2.8.8. Removal of Form Work:
Form work shall be removed in such a manner as would not cause any shock or vibration that would damage the concrete surface shall be exposed to ascertain that the concrete has sufficiently hardened.

a) Where the shape of the element is such that form work has re-entrant angles, the framework shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

2.8.9. Measurement: Measurements shall be taken of the area of shuttering in contact with the concrete surface. Dimensions of the form work shall be measured correct to a cm. to be issued by EPI, as mentioned at ACC.

2.9 STEEL REINFORCEMENT:
2.9.1 Only steel conforming to Fe500D grade of IS 1786:2008 as per item shall only be used. As and when desired by the Engineer-in-charge the contractor shall be required to produce the test certificate from the approved test house at his own cost. The mandatory tests of reinforcement shall be carried out by the contractor at his own cost in IITG Laboratory.

2.9.2 Cleaning of reinforcement: Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned out of rust, dust, grease and any other objectionable deleterious substances.

2.9.3 Bar bending schedule of reinforcement: On receipt of structural drawing, Contractor shall prepare bar bending schedule of reinforcement and shall obtain approval of the Engineer in-charge.

2.9.4 Placing and security: Reinforcement bars shall be accurately placed and secured in position by 20 gauge soft black annealed steel wire and firmly supported or wedged by pre-cast concrete blocks of suitable thickness at sufficiently close intervals so that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. At intersection point binding of reinforcement point shall be in both the direction. Contractor shall maintain reinforcement in its correct position without displacement and correct specified cover.

2.9.5 Welding: Welding of bars shall not be carried out unless specifically authorized in writing by Engineer in-charge as per I.S. Code of Practice in place of splicing. However, no extra payment shall be allowed for the same.

2.9.6 Inspection of reinforcement: No concreting shall be commenced until Engineer in-charge has inspected the reinforcement in position and until his approval has been obtained. A notice of at least 72 hours shall be given to the Engineer in-charge by the contractor for inspection of reinforcement. If in the opinion of the Engineer in-charge, any materials are not in accordance with the specification or the reinforcement is incorrectly
spaced, bent or otherwise defective, the contractor shall immediately remove such materials from the site and replace with new material and rectify any other defects in accordance with the instruction of the Engineer in-charge and to his satisfaction.

2.9.7 Cover for reinforcement: To be followed as per IS Code of practice if not specified.

2.9.8 Net measurement: Reinforcements shall be placed as shown on the structural drawings and payment will be made on the net measurements in accordance with the drawing and taken at the site. Only such laps, dowels, chairs and pins in reinforcement as approved by the Engineer in-charge or shown in drawings shall be paid for. The contractor shall allow in the quoted rates for all wastage, which will not be paid separately.

2.10. CEMENT PLASTER (INTERNAL & EXTERNAL)

2.10.1 Preparation of Surface: The walls to be plastered shall have all joints raked out to a depth of 10 mm, if not already done. R.C.C. surface shall be properly hacked to get good key to the plaster. All dust and oily matter, if any, shall be brushed and cleaned and surface to be plastered shall be kept wet for 6 hours before plastering is commenced.

2.10.2 Proportion of Mortar: It shall be as specified in the items in the BOQ.

2.10.3 Application of Plaster: The mortar shall be applied evenly with force on the surface to be plastered. The mortar surface shall be finished at once by being rubbed over with a trowel till the cement appears on the surface. All corners, angles and junctions shall be truly vertical and horizontal as the case may be, carefully and neatly finished. Rounding of corners and junctions where required shall be done without extra charge. The mortar shall adhere to the surface intimately when set and there should be no hollow sound when struck. The thickness of plaster shall be minimum 6 mm/ 12 mm/ 15 mm as specified in the items.

2.10.4 When neat cement finish is specified over the plaster surface, a coat of pure Portland cement slurry, 1.5 mm thick shall be applied and well rubbed to the plaster surface while the plaster surface is still fresh.

2.10.5 When no finish is specified, the plastered surface shall be rubbed well to an even plane with a wooden float for external surface and finished smooth with a steel trowel for internal surface.
2.11. **WOOD WORK:**

2.11.1 Timber as specified to be used for wood work shall be kiln seasoned, chemically vacuum pressure treated as per the relevant items in the schedule of quantities will be of required variety obtained from approved sources. Timber samples shall be approved by the Engineer-in-charge before quantities are brought to site in bulk.

