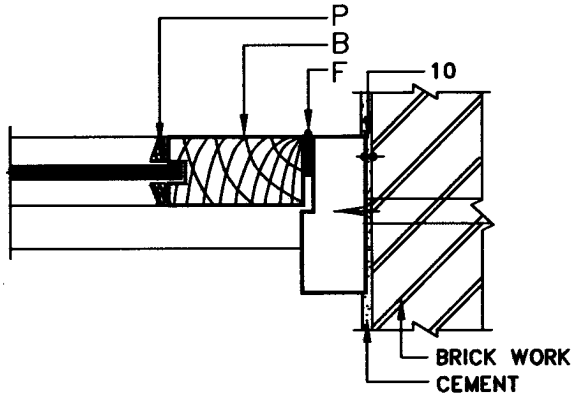
ELEVATION



SECTION 2–2



SECTIONAL PLAN 1–1



LEGEND:

- A: DOOR FRAME AS SPECIFIED
- B: TEAK WOOD STYLE 100x35
- C: TEAK WOOD TOP RAIL 100x35
- D: TEAK WOOD BOTTOM RAIL 200x35
- E: 12 THK. PARTICLE BOARD/MARINE PLY INFILL PANEL WITH SPECIFIED FACING.
- F: 150 LONG BUTT HINGES @ MAX. 600 C/C.
- G: MS HOLD FAST EMBEDDED IN CONCRETE/FASTENER
- H: TOILET DOOR LATCH
- J: TOWER BOLT
- K: COAT AND HAT HOOK

(INTERNAL SIDE OF THE DOOR)

- L: DOOR HANDLE (BOTH SIDE OF THE DOOR)
- M: ACRYLIC KICK PLATE 200X3 THICK.
- N: TEAK WOOD LOCK RAIL 150x35
- P: TEAK WOOD BEADING

NOTE: ALL DIMENSIONS ARE IN MM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	02.02.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ANISH MAHALA	SAMIR DAS	SANJAY MAZUMDAR
5	21.11.16	REAFFIRMED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

Approved by

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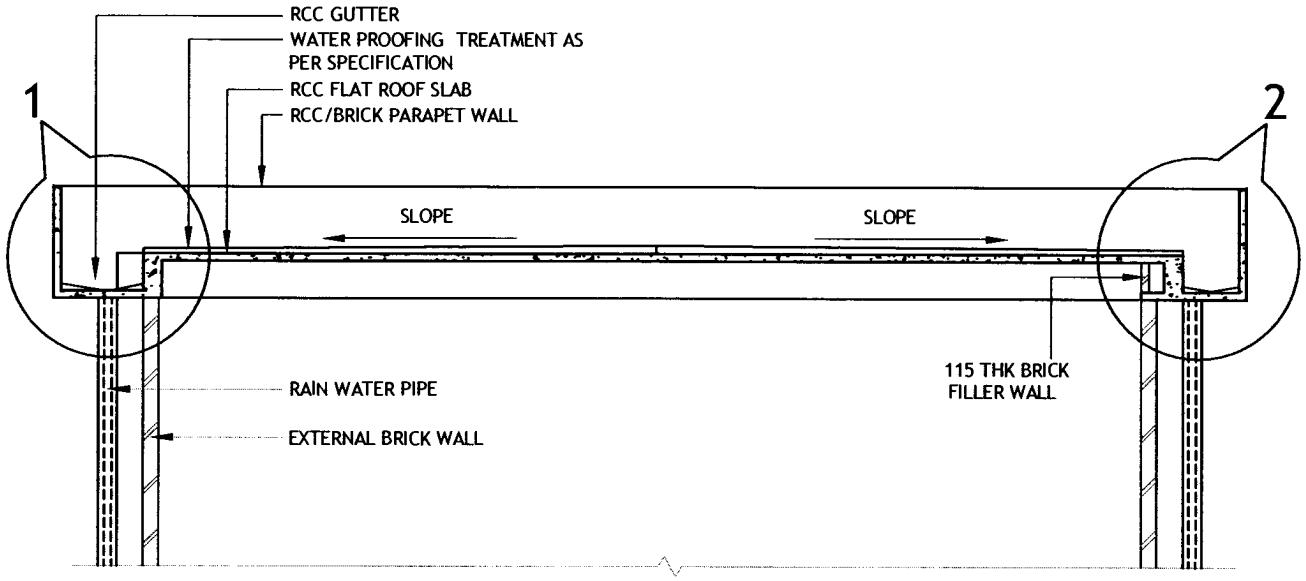
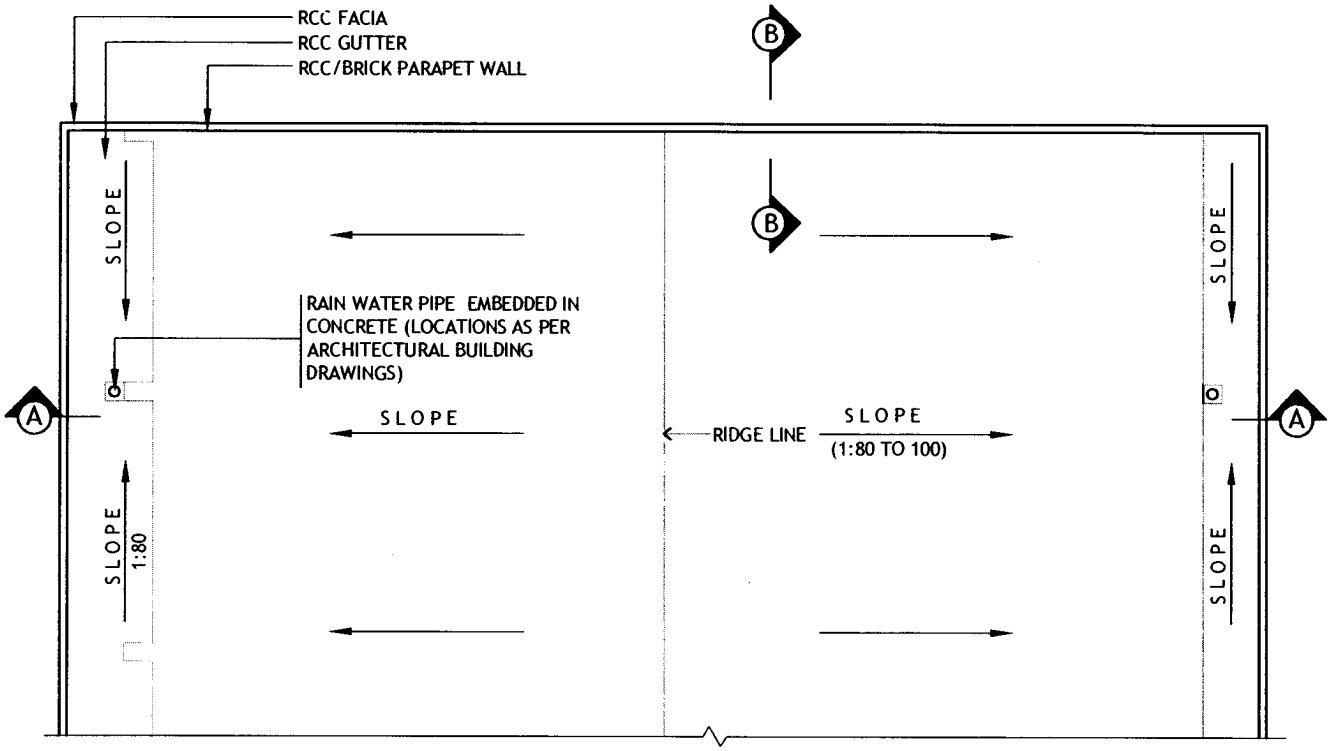


SECTION A-A



PART TERRACE PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MM
2. SECTION A-A INDICATES RCC BEAM INSIDE ON ONE SIDE AND FLUSH OUTSIDE ON OTHER SIDE. THE LOCATION OF BEAM SHALL BE AS PER ARCHITECTURAL AND STRUCTURAL DRAWINGS.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	07.03.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
5	07.03.17	REAFFIRMED & ISSUED AS STANDARD	VK/BK	JKB	RAJANJI SRIVASTAVA	R. NANDA

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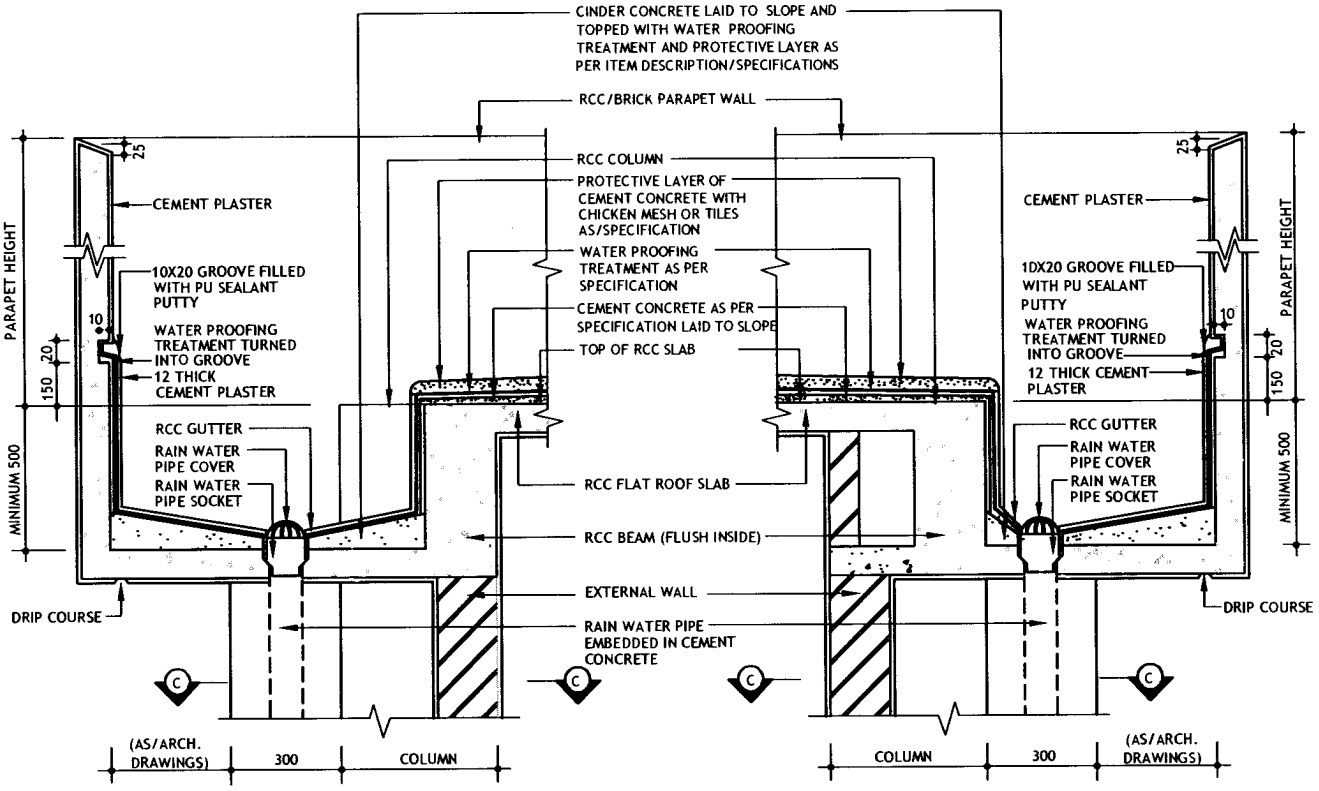
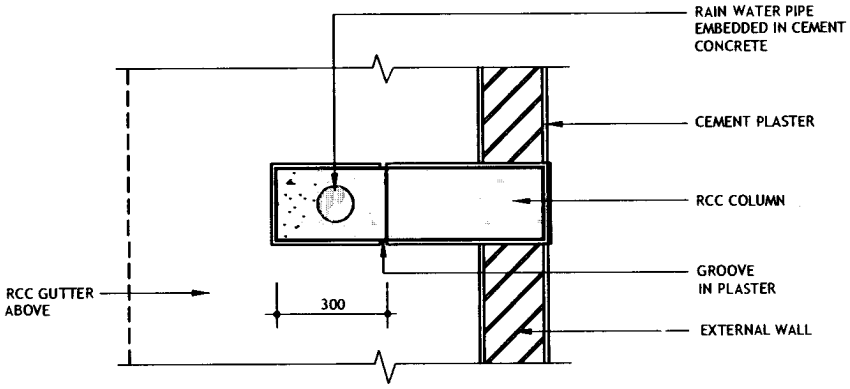


DETAIL - 1

DETAIL - 2



SECTIONAL PLAN C-C

NOTE: REFER SHEET 1 OF 3

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	07.03.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
5	07.03.17	REAFFIRMED & ISSUED AS STANDARD	VK/DK	JKB	RAJANJI SRIVASTAVA	R. NANDA

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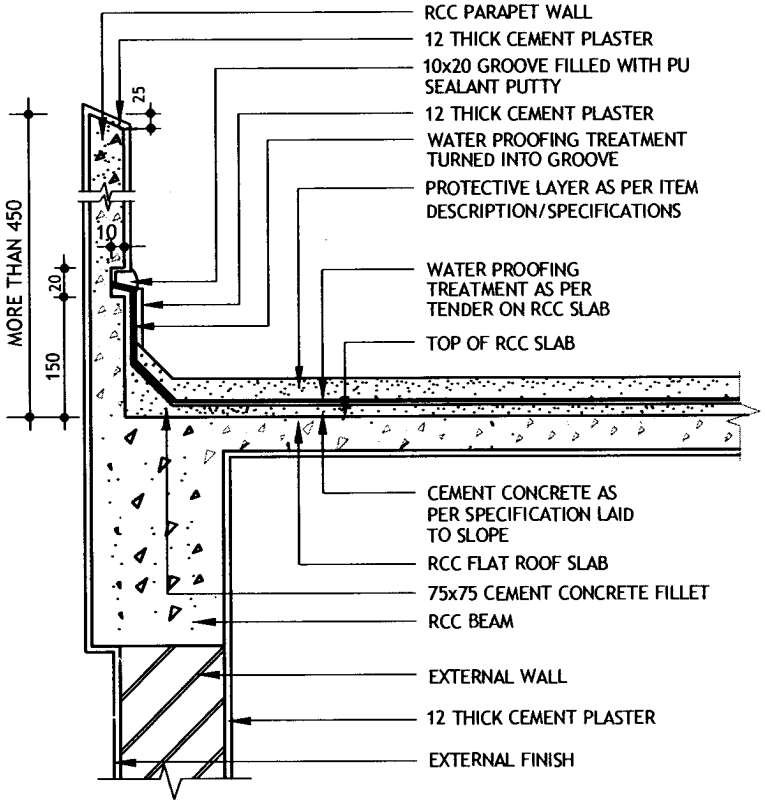
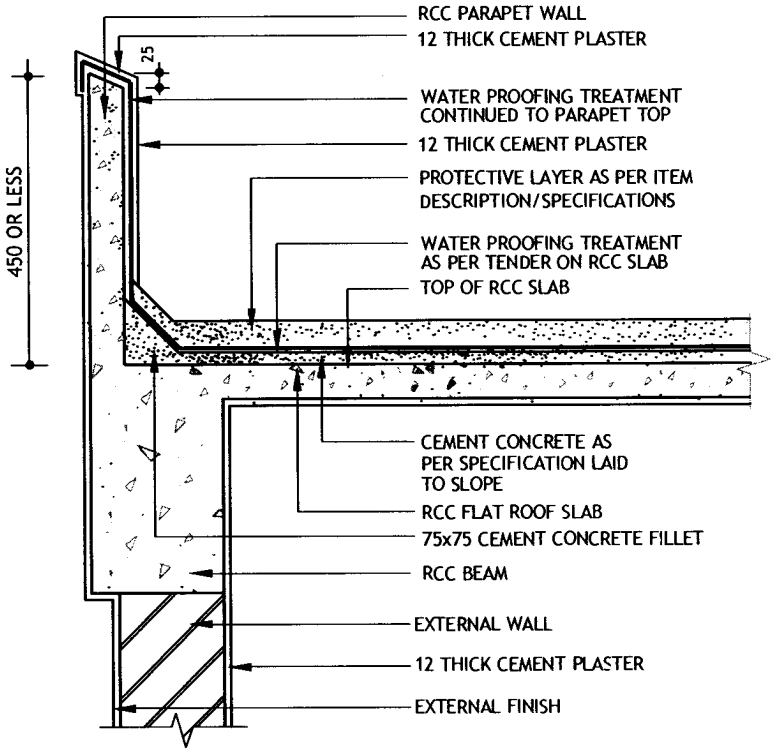


SECTION B-B
(PARAPET HEIGHT MORE THAN 450)



SECTION B-B
(PARAPET HEIGHT UP TO 450)

NOTE : ALL DIMENSIONS ARE IN MM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	07.03.22	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
5	07.03.17	REAFFIRMED & ISSUED AS STANDARD	VK/DK	JKB	RAJANJI SRIVASTAVA	R. NANDA

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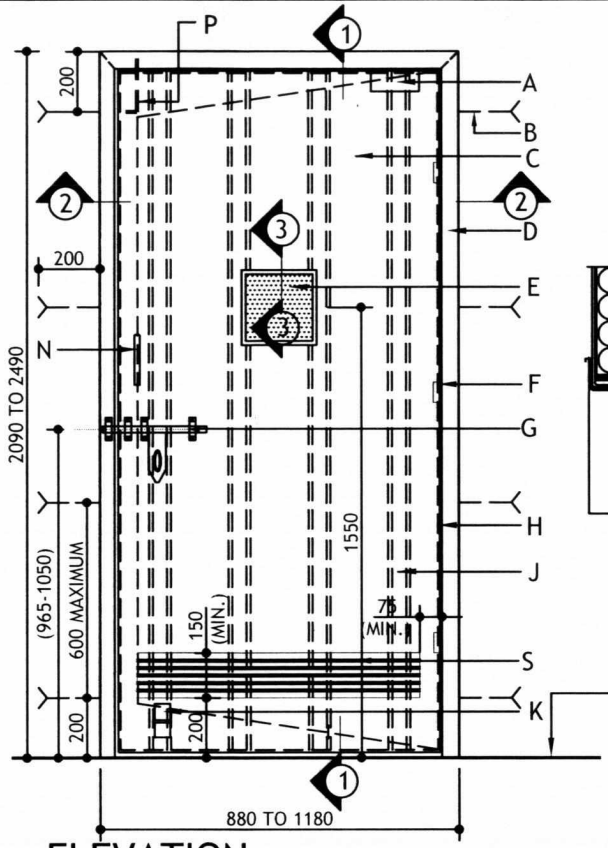
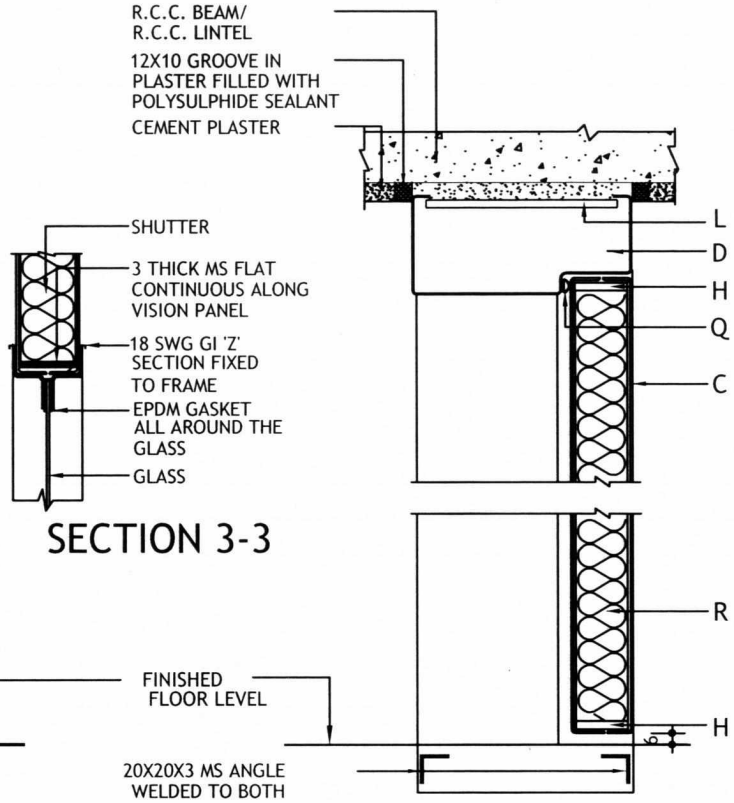
STEEL DOOR (PRESSED STEEL) SINGLE SHUTTER



ELEVATION

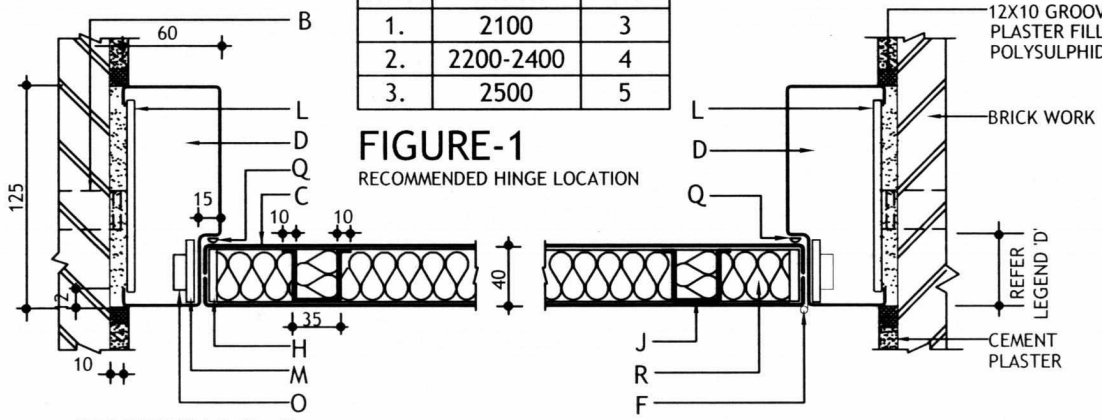


SECTION 3-3

SECTION 1-1

S.NO.	WIDTH	HINGE
1.	2100	3
2.	2200-2400	4
3.	2500	5

FIGURE-1
RECOMMENDED HINGE LOCATION



SECTION 2-2

LEGEND :

A. OVER HEAD HYDRAULIC DOOR CLOSER (HEAVY DUTY).
B. MS HOLDFAST 200x25x6 THICK @ MAXIMUM 600 C/C WELDED TO FRAME SPACER (L).
C. 40 THICK (OVER ALL) 18 SWG GALVANIZED PRESSED STEEL SHUTTER FILLED WITH MINERAL WOOL (48Kg/cum).
D. 16 SWG GALVANIZED PRESSED STEEL FRAME OUT OF 125X60 PROFILE FILLED WITH CONCRETE (REBATE DIMENSION TO BE SUITABLY ADJUSTED FOR ACCOMMODATING GASKET FOR AIR TIGHT DOOR).
E. VISION PANEL (AS PER PROJECT DRAWING).
F. 100 LONG SS 304 GRADE HEAVY DUTY BALL BEARING HINGE AS PER FIGURE 1.
G. SS 304 GRADE 16 DIA 300 LONG ALDROP ON BOTH SIDES.
H. 3 THICK MS FLAT CONTINUOUS ALONG PERIMETER OF OF SHUTTER.
J. 18 SWG GI VERTICAL STIFFNER @ 200 C/C (SPACING TO BE ADJUSTED FOR VISION PANEL).
K. SPRING LOADED HEAVY DUTY DOOR STOPPER.
L. 3 THICK MS FLAT SPACER WELDED TO FRAME AT @ 500 C/C.
M. 40x150x3 THICK MS PAD WELDED TO FRAME AT ALL HINGE & LOCK LOCATIONS.
N. SS 304 GRADE 19 DIA, 200 LONG HANDLE ON BOTH SIDES.
O. 18 SWG GI MORTAR GUARD AT THE BACK OF HINGES & LOCK.
P. 10 DIA SS 304 TOWER BOLT (250 LONG FOR 2100 HT. & 600 LONG FOR 2500 HT.).
Q. 'D' PROFILE EPDM GASKET ALONG FRAME REBATE (FOR AIR TIGHT DOOR ONLY).
R. INSULATION AS PER ITEM DESCRIPTION.
S. LOUVER (SIZE AS PER PROJECT DRAWING) MADE 18 SWG GI (NOT REQUIRED FOR AC AND PRESSURISED AREA

NOTE: 1. ALL DIMENSIONS ARE IN MM

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
6	17.01.23	REVISED & ISSUED AS STANDARD	BABITA SHARMA	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
5	24.04.17	REVISED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

Approved by

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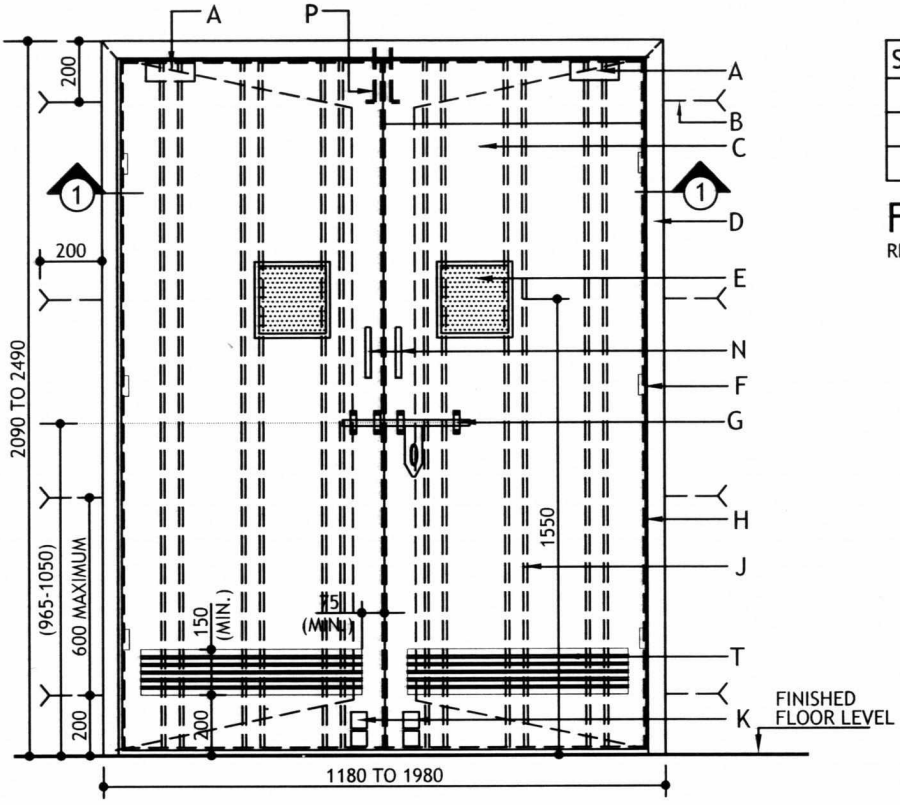
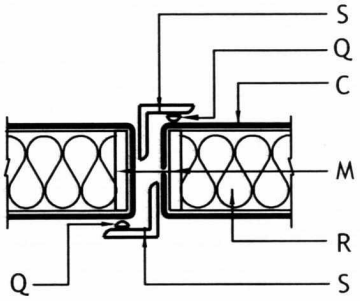
STEEL DOOR (PRESSED STEEL) DOUBLE SHUTTER



ELEVATION

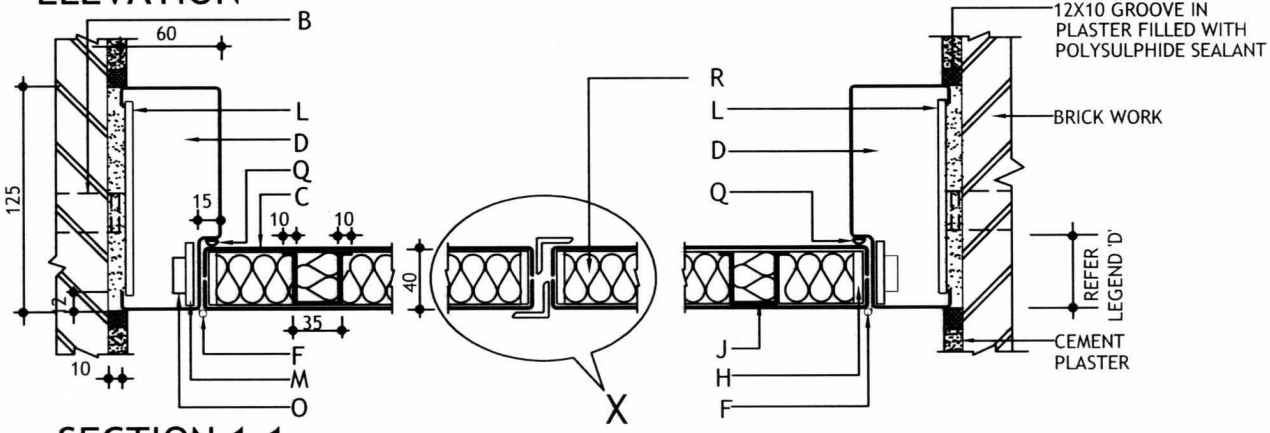
S.NO.	WIDTH	HINGE
1.	2100	3
2.	2200-2400	4
3.	2500	5

FIGURE-1
RECOMMENDED HINGE LOCATION



DETAIL X

NOTE: IN PLACE OF GI ANGLES (S) SUITABLE PROFILING/ DETAILING FOR CLOSURE OF SHUTTERS IS ALSO ACCEPTABLE.



