1.0 GENERAL

1.1.0 These specifications shall cover supply, installation testing & commissioning of all works related with public health Engineering. In general these shall cover the following.

a) Internal and external water supply system.

b) Internal and external drainage system.

c) Soil, waste and vent pipe system.

d) Sanitary fixtures and fittings.

e) Rain water pipes.

f) External storm water drainage system.

g) Water supply pumping system.

2.0 WATER SUPPLY:-

2.1.0 INDIAN STANDARD TO BE FOLLOWED SHALL BE AS UNDER:-

2.1.1 I.S.1239 (Part I) Specification for galvanized M.S. pipes.

2.1.2 I.S. 4736 - 1986 - do -

2.1.3 I.S. 1239 (Part II) Specification for galvanized fittings.

2.1.4 I.S. 1879 (Part 1 to 10) - do -

2.1.5 I.S. 779 - 1079 Specification for water meter.

2.1.6 I.S. 778 Specification for Gate globe & check valve

2.1.7 I.S. 780 Specification for Sluice valve

2.1.8 I.S. 5312 (Part I) Specifications for non return valve.

2.1.9 I.S. 1069 Specification for crome plating.


2.1.12 I.S. 1172 - 1971 Basic requirement for water supply, drainage & sanitation.

2.2 MATERIALS:-

2.2.1 GALVANIZED PIPES:-

The heavy duty (Class “C”) G.I. pipes for concealed / below ground.

2.2.1.1 The medium grade (Class B) galvanized M.S. pipes, hot finished, welded or electric resistance welded, galvanized conforming to IS: 1239 (Part I) and IS: 4736 - 1986 shall be used in work unless otherwise specified. The pipes shall have specified marking code as per IS.

2.2.1.2 The fitting shall be mild- steel tubular or wrought steel fittings, conforming to IS: 1239 (Part II). The fitting may be butter welded or seamless. Alternatively fittings may comply with the requirements of I.S. 1879 (Part 1 to 10). The fittings shall be galvanized.

2.2.1.3 These pipes and fittings shall be well galvanized internally and externally.

2.2.1.4 These shall be free from any visible or hidden defects. Galvanising shall be uniform, reasonably smooth, free from imperfections such as flux, ash, blackspot, pimples, runs, rust stains, blisters, etc.

2.2.2 FIXING MATERIAL

2.2.2.1 The spun yam shall be clean and sterile. For lead caulking, it shall be soaked in hot coal caulking tar or Bitumen and cooled before use.

2.2.2.2 Fibre board or Rubber rings shall be used for fitting C.I flanged type piping. These shall be of smooth, hard, compressed fibre board or rubbed of thickness 1.5 mm to 3 mm and of each width so as to fit inside the circle bolts. The fibre board shall be impregnated shall weigh not less than 110 gm/sqm per mm thickness and shall have a smooth hard surface.

2.2.3 FITTINGS.

2.2.3.1 VALVES:-

All valves (gate, globe, check, safety, etc.) shall be either of brass or gunmetal, suitable for the particular service. All valves shall be of the particular duty and design called for, similar to Leader or G.G. Bombay make or approved equivalent. Valves shall be tested to 21 kg/sq. cm pressure at manufacturer's works. Valves may be either
screw type or flange type, with suitable flanges and non corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valve. Gate globe and check valves shall conform to I.S. 778 and non return valves to I.S. 5312 (Part I).

2.2.3.2 **SLUICE VALVES:-**

Sluice valves shall have flanged ends of cast iron body. The spindle, wall, seat and wedge nuts shall be of gun metal. They shall generally have rising spindle and shall be of the particular duty design called for the valves shall be supplied with suitable flanges, non corrosive bolts and asbestos fibre gaskets. The valves shall be of "Kirloskar" make or other equivalent approved. Sluice valve shall conform to I.S. 780 and I.S. 2506.