Shutters of paneled doors, glazed & mosquito proof windows shall be machine made with kiln seasoned, chemically vacuum pressure treated timber frames as per relevant BIS code & specification of item and with panels of required thickness of phenol bonded particle board pre-laminated in both sides as per nomenclature of item.

2.11.3 Permissible tolerance on wood work shall be as under:-
   a) Door frames = 2mm + 3mm
   b) Door shutters.
      i) On width and height = + 3mm.
      ii) On thickness of = + 1.2mm.

2.11.4 The samples of species to be used shall be got approved by the contractor from the Engineer-in-charge before bulk purchase. Approved samples shall be kept with the Engineer-in-charge if so desired.

2.11.5 Transparent glass conforming to IS 1761-1960 shall be used. Thickness of glass shall be as specified in the item. Glazing for toilets shall be opaque type.

2.11.6 Test: As and when desired by the Engineer-in-Charge the contractor shall be required to produce the test certificate from the approved test house at his own cost.

2.12. **HARDWARE**

2.12.1. Mongery shall be provided to all doors and windows, shutters with necessary matching screws of suitable size etc.

2.12.2. Fittings and fixtures to all doors and windows etc. shall be of anodized aluminium mat finished ISI marked of make and of approved quality.

2.12.3. M.S. butt hinges for doors shall be ISI marked heavy quality in steel of size 100 x 65 x 2.12 mm for doors with mild steel pin and shall be oxidized finished. These shall be fixed with machine screws with steel frame as specified.

2.12.4 All fittings shall be ISI marked for the categories where marked fitting are manufactured.

2.12.5 Other fittings as provided in the different items of work and as required by the owner shall be provided as per the requirement of the owner.
2.12.6 One sample piece of each fitting shall be produced for approval of
Project Engineer. The bulk supply order shall be placed by the
contractor only after approval is accorded by Project Engineer.

2.12.7 Hardware/Fittings of door and window shutters shall be as per items
and drawings.

2.13. STEEL/ALUMINIUM WORK:
Steel work in door frame made of MS angle and MS flat welded built-up
section with provision for fixing hinges and MS flat lugs for fixing with
masonry/RCC etc., complete shall be carried out as per drawing. MS flat
hooks for bolting arrangement for sliding and tower bolts, curtain brackets
and cleats shall also be welded to the MS frame as per drawing. All steel
work shall be painted with a priming coat of approved steel primer.

All works shall be carried out to proper line and specifications. All welding
of steel work shall be tested for the quality of weld as laid down in IS 8222-
1970 before erection. Where ever it appears shall mean continuous fillet
welding unless otherwise directed by Engineer-in-Charge or shown in the
drawing. Machine girding at shop shall be done over the weld to remove
the excess deposit and scales.

2.13.1. Aluminium doors windows and ventilators:
Aluminium doors, windows and ventilators wherever proposed shall be
supplied and fixed with following specifications unless otherwise specified
in relevant item and nothing extra shall be paid beyond the quoted rate.

2.13.2. All aluminium extruded sections (as per IS: 733 - 1983) are to be
provided of Hindalco/ Bhoruka/ Indal or approved equivalent sections as
per drawings and as directed.

2.13.3. All sections shall be anodized in natural mat finished of 15 Microns unless
otherwise mentioned.

2.13.4. Shipping Tolerance will be + 10% . Sections will be as per tolerances
given in relevant I.S. specifications and will also be applicable for bend,
flatness, twist angularity etc.

2.13.5. Fabrications shall be got done through specialized firm in their workshop
and covered with polyethylene paper till completion and handing over the
possession.

2.13.6. Sliding windows shall withstand the arduous duties of applications in 2,3
or 4 track or combine unit.

2.13.7. Sliding shutters are to be joined by special cleats, rollers mounted on ball
bearing are to be fitted to obtain smooth operation. Shutters shall move
within robust frames with grooves for weather strips to exclude wind,
water or dust ingress.
2.13.8. Total sliding systems is to be secured by spring operated flush latch.