SECTION 1-1

LEGEND :

A. OVER HEAD HYDRAULIC DOOR CLOSER (HEAVY DUTY).
B. MS HOLDFAST 200x25x6 THICK @ MAXIMUM 600 C/C WELDED TO FRAME SPACER (L).
C. 40 THICK (OVER ALL) 18 SWG GALVANIZED PRESSED STEEL SHUTTER FILLED WITH MINERAL WOOL (48Kg/cum).
D. 16 SWG GALVANIZED PRESSED STEEL FRAME OUT OF 125X60 PROFILE FILLED WITH CONCRETE (REBATE DIMENSION TO BE SUITABLY ADJUSTED FOR ACCOMMODATING GASKET FOR AIR TIGHT DOOR).
E. VISION PANEL (AS PER PROJECT DRAWING).
F. 100 LONG SS 304 GRADE HEAVY DUTY BALL BEARING HINGE AS PER FIGURE 1.
G. SS 304 GRADE 16 DIA 300 LONG ALDROP ON BOTH SIDES.
H. 3 THICK MS FLAT CONTINUOUS ALONG PERIMETER OF OF SHUTTER.
J. 18 SWG GI VERTICAL STIFFNER @ 200 C/C (SPACING TO BE ADJUSTED FOR VISION PANEL).
K. SPRING LOADED HEAVY DUTY DOOR STOPPER.
L. 3 THICK MS FLAT SPACER WELDED TO FRAME AT @ 500 C/C.
M. 40x150x3 THICK MS PAD WELDED TO FRAME AT ALL HINGE & LOCK LOCATIONS.
N. SS 304 GRADE 19 DIA, 200 LONG HANDLE ON BOTH SIDES.
O. 18 SWG GI MORTAR GUARD AT THE BACK OF HINGES & LOCK.
P. 10 DIA SS 304 TOWER BOLT (250 LONG FOR 2100 HT. & 600 LONG FOR 2500 HT.).
Q. 'D' PROFILE EPDM GASKET ALONG FRAME REBATE (FOR AIR TIGHT DOOR ONLY).
R. INSULATION AS PER ITEM DESCRIPTION.
S. 2 THICK 25X25 GI ANGLE (VERTICAL) EACH WELDED TO ONE SHUTTER.
T. LOUVER (SIZE AS PER PROJECT DRAWING) MADE 18 SWG GI (NOT REQUIRED FOR AC AND PRESSURISED AREA

NOTE: 1. ALL DIMENSIONS ARE IN MM.
2. FOR OTHER DETAILS REFER STANDARD NO. 7-75-0070.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
6	17.01.23	REVISED & ISSUED AS STANDARD	BABITA SHARMA	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
5	24.04.17	REVISED & ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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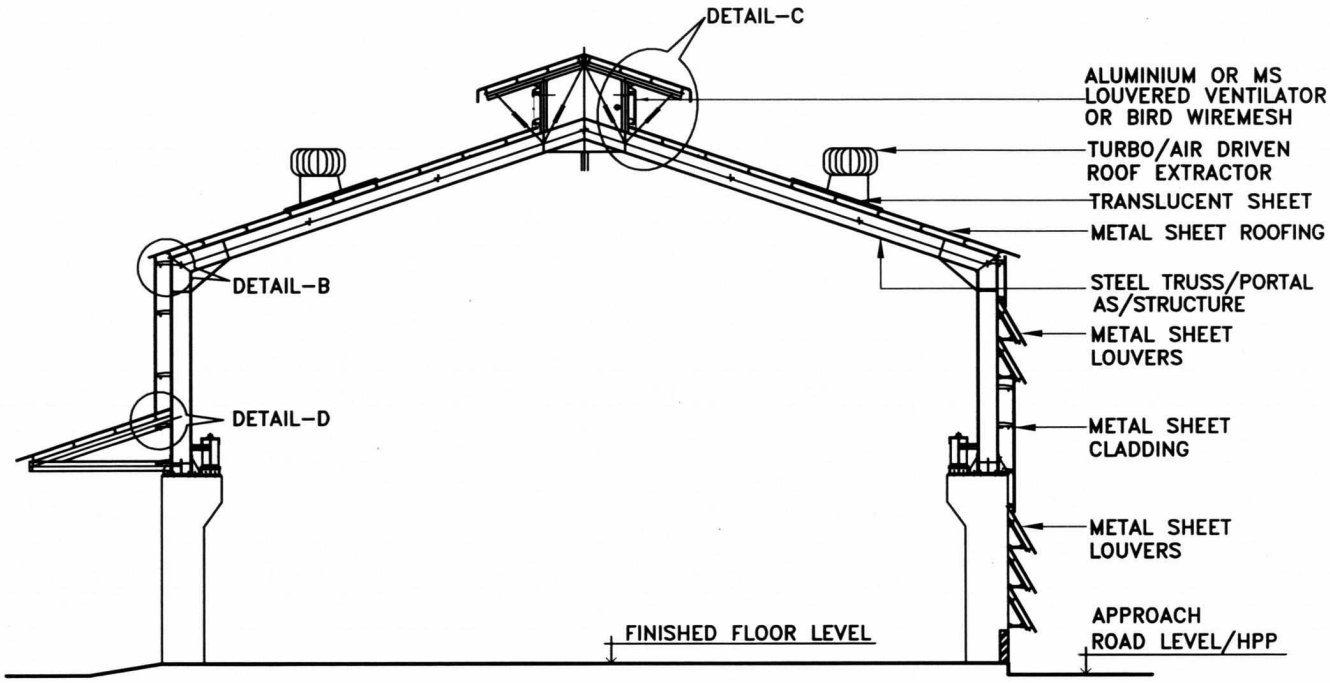
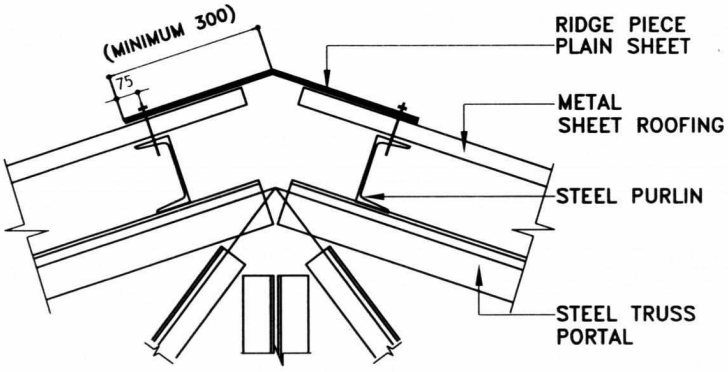
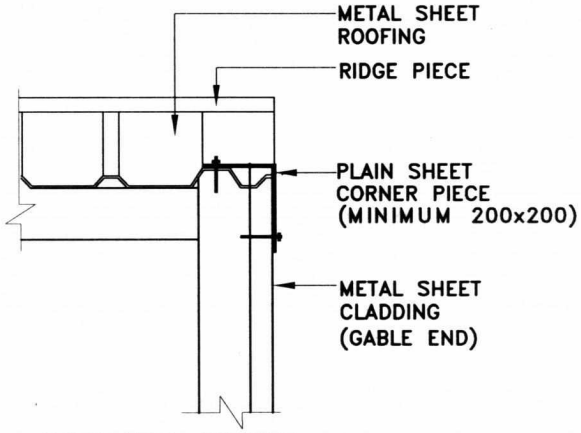


TYPICAL SECTION



DETAIL–A
(RIDGE FLASHING DETAIL)



CORNER PIECE
FLASHING DETAIL
(ROOF AND GABLE END CLADDING)

NOTES:

1. ALL DIMENSIONS ARE IN MM.
2. THIS STANDARD INDICATES VARIOUS ARCHITECTURAL FEATURES AND FLASHING DETAILS OF SHEDS. PROVISION OF FEATURES (ROOF MONITOR, ROOF EXTRACTOR, TRANSLUCENT SHEET, LOUVERS) AND THEIR SIZES, LOCATION ETC SHALL BE AS PER PROJECT DRAWINGS.
3. MATERIAL, THICKNESS AND OTHER DETAILS OF ROOFING, CLADDING, ACCESORIES (RIDGE FLASHING, CORNER PIECE, EAVES PIECE, APRON PIECE AND OTHER FLASHING) AND BIRD MESH SHALL BE AS PER PROJECT SPECIFICATION.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	17.01.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
1	16.01.18	REVISED & REISSUED AS STANDARD	RS	JS/SD	R. SRIVASTAVA	R. NANDA

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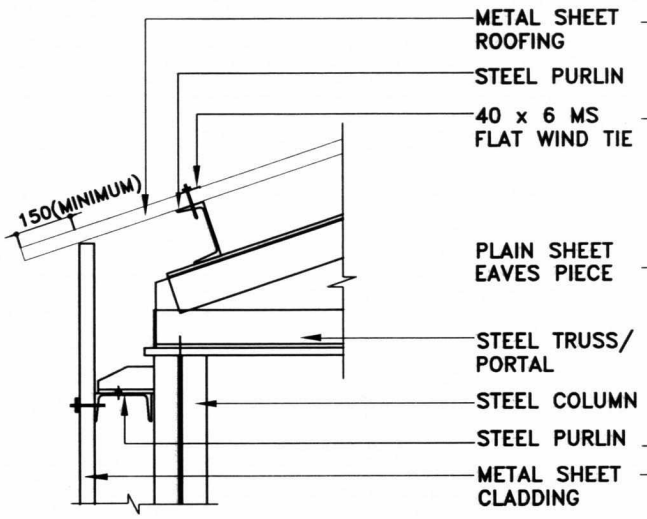
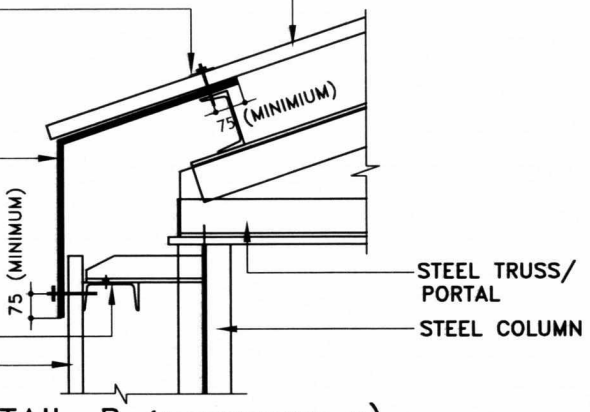
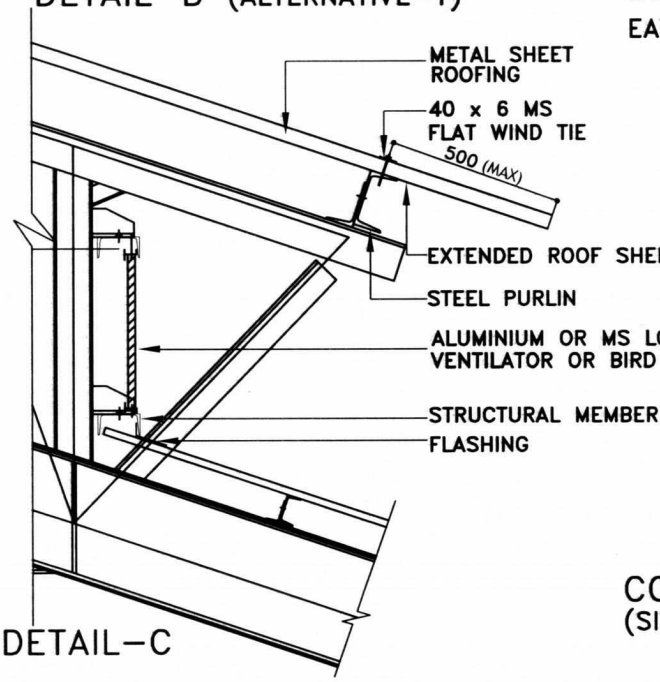


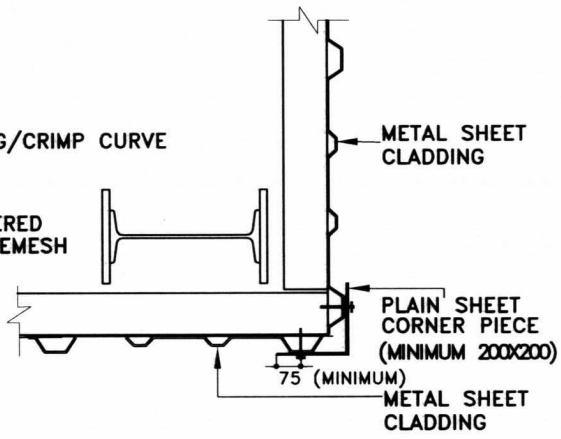
DETAIL–B (ALTERNATIVE–1)



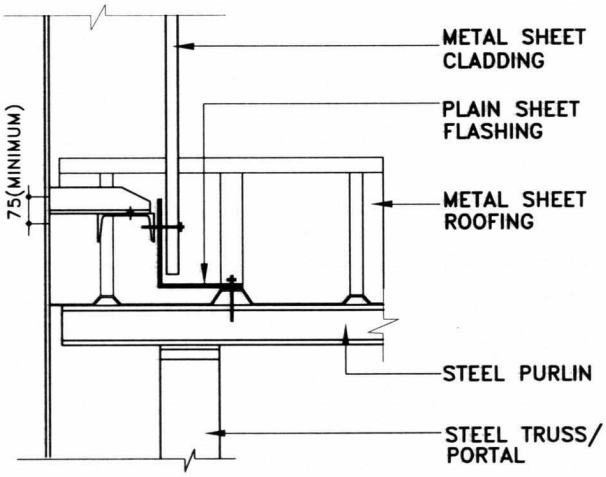
DETAIL–B (ALTERNATIVE–2)
EAVES FLASHING DETAIL



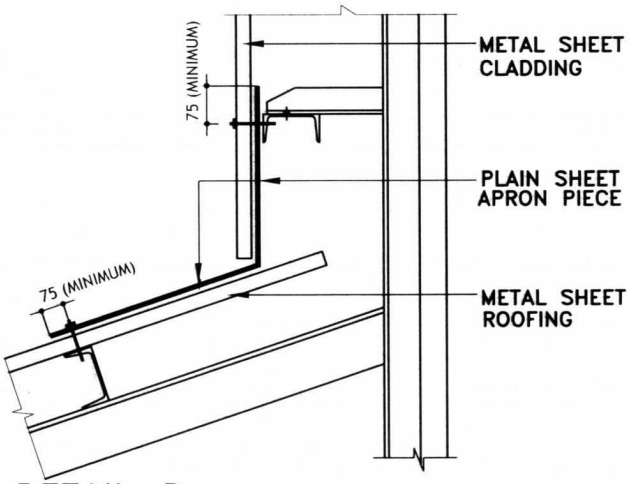
DETAIL–C



CORNER PIECE FLASHING DETAIL
(SIDE AND GABLE END CLADDING)



FLASHING DETAIL
(VERTICAL CLADDING AND ROOF)



DETAIL–D
(APRON FLASHING DETAIL)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	17.01.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
1	16.01.18	REVISED & REISSUED AS STANDARD	RS	JS/SD	R. SRIVASTAVA	R. NANDA

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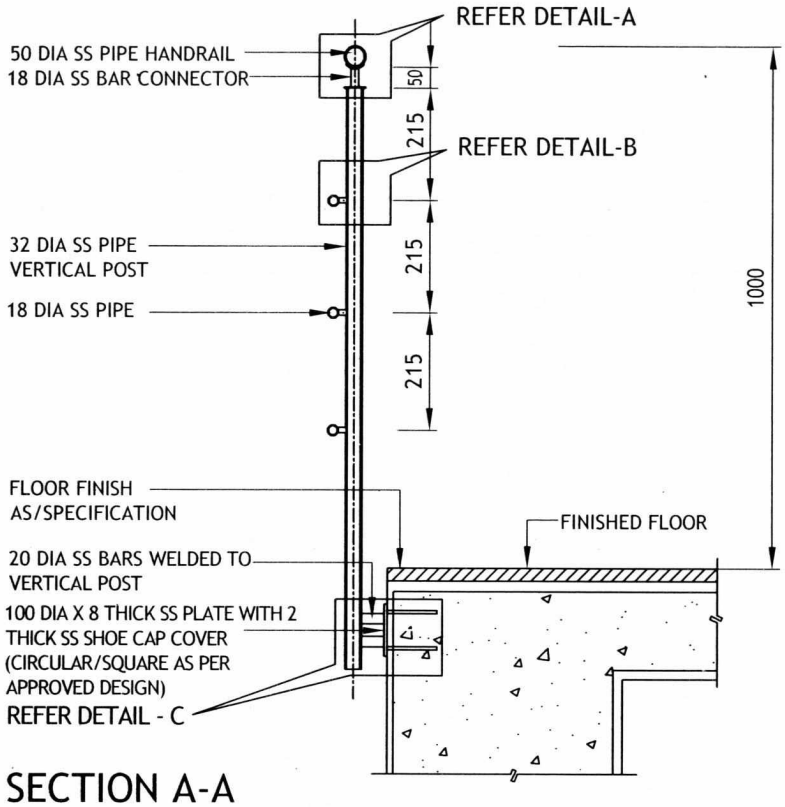
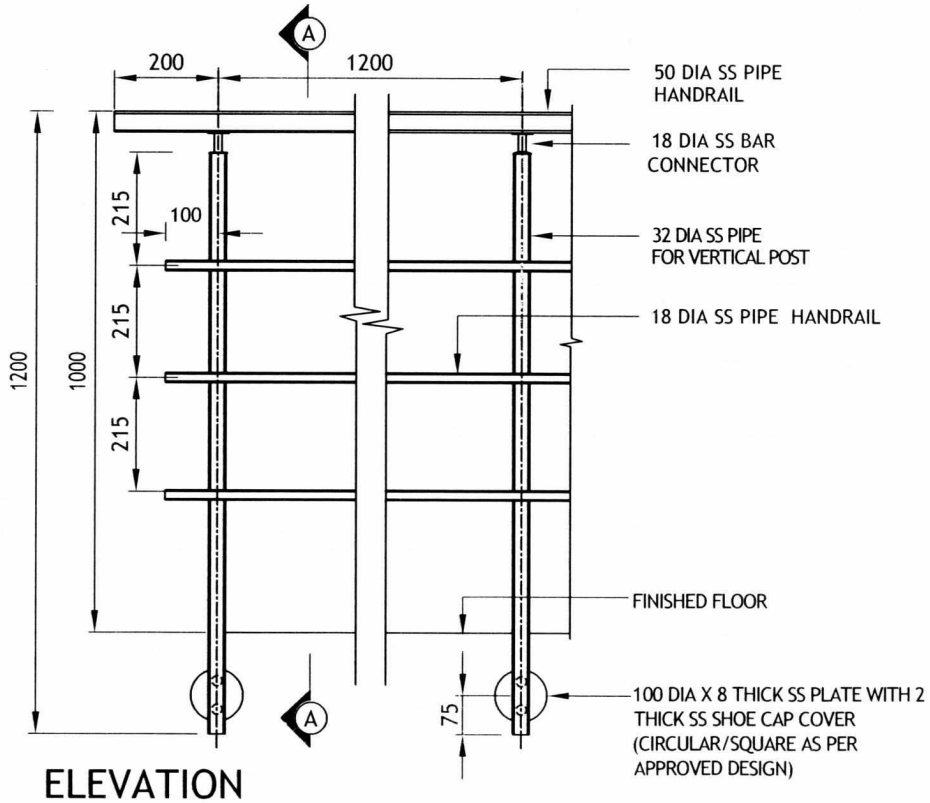


SECTION A-A



ELEVATION

STAINLESS STEEL HANDRAIL FIXED ON SIDE OF SLAB & STAIRS (TYPE-A)

NOTE: 1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. 50 & 32 DIA (OUTER) PIPES SHALL BE OF 16 GAUGE. ALL OTHER MEMBERS SHALL BE OF 18 GUAGE/ APPLICABLE.
3. GRADE OF STEEL IS S/S 304 (SATIN FINISH).

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	16.10.23	REVISED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
1	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR

Approved by

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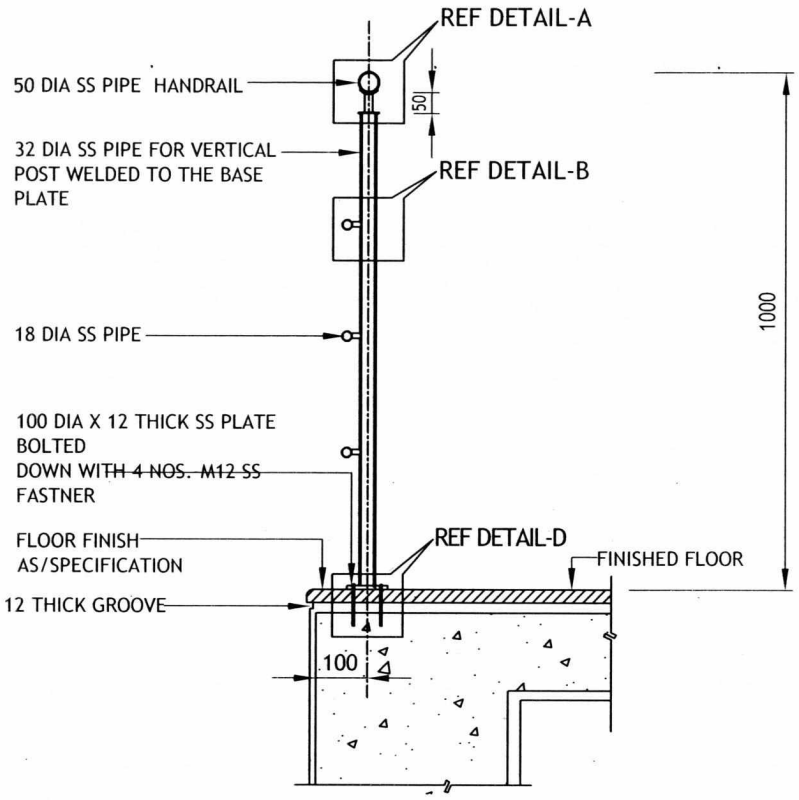
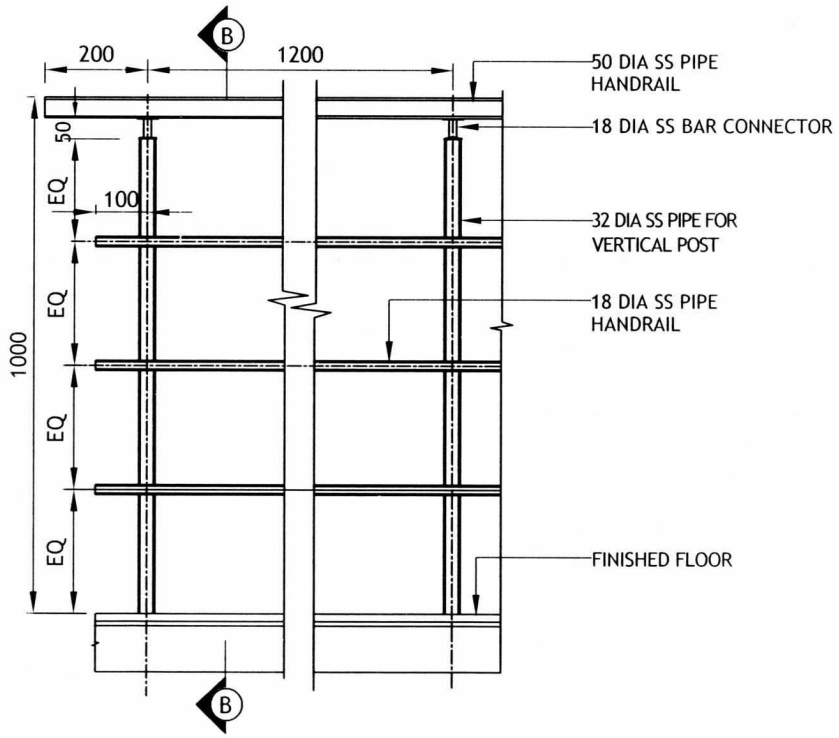


SECTION B-B



ELEVATION

STAINLESS STEEL HANDRAIL FIXED OVER THE SLAB & STAIRS (TYPE-B)

NOTE: 1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. GRADE OF STEEL IS S/S 304 (SATIN FINISH).