2.2.3.3 **STOP VALVES:-**

The stop valves shall be of brass polished or chromium plated.

Minimum weights shall be.

- 15 mm: 0.4 Kg.
- 20 mm: 0.75 Kg.

The chromium plating shall conform to I.S. 1069.

2.2.3.4 **WASHERS :-**

Washers for cold water taps shall be of selected leather, rubber asbestos composition or of plastics as directed. Washers for hot water taps shall be of good quality fibre or rubber asbestos composition as directed.

Metallic washers where required shall also be chromium plated, brass or brass polished matching to overall fittings.

2.2.3.5 **BALL VALVES WITH FLOATS:-**

Ball valves with floats to be fixed in underground storage tanks shall consist of brass lever arms having copper balls (28 SWG) screwed to arm integrally. The copper ball shall have bronze welded seams. The closing / opening mechanism incorporating the position and cylinder shall be of a non corrosive metal and include washers. The size and construction of ball valve and float shall be suitable for desired working pressure operating the supply system. Ball valves
shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to supply pipes.

2.2.3.6 **WATER METERS:**

Water meters of approved make and design shall be supplied and installed at locations as shown. The water meters shall meet with the approval of the local supply authorities. Suitable valves & chambers to house the meters shall also be provided along with the meters.

All meters shall conform to Indian Standard IS: 779 - 1978 or IS: 2273 - 1981 and of an approved manufacturer. Where called for water meter shall be located in masonry chamber of appropriate size as indicated.

2.2.3.7 **GARDEN HYDRANTS:**

Garden hydrants shall be of 20 mm size, unless otherwise indicated. All hydrants shall be provided with gate valve and threaded nipple to receive Hose Pipe. Where called for garden hydrant shall be located in masonry chambers of 300 x 300 x 300 mm size.

2.3 **WORKMANSHIP.**

2.3.1 **PIPES TRENCHES:**

2.3.1.1 Excavation and refilling shall comply with earth work section detailed earlier. Also items pertaining to building work shall be as per relevant sections detailed in this contract.

2.3.1.2 The trench excavation shall be very carefully carried out especially bottom of trench to allow pipes well bedded for their whole length on a firm surface and one true to level and gradient. Any extra depth cut out at the bottom of the pipeline shall be made good with cement concrete of mix 1:5:10.

2.3.1.3 In some cases tarmeted finished surface becomes soft after levelling. It shall be treated by providing 80 mm thick gravel or broken stone layer base well compacted.

2.3.1.4 In case of excavation in rock, the trench shall be excavated 150 mm below required depth. The trench shall be brought to the required levels by filling with a layer of fine selected material or where there is steep gradient on a layer of concrete.

2.3.1.5 Refilling of trenches shall not be carried out until pipes are tested checked and approved by Engineer-in-charge.
2.3.2 PIPE LAYING:-

2.3.2.1 Pipes shall be examined carefully for any visible defects before being shifted. Any coating, sheathing of pipes shall be examined and repaired where necessary.

2.3.2.2 Pipes shall be cleaned and cleared of all foreign matter before being laid. They shall be brushed internally to remove any soil that might have accumulated therein.

2.3.2.3 Pipes up to 250 mm dia may be handled without mechanical equipment. In no case pipes shall be rolled and dropped into the trench. Mechanical device shall be used in case of larger pipes.

2.3.2.4 Pipes of large diameter shall be laid at gradient to allow air travels to air valves.

2.3.2.5 When pipes are laid on pillars, the socket should be well dear of machinery to allow the lead joints to be caulked.

2.3.2.6 At the end of each day's work the last pipe shall be securely closed to prevent entry of water, soil, rats, etc.

2.3.2.7 Galvanized steel pipes shall be jointed with screwed and socketed joints, using screwed fittings, Care shall be taken to remove any burr from the ends of the pipes after thread cutting. White lead or an equivalent jointing compound shall be used, according to the manufacturer's instructions, with a grument of a few strands of fine yarn while tightening. Compounds containing red lead shall not be used because of the danger of contamination of water. Any threads exposed after jointing shall be painted with bituminous paint to prevent corrosion.