2.13.9. All glass pans shall be fixed using gaskets of ethylene - propylene or PVC (EPDM).

2.13.10. All doors and windows are to be provided with all required fittings in anodized aluminium as stated in item without additional cost unless otherwise directed. Samples of doors, windows and ventilators shall be brought to site and fitted in a position for approval of the Engineer-in-charge before bulk purchase and manufacture.

2.13.11 The windows in southern & western sides shall have double glazing hermetically sealed as per item of work.

2.13.12. Measurement

Unit of measurement shall be given in the B.O.Q.

2.14. ROOF TILES

2.14.1 General

Well burnt machine made clay Tiles of approved design and manufacturer shall be laid on sloped roof with following specifications.

a) The tiles shall be machine made and of approved quality, well and uniformly burnt, free form cracks, twist, flaws and any imperfections in shape or size. They shall be uniform in colour and must give a clear ringing sound when struck. The dry tiles on immersion in water for one hour shall not absorb more than 1/6 of its dry weight.

Sample of the tiles proposed to be used should be got approved from the Engineer-in-charge in advance before supply is made. Tiles not confirming to the above specifications and to the approved sample shall be rejected.

Some samples of approved tiles are in the Office of the Engineering Section, IITG and can be seen during office hour before submitting tenders.

2.14.2 Laying

Tiling shall consist of a layer of flat trough shaped laid on RCC roof terrace edges.

a) The flat tiles must lap accurately one over the other. The moulded notch at the lower and of each flat tile must fit completely into the head of the tiles next below it.

b) All the lines of the tiles shall be straight in both directions.

c) All ridges, hips and eaves tiles shall be laid in cement mortar 1:4 (1 cement : 4 coarse sand).
d) The valleys shall be formed in proper manner with cutting the tiles in its proper shape & neatly and shall be set in cement mortar 1:4 for half the length.

e) Tiles, ridges & hips which are to be set in cement mortar, shall be soaked in water for two hours before laying and shall be kept wet for seven days after they are laid. Laying operation shall include all scaffolding work involved at all heights.

Roof tiles of equivalent specifications shape and design may also be allowed to be used after getting fully satisfied regarding its specifications, shape and design by the Engineer-in-charge and the Architect.

2.14.3: Rate: Rate should include supply and fixing of tiles including ridge, valley etc.

2.14.3 Measurement

Measurement for payment will be taken in sqm on the finished work. No separate payment shall be made for ridge, valley, etc.

2.15 WATER PROOFING OF ROOF, TERRACE AND SUNKEN FLOOR:

2.15.1 Roof

A protective water proofing layer with polymer base polyurethane coating of approved brand and shade over the machine made clay tiles shall be provided as per manufacturer’s specifications and as directed by the Engineer-in-Charge. Surface to be treated should be absolutely free from dust, loose particles, oils, and grease before application. Rate quoted should cover the entire operations. And measurement for payment shall be taken once on the finished surface and paid under the relevant item of BOQ.

2.15.2 Terrace and Sunken floors:

Water proofing treatment of the sunken floors, terraces and sloping roofs will be done with approved polymer modified cementitious composite (PMCC) slurry and fibre glass cloth as per manufacturer’s specifications as directed by Engineer-in-Charge. Work shall be done in the following steps.

a) Cleaning the roof surface and parapet wall from dust, dirt, cement slurry etc. by means of wire brush, dust removing brush, scraper etc.

b) Wetting the surface prior to application of ‘PMCC’ without free water standing.

c) Application of 1st coat of acrylic polymer modified cementitious slurry coating over the mother roof slab surface and to be taken to the vertical parapet walls and turned down the exterior surface of the parapet walls.
d) Laying fibre glass cloth over the PMCC applied surface upto 300 mm height of vertical walls when the first coating is still green and allowed to air cure at least 4 (four) hours.

e) Application of one coat of PMCC Brush Topping coat over the treated surface and allowed for air cure for at least 4 (four) hours and water cure for next two days.

f) The treated surface shall be covered by laying a protective layer of 12 mm plaster of cement mortar 1:4 (1 cement: 4 coarse sand) with approved water proofing compound as per manufacturer's specifications. Normal curing of the roof should be done prior to allowing traffic.