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	16.10.23	REVISED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
1	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR

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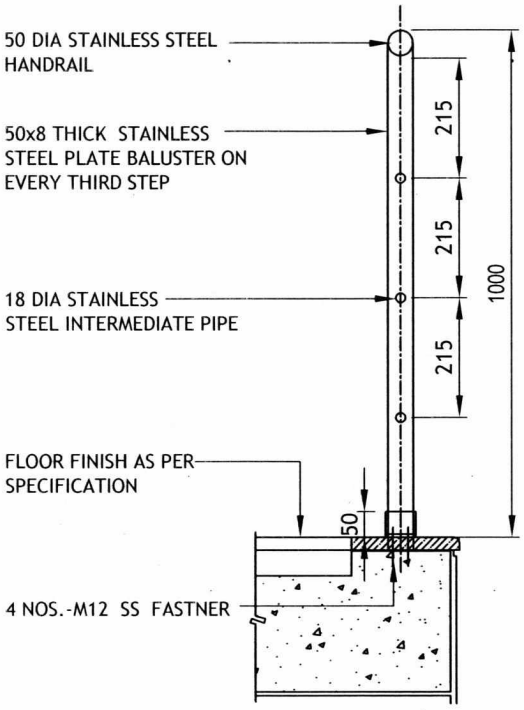
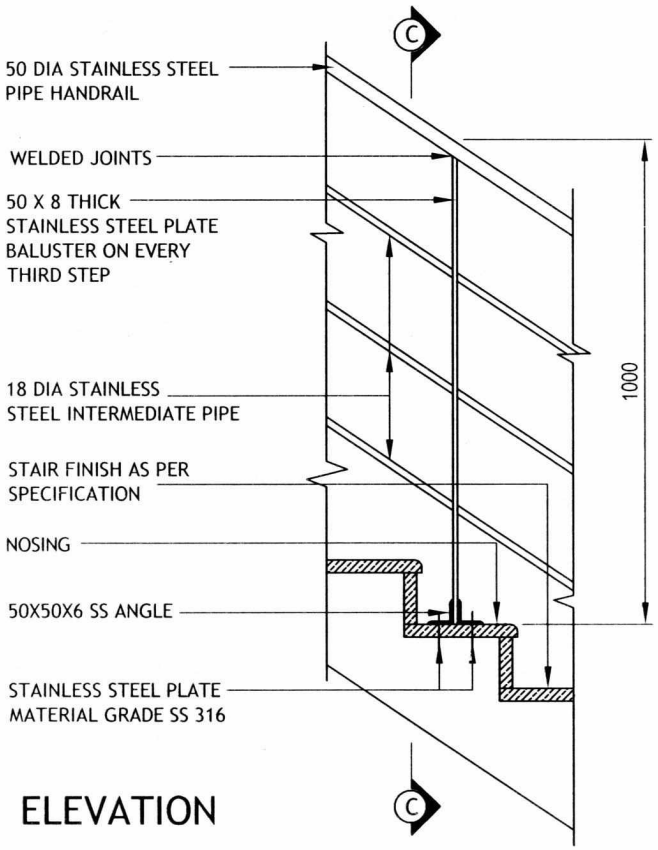


SECTION C-C



ELEVATION

STAINLESS STEEL HANDRAIL FOR SLAB & STAIRS (TYPE-C)

NOTE: 1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. GRADE OF STEEL IS S/S 304 (SATIN FINISH).

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	16.10.23	REVISED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
1	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG-SINHA	SANJAY MAZUMDAR

Approved by

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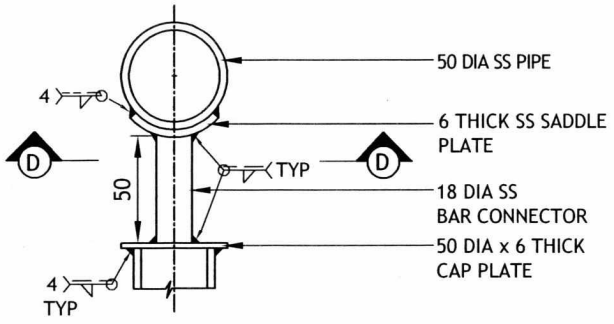
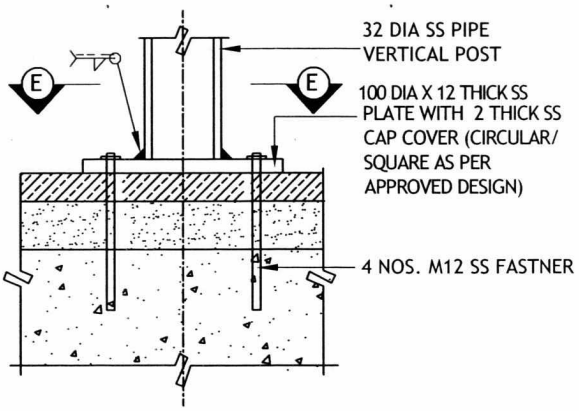
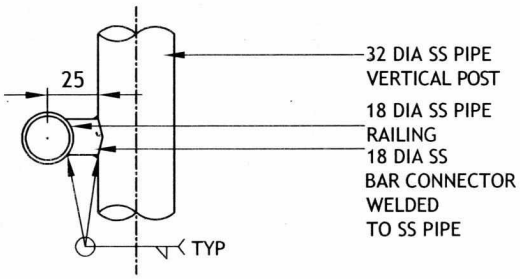


DETAIL A



DETAIL D



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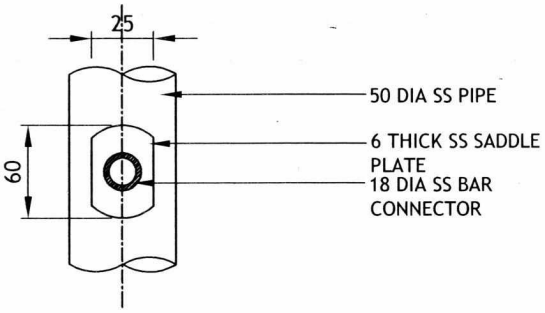
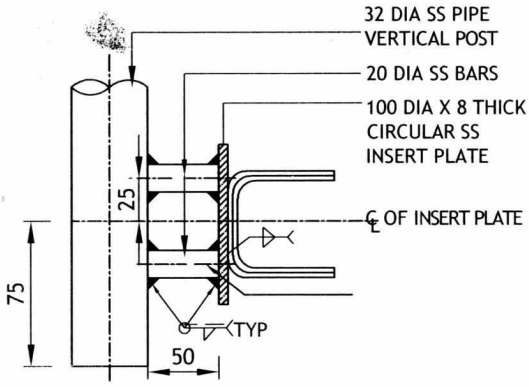
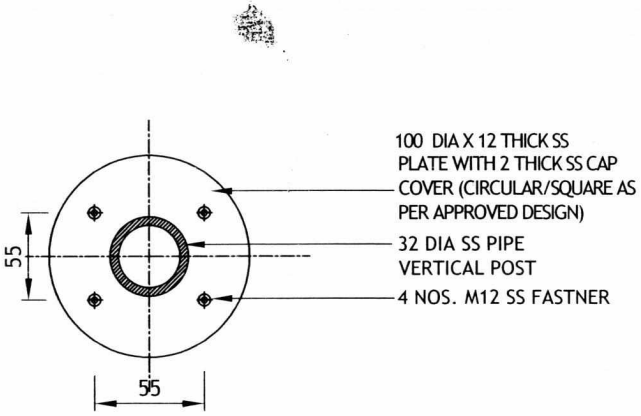


SECTION D-D



DETAIL C

(TYPICAL DETAILS)



SECTION E-E

NOTE: 1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. GRADE OF STEEL IS S/S 304 (SATIN FINISH).

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
2	16.10.23	REVISED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
1	30.03.21	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SAMIR DAS	ANURAG SINHA	SANJAY MAZUMDAR

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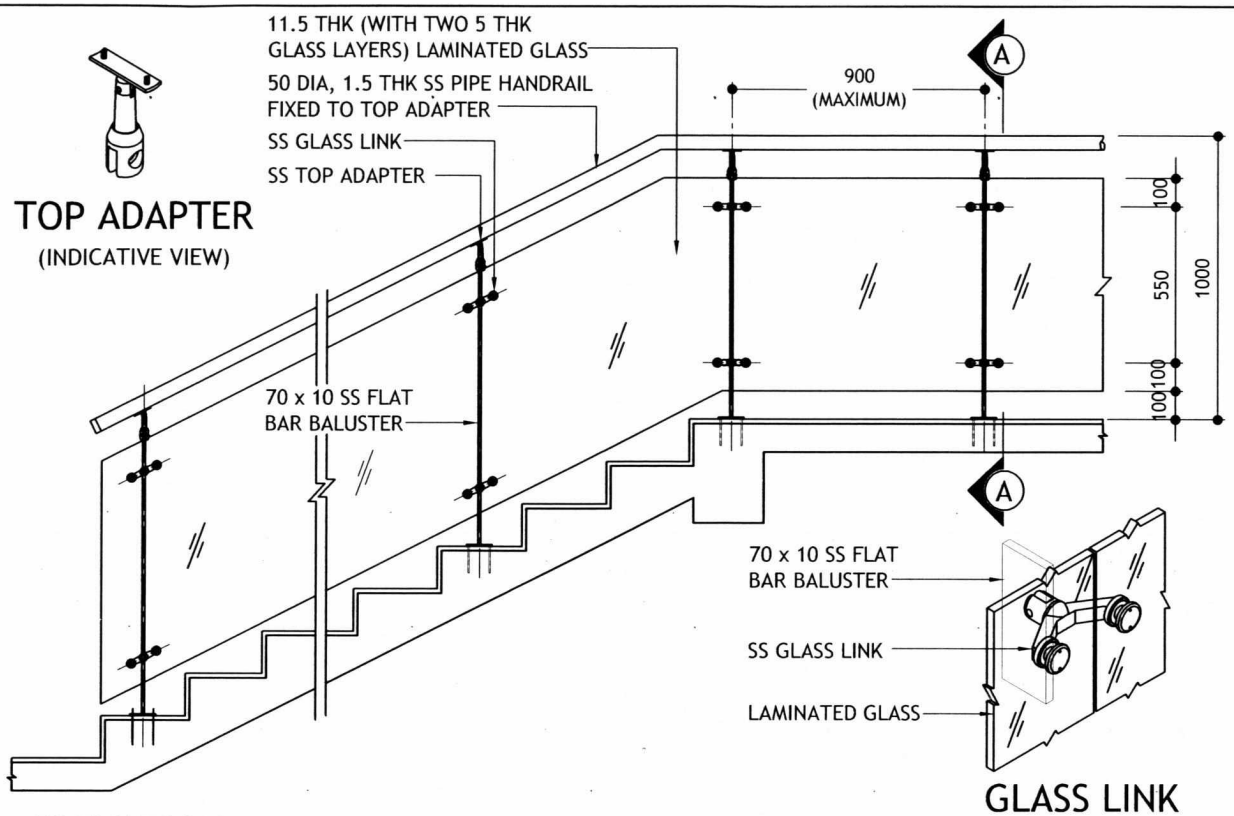
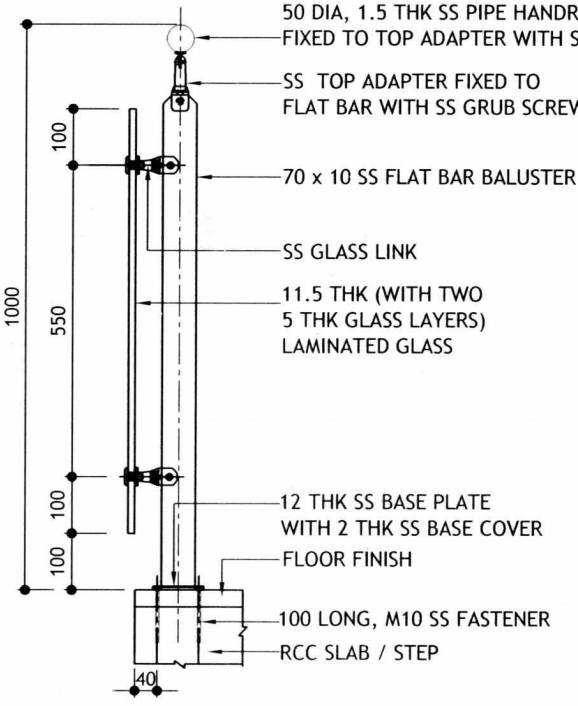
STAIRCASE RAILING
(WITH SS MEMBER & GLASS PANEL)

TOP ADAPTER
(INDICATIVE VIEW)

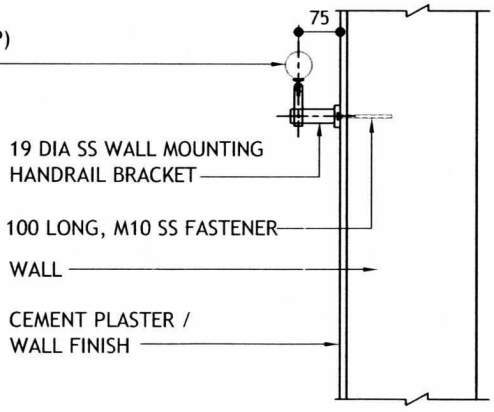


ELEVATION

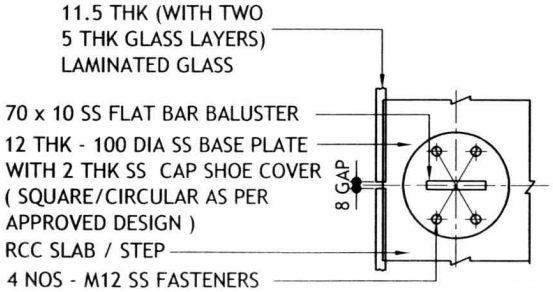
GLASS LINK
(INDICATIVE VIEW)



SECTION A-A



DETAIL OF GRAB RAIL
(ALONG WALL)



BASE PLATE DETAIL (PLAN)

NOTE :
1. ALL DIMENSIONS ARE IN MILLIMETRE
2. SS - STAINLESS STEEL (GRADE-304)
3. ALL SS MEMBERS/FITTING SHALL BE OF SATIN FINISH.
4. IN PLACE OF TOP ADAPTER & GRUB SCREW, WELDING USING SUITABLE SS MEMBER IS ACCEPTABLE IF SPECIFIED.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
1	16.10.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
0	04.06.18	ISSUED AS STANDARD	MLT	SD	RS	R K TRIVEDI

Approved by

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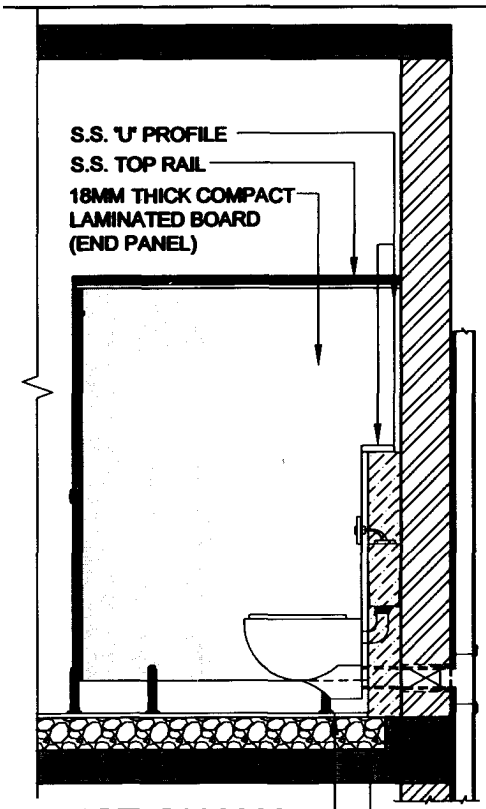
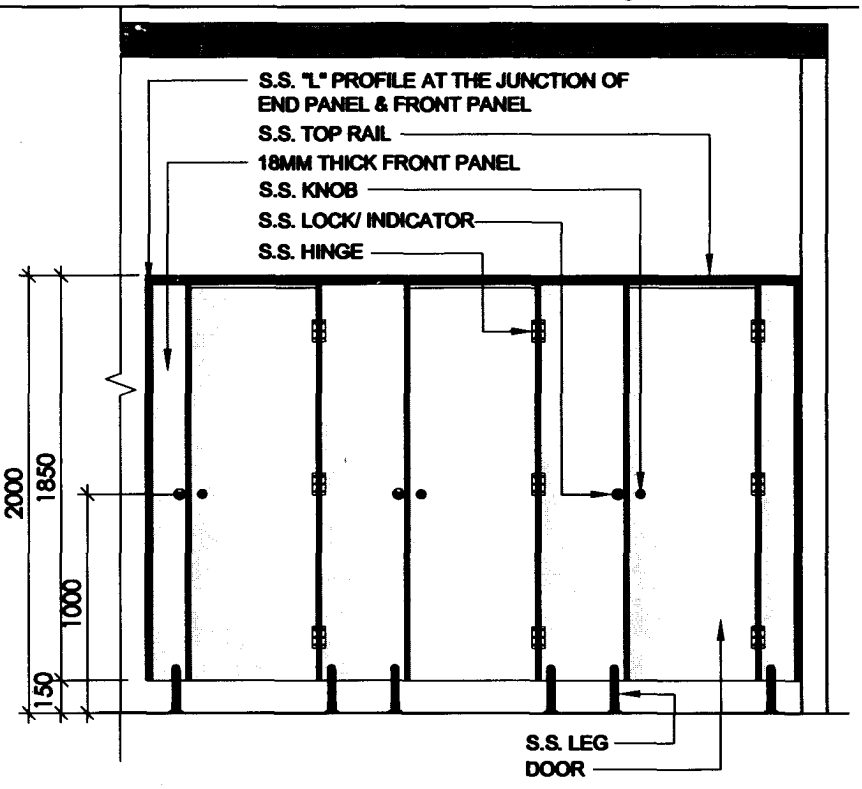
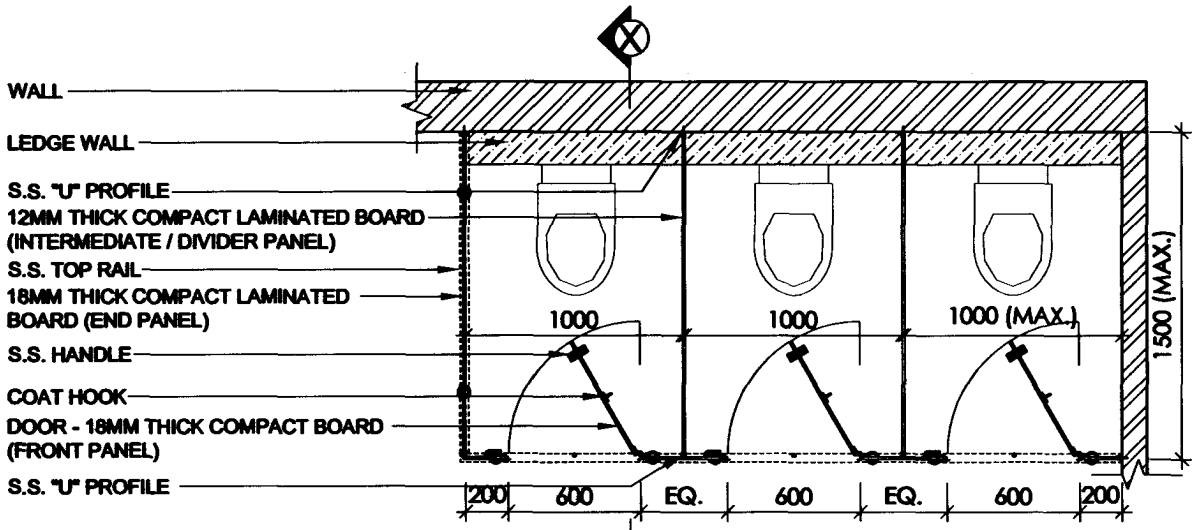
TOILET CUBICLES DETAILS



SECTION X-X



ELEVATION



PLAN

NOTES:-

1. ALL DIMENSIONS IN MILLIMETERS.
2. THIS STANDARD IS INDICATIVE AND TYPICAL CONSIDERING 3NO. OF W.C. CUBICLES. REFER RELEVANT ARCHITECTURAL DRAWING FOR EXACT NO. AND SIZES OF CUBICLES AND THEIR CONFIGURATION.
3. W.C. SEAT SHOWN IS INDICATIVE, EXACT TYPE OF SEAT (FLOOR MOUNTED OR WALL MOUNTED) SHALL BE AS PER TENDER ITEM.
4. ALL S.S. FITTINGS/ FIXTURES SHALL BE OF GRADE SS-316.
5. R.C.C. SUNK SLAB SHOWN IN SECTION X-X IS APPLICABLE FOR FIRST & HIGHER FLOORS ONLY (AND NOT FOR GROUND FLOOR).
6. FILLING MATERIAL FOR R.C.C. SUNK SLAB SHALL BE AS/ TENDER ITEM.

LEGEND:

S.S. = STAINLESS STEEL

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	02.02.22	REVISED & ISSUED AS STANDARD	BABITA SHARMA	PIYALEE DAS	SAMIR DAS	SANJAY MAZUMDAR
0	09.12.16	ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

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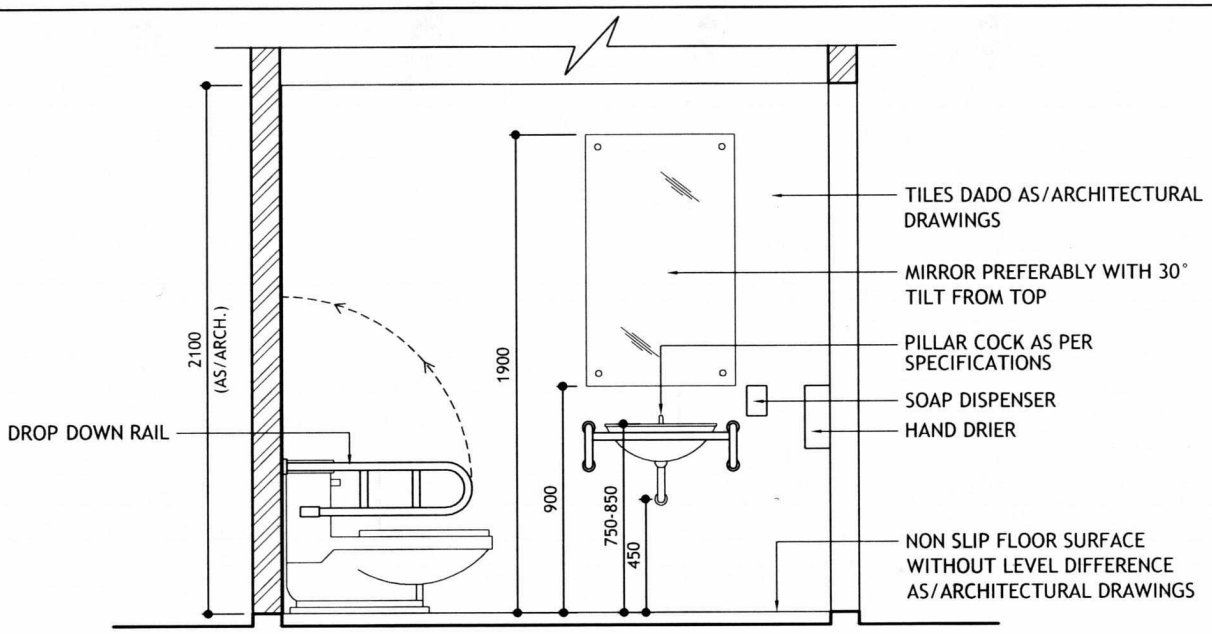
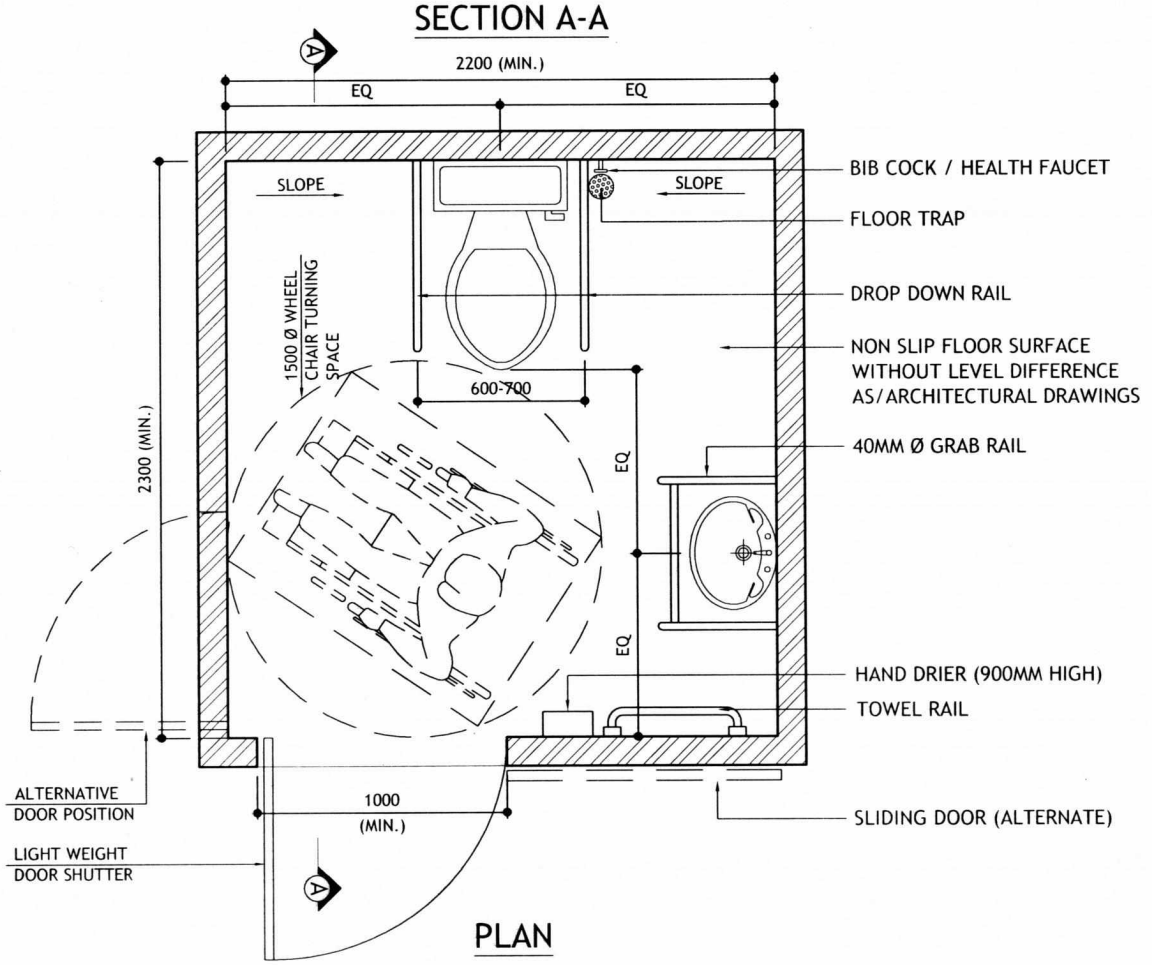