2.3.2.8 Pipes and joints laid for water supply system shall be tested to a pressure of 5 Kg per sq. cm for two hours without developing leaks fall in pressure. In case of leaks piping, shall be redone in such portions and the test repeated till achieving satisfactory result.

2.3.2.9 G.I. Pipes shall run on the surface or walls and ceilings and not in chase. The fixing shall be done with standard pattern holder bat
damp of required size keeping clear distance of about 1 to 1.5 cm from wall. Where pipes are ordered chased and concealed these shall be insulated for hot water and painted and with tar or bitumen in cases. G.I. pipes shall be jointed with screwed and socket joints. Threads shall be cleaned to remove burrs. White lead or equivalent jointing compound with a grument of a few standards of fine yarn shall be used while fitting.

Water supply shall be tested to a pressure of 5 kg/sq.cm for internal and 7 kg/sq.cm for all external pipes for two hours without developing leaks/fall in pressure. All leaking pipes to be removed and replaced at no extra cost of contract.

2.3.2.10 The spacing of G.I. pipe damping shall be as suggested under:

<table>
<thead>
<tr>
<th>SIZE OF PIPE IN MM</th>
<th>DISTANCE IN METER</th>
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</thead>
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<tr>
<td></td>
<td>HORIZONTAL</td>
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<tr>
<td>15</td>
<td>2</td>
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<tr>
<td>40</td>
<td>3</td>
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<td>50</td>
<td>3</td>
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Clamps at turning and near to fitting shall be fixed closely to give full rigidity.

2.3.2.11 All pipes laid below ground shall rest on solid prepared bed concrete base and shall be protected by cement concrete up till haunches of the pipes. Other than small pipes under low pressure, all pipes shall be provided with concrete thrust blocks of specified size at bends to transmit hydraulic thrust on to the undisturbed ground. Concrete anchor blocks of sufficient weight shall be made after the joints have been caulked with lead.

2.3.2.13 The sluice valve shall be cleared of all foreign matter and examined prior to use in works. It shall be fixed in position by means of bolts, nuts and 3 mm rubber insertions or chemically treated compressed fibre board 1.5 mm thickness and weight not less than 0.183 gm per
sq. cm. The tail piece shall conform to IS: 1983 - 1960. These shall be jointed to the pipe by means of lead caulked joints.

2.3.2.14 Required reflex, check, non-return valves or flap valves must be provided in the piping to control burst in main and where flow reverse its directions.

Foot valves shall be provided at end of suction lines of pumps and they shall be in vertical position.

Relief valve shall be provided in delivery pipe of pumping station to save pump, from damage or strain in case of sudden stoppage of water flow. With two more pumps discharging into the same main, each of them shall be provided with a non-return and an air relief valve.

2.3.2.15 Codes of practice listed in 1.0 shall be followed strictly.

2.3.2.16 It shall be responsibility of contractor to repair, restore to its original condition any damage caused to the building, to electric, sanitary, water supply or other installation, etc. No extras shall be paid on these accounts unless damage is not due to any failure on the part of contractor EIC’s decision in this regard shall be final and binding on all parties without any further discussion at any level.

2.3.2.17 Checking The Quality of Pipes Before Using on Works

The Pipes and fittings shall be inspected at site before use to ascertain that they confirm to the specification given in para 1.1 above. Thickness of pipe wall and weight of pipe for one meter length of pipe shall be necessarily checked to ensure the appropriate class of pipe (medium class/heavy class) before acceptance of the pipe for use in the building. The wall thickness of pipe has to be checked accordingly to second decimal of a millimeter using a screw gauge. The defective pipes shall be rejected. While curing, laying and jointing for internal and external works, where the pipes have to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The requirements of IS 554-1985 with pipe dies and taps be observed carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together. The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so
as to make them slack, as the later procedure may not result in a water tight joint. The screw threads of pipes and fittings shall be protected from damage until they are fitted.