The rate for the item should include all the operations. Measurement shall be taken once on the finished surfaces.

2.16. FLOORING: The flooring shall be laid as per specifications of items of B.O.Q and detailed specifications. The rate of items of flooring is inclusive of providing sunken flooring in bath rooms, kitchen etc. and nothing extra on this account is admissible.

2.16.1. Cement Concrete Flooring: Cement concrete flooring shall in general conform to IS: 2571. Cement concrete flooring shall consist of a sub base (laid on the compacted earth or sand or sand fill in case of ground floor only) a base course laid on the sub-base and then finishing layer of flooring. The bed for flooring shall be prepared either level or sloped as per drawings and as instructed by Engineer-in Charge.

The sub-base which shall be laid on the prepared bed shall be of specified thickness and as per drawings.

The sub-base shall be of boulders/ gravel/ bricks/ sand / cement concrete as per drawings. In case of upper floors, the structural RCC slab shall be treated as sub-base.

Base course shall be of cement concrete of specified mix and of specified thickness as indicated in drawings/ item descriptions.

The floor space on which base course is to be laid shall be divided into square/ rectangular or as per designed panels to prevent cracks in the floor finish. No dimension of the panels shall exceed 2m and length of the panel shall not exceed 1.5 times its breadth. Base course shall be laid on alternate panels and shall have mitred joints at the corners of the room and intermediate joints shall be in straight line with panel joints.

The flooring shall butt against masonry wall which shall not be plastered. When the base course is to be laid on hardened base, the sub-base be roughened by steel wire brushing and cleaned. Before laying the base course, neat cement slurry shall be brushed into the prepared surface.
Cement concrete shall be placed in position and beaten with trowel and finished smooth. Beating shall cease as soon as surface is found covered with cream of mortar. Necessary slope shall be provided.

2.16.2 Curing:
Each finished portion of floor, on completion shall be kept wet ponding for a minimum period of 7 days.

2.16.3 Pre-cast Hydraulically Pressed Plain Cement Tiles Flooring:
Cement concrete tile shall conform to IS: 1237 and shall be of approved shade, with 10mm down size stone aggregates and shall be of specified thickness and approved shade. Cement shall be of light shade and all tiles required for the work shall be made from the same lot of cement to maintain uniform shade.

Pigments when used with mortar or for grounding shall conform to Table -1 of IS:2114. Cement mortar shall be of specified mix and thickness.

Workmanship shall in general conform to IS: 1443. The base on which tiles are to be laid shall be cleaned of all dust, dirt and properly wetted without allowing water pools. Cement mortar of specified thickness shall then be spread over base for two rows of tiles and 3-5 meters in length. The mortar shall be laid in slope as per requirements and thickness of mortar shall not be less than 10mm at any place. The top of the mortar shall be kept tough so that cement slurry can be absorbed. Laying shall be from centre & proceed outwards in the two directions at 90⁰. Cut tiles of uniform sizes shall be laid along periphery, if necessary. Neat cement slurry @ 4.4 kg of cement per sqm shall be spread over the mortar bed for laying 20 tiles at a time. The tiles shall then be fixed in this grout one after the other, each tile being gently tapped and properly bedded in line and level. The joints shall not exceed 1.5mm in width. After the day’s work, the excess cement slurry on top and the joints shall be cleaned with broom stick and washed before the slurry sets hard. Next day, the joints shall be filled with the cement grout of the same shade as the matrix.
Tiles along the periphery shall be continued by average 12mm under the wall plaster, shuttering or dado.
The flooring shall be cured for 7 days by keeping it wet with ponding. Heavy traffic on the flooring shall be permitted only after 14 days.
Grinding shall be commence after 14 days when the tiles and the joints are properly set. Grinding shall be done by machines except for skirting and small areas, First grinding shall be done with carborundum stones of 48 to 60 grade grit fitted the machine. Water shall be properly used during grinding. When the chips show up and the floor has been uniformly rubbed, it shall then be cleaned with water baring all pin holes. It shall then be covered with a thin coat of grey/ white cement mixed with pigments to match with colour of the flooring. This grout shall be kept moist for a week. Thereafter the second grinding shall be started with carborundum stone of 120 grit. Grinding and curing shall follow again. Final grinding shall be with carborundum of grade 220 to 350 grit using water in abundance. The floor
shall be washed clean with water, oxalic acid powder shall then be dusted
at 33 gms/ sqm. on the surface rubbed with machine fitted hessian bobs or
rubbed hard with woolen rags. The floor shall then be washed clean and
dried with a soft cloth or linen. If any tile is disturbed or damaged, it shall be
re fitted or replaced proper jointed and polished.