SECTION A-A



PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. LOCATION OF WINDOW/VENTILATOR/EXHAUST FAN SHALL BE AS/ARCHITECTURE DRAWING OF THE JOB.
3. THIS STANDARD SHALL BE READ CONJUNCTION WITH ARCHITECTURE STD. NO. 7-75-0062, 7-75-0064 (FOR PIPE CONNECTIONS, DISPOSAL ARRANGEMENTS ETC.).
4. THIS STANDARD SHOWS MINIMUM MANDATORY REQUIREMENTS OF TOILET FOR DIFFERENTLY ABLED PERSONS. REFER RELEVANT ARCHITECTURAL DRAWING FOR EXACT SIZES AND EXTENT OF FACILITIES.
5. WC CISTERN SHALL HAVE PUSH BUTTON TYPE FLUSHING SYSTEM.
6. COAT HOOK SHALL BE PROVIDED ON THE DOOR FROM INSIDE AT 1200MM FROM FLOOR LEVEL.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
1	17.01.23	REVISED & RE-ISSUED AS STANDARD	M L THAKUR	SUMEDHA	SAMIR DAS	SANJAY MAZUMDAR
0	19.05.17	ISSUED AS STANDARD	DK	JS/JKB	RAJANJI SRIVASTAVA	R. NANDA

Approved by

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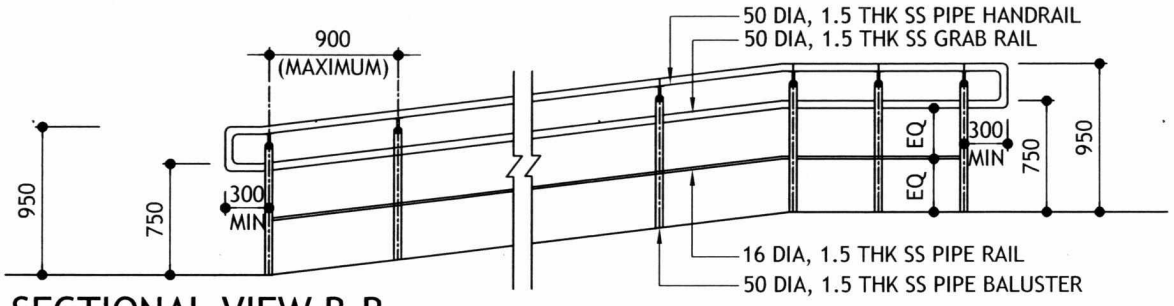
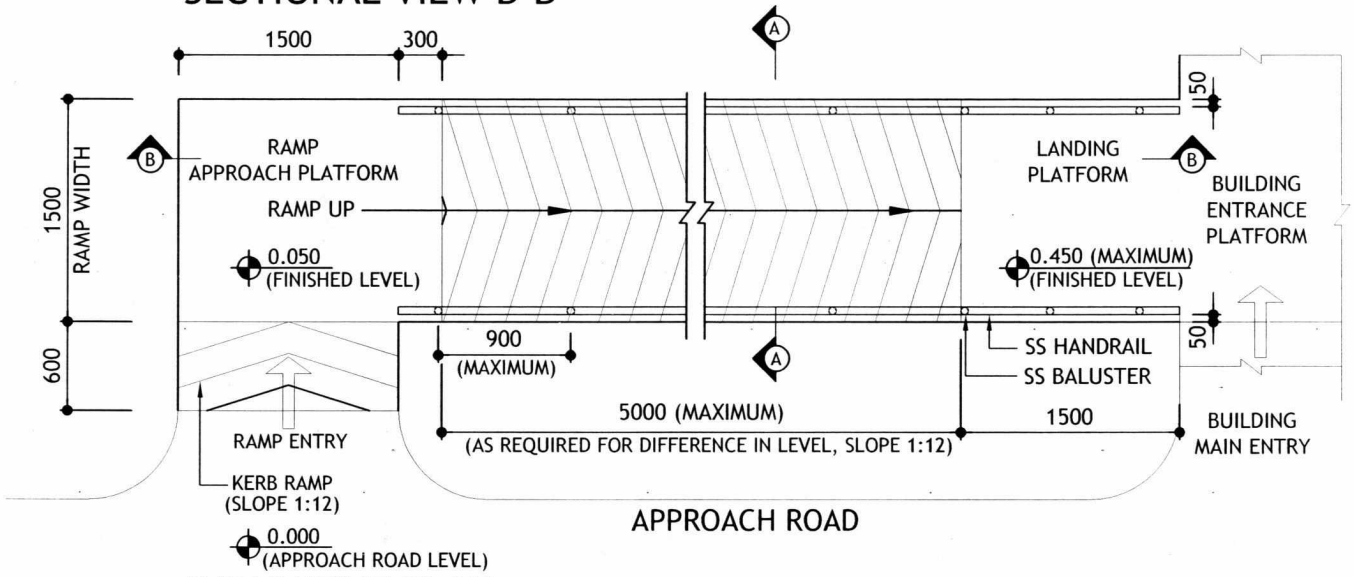
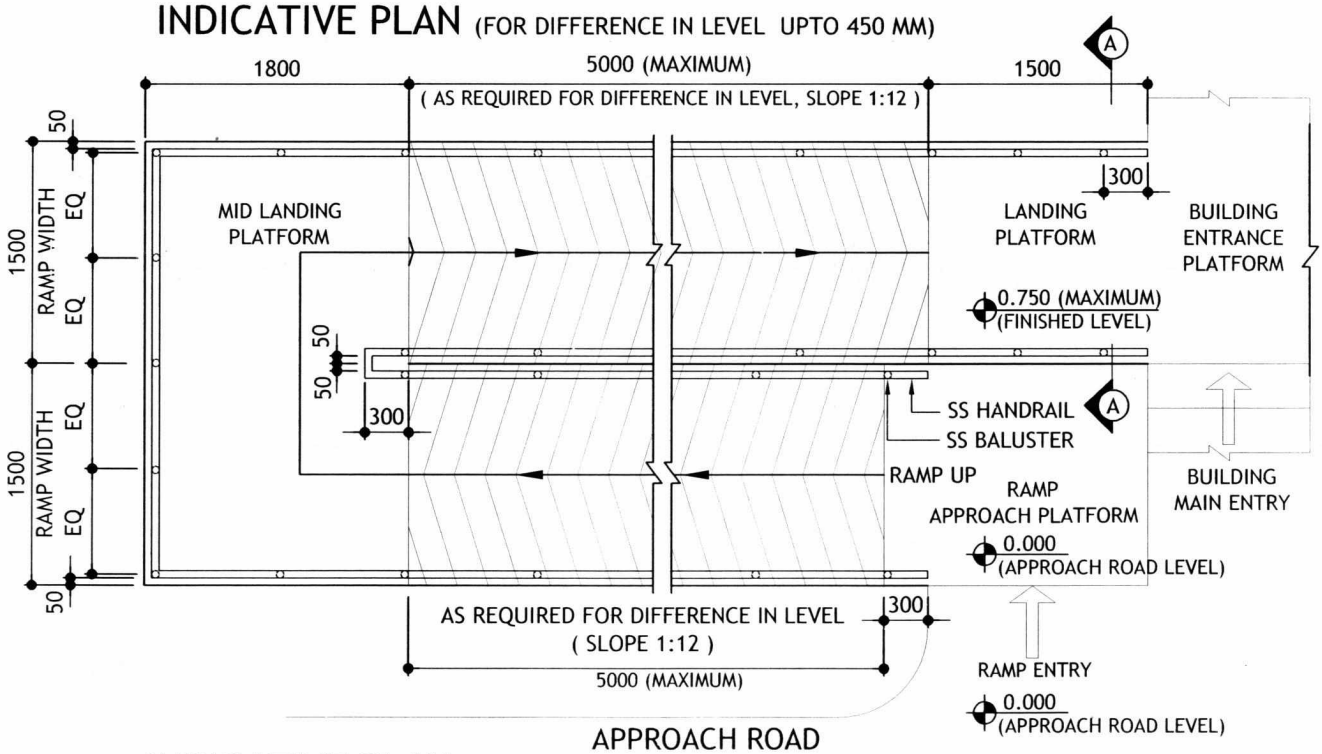
RAMP DETAIL
(FOR WHEEL CHAIR USERS)



SECTIONAL VIEW B-B



INDICATIVE PLAN (FOR DIFFERENCE IN LEVEL UPTO 450 MM)



INDICATIVE PLAN (FOR DIFFERENCE IN LEVEL 451 TO 750 MM)

NOTE :

1. ALL DIMENSIONS ARE IN MM
2. SS - STAINLESS STEEL (GRADE-304)
3. ALL SS MEMBERS/FITTING SHALL BE OF SATIN FINISH.
4. THE RAMP ARRANGEMENT IS INDICATIVE. THE ARRANGEMENT SHALL BE AS PER ARCHITECTURAL DWG. BUT RAILING, LANDING DETAILS SHALL BE AS PER THIS STANDARD.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	16.10.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
0	04.06.18	ISSUED AS STANDARD	MLT	SD	RS	R K TRIVEDI

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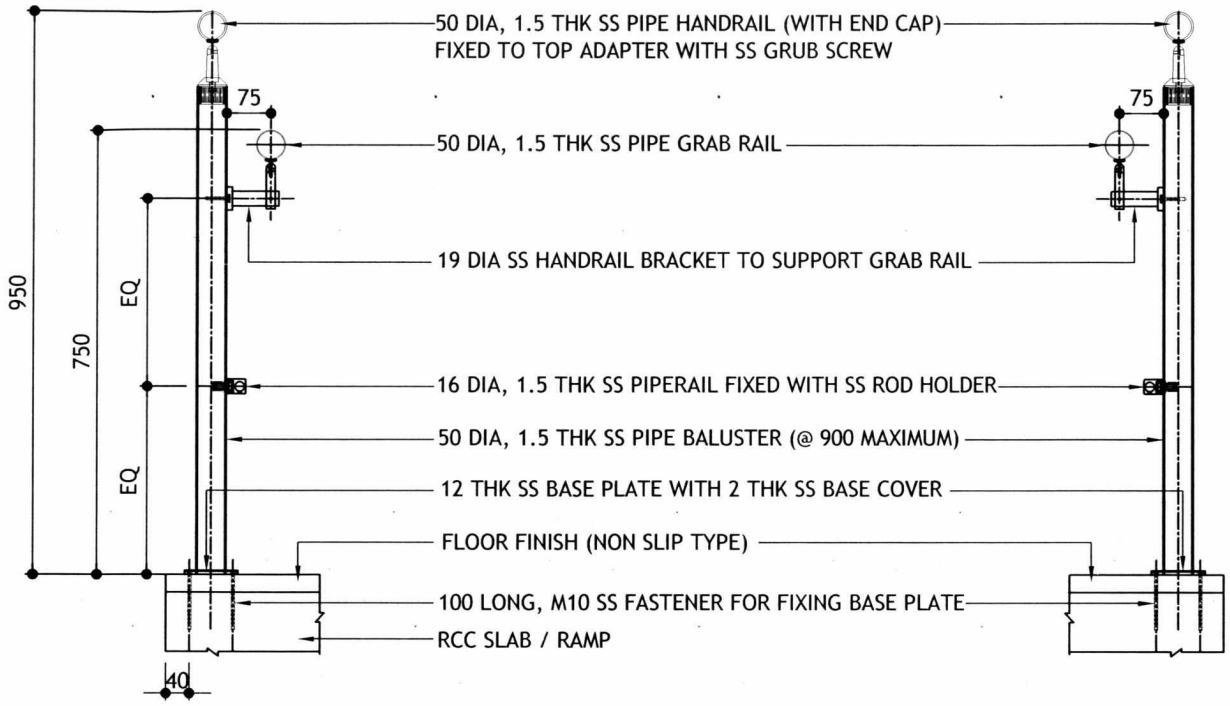
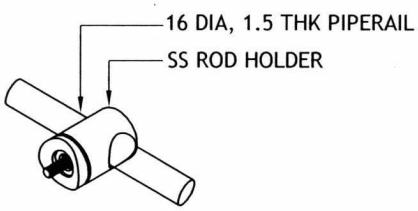
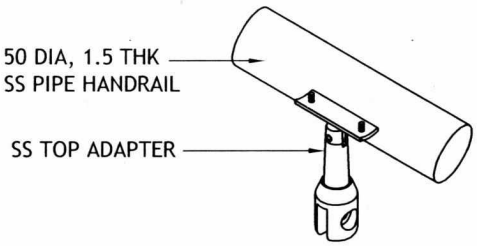


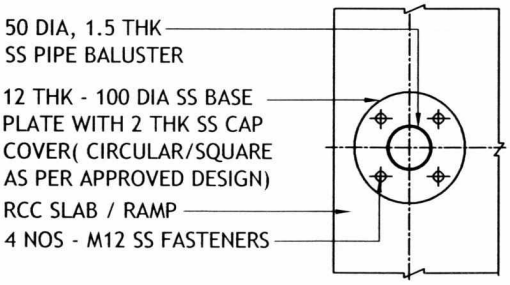
SECTION A-A



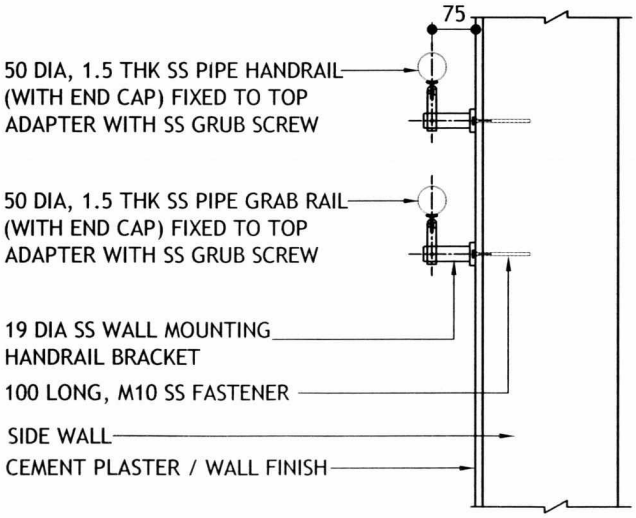
ROD HOLDER
(INDICATIVE VIEW)



TOP ADAPTER
(INDICATIVE VIEW)



BASE PLATE DETAIL (PLAN)

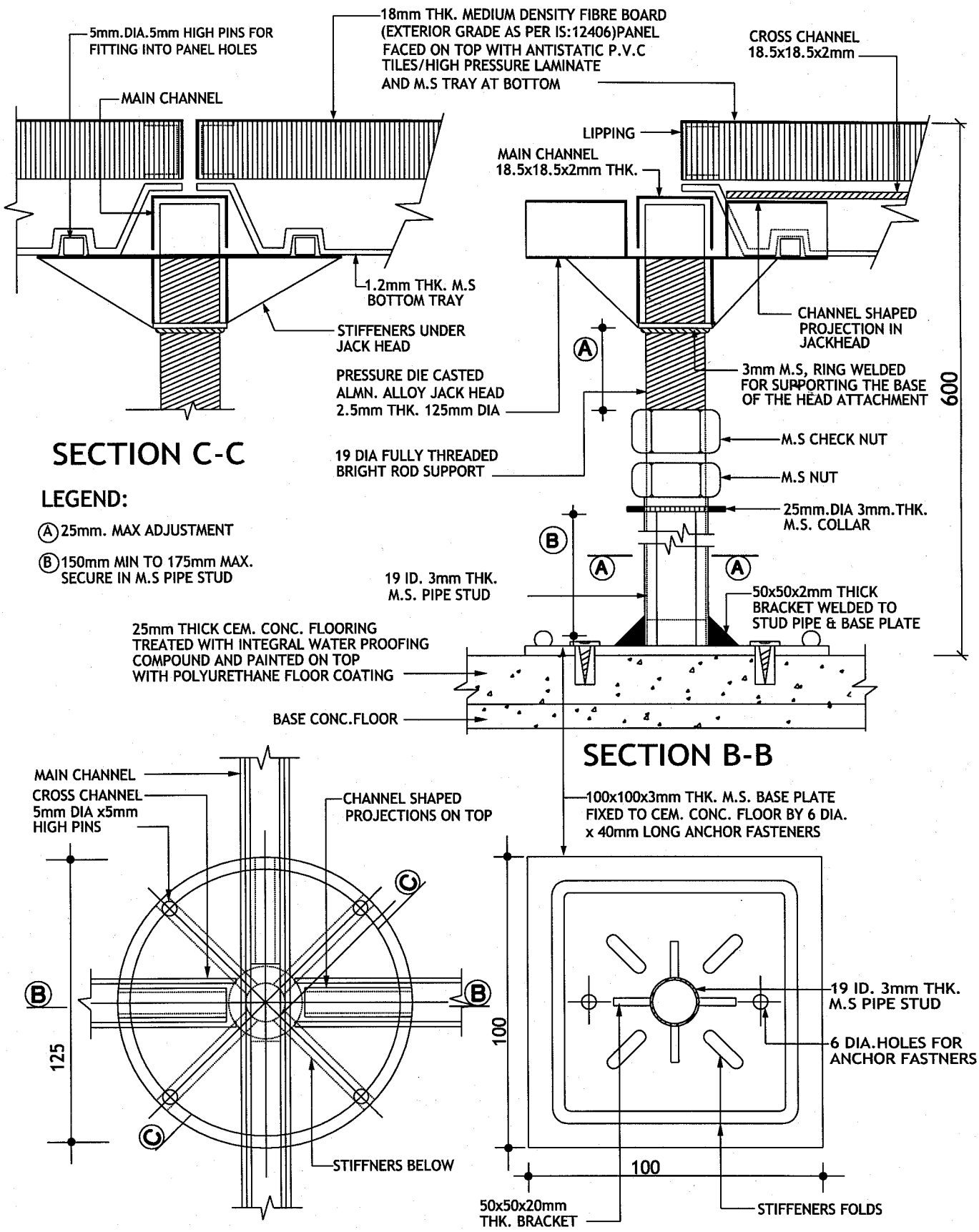


DETAIL OF GRAB RAIL
(ALONG WALL)

NOTE :
5. IN PLACE OF TOP ADAPTER & GRUB SCREW, WELDING USING SUITABLE SS MEMBER IS ACCEPTABLE IF SPECIFIED.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	16.10.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	SANDEEP	SAMIR DAS	SANJAY MAZUMDAR
0	04.06.18	ISSUED AS STANDARD	MLT	SD	RS	R K TRIVEDI

Page No. 1868 of 2390_Tender Document No. B889-000-81-46-CF-T-8202-0



SECTION C-C

LEGEND:

(A) 25mm. MAX ADJUSTMENT

(B) 150mm MIN TO 175mm MAX. SECURE IN M.S PIPE STUD

SECTION B-B

PLAN OF JACK HEAD

SECTION PLAN A-A

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
3	14.03.05	REAFFIRMED AS STANDARD	DIDAR SINGH	SD/JKB	ARVIND KUMAR	S.K. GARYALI
					Approved by	

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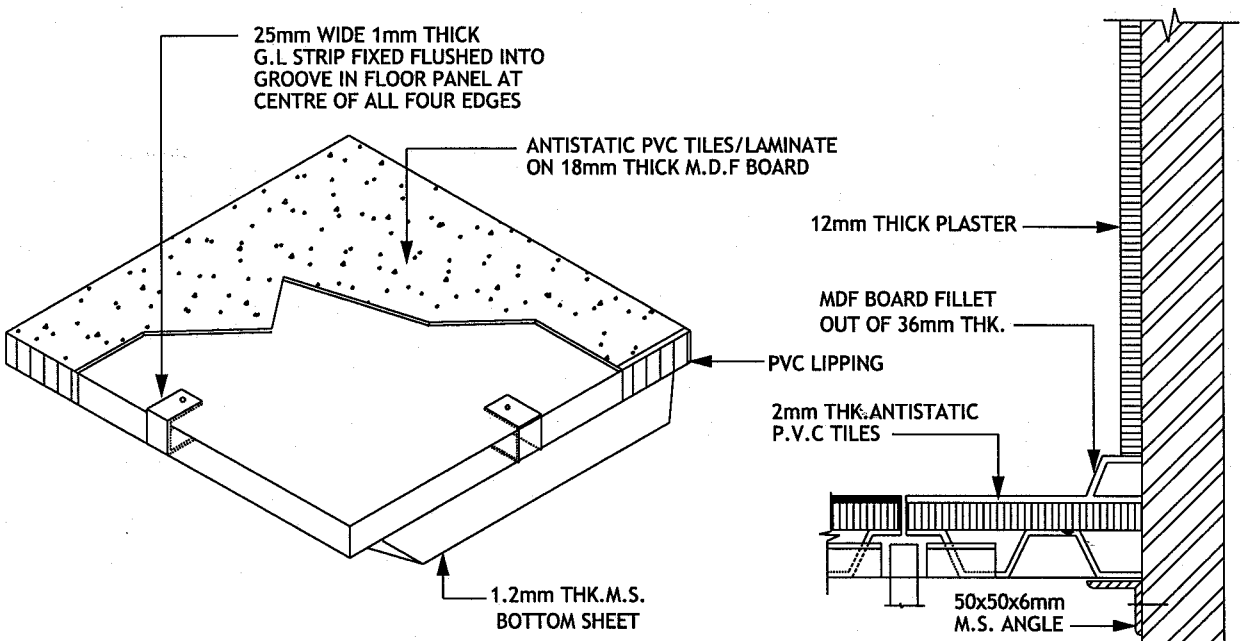
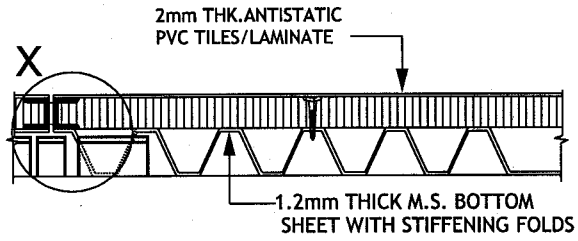
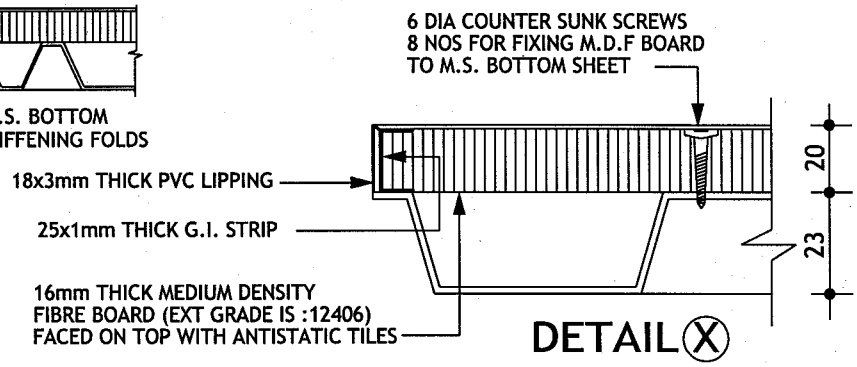


ISOMETRIC VIEW OF A PANEL

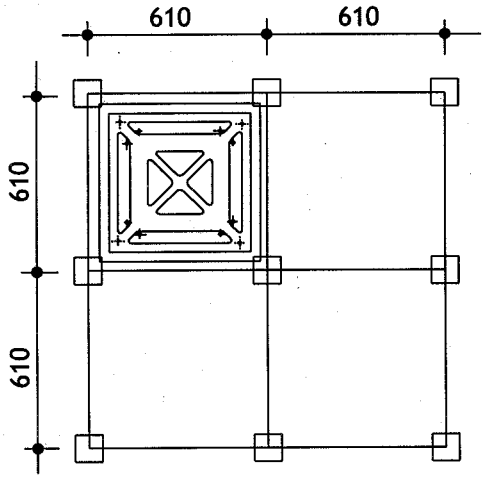
DET. OF JUNCTION WITH THE WALL



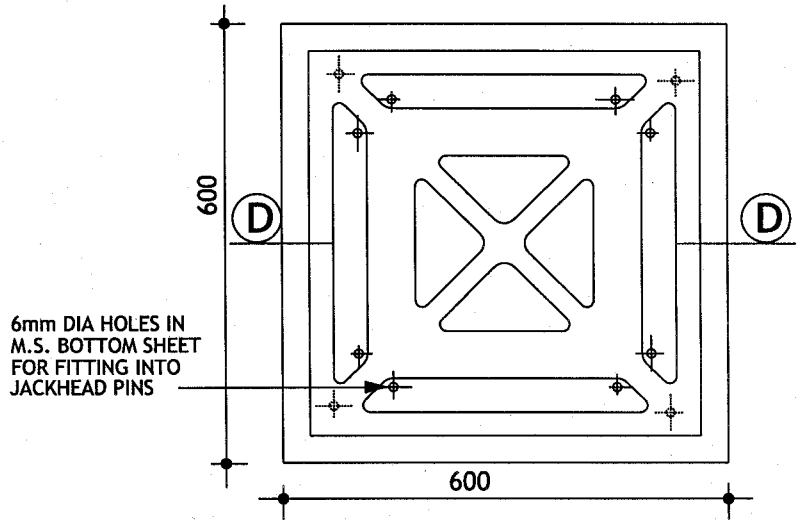
SECTION D-D



DETAIL (X)



PART OF GRID PLAN



PLAN OF FLOOR PANEL

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
3	14.03.05	REAFFIRMED AS STANDARD	DIDAR SINGH	SD/JKB	ARVIND KUMAR	S.K. GARYALI