2.3.2.18 Jointing of GI Pipes

The pipes shall be cleaned and cleared of all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screw end of the pipes shall be oiled and rubbed over with white lead and a few turns of spun yarn wrapped round the screwed end of the pipe. The end shall then be screwed in the socket, tee etc., with the pipe wrench. Care should be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all time free from dust and dirt during fixing. Burr from the joint shall be removed after screwing. After laying the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter. Any threads exposed after jointing shall be painted or in the case of underground pipes thickly coat of approved anticorrosive paint be applied to prevent corrosion.

2.4.1 Excavation in Trenches:

2.4.1.1 Authorised quantities or those actually excavated, whichever are less shall be allowed.

2.4.1.2 For the purpose of calculating cubic contents, cross sections shall normally be taken at suitable intervals, i.e. manhole or wall chamber intervals except in abnormal cases like sudden change in strata or undulating ground, etc. When they may be taken at closure intervals as approved by the Engineer-in-charge whose decision shall be final, conclusive and binding.

3.0 Drains and sewerage:

3.1 Indian Standard to be followed shall be as under:

3.1.1 13592 & 4985 Specification for fittings.

3.1.2 458-1871 Specification for concrete pipes.

3.1.3 3486-1960 Specification for cast iron spigot and socket drain pipes.

3.1.4 5455-1969 Specification for cast iron steps for manhole.
3.1.5  1729-1984  Specification for sand cast iron spigot and socket soil waste and vent pipe, e and accessories.

3.1.6  1537-1960  Specification for vertically cast iron pressure pipes for water, gas and sewage.


3.1.8  1172 - 1971  Code of basic requirements for water supply, drainage and sanitation.


3.1.10 1230 – 1968 Specification for cast iron rain water pipes and fittings.


3.2  MATERIALS:

3.2.1  STONEWARE PIPES AND FITTINGS:

The salt glazed stoneware pipes and fittings shall conform to grade A class. Surfaces remaining exposed internally and externally of pipes and fitting shall be glazed. Pipes shall be sound, free from fire cracks, hair cracks which impair the strength, durability and serviceability. The glaze of the pipes and fittings shall be free from casing. There shall be no broken blisters. The pipes and fitting shall give dear note when struck with a light hammer. Pipes and fittings shall conform to I.S. 651 - 1980.

The pipes shall be hard, smooth, even textured, truly circular in cross section, perfectly straight and of standard nominal diameter with correct depth and diameter of socket.
3.2.2 CEMENT CONCRETE PIPES:-

The pipes shall be with or without reinforcement as required and shall be of specified class. These shall conform to I.S.: 458-1971. The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process while un-reinforced cement concrete pipes by spun or pressure process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surface of the pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding.

Concrete used for the manufacture of reinforce and un-reinforced pipes and c.c. shall not be leaner than 1:2:4 (1 cement: 2 coarse sand: 4 grade stone aggregate.) The maximum size of the aggregate should not exceed one third of the thickness of the pipe or 20mm whichever is smaller. The reinforcement in the reinforced concrete pipes shall extend throughout the length of the pipe. The circumferential reinforcement shall be adequate to withstand the hydrostatic pressure and further bending stresses due to the weight of the water when running full across the span equal to the length of the pipe plus three times its own weight.

3.2.3 MANHOLE COVERS AND FRAMES:-

All manholes covers and frames shall be of precast fibre reinforced concrete covers or RCC as indicated in schedule of quantities. Light duty, medium duty and heavy duty shall be employed depending upon location, type of traffic expected to be carried over them. Covers shall be marked with sewer or storm depending upon its use while being cast.