2.16.4 Pre-cast hydraulically pressed terrazzo tile flooring :
Terrazzo tiles shall be of specified thickness and shade shall generally
conform in all respect to IS-1237.
Pigments ,Cement Mortar, Workmanship ,Curing, Grinding and Polishing
shall be followed as given for Pre-cast Hydraulically Pressed Plain Cement
Tiles Flooring.

2.16.5 Glazed Tiles work:
Glazed tiles shall conform to relevant IS codes and shall be of specified
shade, size and of approved manufacturer.
Pigments, cement mortar, shall be as specified as in PCC tiles.
The tiles shall be laid over coating of specified adhesive ( as per approved
manufacturer’s specification) laid on base floor/ wall plaster. The joints of
the tiles shall be flush pointed with cement paste ( white cement and
pigment conforming to IS-2114, Table -1 ) matching the shade of colours.

Curing shall be as specified as in PCC tiles

2.16.6 Kota Stone Flooring:

The slabs shall be of selected quality and shade, hard sound, dense
homogenous in texture, free from cracks, decay weathering and flacks.
These shall be machine cut to size of 550x550mm unless otherwise
specified. For kitchen slab where specified the stone slab shall be for full
width of kitchen slab and length of minimum 1800mm. Kota stone slabs in
treads and risers of stair cases shall be in single piece. In the floors where
dimensions are not in the multiple of 550mm equal borders shall be left on
opposite sides and shall be made up with matching size of kota stone slab.
No extra payment shall be made for such extra border work.

The slabs shall have the top (exposed) face polished before being bought
to site. Before starting the work, the contractor shall get the samples of
slabs approved by the Engineer-in-Charge.

Each slab shall be machine cut to the required size and shape and fine
chisel dressed at all edges to full depth and machine rubbed to smooth
surface finish. All angles and edges of the slabs shall be True Square and
free from chippings giving a plane and smooth surface.

Cement mortar 1:6 (1 cement: 6 coarse cement sand by volume) of
specified thickness shall be laid over the base after making it rough and
cleaning thoroughly. The mortar shall be laid for flooring one slab at a time
over the base slab thoroughly washed, cleaned and kept moist.
The slab shall be washed clean before laying. It shall be laid over cement mortar bedding on top, pressed, and tapped gently to bring it in level. It shall be then lifted and laid aside. Top surface of the mortar then shall be connected by adding fresh mortar at hollow or and depressions. The mortar then shall be allowed to harden and cement slurry of honey like consistency @ 4.4 kg of cement per sq. shall be spread over the mortar. The edged of the slabs shall be buttered with white cement with or without pigment grout to match the shade of the slabs. The slabs shall then be gently placed in position and tapped with wooden mallets till it is properly bedded on level. The joints shall be as fine as possible. Surface cement on the surface of the slab shall be removed. The slabs in flooring shall continue for not less than 10mm under the plaster/ skirting. The finished surface shall be true to levels and slope as instructed by the Engineer-in-Charge.

The slabs shall be laid in patterns as per drawings and size shall not be less than 31mm x 310mm. Cut uniform size may be used along periphery as required.

The floor shall be cured for a minimum period of 7 days by wetting.

Unevenness at the meeting edges of slabs shall be removed by fine chiseling polishing etc. shall be done in accordance with what has been specified for Pre-cast Hydraulically Pressed Plain Cement Tiles Flooring except that cement slurry shall not be applied on the surface before each polishing.
SECTION - 3

3.1 The intent of this section of the specification is to define the general technical requirements of the major items of Sanitary and water supply works.