Approved by

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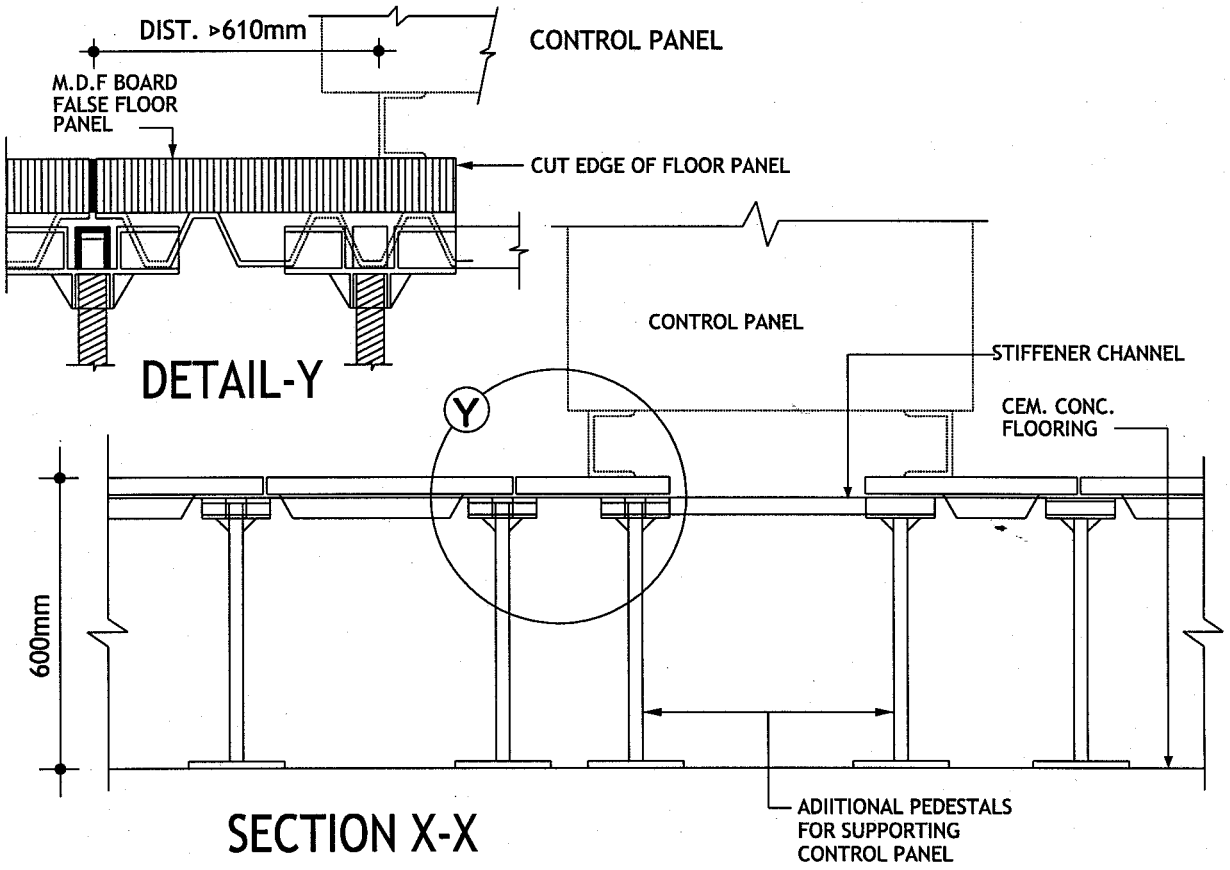
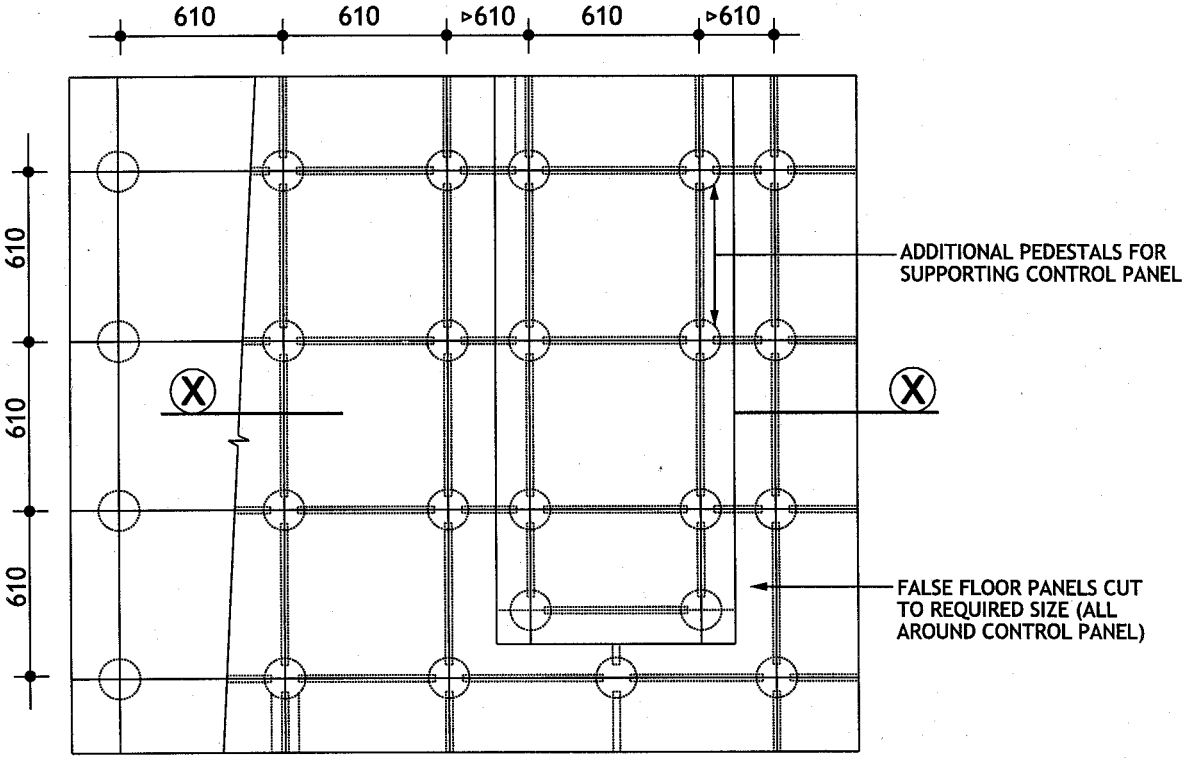


SECTION X-X



PART PLAN OF FALSE FLOORING

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	14.03.05	REAFFIRMED AS STANDARD	DIDAR SINGH	SD/JKB	ARVIND KUMAR	S.K. GARYALI

Approved by

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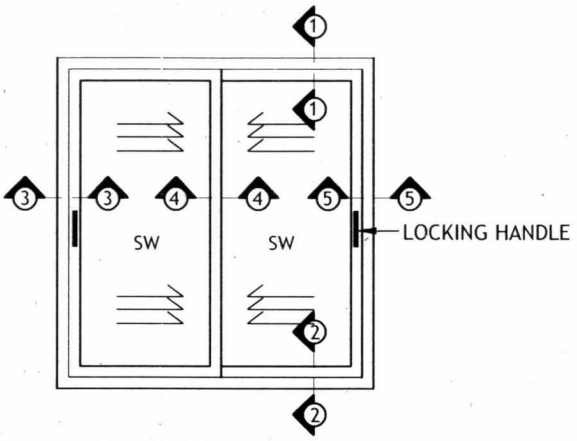
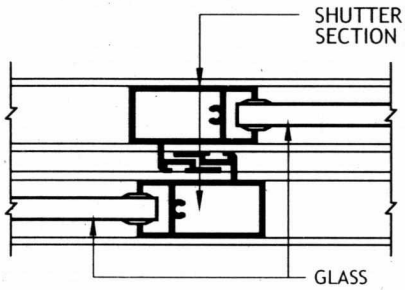
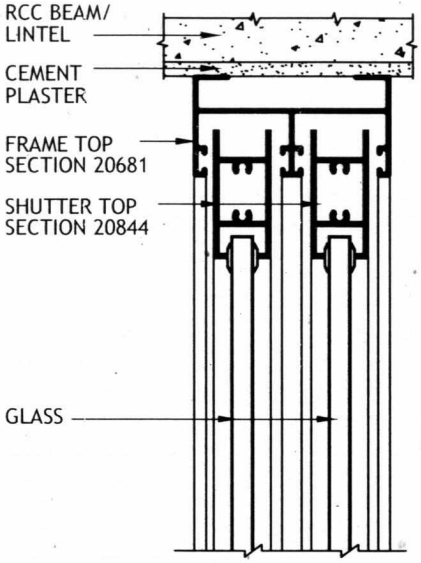
ALUMINIUM SLIDING WINDOW
(2 TRACK TYPE)



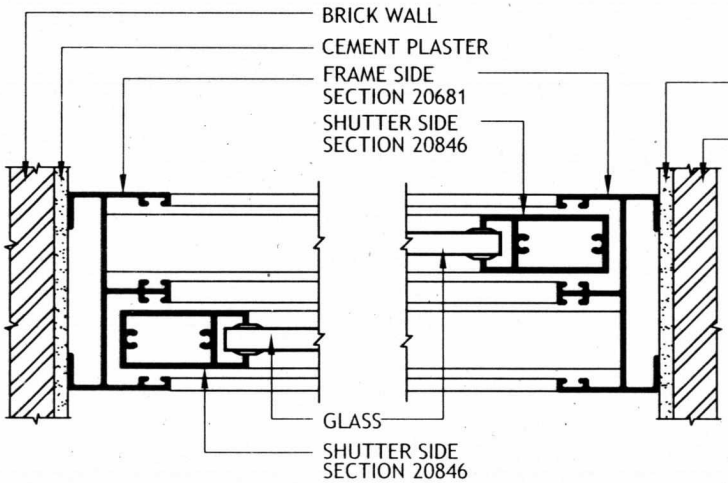
ELEVATION
(SW-SLIDING WINDOW)



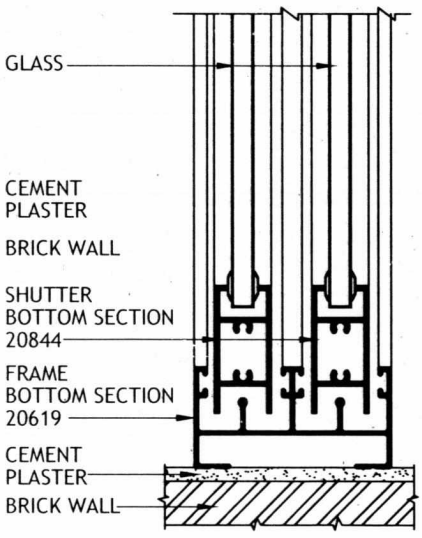
SECTION 4-4



SECTION 1-1



SECTION 3-3



SECTION 5-5

SECTION 2-2

NOTE:
1. THE SECTION DESIGNATION NOS. PERTAIN TO EXTRUDED ALUMINIUM SECTIONS OF "JINDAL ALUMINIUM LTD." AND ARE INDICATED FOR REFERENCE. EQUIVALENT SECTIONS OF OTHER APPROVED MANUFACTURERS CAN ALSO BE USED.
2. FOR FINISHING OF ALUMINIUM SECTION (ANODISED/POWDER COATING) REFER BID/TENDER.
3. RUBBER/EPDM GASKET SHALL BE USED FOR FIXING OF GLASS.
4. HARDWARE AND GLASS SHALL BE AS PER BID/TENDER.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	17.03.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
1	16.01.18	REISSUED AS STANDARD	AK	SD	RAJANJI SRIVASTAVA	R.NANDA

Approved by

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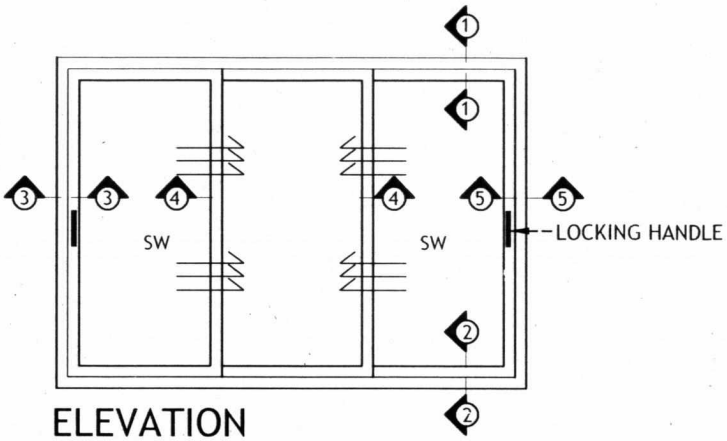
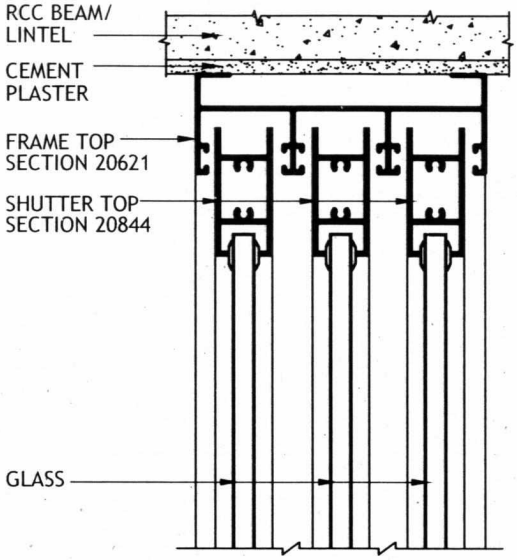
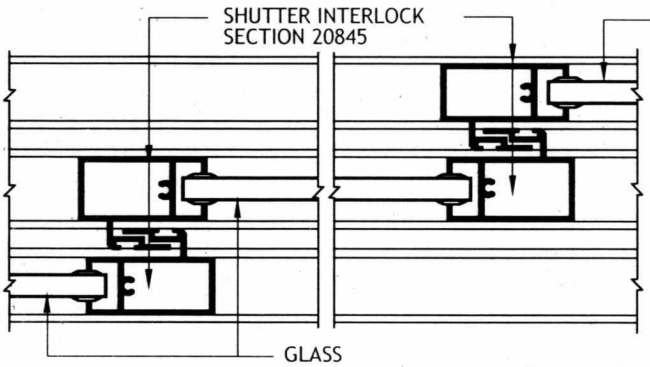


ELEVATION
(SW-SLIDING WINDOW)



SECTION 1-1



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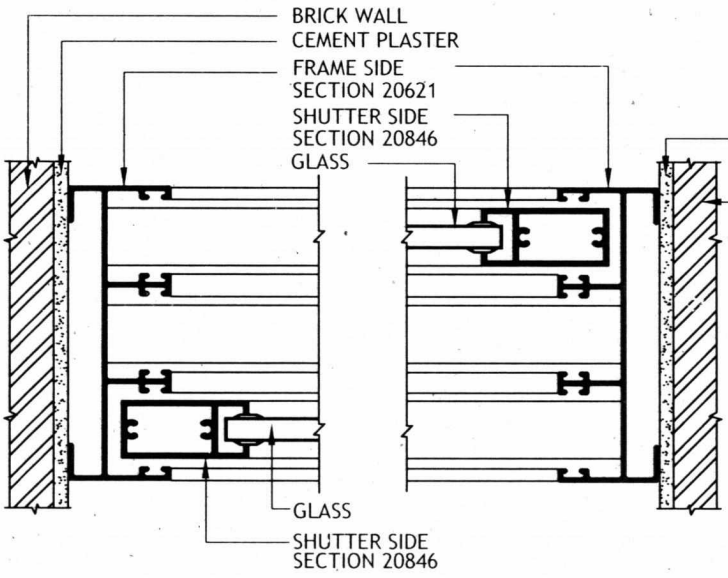
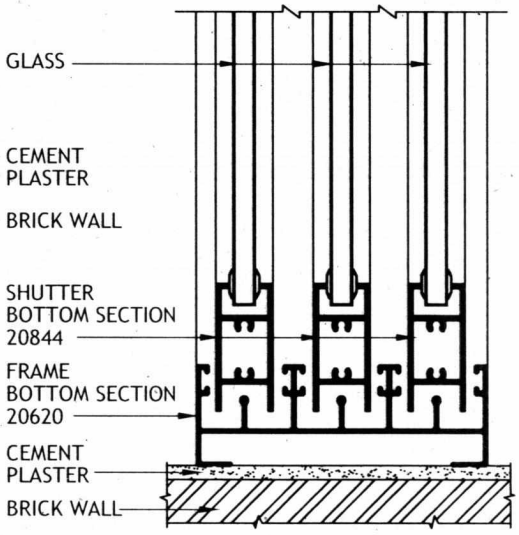


SECTION 3-3



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SECTION 2-2

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Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
2	17.03.23	REAFFIRMED & ISSUED AS STANDARD	M L THAKUR	ATUL GUPTA	SAMIR DAS	SANJAY MAZUMDAR
1	16.01.18	REISSUED AS STANDARD	AK	SD	RAJANJI SRIVASTAVA	R.NANDA

Approved by

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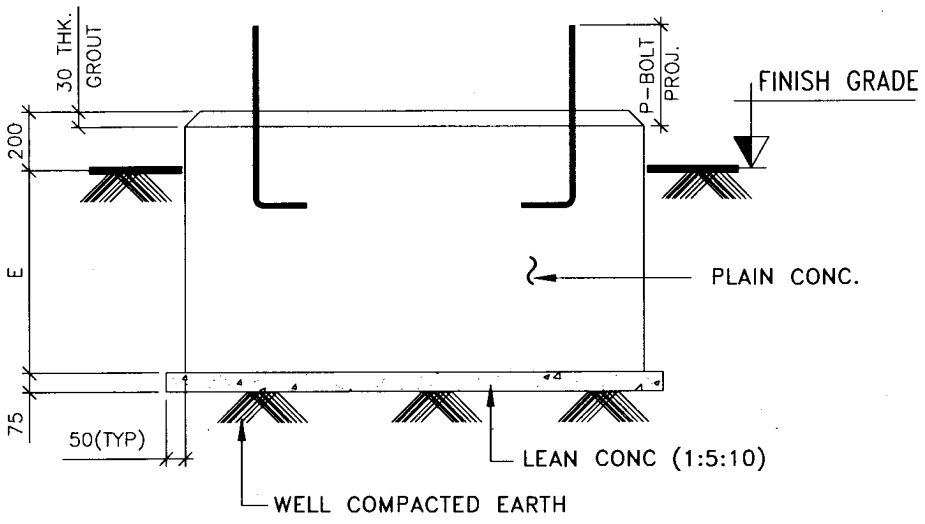
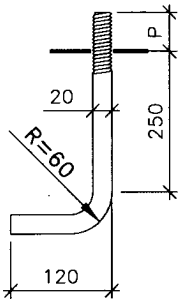
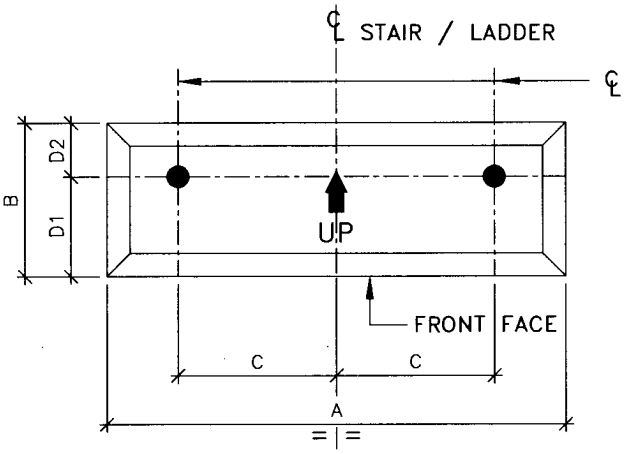


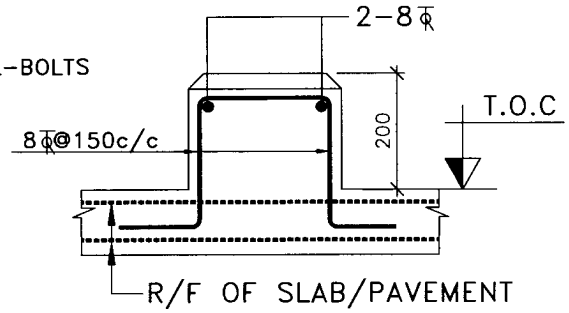
PEDESTAL FOR UNPAVED AREA



DET. OF L-BOLT



PLAN



PEDESTAL ON CONC. PAVEMENT/R.C.C. SLAB

S.NO.	ITEM	WIDTH	A	B	C	D1	D2	P	E	NUT	REMARKS
1	LADDER	450	750	300	280	200	100	90	500	SINGLE	
2	STAIR	750	1100	310	421	160	150	90	600	SINGLE	FOR STRINGER BEAM MC150
3	STAIR	750	1100	355	421	255	100	90	600	SINGLE	FOR STRINGER BEAM MC200

NOTES:-

1. IN CASE OF PEDESTAL OVER PILE CAP/RCC FOUNDATION, DIMENSION 'E' TO SUIT ACCORDINGLY BUT NOT TO EXCEED VALUES GIVEN IN ABOVE TABLE.
2. CONCRETE GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT BUT NOT LOWER THEN M20.
3. REBARS GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT.
4. M20 L-BOLT AS PER DETAIL GIVEN ABOVE SHALL BE PROVIDED.
5. ANCHOR BOLT GRADE, NUTS, WASHERS & THREADING SHALL BE AS PER STANDARD NO. 7-68-0417.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	08.07.21	REVISED AND ISSUED AS STANDARD	JITENDER GUPTA	ANKUR SHARMA	ANURAG SINHA	S. MAZUMDAR
7	16.09.16	REAFFIRMED AND ISSUED AS STANDARD	B.S SHARMA	R.B SHARMA	RAJAN JI SRIVASTAVA	R.NANDA

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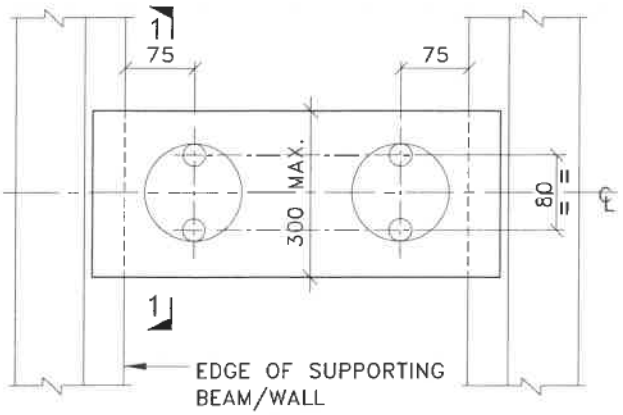
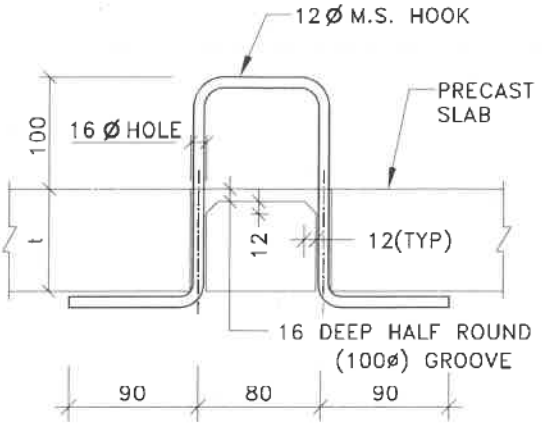
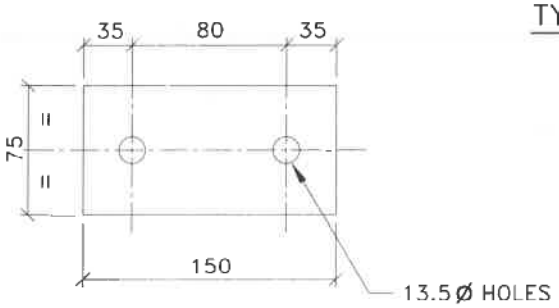


PLAN

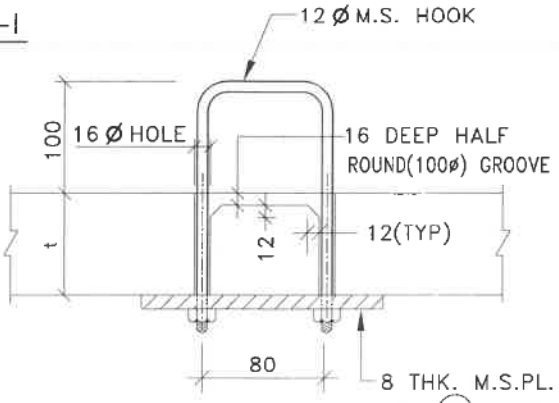


SECTION:1–1

TYPE–I

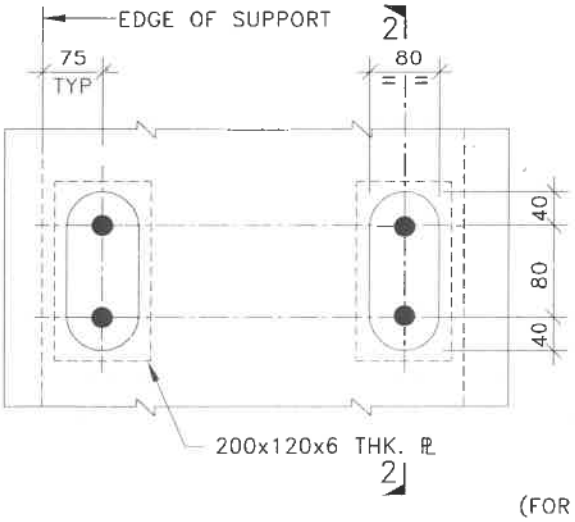


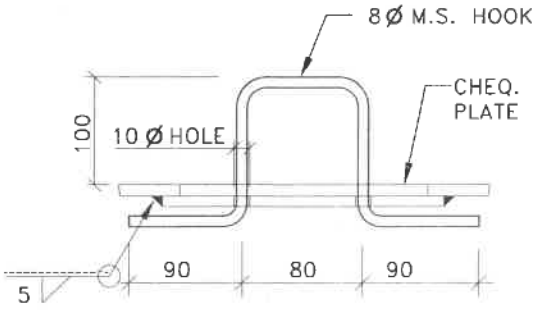
DETAIL OF M.S. PLATE MKD. (X)



SECTION:1–1

TYPE–II





SECTION:2–2

TYPE–III

(FOR CHEQ. PLATE ONLY)

NOTES:

1. ALL DIMENSIONS ARE IN mm
2. FOR PRECAST SLABS GENERALLY LIFTING HOOK TYPE–I SHALL BE USED UNLESS TYPE–II IS SPECIFIED IN THE DRAWING.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
7	28.03.24	REVISED AND ISSUED AS STANDARD	SN	AD/MM	ANURAG SINHA	MAINAK NANDI
6	27.08.18	REAFFIRMED AND ISSUED AS STANDARD	KKS	A. SINHA	R. SRIVASTAVA	R. K. TRIVEDI

Approved by

Page No. 1875 of 2390_Tender Document No. B889-000-81-46-CF-T-8202-0
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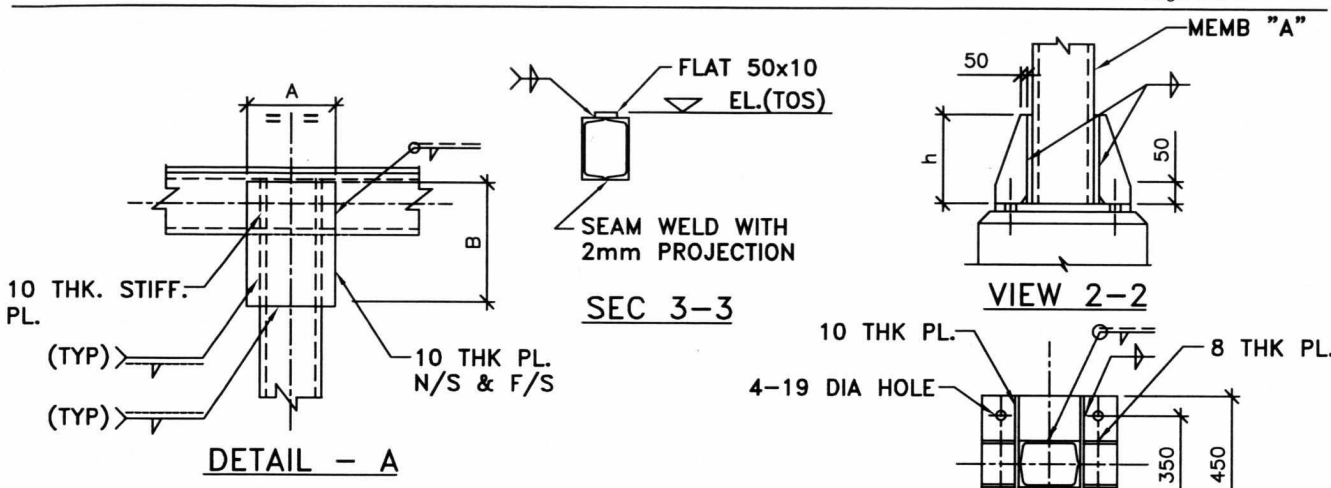
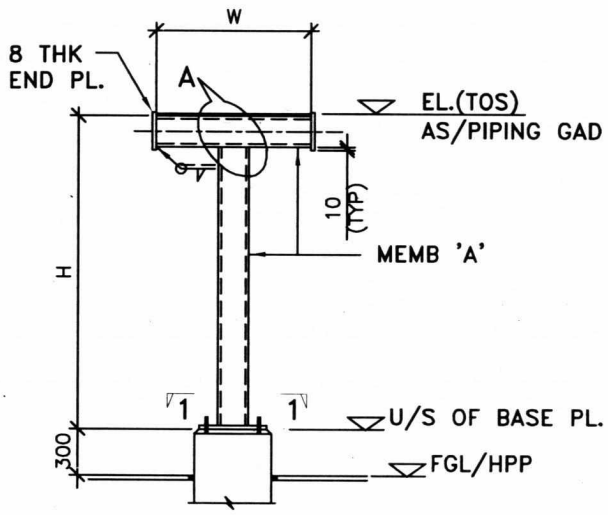
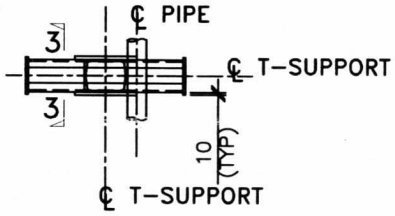