Covers shall have raised chequered design to provide a non-slippery surface. They shall be painted with black bituminous composition to withstand temperature up to 63 degree C and 0 degree C. Covers shall be recessed to provide grip for lifting keys. Covers and frames shall have proper seals to avoid gases coming out.

3.2.4 GULLY TRAPS:-

S.W. gully traps shall be conforming to I.S. 651. Gully trap shall be provided with RCC cover 300 mm x 300 mm and frame. The minimum weight of cover shall be 4.53 Kg. and of frame 2.72 Kg.
RCC cover and frames shall be of good quality free from any defects and seal faces and edges truly square machined.

3.2.5 **NAHANI TRAP:**

The UPVC (Minimum 100mm), nahani trap shall be sound and free from porosity or any other defect which affects serviceability. It shall conform to relevant Indian Standard and as approved by EIC or of specified or equivalent approved make. Trap shall be self cleansing design and size as shown in drawing or as specified. Trap shall be provided with PVC grating screwed to trap with even perforations. Joints of nahani trap shall be with rubber ring.

3.2.6 **VENT SHAFT:**

Vent shaft may be UPVC pipes conforming to relevant I.S.

3.2.7 **RUNGS:**

Cast iron steps conforming to I.S. 5455 shall be used. G.I. rungs if approved by Engineer-in-charge may be permitted in place of C.I. specified.

3.3 **WORKMANSHIP:**

3.3.1 **GENERAL:**

3.3.1.1 Various trades required to be carried out along with these items shall follow relevant specifications given for such work in relevant sections.

3.3.1.2 All sewers and /drains laid below ground shall be water tight.

3.3.1.3 First operation of refilling shall be done carefully as far as possible hand packing by fine selected material. Packing operation should be simultaneous on both sides of pipe and should continue till 150 mm above top of pipe. Filling shall be done in dry trenches only.

3.3.1.4 All pipes, when laid above ground shall be air and water tight.

3.3.1.5 Pipes shall rest on solid prepared bed concrete. SW pipes shall be provided with cement concrete around the pipe where as RCC pipes shall be provided with cement concrete upto the haunches of the pipe.

3.3.1.6 If excavation has been carried out lower than required packing shall be in cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate).
3.3.1.7 Pipes shall be laid with socket leading up till and shall rest on solid and even foundations for full lengths of the barrel.

3.3.1.8 Collar pits, socket holes shall be formed sufficiently deep, to allow just sufficient space for pipe jointer to work light round the pipes.

3.3.1.9 Trenches shall be kept free from water until joints are sufficiently set.

3.3.1.10 Pipes shall be examined to see that there are no cracks or defects.

3.3.1.11 Work shall be tested and got approved in writing by EIC prior to covering of pipes.
### 3.3.2 DROP CONNECTIONS:

3.3.2.1 Where it is uneconomical or impractical to arrange the connection within 600 mm height above the invert of the manhole, the connections shall be made by constructing a vertical shaft outside the manhole chamber.

3.3.2.2 At the end of branch sewer line sand cast iron tee shall be fixed to the line which shall be extended through the wall of the manhole by a horizontal piece of SCI pipe to an inspection or cleaning eye. Open end shall be provided with chain and lid. The SCI drop pipe shall be connected to the tee at the top and to the SCI bend at the bottom by CI pipe to allow discharge into channel.

3.3.2.3 Required channels shall be made in cement concrete 1:2:4 smooth finished.

3.3.2.4 The exposed portion of the drop connection shall be encased allround with 150 mm thick concrete 1:5:10.

### 3.3.3 MANHOLES:

3.3.3.1 Manholes of different types and size shall be constructed in sewer lines at location indicated on drawings or as directed by Engineer-in-charge in due course. Size of manhole referred shall be internal dear size in every case.

3.3.3.2 Sewers of unequal sectional area shall not be jointed at same invert in manhole. The invert of smaller sewer at its junction with main shall be at least 2/3rd the diameter of the main above the invert of the main. The main branch sewer should deliver sewerage in the manhole in the manholes direction of main flow and junction must be made care so that flow in main is not impeded.