3.2. GLAZED STONEWARE PIPES

3.2.1 Specifications

Wherever specified for drainage/ sewer lines, glazed stoneware pipes shall be used. These pipes shall be of first class approved quality, straight, free from any roughness inside or outside and conforming to IS: 651-1980.

3.2.2 Laying

The pipes shall be laid on a bed of 15 cm thick cement concrete 1:5:10 mix or as specified in items with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe jointer room to work right round the pipes and as short as possible to admit the socket and allow the joint to be made.

If the bottom of the trench consists of rock or very hard ground that cannot be easily excavated to a smooth surface, the pipes shall be laid on concrete cradles to ensure even bearing.

The pipes with their crown level at 1.2m depth and less from finished ground level shall be surrounded with 15 cm thick cement concrete 1:5:10 mix or as specified in items all around. Pipes laid at a depth greater than 1.2 m at crown shall be laid in concrete at the side upto the level of the centre of the pipe and slopped up from the edges to meet the pipe tangentially.

3.2.3 Jointing

The spigot of each pipe shall be slipped home well into the socket of the pipe previously laid and adjusted in correct position.

The opening of the socket shall then be filled with a stiff mixture of cement mortar 1:1 (1 cement : 1 fine sand). The jointing material shall be properly cured. When the socket is thus filled a fillet shall be formed round the joint with a trowel forming an angle of $45^0$ with the barrel of the pipe.
3.3 CAST IRON PIPES

3.3.1 Specifications

Wherever specified the cast iron pipes for drainage shall be either vertically cast type conforming to IS:1537-1976 or centrifugally spun type conforming to IS: 15536-1976 or as specified in the item of works.

Generally all drainage lines passing under buildings floors, road with heavy traffic and in exposed position above ground or like situations shall be in cast iron.

3.3.2 Laying and Jointing

All excavation work for laying cast iron drainage pipes shall be done as described in section B.2.2. Jointing pipes shall be done as described in sub-section B4.2.2 hereunder after.

3.4. EXTERNAL WATER SUPPLY

3.4.1 Galvanised Iron pipes and fittings:

a) Specifications

Where specified G.I. pipes for water supply inside and outside the buildings shall be genuine galvanised steel tubes conforming to IS: 1239-1968 of specified grade.

All fittings shall be malleable iron galvanised fittings conforming to IS: 1239 (Part II) - 1968. All fittings shall have manufacturers trade mark stamped on it. Fittings in G.I. pipelines shall include elbows, tees bends reducers, nipples, union busses, G.I. clamps of approved design, G.I flanges with 3mm rubber insertion, nuts, bolts, washers etc.

b) Laying and Fixing

Screwed G.I pipes shall be joined with screwed socket joints, using screwed fittings. After cutting and threading white lead with PTFE tapes shall be used while tightening. Other pipe jointing compound may be permitted if approved before starting the work. All pipes shall be fixed with G.I holder bat clamps clear off the wall. If pipes are fixed in chases they shall be fixed in position by iron hooks. All piping shall be kept plugged at the end of day’s work.

Pipe laid underground shall be painted with two coats of anticorrosive bitumastic paint and covered with fine sand 150 mm all around. The pipes in chases shall also be painted with bitumastic paint.

c) Depth of cover for underground water pipes

The cover for the mains shall be at least 90 cm under vehicular areas and 75 cm in pedestrian areas and 30cm to 60cm at other places as directed.
3.5 NON RETURN VALVES

The valves shall be of best quality and shall generally conform to IS : 778 - 1971.

3.6 VALVE CHAMBER

Valve chamber shall be provided at suitable location as directed.

3.7 SOIL, WASTE AND VENT PIPES

3.7.1. Specifications

Cast iron pipes & fittings shall conform to IS: 1729 - 1979 or IS: 3989 - 1970 (or as revised) and shall be used for soil, waste and vent pipes. Pipes and fittings with irregular bore, blow holes and other manufacturing defects shall not be allowed to used for work.