ELEVATION



PLAN

S. NO.	T-SUPPT. MKD.	WIDTH 'W'	HEIGHT 'H'	MEMB 'A'	BASE PLATE TYPE	h	CONN. PLATE		APPX. QTY IN KG
							A	B	
1	TSA	UPTO 750	UPTO 2000	ISMC150[]	I	200	200	225	150
2	TSB	UPTO 750	2000<H≤3000	ISMC200[]	II	275	250	300	260
3	TSC	UPTO 750	3000<H≤4000	ISMC250[]	III	325	300	350	410
4	TSD	750<W≤1500	UPTO 1500	ISMC150[]	I	200	200	225	160
5	TSE	750<W≤1500	1500<H≤2300	ISMC200[]	II	275	250	300	260
6	TSF	750<W≤1500	2300<H≤3000	ISMC250[]	III	325	300	350	400

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
4	12.04.23	REVISED AND ISSUED AS STANDARD	RKAUR	DK/BA	ANURAG SINHA	S.MAZUMDAR
3	15.04.17	REAFFIRMED & ISSUED AS STANDARD	Anju	ADITYA	RAJAN JI SRIVASTAVA	R.NANDA
2	27.06.11	REVISED AND ISSUED AS STANDARD	SUSHMA	P.K.MITTAL	S.CHATURVEDI	D.MALHOTRA

Approved by

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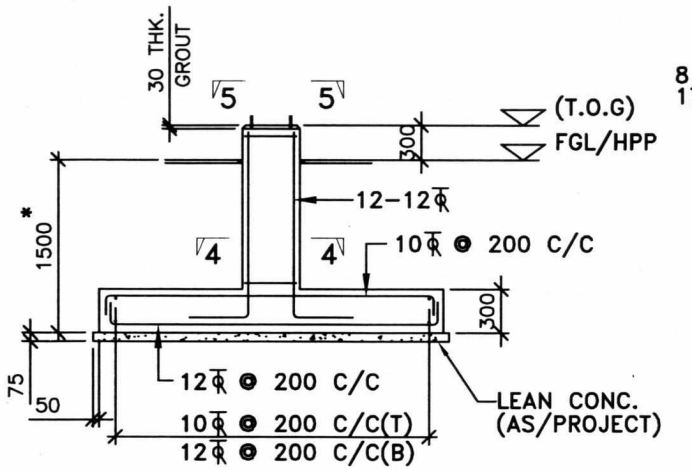
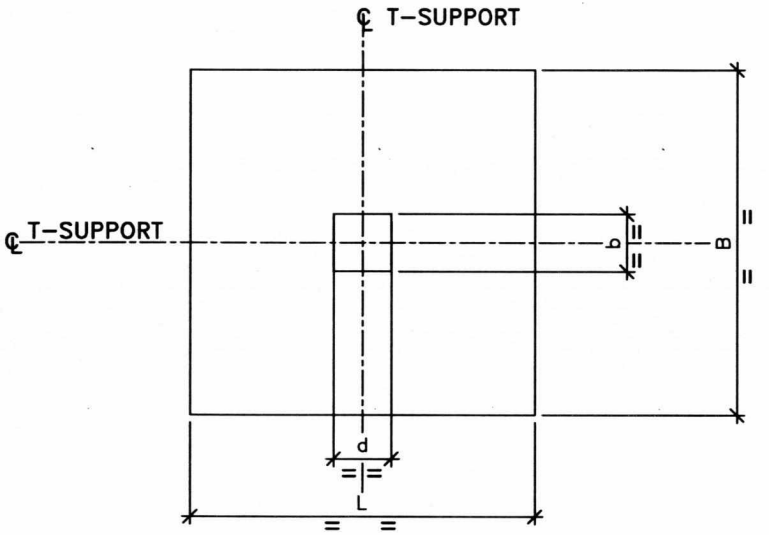
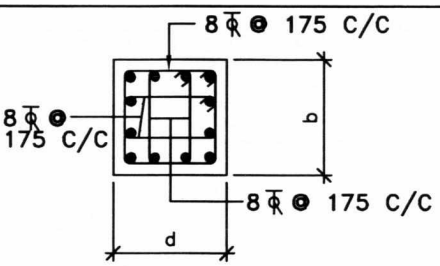


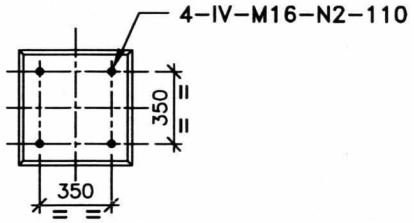
ELEVATION



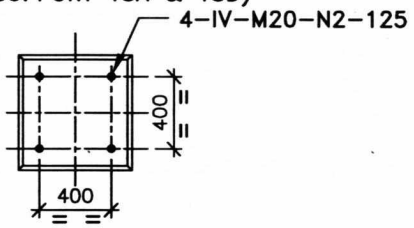
FDN. PLAN



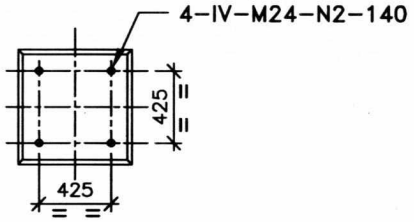
SECTION 4-4



VIEW 5-5
(FOR SUPPORT TSA & TSD)



VIEW 5-5
(FOR SUPPORT TSB & TSE)



VIEW 5-5
(FOR SUPPORT TSC & TSF)

S. NO.	T-SUPPORT MARKED	PED SIZE		5.0≤ S.B.C<10.0 T/sqM			10.0≤ S.B.C<15.0 T/sqM			S.B.C≥15.0 T/sqM		
				FDN. SIZE		QTY IN	FDN. SIZE		QTY IN	FDN. SIZE		QTY IN
		d	b	L	B	m^3	L	B	m^3	L	B	m^3
1	TSA	600	600	1800	1800	1.51	1600	1600	1.31	1500	1500	1.22
2	TSB	650	650	2000	2000	1.83	1750	1750	1.55	1600	1600	1.40
3	TSC	700	700	2250	2250	2.25	1800	1800	1.71	1800	1800	1.71
4	TSD	600	600	2000	2000	1.74	1750	1750	1.46	1600	1600	1.31
5	TSE	650	650	2250	2250	2.15	1800	1800	1.60	1700	1700	1.50
6	TSF	700	700	2250	2250	2.25	1900	1900	1.82	1900	1900	1.82

NOTES:-

1. FOLLOWING LOADS HAVE BEEN CONSIDERED IN DESIGN:
   a) VERTICAL LOAD = 1.0 MT FOR 750 WIDTH
   = 2.0 MT FOR 1500 WIDTH
   b) WIND INTENSITY = 150 Kg/sqm
   c) WIND ON 24" PIPE HAS BEEN CONSIDERED
   d) PIPE FRICTION COEFFICENT IN EITHER DIRECTION = 0.30
2. CONC GRADE SHALL BE AS PER GENERAL NOTES OF THE PROJECT BUT NOT LOWER THEN M20.

* DEPTH OF FDN. CAN BE INCREASED TO CLEAR U/G PIPING IF ANY.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
4	12.04.23	REVISED AND ISSUED AS STANDARD	RKAUR	DK/DA	ANURAG SINHA	S.MAZUMDAR
3	15.04.17	REAFFIRMED & ISSUED AS STANDARD	Anju	ADITYA	RAJAN JI SRIVASTAVA	R.NANDA
2	27.06.11	REVISED AND ISSUED AS STANDARD	SUSHMA	P.K.MITTAL	S.CHATURVEDI	D.MALHOTRA

Approved by

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GENERAL NOTES :-

1. ALL LUGS SHALL BE OF HIGH STRENGTH DEFORMED BARS OF GRADE Fe500/Fe500D CONFORMING TO IS 1786 (WITH GUARANTEED WELDABILITY) AND SHALL BE CONNECTED TO METAL INSERT PLATES BY 6 mm FILLET WELDS AS SHOWN IN SKETCHES.
2. METAL INSERT PLATES SHALL BE OF GRADE E250, CONFORMING TO IS 2062 (GR-A/BR/BO).
3. METAL INSERT PLATES MARKED ON DRAWING REFER AS UNDER

   IP-(A) @ (C)

   IP = INSERT PLATE

   A = TYPE OF INSERT PLATE

   C = ELEVATION OF INSERT PLATE (TOP EDGE)

   e.g IP-R9a @ EL.110.300 MEANS INSERT PLATE TYPE R9a AT EL.110.300.
4. METAL INSERT PLATES SHALL BE KEPT FLUSH WITH CONCRETE SURFACE.
5. THE LONGER SIDE OF METAL INSERT PLATE SHALL BE KEPT VERTICAL UNLESS SHOWN OTHERWISE.
6. METAL INSERT PLATE ON COLUMN OR BEAM SHALL BE KEPT SYMMETRICAL ABOUT ℄ OF COLUMN OR BEAM, UNLESS SHOWN OTHERWISE.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	14.03.24	REVISED AND ISSUED AS STANDARD	EMMANUEL	SUDIP PAUL	ANURAG SINHA	MAINAK NANDI
7	06.06.18	REAFFIRMED AND ISSUED AS STANDARD	CS	AVM	R SRIVASTAVA	RK TRIVEDI

Approved by

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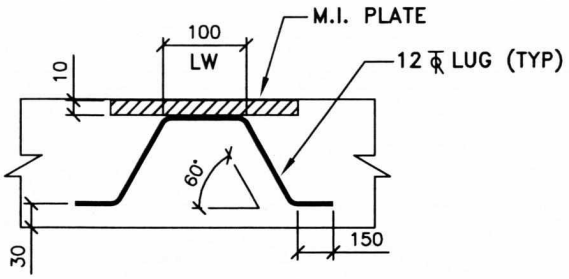
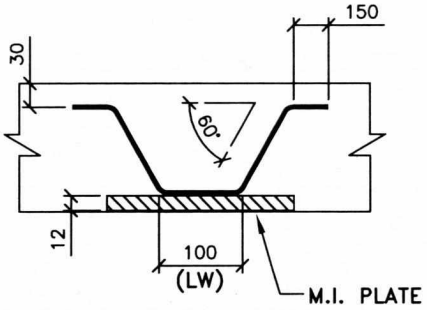
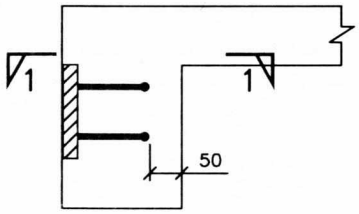
LUG BENDING DETAILS



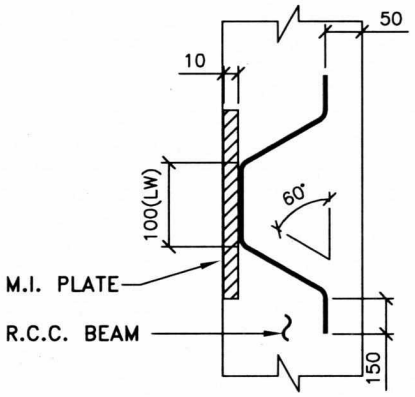
METAL INSERT DETAIL
ON TOP OF SLAB



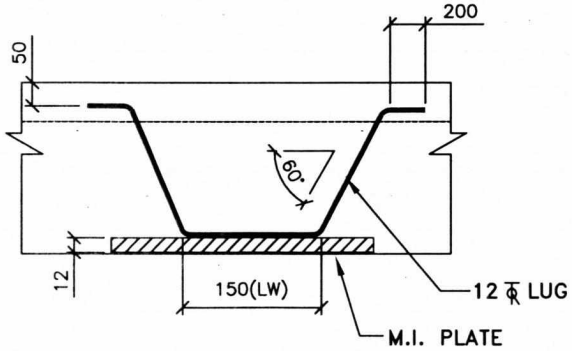
METAL INSERT DETAIL
ON BOTTOM OF SLAB



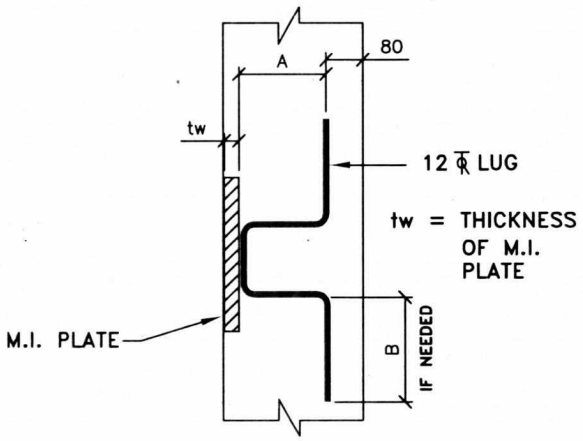
METAL INSERT DETAIL
ON SIDE OF BEAM



VIEW 1–1



METAL INSERT DETAIL
ON BOTTOM OF BEAM
(FOR ALTERNATE DETAIL REF. SHT. 7 OF 7)



METAL INSERT DETAIL
ON COLUMNS

A+B = LUG EMBEDMENT REQUIRED AS PER SHT. 4,5,6 OF 7

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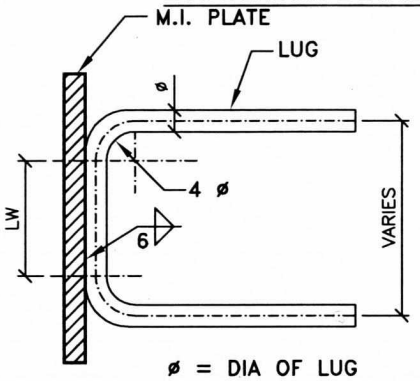
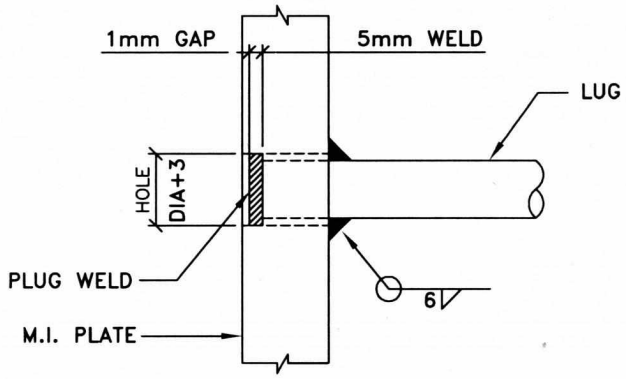
LUG BENDING DETAILS



ø = DIA OF LUG
LW = WELD LENGTH AVAILABLE

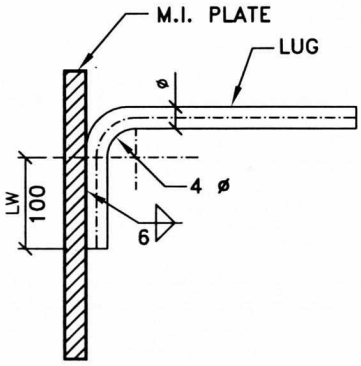
BENDING DIMENSIONS FOR 12ϕ & 16ϕ LUGS

(FOR SPACING OF LUGS ⩾ 190)
(NOT APPLICABLE FOR S1, S2, R1 & PS1)



WELD DETAIL OF 12ϕ & 16ϕ LUGS WITH M.I. PLATE

(FOR SPACING OF LUGS < 190)
(VALID FOR S1, S2 R1 & PS1)



BENDING DIMENSIONS FOR 12ϕ & 16ϕ LUGS

(VALID FOR R9, R10, R12, R13, R14, PS11, & PS12)

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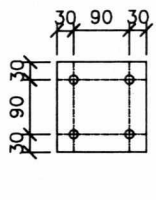
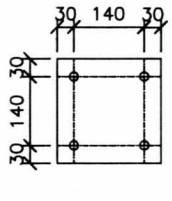
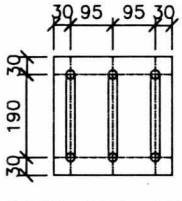
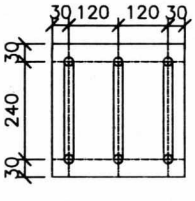
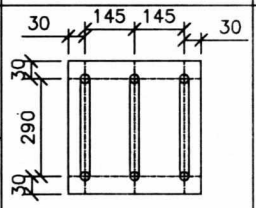
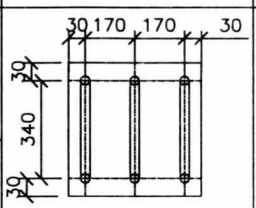
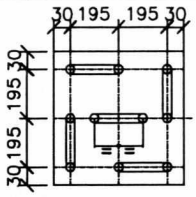
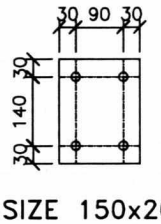
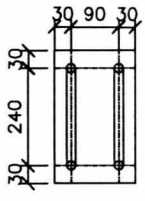
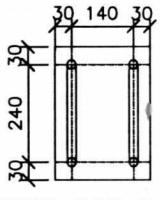
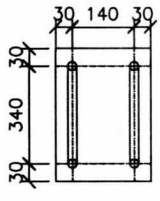
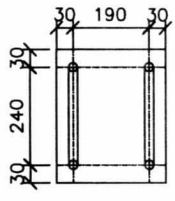
S/R DESIGNATES

S. NO.	TYPE OF INSERT	DIA OF LUGS	THK. OF INSERT	DETAILS OF INSERT PLATE	
				PLAN	CROSS SECTION
1.	S1a	12	12	 SIZE 150x150	
	S1b	16	16		
2.	S2a	12	12	 SIZE 200x200	
	S2b	16	16		
3.	S3a	12	12	 SIZE 250x250	
	S3b	16	16		
4.	S4a	12	12	 SIZE 300x300	
	S4b	16	16		
5.	S5a	12	12	 SIZE 350x350	
	S5b	16	16		
6.	S6a	12	12	 SIZE 400x400	
	S6b	16	16		
7.	S7a	12	12	 SIZE 450x450	
	S7b	16	16		
8.	R1a	12	12	 SIZE 150x200	
	R1b	16	16		
9.	R2a	12	12	 SIZE 150x300	
	R2b	16	16		
10.	R3a	12	12	 SIZE 200x300	
	R3b	16	16		
11.	R4a	12	12	 SIZE 200x400	
	R4b	16	16		
12.	R5a	12	12	 SIZE 250x300	
	R5b	16	16		

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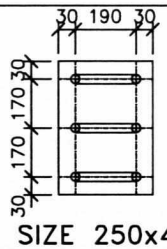
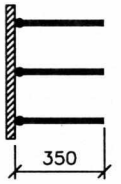
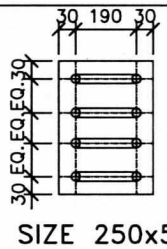
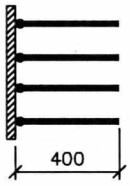
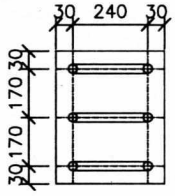
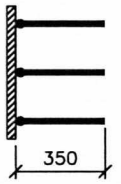
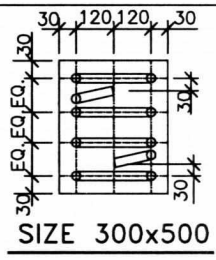
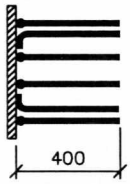
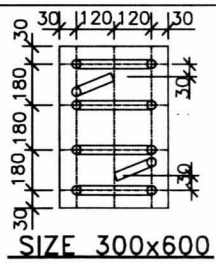
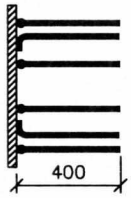
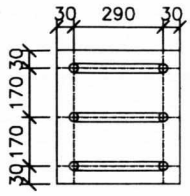
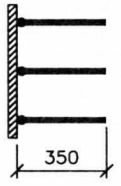
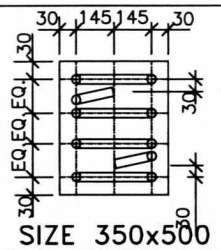
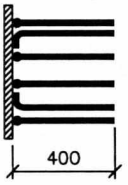
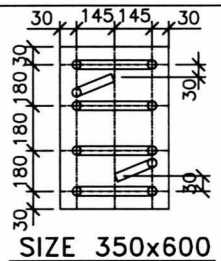
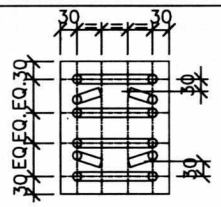
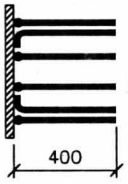
METAL INSERT PLATES

R DESIGNATES

S. NO.	TYPE OF INSERT	DIA OF LUGS	THK. OF INSERT	DETAILS OF INSERT PLATE	
				PLAN	CROSS SECTION
13.	R6a	12	12		
	R6b	16	16		
14.	R7a	12	12		
	R7b	16	16		
15.	R8a	12	12		
	R8b	16	16		
16.	R9a	12	12		
	R9b	16	16		
17.	R10a	12	12		
	R10b	16	16		
18.	R11a	12	12		
	R11b	16	16		

S. NO.	TYPE OF INSERT	DIA OF LUGS	THK. OF INSERT	DETAILS OF INSERT PLATE	
				PLAN	CROSS SECTION
19.	R12a	12	12		
	R12b	16	16		
20.	R13a	12	12		
	R13b	16	16		
21.	R14a	12	12		
	R14b	16	16		

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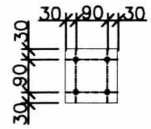
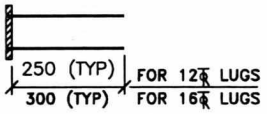
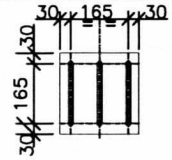
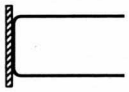
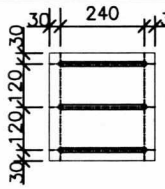
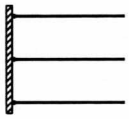
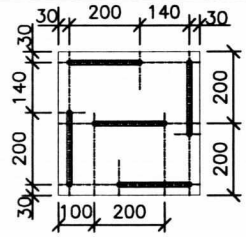
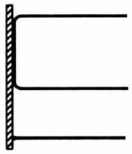
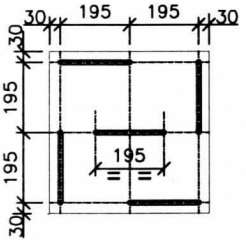
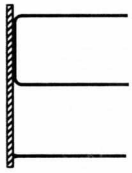
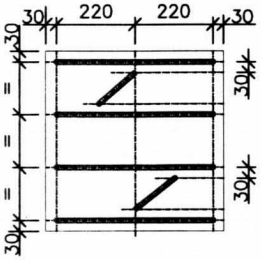
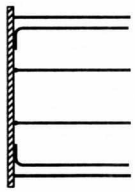
PS DESIGNATES

S.NO.	TYPE OF INSERT	DIA OF LUGS	THK. OF INSERT	DETAILS OF INSERT PLATE	
				PLAN	CROSS SECTION
1.	PS1	12	12	 SIZE 150x150	
	PS2	16	16		
2.	PS3	12	12	 SIZE 225x225	
	PS4	16	16		
3.	PS5	12	12	 SIZE 300x300	
	PS6	16	16		
4.	PS7	12	12	 SIZE 400x400	
	PS8	16	16		
5.	PS9	12	12	 SIZE 450x450	
	PS10	16	16		
6.	PS11	12	12	 SIZE 500x500	
	PS12	16	16		

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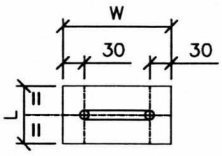
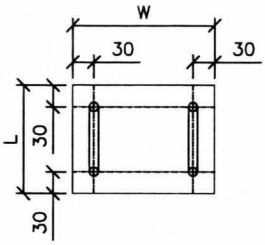
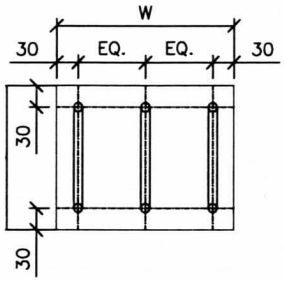
T DESIGNATES



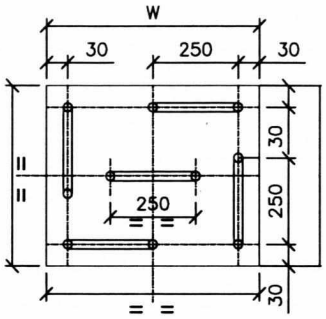
TYPE T1



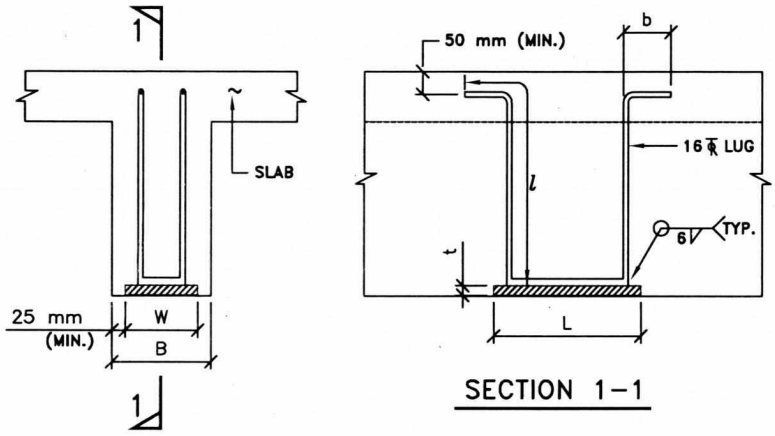
TYPE T2, T3 & T4



TYPE T5 & T6



TYPE T7



SECTION 1–1

TYPICAL FIXING DETAIL

S.NO.	TYPE OF INSERT	WIDTH OF BEAM 'B' (mm)	MAXIMUM WIDTH OF PLATE 'W' (mm)	LENGTH OF PLATE 'L' (mm)	MAXIMUM 'b' (mm)	THICKNESS OF PLATE 't' (mm)	TOTAL ANCHORAGE LENGTH 'l' (mm)
1.	T1	230	180	180	110	16	350
2.	T2	300	220	250	110	20	350
3.	T3	350	270	250	110	20	350
4.	T4	400	320	250	110	20	350
5.	T5	450	370	300	110	32	350
6.	T6	500	420	300	110	32	350
7.	T7	500	420	400	110	32	350