3.3.3.3 No drain from house fittings E.G. gully trap or soil pipe etc to manhole shall normally exceed a length of 6 meter unless it is unavoidable.

3.3.3.4 Normally standard for manhole sizes shall be as under. It is to be noted that various sizes will depend upon the number of connections to be done in manhole.
Manholes 900 x 450 mm are generally constructed with in the compound for house drainage only and near the buildings for house drainage for depth of 1.20 metre or less conical manholes 120 m. dia. (bottom) are constructed for drainage work for depth between 1.2 and 2.5 metres. Manholes 1.5 m dia. are of the conical type and are generally constructed for main drainage works where depth is 2.50 metre or more.
3.3.3.5 Standard manhole construction shall be as under:

a) **BED CONCRETE**-

The manhole shall be built on a bed of cement concrete 1:4:8 (1 cement: 4 coarse sand: 8 graded stone aggregate 20 mm nominal size) the thickness of the bed concrete shall be 15 cms for manholes upto 1 meter depth, 20 cm for manholes from 1 meter to 2 meter depth and 30 cm for manholes of greater depth. Projection of bed concrete beyond the masonry wall shall be 15 cm.

b) **WALL**-

The wall of the manhole shall be of the following

Brick masonry shall be well cement concrete blocks in cement mortar 1:5 (1 cement: 5 coarse sand)

The jointing face of each block being well buttered with cement mortar before laying so as to ensure a full joint.

c) **PLASTER**-

The inside of walls shall be plastered 12 mm Wick with cement mortar 1:5 (1 cement: 5 sand) and finished with a floating coat or neat cement. All angles shall be rounded to 7.5 cm radius and all rendered external surface shall have hard impervious finish obtained by using a steel trowel. The internal joints of the masonry shall be finished smooth. In wet ground 20 mm thick cement plaster of the above specifications shall be carried on the outside surface of the walls also. This shall be water proofed with addition of water proofing compound in the proportion by weight recommended by manufacturers.

d) **CHANNELS AND BENCHING**-

Channels shall be semicircular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but their junction with the main channel on appropriate fall suitably rounded off in the direction or flow in the main channel shall be given. The channels and benching
shall be done in cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) rising at slope of 1 in 6 from the edge of channel. The channels of bottom of the chamber shall be plastered with cement mortar 1:2 (1 cement: 2 coarse sand) and steel trowelled smooth with respect to the benching but thaw junction with the main channel on appropriate fall suitably rounded off in the direction or flow in the main channel shall be given. The channels and benching shall be done in cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) rising at slope of 1 in 6 from the edge of channel. The channels of bottom of the chamber shall be plastered with cement mortar 1:2 (1 cement: 2 coarse sand) and steel trowelled smooth.

e) COVER SLABS:-

These shall be or RCC M-30 and 15 cm thick reinforced with 10 cm bars at 15 cm centres both ways, surface and edges finished fair. Full bearing equal to the width of the wall shall be given to the slab on all sides. The frame of the manhole cover shall be embedded firmly in the RCC slab so that the top of the frame remains flush with the top of the RCC slab.

f) TESTING:-

Manholes shall be tested by filling with water to a depth not exceeding 1.2 meter as directed by the Engineer - in - charge.

3.3.4 INSPECTION CHAMBER: -

Inspection chamber with provision of inlets of specified size for under ground drains shall be constructed as per the following details:-

a) SIZE:-

The inside dimensions shall be taken as the clear internal dimensions between the masonry wall faces.

b) EXCAVATION:-

The excavation shall be done to dimensions and levels shown on the plans or as directed by the Engineer in charge.

c) BED CONCRETE:-

The foundation concrete shall consists of 15 cm thick cement concrete 1:4:8 (1 cement: 4 fine sand: 8 graded stone
aggregate 20 mm nominal size). Projection of bed concrete beyond the masonry walls shall be 7.5 cm.

d) WALLS:-

The specifications of walls in para 3.3.3.5 (b) shall apply.

e) PLASTER:-

The specifications at plaster in para 3.3.3.5 (c) shall apply.

f) PLASTER:-

The specifications of para 3.3.3.5 (e) of manholes shall apply.

g) COVERS AND FRAMES:-

The specifications of para 3.2.3 of covers and frames shall apply.