3.7.2 Jointing

The spigot of the pipe shall be placed inside the socket & gasket caulked home to leave the depth for lead as specified in the table below. Molten pig lead shall then be poured into the joint filling the same in one pouring. While filling horizontal pipe joints with molten pig lead, care shall be taken against flow of any molten material outside the joint by putting 25mm thick plug of suitable material at the face of the bottom half of the joint. This plug shall be removed and joints checked. The lead shall be caulked by proper tools to make it even all around. The pig lead shall conform to IS : 782 - 1978.

The depth of lead required for joints in various sizes of cast iron pipes are

<table>
<thead>
<tr>
<th>Nominal Dia (mm)</th>
<th>Depth of lead (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>38</td>
</tr>
</tbody>
</table>

3.7.3 Holder bat Clamps

All pipes shall be fixed clear off the wall with M.S. holder bat clamps. Holder bat clamps shall be of a standard design fabricated from M.S. galvanized flat 32x1.5mm thick and 12mm dia M.S. bar and 6mm nuts and bolts. Holder bat clamps shall be fixed in cement concrete (1:2:4) blocks 100x100x100mm. Walls shall be plastered before fixing the pipe on the surface. The clamps shall be welded with extension pieces to increase their clearance from wall as per drawing.
3.8. TRAPS

3.8.1 General

The entry of foul air to the building should be prevented by suitable traps, properly sited.

Traps should always be of a self-cleansing pattern. A trap which is not an integral part of an appliance should be directly attached to its outlet, and the pipe bore should be uniform through and have a smooth surface.

Traps for use in domestic waste installations and all other traps should be conveniently accessible and provided with cleaning eyes or other means of cleaning.

The size of the trap shall be as per the internal diameter of waste pipe of the appliances to which it is attached. Minimum internal diameter for various waste appliances are as given following table:

<table>
<thead>
<tr>
<th>Item</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking fountains</td>
<td>25</td>
</tr>
<tr>
<td>Wash basins</td>
<td>30</td>
</tr>
<tr>
<td>Bidets</td>
<td>30</td>
</tr>
<tr>
<td>Domestic sinks and baths</td>
<td>40</td>
</tr>
<tr>
<td>Shower bath trays</td>
<td>40</td>
</tr>
<tr>
<td>Domestic bath tubes</td>
<td>50</td>
</tr>
<tr>
<td>Hotel and Canteen sinks</td>
<td>50</td>
</tr>
<tr>
<td>Urinals:</td>
<td></td>
</tr>
<tr>
<td>Stall urinals (with not more than 1.20 m of channel drainage)</td>
<td>50</td>
</tr>
<tr>
<td>Lipase urinals</td>
<td>40</td>
</tr>
<tr>
<td>Floor traps (outlet diameter)</td>
<td>75</td>
</tr>
</tbody>
</table>
3.8.2 Floor Traps

Floor taps shall be cast iron deep seal type P or S traps with a minimum seal of 65mm. They shall be with or without vent. All traps shall be set in cement concrete block 1:2:4 mix without any extra additional cost.

Urinal traps shall be provided with C.P. brass domical grating. Traps shall be provided with suitable extension pieces where required, with chromium plated grating to flush with the floor without any extra cost.

3.9 INSTALLATION OF SOIL, WASTE AND VENTILATION PIPE WORK

3.9.1 Gradient

The gradient of a horizontal branch should not be flattered than 1 in 50 and not steeper than 1 in 10.

3.9.2 Layout

The pipe work in branch connections should always be arranged to allow free drainage of the system. Connections to main or branch pipes should be so arranged as to prevent cross flow from one appliance to another. Connections should be made with an easy sweep in the direction of flow.

3.9.3 Joint

All joints in pipe work and all pipe work to appliances should be made in such a manner as to be air-tight and water tight and to remain so during use.

3.9.4 Bends

Bends should be of long radius where practicable. In the case of bends in the bottom most pipes, they should necessarily be of long radius and should preferably be made of 135° (1/8) bends.

3.9.5 Access

Ample provision should be made for access to all work and embedding of joint in wall should be avoided as far as possible. All tee and cross pieces shall be with access doors. Where instructed by the Engineer-in-Charge, the bends with access doors shall also be provided. The bottom most pipes of every soil and waste stack shall be provided with an access piece at a height not more than 30 cm finished ground/floor level.