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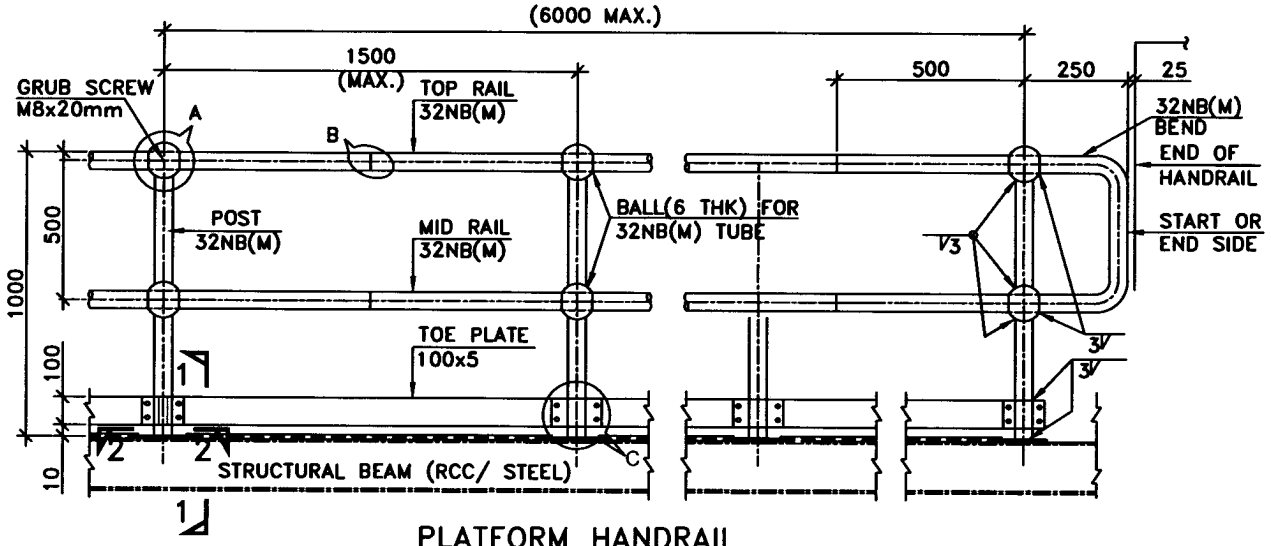
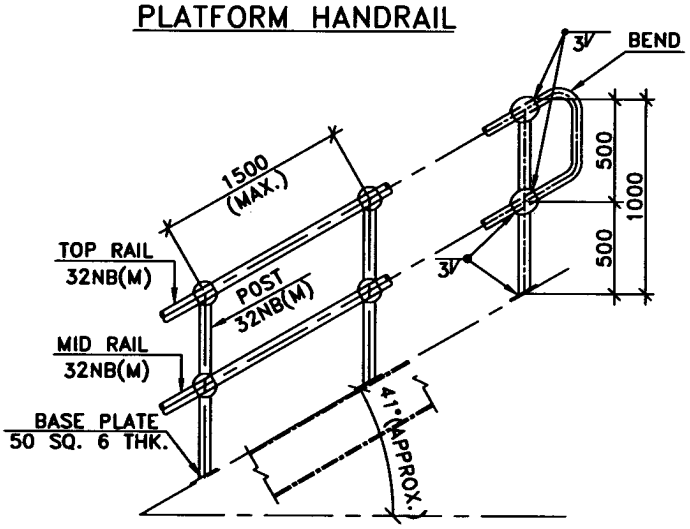
NOTES :-

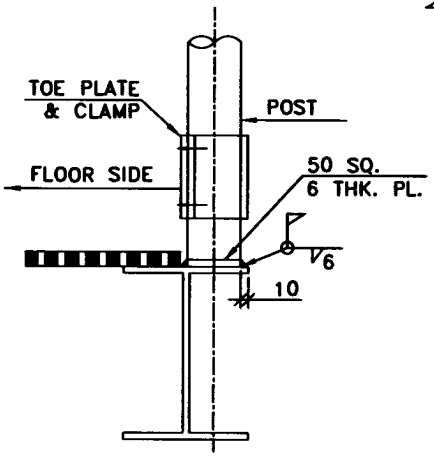
1. ALL DIMENSIONS ARE IN mm.
2. ALL M.S. TUBES SHALL CONFIRM TO IS : 1161/1239 & PLATE SHALL CONFIRM TO IS:2062.
3. PAINTING AND GALVANIZATION OF HANDRAIL SHALL BE AS PER JOB SPECIFICATION.



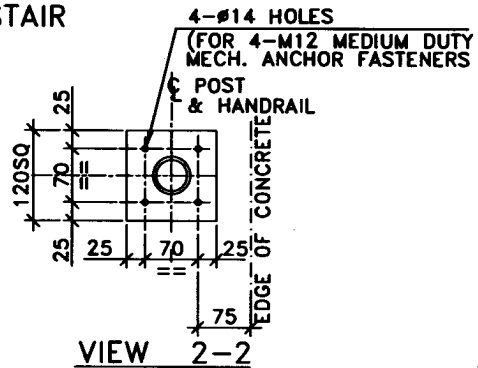
PLATFORM HANDRAIL



STAIR HANDRAIL
INCLINED RAILING
ON STEEL STAIR



VIEW 1-1
HORIZONTAL RAILING
ON STEEL PLATFORM



VIEW 2-2
BASE PLATE DETAIL
FOR VERTICAL POST
ON RCC BEAM/SLAB

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
1	23.02.2021	REAFFIRMED & REISSUED AS STANDARD	AK	[illegible]	AS	S.MAZUMDAR
0	15.10.2015	ISSUED AS STANDARD	KKS	SG/AS	RS	SC

Approved by

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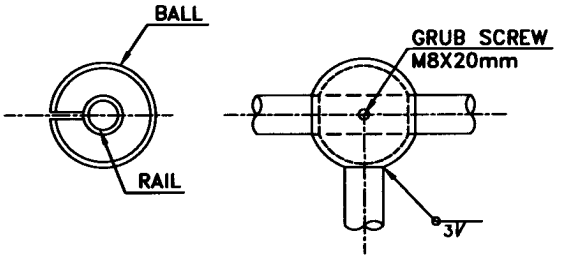
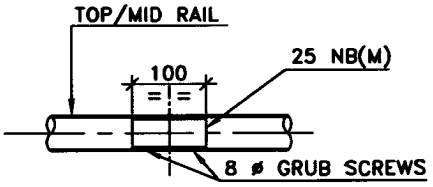
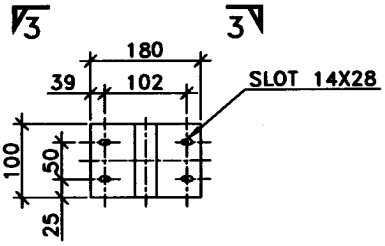


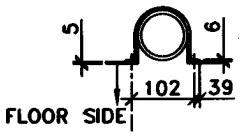
DETAIL– Ⓐ



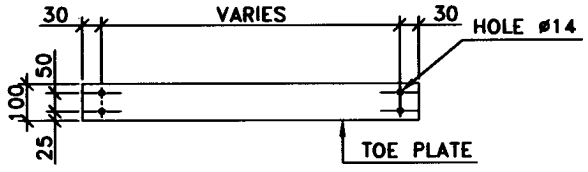
DETAIL – Ⓑ
DETAIL OF SPLICE



DETAIL – Ⓒ



VIEW 3–3
TOE PLATE CLAMP



TOE PLATE DETAIL

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
1	23.02.2021	REAFFIRMED & REISSUED AS STANDARD	AK	RBS	AS	S.MAZUMDAR
0	15.10.2015	ISSUED AS STANDARD	KKS	SG/AS	RS	SC

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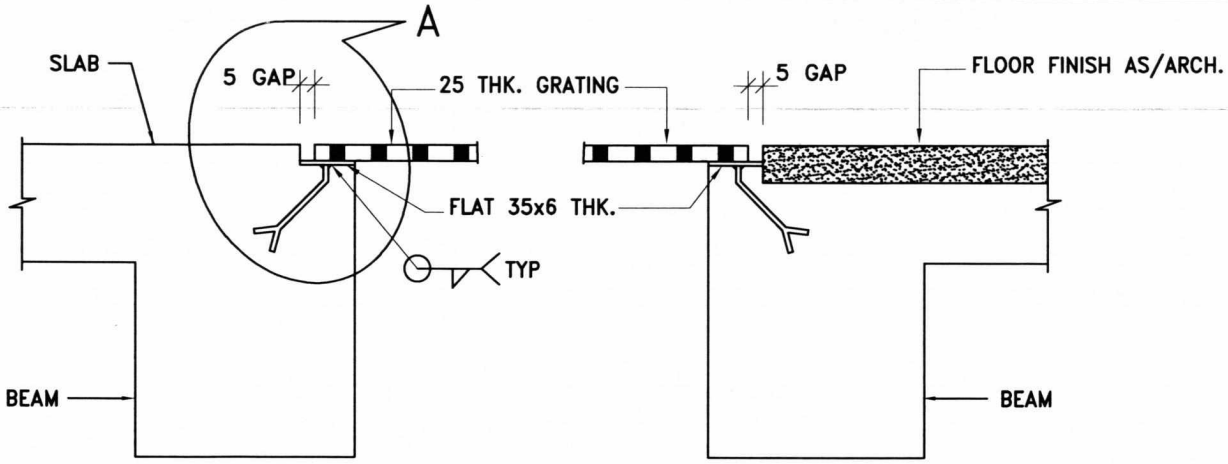
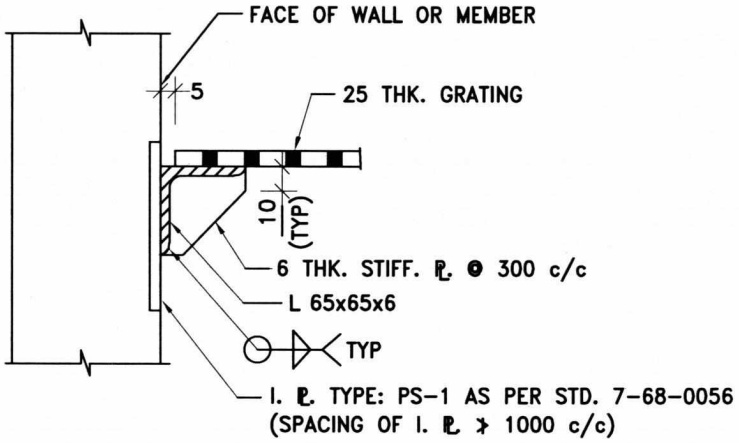
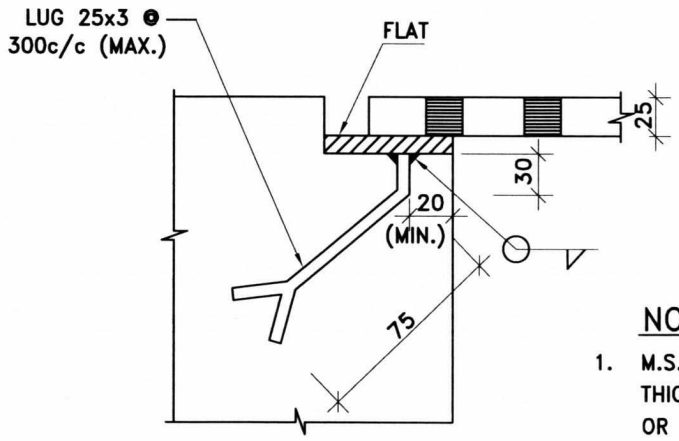


GRATING SUPPORT OVER BEAM WITHOUT FLOOR FINISH

GRATING SUPPORT OVER BEAM WITH FLOOR FINISH



GRATING SUPPORT ON WALL/COLUMN



DETAIL-'A'

NOTES:

1. M.S. LUGS SHALL BE SUITABLY BENT IF CONCRETE THICKNESS IS LESS THAN THE LENGTH OF LUGS OR LUGS INTERFERE WITH R/F BARS.
2. ALL DIMENSIONS ARE IN mm.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	12.12.23	REVISED AND ISSUED AS STANDARD	SN	AD/MM	ANURAG SINHA	MAINAK NANDI
7	06.06.18	REAFFIRMED AND ISSUED AS STANDARD	CS	AVM	R.SRIVASTAVA	RK TRIVEDI

Approved by

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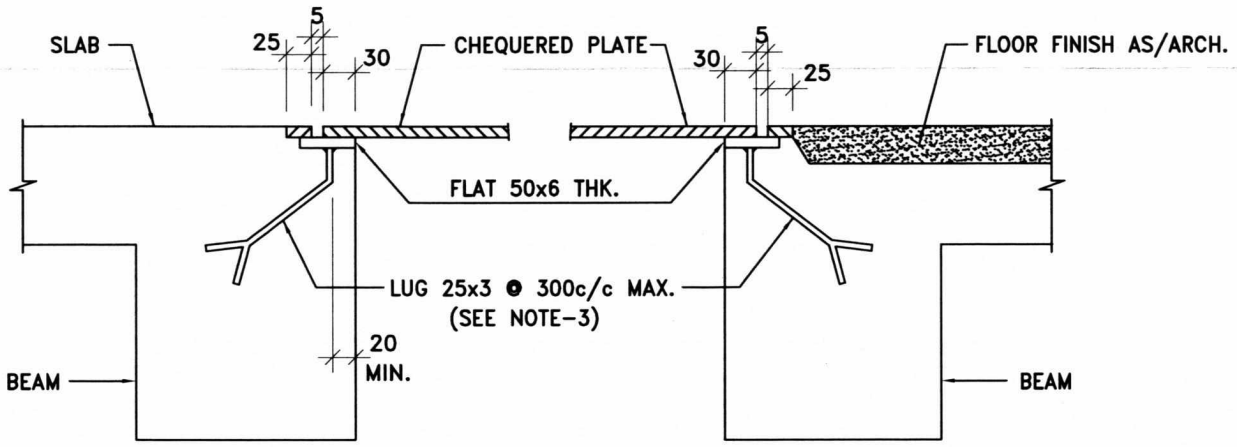
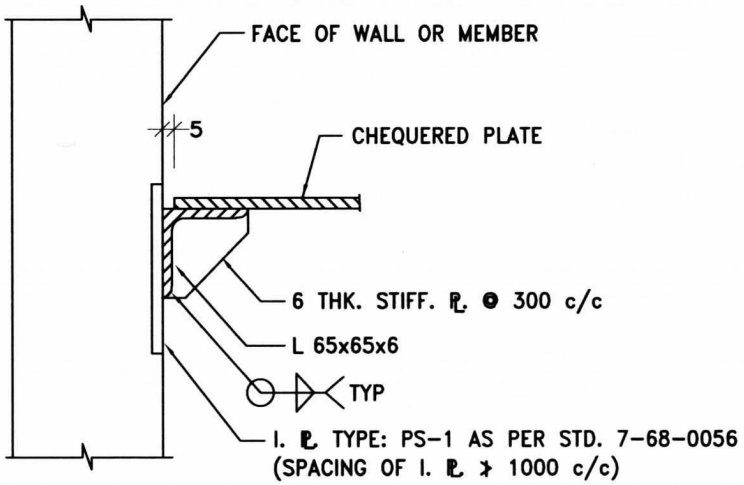


CHQD. PL SUPPORT OVER BEAM WITHOUT FLOOR FINISH

CHQD. PL SUPPORT OVER BEAM WITH FLOOR FINISH



CHQD. PL SUPPORT ON WALL/COLUMN

NOTES:

1. M.S. LUGS SHALL BE SUITABLY BENT IF CONC. THICKNESS IS LESS THAN THE LENGTH OF LUGS OR LUGS INTERFERE WITH R/F BARS
2. ALL DIMENSIONS ARE IN mm.
3. DETAILS OF LUGS SHALL BE SAME AS GIVEN IN 7-68-0202.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
8	12.12.23	REVISED AND ISSUED AS STANDARD	SN	AD/MM	ANURAG SINHA	MAINAK NANDI
7	06.06.18	REAFFIRMED AND ISSUED AS STANDARD	CS	AVM	R.SRIVASTAVA	RK TRIVEDI

Approved by

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GRADE OF CONC.	BOLT TYPE	DIMENSIONS MM		BOLT DIA (ø) IN MM											
				10	12	16	18	20	22	24	27	30	33	36	39
M20	I & III	L		250	300	450	450	550	600	650	750	850	950	1000	1100
		E		95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	280	336	498	504	610	666	722	831	940	1049	1108	1217
			TYPE-III	430	486	648	654	910	966	1022	1281	1390	1499	1558	1667
	II & IV	L		200	200	300	350	400	450	450	550	600	700	700	800
		E		150	180	240	270	300	330	380	405	450	495	540	585
		H	TYPE-II	230	236	348	404	460	516	522	631	690	799	808	917
			TYPE-IV	380	386	498	554	760	816	822	1081	1140	1249	1258	1367
M25	I & III	L		200	250	400	400	450	550	550	650	700	800	850	950
		E		95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	230	286	448	454	510	616	622	731	790	899	958	1067
			TYPE-III	380	436	598	604	810	916	922	1181	1240	1349	1408	1517
	II & IV	L		150	150	250	250	300	350	350	450	500	550	600	650
		E		150	180	240	270	300	330	360	405	450	495	540	585
		H	TYPE II	180	186	298	304	360	416	422	531	590	649	708	767
			TYPE-IV	330	336	440	454	660	716	722	981	1040	1099	1158	1217
M30	I & III	L		180	220	315	335	390	445	470	550	600	680	735	815
		E		95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	210	260	365	390	450	515	545	635	690	780	845	935
			TYPE-III	360	410	515	540	750	815	845	1085	1140	1230	1295	1385
	II & IV	L		150	150	200	200	250	275	300	350	375	425	450	500
		E		150	180	240	270	300	330	360	405	450	495	540	585
		H	TYPE-II	180	190	250	255	310	345	375	435	465	525	560	620
			TYPE-IV	330	340	400	405	610	645	675	885	915	975	1010	1070

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
9	06.06.24	REVISED AND ISSUED AS STANDARD	ANNU AHUJA	VIKRAM GUPTA	ANURAG SINHA	MAINAK NANDI
8	27.03.19	REVISED AND ISSUED AS STANDARD	JITENDER GUPTA	AMARJEET	RAJANJI SRIVASTAVA	R.K.TRIVEDI
7	26.11.13	REVISED AND ISSUED AS STANDARD	A.K. SHARMA	AMARJEET	P.K.MITTAL	S.CHANDA

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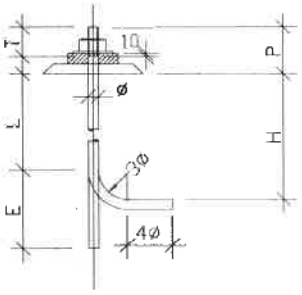
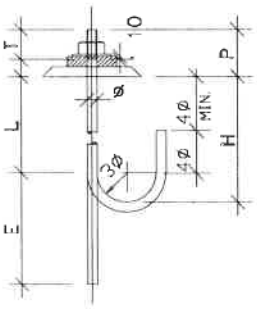
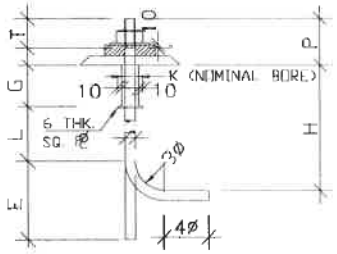
GRADE OF CONC.	BOLT TYPE	DIMENSIONS MM		BOLT DIA (ø) IN MM											
				10	12	16	18	20	22	24	27	30	33	36	39
M35	I & III	L		160	190	275	295	340	390	410	480	525	595	640	710
		E		95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	190	230	325	350	400	460	485	565	615	695	750	830
			TYPE-III	340	380	475	500	700	760	785	1015	1065	1145	1200	1280
	II & IV	L		150	150	150	150	180	225	225	275	300	350	350	400
		E		150	180	240	270	300	330	360	405	450	495	540	585
		H	TYPE-II	180	190	200	205	240	290	300	360	390	450	460	520
			TYPE-IV	330	340	350	355	540	590	600	810	840	900	910	970
M40	I & III	L		150	170	240	255	300	340	360	425	460	525	565	625
		E		95	115	155	170	190	210	230	255	285	315	345	370
		H	TYPE-I	180	210	290	310	360	410	435	510	550	625	675	745
			TYPE-III	330	360	440	460	660	710	735	960	1000	1075	1125	1195
	II & IV	L		150	150	150	150	175	200	200	225	250	275	300	325
		E		150	180	240	270	300	330	360	405	450	495	540	585
		H	TYPE-II	180	190	200	205	235	270	275	310	340	375	410	445
			TYPE-IV	330	340	350	355	535	570	575	760	790	825	860	895



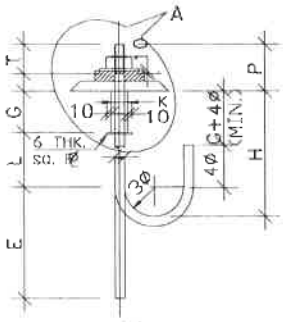
TYPE – I



TYPE – II



TYPE – III



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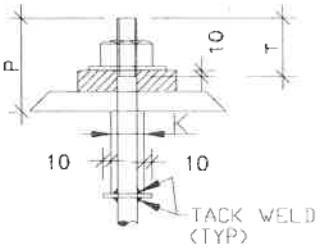

DETAIL–A (TYP)

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GRADE OF CONC.	BOLT TYPE	DIMENSIONS MM		BOLT DIA (ø) IN MM																															
				10	12	16	18	20	22	24	27	30	33	36	39	42	45	48	52	56	60	64													
M20,M25, M30,M35 & M40	III & IV	SLEEVE	G	150	150	150	150	300	300	300	450	450	450	450	450																				
			K	50	50	50	50	50	80	80	80	80	80	80	100																				
	I TO IV IX & XII	THREADED (T) LENGTH	SINGLE NUT	40	45	55	60	60	65	70	75	80	90	95	100																				
			DOUBLE NUT	50	60	70	75	80	90	95	105	110	120	130	140																				
M20 & M25	V		G	150	150	150	200	300	300	300	450	450	450	450	550	600	650	700	750	800	900	900													
			H	210	222	234	291	398	410	417	580	585	598	608	722	786	841	905	975	1035	1150	1171													
	V & VI		W	80	80	90	100	100	130	130	140	150	170	180	200	210	220	230	260	270	290	320													
			±3	10	12	16	16	20	20	25	25	25	28	32	36	36	36	40	45	45	50	56													
	VII		L					350	400	400	500	550	600	750	950	1050	1100	1200	1350	1500	1750	1900													
	VIII		L											350	400	450	500	550	600	650	700	750													
			C											160	200	200	200	240	240	240	260	280													
M30	V		G	150	150	150	200	300	300	300	450	450	450	450	500	500	550	600	650	750	800	800													
			H	210	225	235	290	400	410	415	580	585	600	610	675	690	745	805	875	985	1050	1075													
	V & VI		W	80	80	90	100	100	100	100	110	110	140	160	200	210	220	230	260	270	290	320													
			±3	10	12	16	16	20	20	20	25	25	28	32	36	36	36	40	45	45	50	56													
	VII		L					275	325	325	375	425	500	600	750	850	975	1000	1075	1225	1375	1525													
	VIII		L											300	350	400	450	500	550	600	650	700													
			C											125	160	160	160	185	185	200	240	240													

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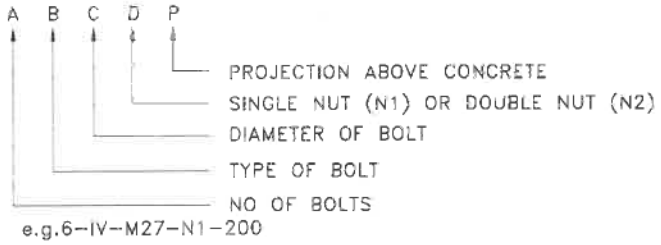
GRADE OF CONC.	BOLT TYPE	DIMENSIONS MM		BOLT DIA (ø) IN MM																		
				10	12	16	18	20	22	24	27	30	33	36	39	42	45	48	52	56	60	64
M35 & M40	V	G		150	150	150	200	300	300	300	450	450	450	450	450	500	550	600	600	700	750	750
		H		210	225	235	290	400	410	415	580	585	600	610	625	690	745	805	825	935	1000	1025
	V & VI	W		80	80	90	100	100	100	100	110	110	140	160	200	210	220	230	260	270	290	320
		t3		10	12	16	16	20	20	20	25	25	28	32	36	36	36	40	45	45	50	56
	VII	L						250	275	300	350	400	450	550	675	775	875	900	975	1100	1250	1375
	VIII	L												300	350	400	450	500	550	600	650	700
		C												125	160	160	160	185	185	200	240	240
M20, M25, M30, M35, & M40	V & VI	E		50	60	70	75	80	90	95	105	110	120	130	140	150	155	165	180	190	200	215
	V , VI ,	K		50	50	50	50	50	80	80	80	80	80	80	100	100	100	100	125	125	125	150
	VII & VIII	THREADED (T) LENGTH	SINGLE NUT	40	45	55	60	60	65	70	75	80	90	95	100	105	110	120	125	135	140	150
			DOUBLE NUT	50	60	70	75	80	90	95	105	110	120	130	140	150	155	165	180	190	200	215
	VII	t3						16	16	16	16	16	16	16	16	16	16	20	20	20	20	20
	VIII	t3												16	20	20	20	25	25	25	28	32
	VII & VIII	G		150	150	150	150	300	300	300	450	450	450	450	450	450	450	450	450	450	450	600
	IX	L		80	100	150	170	200														
M20&25	XII	L		185	220	310	335	385	435	460	535	590	660	720								
M30		L		150	150	200	225	250	275	300	350	375	425	450								
M35&M40		L		150	150	175	200	225	250	275	300	350	375	400								

NOTES :-

1. BOLTS SHALL BE MARKED ON THE DRAWING AS UNDER :



e.g.6-IV-M27-N1-200

2. BOLTS SHALL BE TURNED FROM M.S. ROUNDS CONFORMING TO IS:2062 GRADE-E250 QUALITY A/BR/BO.
3. NUTS AND WASHERS SHALL CONFORM TO IS:1363.
4. THREADING SHALL BE COARSE CONFORMING TO IS:1367 AND IS:4218.
5. ANCHOR BOLTS SHALL BE SET ACCURATELY AND HELD IN POSITION BY TEMPLATE BEFORE CONCRETING.
6. 6 THK. SQ. PLATE AT THE BOTTOM OF SLEEVE SHALL BE TACK WELDED WITH BOLT AND SLEEVE FOR BOLT TYPE III, IV, VII AND VIII.
7. SLEEVE SHALL BE M.S. TUBES (MEDIUM) AS PER IS:1239.
8. REFER DESIGN DRAWINGS FOR PROJECTION (P) OF BOLT ABOVE TOP OF ROUGH CONCRETE AND NUMBER (A) OF BOLTS.
9. ANCHOR BOLTS SHALL BE TEMPERED BEFORE MACHINING IF MADE BY FORGING. THE FORGING TEMPERATURE SHALL BE ABOVE 900° C BUT LOWER THAN SUPER HEATING TEMPERATURE.