4.0 SANITARY FITTINGS:-

1) 1 No. of tap point with additional point for Geyser.
2) 90mm dia PVC Nahani trap.
3) 100mm dia chromium plated brass shower hose.
4) 150 x 150 x 12.5 mm corner piece granite.

4.1.1 All fittings and fixtures shall be of good quality conforming to I.S. or brand specified or equivalent as approved by EIC.

4.1.2 Fitting and fixtures shall be installed basically with required basic accessories as noted in catalogue of manufacturer. All additional or optional fixtures and fittings shall be as per BOQ or direction of EIC.

4.1.3 Method of fixing, fitting and fixtures shall be as per suggestion given by manufacturers as per drawing and as directed by EIC.

4.1.4 For general practice, following minimum norms shall be followed.

4.2.0 FITTINGS:

4.2.1 INDIAN WATER CLOSET (OWC):- (ORRISA PAN) (575 mm long)

It is advisable to provide a sunken R.C.C. floor slab of depth about 500 mm. Required size opening from beam or wall shall be provided to carry out connection with P or S trap as per location. The pan shall be levelled in position keeping top of pan at required finished level allowing margins for slopes of drain of floor. Pan shall be
concreted with nominal mix of 1:5:10 (1 cement: 5 sand: 10 stone or brick aggregate).

This concrete shall be kept 50 to 60 mm below finished floor level to carry out flooring operation as detailed in flooring section.

The P or S trap, shall be provided with 50 mm seal. Joints between the trap shall be made leak proof with cement mortar 1:1 (1 cement: 1 fine sand) and lead Pash strip.

After laying the floor, foot rests of specified shall be fixed in cement mortar 1:3 (1 cement: 3 coarse sand). Location shall be about 175 mm from back side inner edge of the pan.
4.2.2 FLUSHING SYSTEM:-

4.2.2.1 CISTERN :-
These shall be low level. EWC shall be provided with low level cistern. Low level cisterns shall be minimum at 300mm from top of pan or as shown in the drawing.

4.2.2.2 FLUSH PIPE CONNECTION:-
O.W.C. pan shall be connected to the cistern by PVC flush pipe of 40 mm dia. Flush pipe shall be fixed to wall with clamps. The flush pipe shall be connected to closet by means of cement. The flush pipe securely connected to the cistern outlet by means of coupling nut made out of non corrosive material.
Low level cistern shall be connected to the closet by means of 40 mm dia white porcelain enamelled flush bend/CP bend using Indian rubber adopter joints. The other specification are same as above.

4.2.3 WASTE FITTING FOR SINKS:-
The waste fitting shall be of chromium plated brass. The fittings shall conform to IS: 2863 - 1964 and shall be sound free from laps, blow holes and pitting and other manufacturing defects. External and internal surface shall be clean and smooth. The body and the nut shall be truly machined so that nut smoothly moves on the busy. The waste pipe of the sink shall be UPVC pipes.

4.2.4 BOTTLE TRAP:
Bottle traps for wash basins, shall be deep seal (minimum 6 cm seal) of 32 mm size cast brass bottle traps, heavy chromium plated. All bottle traps shall be provided with suitable cleaning eye, extension pieces, flare nut all chromium plated. Bottle traps shall be of approved make and design.

__________________________________________
Signature of Tenderer
Date.

__________________________________________
Additional Chief Engineer(I&NT)
Date.