इंजीनियर्स इंडिया लिमिटेड
ENGINEERS INDIA LIMITED
(A Govt. of India Undertaking)

M.S. ANCHOR BOLT ASSEMBLIES

STANDARD No.
7-68-0417 Rev. 9
SHT. 4 of 8

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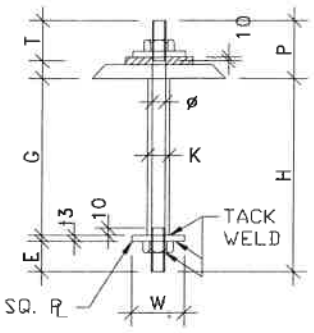
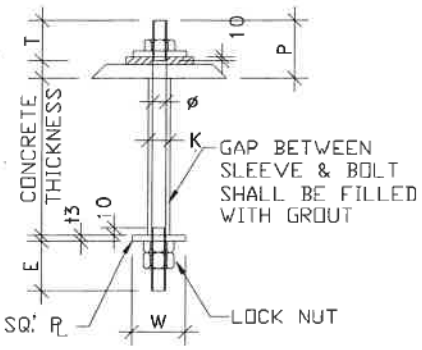
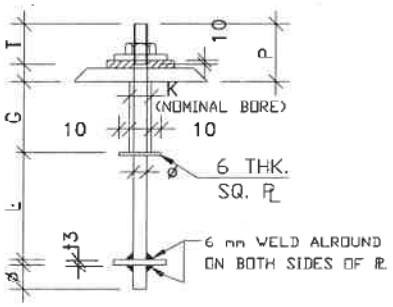
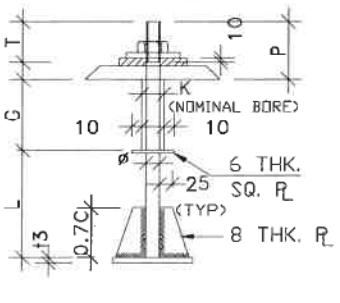


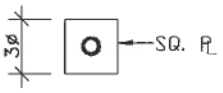
TYPE – V



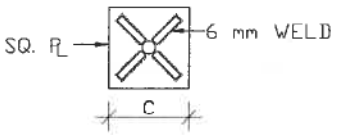
TYPE – VI







TYPE – VII



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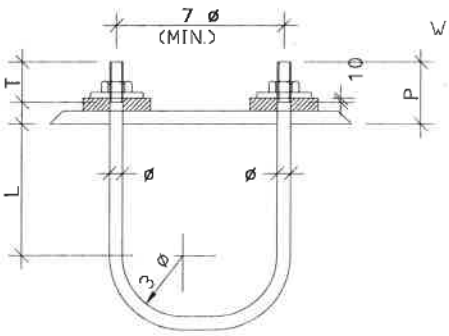
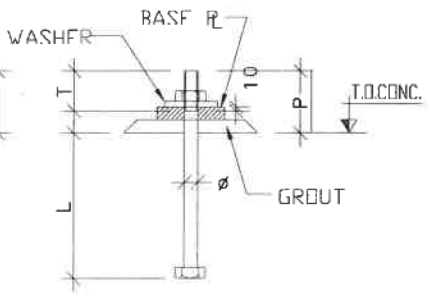


TYPE – IX



TYPE – XII

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GRADE OF CONC.	BOLT TYPE	DIMENSIONS MM		BOLT DIA (ø) IN MM																						
				20	22	24	27	30	33	36	39	42	45	48	52	56	60	64								
M20, M25, M30, M35 & M40	X	a		150	160	180	200	220	240	260	280	300														
		b		250	290	310	330	370	390	460	480	500														
		L		600	700	800	900	1000	1100	1200	1300	1400														
		E		220	220	240	270	300	330	360	390	420														
		H		640	744	848	954	1060	1166	1272	1378	1484														
		ISA		100x100 X10	130X130X10			150X150X12			200X200X16															
		THREADED LENGTH (T)	SINGLE NUT	60	65	70	75	80	90	95	100	105														
			DOUBLE NUT	80	90	95	105	110	120	130	140	150														
	XI	h				18		20		25		30		30		30		30								
		k				18		22		25		30		35		40		50								
		c				24		30		36		42		48		56		64								
		q				65		75		85		95		110		125		140								
		r				1.6		1.6		2.0		2.0		2.0		3.0		3.0								
		f				140		150		170		190		210		220		240								
		e				30		35		42		50		58		65		75								
		L				800		1000		1200		1400		1600		1800		2000								
		ISMC				75x40		75x40		100x50		125x65		150x75		150x75		175x75								
		THREADED LENGTH (T)	SINGLE NUT			70		80		95		105		120		135		150								
			DOUBLE NUT			95		110		130		150		165		190		215								

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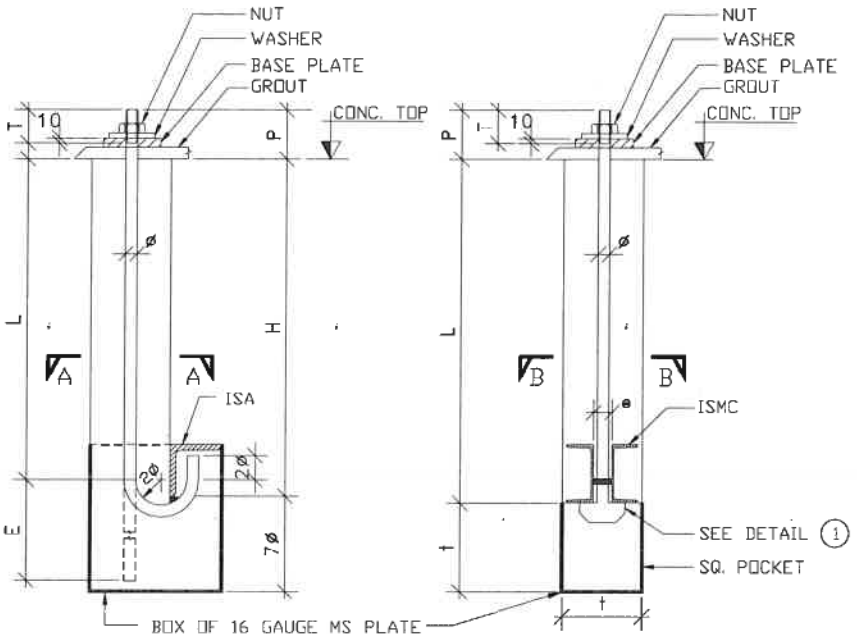
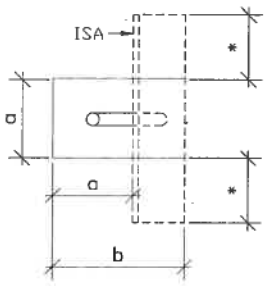
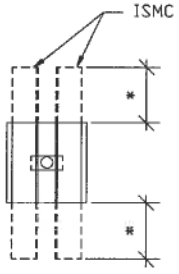




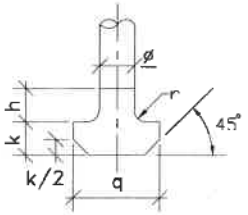
VIEW A – A

TYPE – X

(* AS PER DESIGN REQUIREMENT)



VIEW B – B



DETAIL – (1)

(FOR FORGED BOLT HEAD)

TYPE – XI

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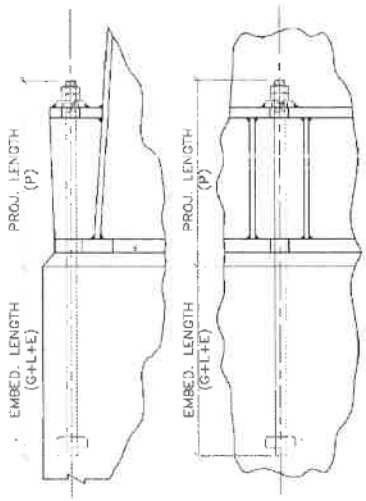

FIGURE 1: ANCHOR BOLT WITH ANCHOR CHAIR
(VERTICAL VESSELS ON SKIRT, STORAGE TANKS, ETC.)

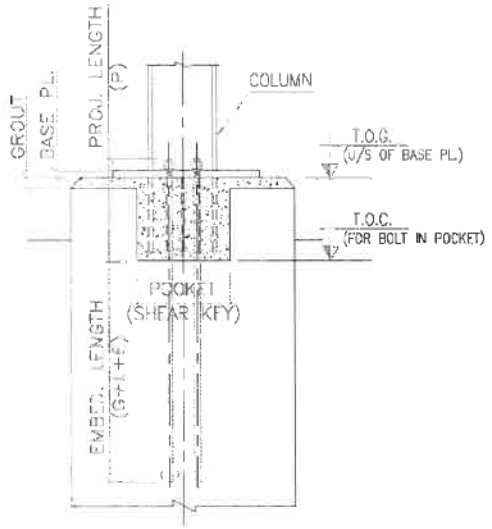

FIGURE 2: ANCHOR BOLT WITH POCKET IN PEDESTAL

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NOTES:–

1. ALL HANDRAILS AND UPRIGHT SHALL BE AS PER RESPECTIVE TYPE.
2. ALL FILLET WELDS OF 3mm (MINIMUM) THICKNESS SHALL BE CONTINUOUS UNLESS NOTED OTHERWISE.
3. JOINTS IN HANDRAILS SHALL BE PROVIDED AT SUITABLE LOCATIONS, WELDED AND GROUND FLUSH.
4. FOR ADDITIONAL TYPE OF UPRIGHT FIXING DETAILS REFER EIL STD. 7–68–0061.
5. ALL M.S. TUBES SHALL CONFORM TO IS:1239.
6. FABRICATION OF TOP RAIL, INTERMEDIATE FLAT AND TOE PLATE SHALL ONLY BE STARTED AFTER TAKING ACTUAL DIMENSIONS AT SITE.
7. ADJUSTMENT IN SPACING OF VERTICAL POST SHALL BE DONE AT EITHER END OF PLATFORM.

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	28.09.2020	REAFFIRMED & ISSUED AS STANDARD	JG	AVM	AS	SM
7	16.12.2014	REVISED & ISSUED AS STANDARD	V.P.SINGH	V GOEL	PK MITTAL	S CHANDA

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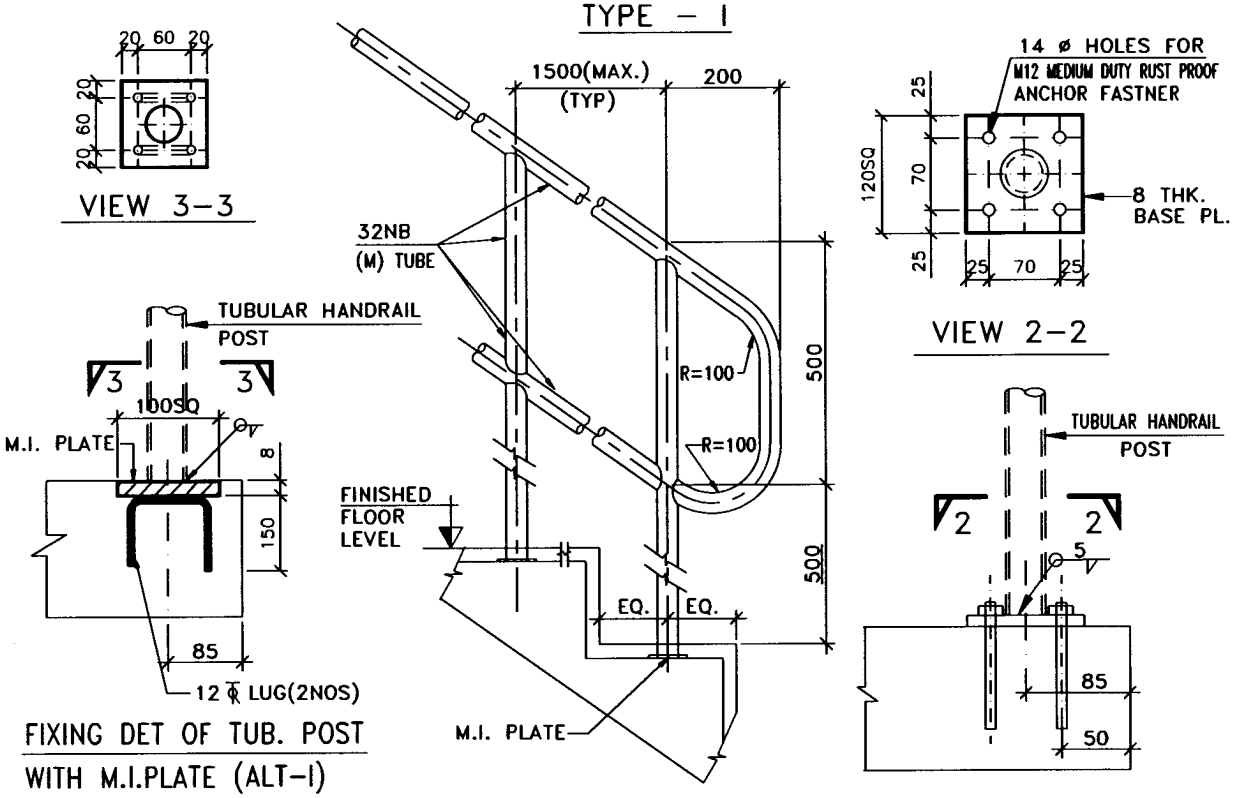
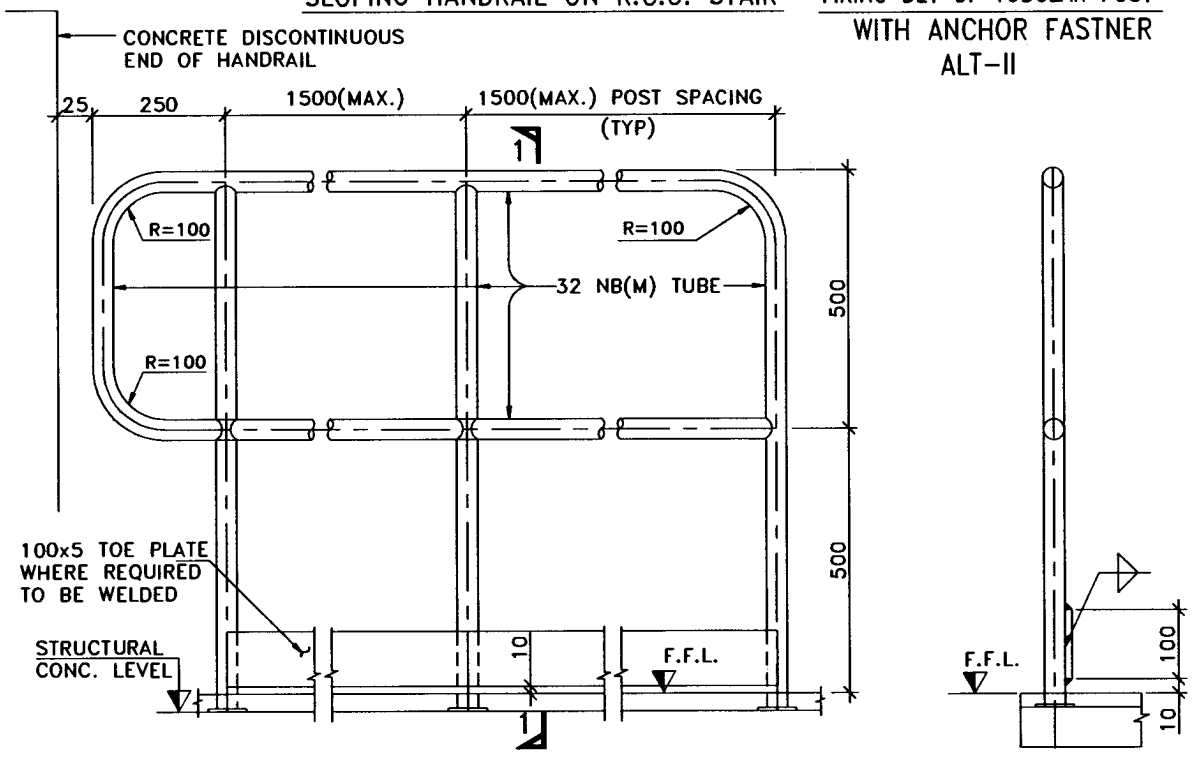
TYPE – I



FIXING DET OF TUB. POST WITH M.I.PLATE (ALT–I)

SLOPING HANDRAIL ON R.C.C. STAIR

FIXING DET OF TUBULAR POST WITH ANCHOR FASTNER ALT–II



HORIZONTAL HANDRAIL ON R.C.C. PLATFORM

SEC. 1–1

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	28.09.2020	REAFFIRMED & ISSUED AS STANDARD	JG	AVM	AS	SW
7	16.12.2014	REVISED & ISSUED AS STANDARD	V.P.SINGH	V GOEL	PK MITTAL	S CHANDA

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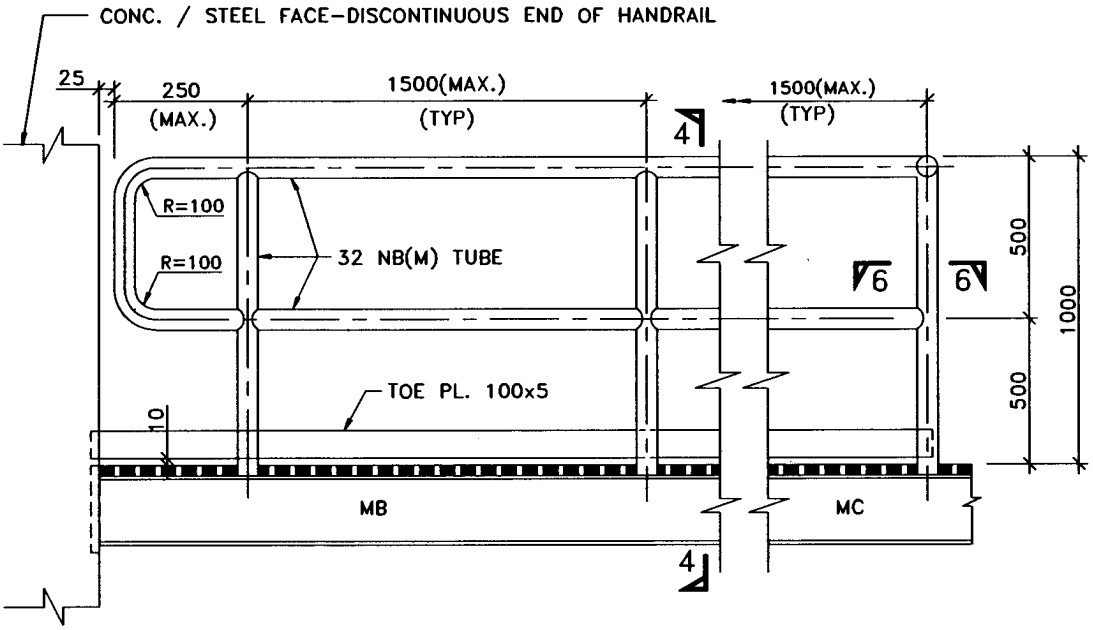
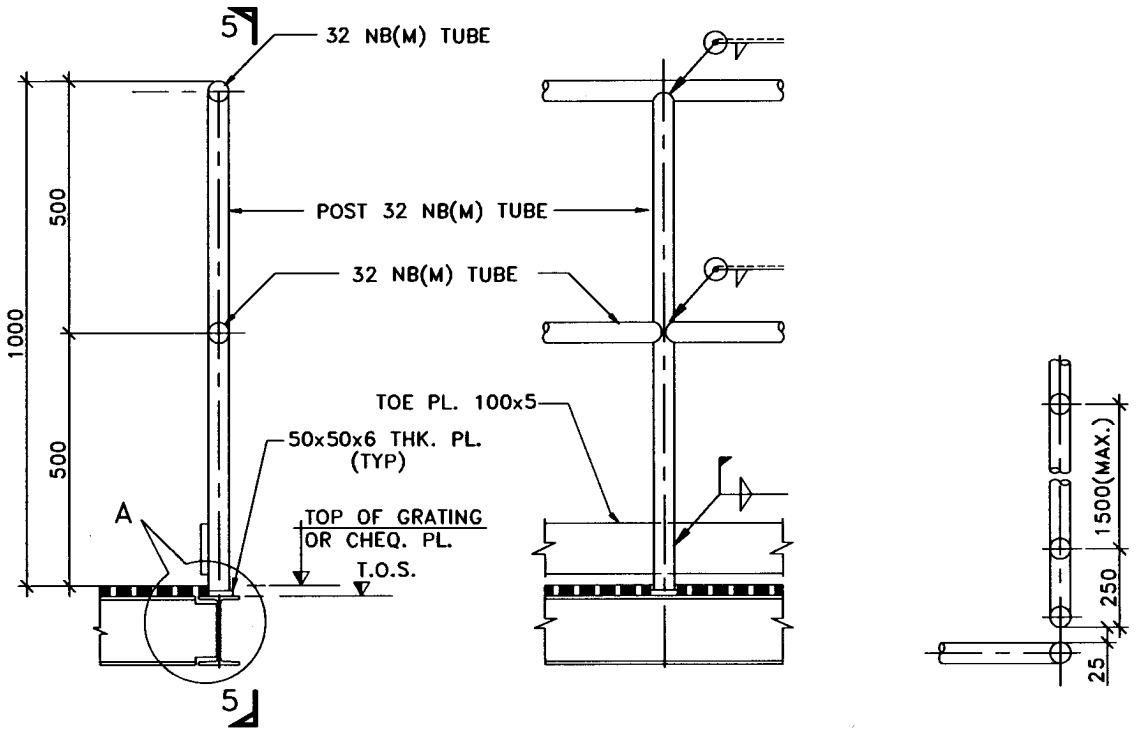
TYPE – II



HORIZONTAL HANDRAIL ON STEEL PLATFORM



SECTION 4–4
(FOR DETAIL (A) REFER PAGE 8 OF 8)

VIEW 5–5

VIEW 6–6
(AT CORNER)

Rev. No.	Date	Purpose	Prepared by	Checked by	Stds. Committee Convenor	Stds. Bureau Chairman
					Approved by	
8	28.09.2020	REAFFIRMED & ISSUED AS STANDARD	JG	AVM	AS	SM
7	16.12.2014	REVISED & ISSUED AS STANDARD	V.P.SINGH	V GOEL	PK MITTAL	S CHANDA

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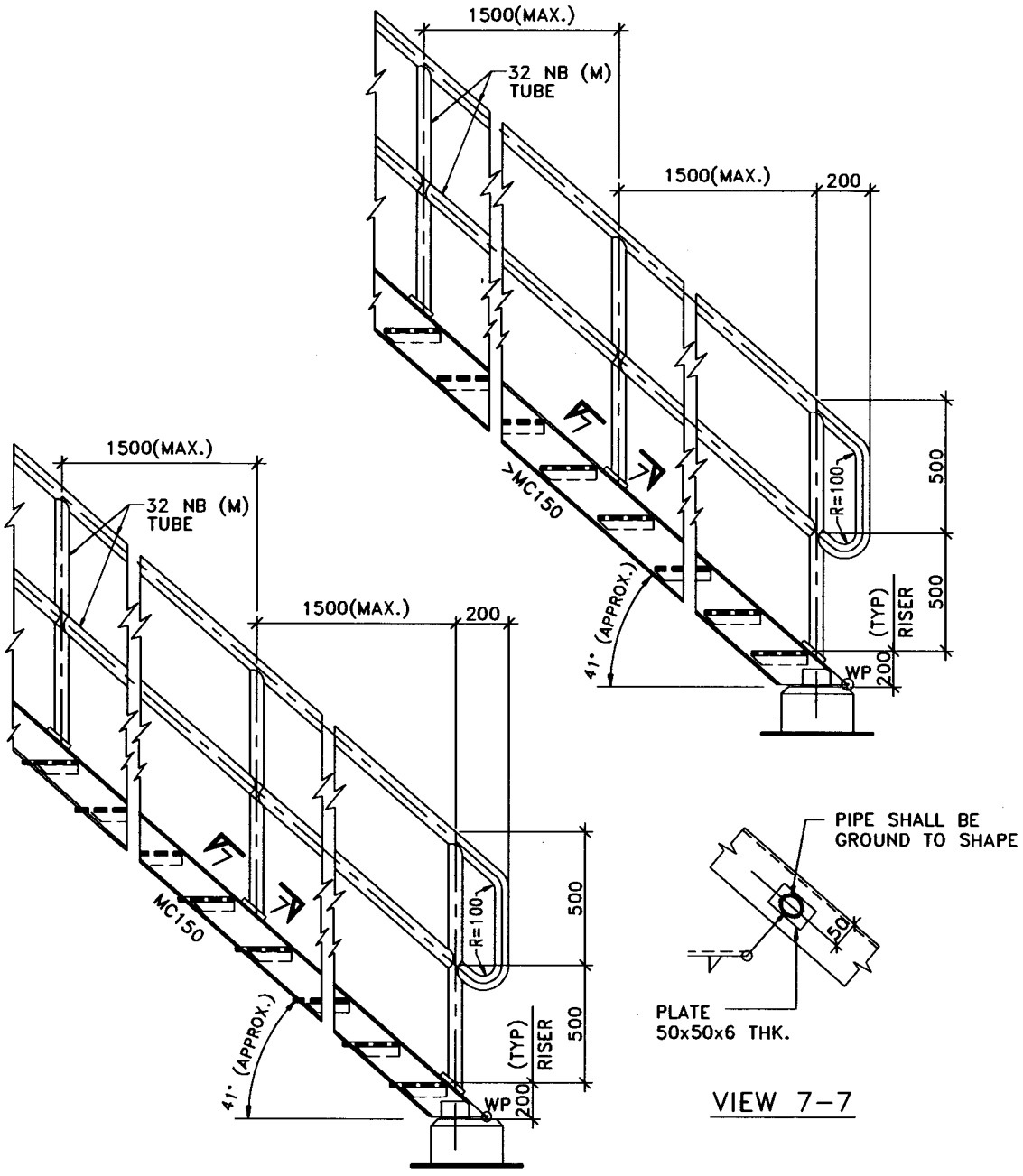
TYPE – II



VIEW 7–7

SLOPING HANDRAIL ON STEEL STAIR

WHEREVER HIGHER SIZE OF STRINGER BEAMS ARE REQUIRED AS PER DESIGN SIMILAR G.A. BE FOLLOWED FOR THE SAME.

Rev. No.	Date	Purpose	Prepared by	Checked	Stds. Conv.	Stds. Bureau Chairman
8	28.09.2020	REAFFIRMED & ISSUED AS STANDARD	JG	AVM	AS	SM
7	16.12.2014	REVISED & ISSUED AS STANDARD	V.P.SINGH	V. GOEL	PK MITTAL	S. CHANDA

Format No. 8-00-0001-F4 Rev.0

Signature Not Verified
Digitally signed by P. KONGUPRABALAHARAN
Date: 2026.05.09 17:19:21 IST
Location: eProcure-EPROC

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